

J**BM**

Journal of Business Models

2019

Vol. 7 - No. 5

Journal of Business Models (2019), Vol. 7, No.5

Editorial staff: Christian Nielsen, Robin Roslender & Mette Hjorth Rasmussen

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This edition© Business Model Design Center at Aalborg University, Denmark, 2019

Graphics: Amarjeet Kumar

Font: Klavika

ISBN: 978-87-7112-126-1

ISSN: 2246-2465

Published by:

Aalborg University Press

Skjernvej 4A, 2nd floor

9220 Aalborg

Denmark

Phone: (+45) 99 40 71 40

aauf@forlag.aau.dk

www.forlag.aau.dk

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Trends in Business Model Research: A Bibliometric Analysis

Julio E. Cuc^{1*}

Abstract

Purpose: The purpose of this article is to provide an overview of the evolution of the business model research while identifying the leading trends and suggesting future research directions.

Design/Methodology/Approach: The study consists of bibliometric analysis, and bibliographic data visualization using the Web of Science (WoS) database, and cluster analysis using the VOSViewer software.

Findings: The results reveal the exponential growth of the topic favored within the academic literature. The analysis identified eight clusters of co-words in the field of the business model (BM). Five relevant research trends were identified in which the topic of the business model (BM) would develop in the next years.

Research limitations: The analysis focuses on the field of management, business, finance, and economics literature. The paper describes the research activity concerning a bibliometric analysis. Therefore it does not take into consideration the quality of the publications and methodological issues.

Practical Implications: This study may serve as a model providing useful information for academic and practitioners to analyze the topic of the business model (BM) within a certain discipline, as well as to identify research areas that need more attention to come up with theoretical and practical implications.

Originality/Value: The analysis structures and consolidates the concept of the business model (BM) in the academic research, providing valuable insights. It identifies future themes for the development of the field and its consolidation within the academic and business literature.

Keywords: Business model research, bibliometrics, co-word analysis, research trends, bibliographic mapping

Please cite this paper as: Cuc, J. E. (2019), Trends in Business Model Research: A Bibliometric Analysis, Vol. 7, No. 5, pp. 1-24

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Acknowledgements: I wish to thank ASTRA "TTÜ arenguprogramm states 2016-2022" Doctoral School in Economics and Innovation Project code: 2014-2020.4.01.16-0032 for its support in editing and proofreading this article, and to Dra. Cristina Quintana-Garcia Professor of Management at the Department of Economics and Business Administration, School of Economics and Business Studies, University of Málaga for her supervision, comments and valuable feedback.

Introduction

Recently, the interest in the business model research has increased significantly (Wirtz, Pistoia, Ullrich & Göttel, 2016). Scholars have studied the subject of the business model (BM) to have a better understanding of the ways that firms operate within the business environment (Magretta, 2002), which is characterized by the rise of the new technologies, the digitalization, and the interconnection between customers and markets (Teece, 2010). The topic of the business model has been analyzed from different perspectives to define, categorize and classify the field within the academic, and the business literature. However, there is still no consensus about the conceptualization of the BM (Fielt, 2013) hence producing multiple definitions, and a lack of theoretical groundings (Teece, 2010; Zott, Amit & Massa, 2011).

Renowned scholars have conducted studies trying to clarify and to get a better understanding of the concept of the BM while analyzing its evolution, its recent developments, and therefore its future research directions. For instance, Osterwalder, Pigneur & Tucci (2005) in their study "Clarifying Business Models: Origins, present, and future of the concept" found a broad diversity of understandings, usages, and places in the firm for the concept of the business model, whilst identifying multiple definitions, and describing the process of execution and its implementation. They proposed a nine business model blocks for its analysis and implementation, as well as the role of the terminology and the ontology to describe the concept of the BM. Teece (2010) argued that the business model is implicitly or explicitly used to design, to deliver value to customers, and to capture value as a profit. He explored the connections between business models with business strategy, innovation management, and economic theory to better understand the significance of business models in established firms. The concept of the business model within the economic theory, strategy and innovation, and organizational literature lack theoretical groundwork. He concluded that getting a better understanding of the topic would benefit a better appreciation of the role of the BM in entrepreneurship, innovation and business performance.

Later, Zott et al. (2011) conducted a literature review about business model literature that revealed that

there is no consensus about its definition. There is different interpretation according to the particular interest, and perspective of each researcher. However, they suggested that employing more precise concepts such as e-business model archetypes, using the BM as an activity system, and as cost/revenue architecture that would allow other researchers to get a better understanding of the meaning of the topic. They suggest taking the BM as a new unit for analysis, offering a systemic perspective to understand how the firms do business, and therefore focus on value creation to move toward a conceptual consolidation.

More recently, Wirtz et al. (2016) conducted a comprehensive qualitative and quantitative literature review through a synoptic analysis, providing an overview of the origins and development of the topic. It includes definitions, perspectives, and its components. They also surveyed twenty-one experts to identify the future focus of business models research. They found that a heterogeneous understanding of the concept by the scholars is gradually uniting into a converging understanding. There is a comprehensive perspective of the concept, and the components are well identified, especially in the areas of innovation, change and evolution, performance and control, and management-process-oriented area of design, at the most advanced current state of development regarding the topic. They stated that the field of research of the BM is at the moment in a consolidation phase. Although, there are gaps in the research, especially regarding the application and theoretical grounding of the concept. They identified future focus, and research directions of the research field, suggesting that innovation, design, and change as the most important themes. In this regard, they stated that the research methodologies for future business model research would be focusing on theoretical deduction, large-scale survey ($N > 100$), case studies, in-depth interviews, and small-scale survey ($N < 100$) based on the responses from the experts interviewed.

Recently, Nielsen, Lund, Montemari, Paolone, Masaro & Dumay (2019) have conducted a structured and systematic literature review to describe the trajectory of the concept of the business model. They analyse the topic in terms of definitions, classification, frameworks, and applications in different sectors and industries, describing the recent developments of the

concept, and its evolution within innovation, entrepreneurship, organizational change and strategy areas, based on the impact of the publications, using the Google Scholar citations, citations per year and citations in the last five year, computing the keywords of “business model”, “business models”, and “business modelling”. They constructed three league tables of the top 100 sources according to three criteria: Google Scholar Citations (GSC), Citations per year (CPY), and Citation in the last 5 years (CI5Y), identifying 79 publications that represent the most impactful work in the field of business model.

Their study consists of five levels of analysis, which includes five dimensions “when”, “who”, “what”, “how”, and “which”. The first level, the dimension of “what” analyses the evolution of the topic, over time-based on the number of papers and citations. The second level, the “who” dimension describes the author demographics, number of publications by author, and the background of the first author, distinguishing between academics and non-academics, the objective of this level is to identify who are the most prominent author in the field. The third and fourth level includes the “what” and “how” dimensions respectively, analyse the research questions, and the research methods used. The fifth level, the “which” dimension, identifies the practical and research implications.

Additionally, they conducted a content analysis, providing valuable insights about the evolution over the time of the concept of business model based on the citations, and citation per year index, identifying the most prominent authors and most cited articles, the authors origin and publication outlets, the business model definitions inclusion over time and themes, the country of origin of the author and theme, types of research questions, and their evolution over time, research method and evolution over time, and practical and research implications within the field. Nielsen et al. (2019) suggest the following research paths for business model, definitions and redefinitions, taxonomies and archetypes for building theory of business model, and the determination of primary areas in which the firm’s key competencies should be developing, the relationship between business model components with the value creation and financial performance. This extensive analysis of provides valuable insights into the state of

the art of the field of business models, identifying that the topic has reached its maturity phase of research.

Nowadays, scholars and practitioners are getting a better understanding, and comprehension of the concept. However, the application of the field still needs to address more research for its improvement and development (Teece, 2010; Wirtz et al., 2016; Christopher Zott et al., 2011). This study attempts to outline the state of the art of the business model research, describing its evolution and development over time and to identify the relationship with other topics and sub-topics, pointing out new areas of application that have emerged within the research field as well as research areas with high potential to be developed within the business model research in the next years. The continuous development of the business environment due to the progress of new technologies, changes in customer behaviors, global markets, and a more interconnected world set a new scenario for the firms, in which the BM has a main role for its competitiveness (Mitchell and Coles, 2003). This situation demands a structured and comprehensive analysis of the current state of business model research, identifying the experts in this research area, methodologies, research questions, demographics, and areas that deserve additional attention (Nielsen *et al.*, 2019).

The applications described above have produced significant advancements, not only for the understanding, definition, and conceptualization of the topic, but also for its classification, implementation, and theory development. It is important to analyze the work done and the recent advancements on the topic. It provides useful information for researchers and practitioners to extensively study the topic within a certain discipline, as well as to identify research areas that need more attention to find theoretical and practical implications, and predict its future directions. Two questions arise based on this occurrence. First, what is the current state-of-the-art of the business model research? Second, what are the main trends and its future directions?

Bibliometrics methods are common in the social sciences literature which helps us to explain the evolution of the research fields, providing an overview of a specific topic (Bjork, Offer and Söderberg, 2014). Other authors conducted this type of studies for the analysis

of journals activity and its impact (Baier-Fuentes, Merigó, Amorós, & Gaviria-Marín, 2018). It shows the evolution of certain topic within the academic literature (Gurzki and Woisetschläger, 2017), and identify the evolution and development of research topics throughout co-citation and co-word analysis (Leung, Sun and Bai, 2017; Zhao, Zhang and Kwon, 2017). A bibliometrics study is useful to identify research trends (Benavides-Velasco, Quintana-García and Guzmán-Parra, 2013) and helps to direct future research in the field of the business model based on bibliographic data.

This study aims to describe the evolution of the BM within the academic literature, providing state-of-the-art research on the topic, and identifying leading trends in the field. In this respect, a bibliometrics analysis is conducted to identify the research activity, the most cited authors, the most productive journals, the institutions and the countries involved on the topic.

For this particular study, the data was collected from the Web of Science Core Collection Database, using the subject of "business model" within management, business, economics, business finance articles and papers published in English between 1994 and 2017. Then, it chooses the five hundred (500) most cited articles to conduct this research. The methodology section explains extensively the criteria and selection process for these articles. The paper consists of four sections. First, it explains the methodology and the data collection process. Second, it presents descriptive statistical information about the research activity of the topic within the subject areas selected. Third, a co-occurrence of keywords, graphic visualization, and cluster analysis is presented to identify the research trend in the field. Finally, the article ends with some conclusions and some practical implications used for further research.

Methodology

To identify trends in business model research, it was carried out a bibliometric study using the Web of Science (WoS) Core Collection database. It includes the world-leading scholarly literature from 1980 to present. The articles are from the field of sciences, social sciences, arts, and humanities. It used the full citation

network, all cited references, and publications that are fully indexed and searchable. Such a database has traditionally been the main source of scientific evaluation (Baier-Fuentes *et al.*, 2018). The bibliometric analysis provides a general overview of a specific research field (Bjork *et al.*, 2014). The bibliometric methods determine the quantitative and qualitative changes in the subject of scientific research, as well as to help us to identify structural aspects and trends within a specific topic (Rey-Martí, Ribeiro-Soriano and Palacios-Marqués, 2016). For this purpose, it was used the keyword "Business Model" in titles, abstracts, and keywords within the subject areas of management, business, economics, and business finance. The articles and papers published were in English. The period selected for this analysis started in 1994, when the topic became popular and publishing activity increase, until 2017. It was found a total of 1509 articles as a result following these criteria. Out of this total, it is selected the five hundred (500) most cited articles for the analysis, which describe the current state-of-the-art of business model research.

The carried out bibliometric analysis contains two main phases. First, a general descriptive statistical information was presented based on the bibliographical data collected, describing the evolution of the publication activity, the top journals in the field, the most relevant authors, and the most productive organizations, and countries. Second, a cluster analysis was carried out using the VOSViewer software developed by van Eck & Waltman (2010), constructing and visualizing networks of the co-occurrence of keywords which examine the relatedness of items based on the number of documents in which they occur.

The visualizations represented by a network of elements, in which the size of the circles varies according to the importance of the elements regarding the number of links and its link strengths, shows the closeness of the link between elements. The colors and placement of the circles are used to cluster the items. It also performed an in-depth analysis of the co-occurrence of keywords throughout a network, density, and overlay visualizations. Finally, a clusters analysis was carried out based on these data to identify the currently developed research areas and potential research trends that could be developed in the next years.

Results

Evolution of Business Model Research

This section presents the main results of the bibliometric analysis applied to the records found in WoS for the business model research between 1994 and 2017. The search process was conducted in May 2018 selecting the five hundred (500) most cited documents for the analysis.

The field of the business model (BM) within the academic literature has grown exponentially in the last years. The first appearances of the topic in an academic article dates from 1957 (Bellman, Clark, Malcolm, Craft and Ricciardi, 1957), and in an article by Jones (1960). The topic has become very popular three decades after the publications of these articles with the advent of the Internet in the business world, the rise of high-technology companies, and the “dotcom” boom (Osterwalder, Pigneur and Tucci, 2005). Figure 1 presents the number of studies published between 1994 and 2017 showing a high increase of interest on the topic by the scholars, and the increase in the number of publications. Note that during the 1990s, the publication activity was quite low, producing between 1 to 5 articles per year. However, in the following years, the number of publication started to increase. In 2010, the journal

Long Range Planning (LRP) published a special issue on business models. It includes business model foundations, definitions, approaches and its application in the new business era, discussed by Baden-Fuller and Morgan, Teece, Casadesus-Masanell and Ricart, Amit and Zott, Demil and Lecocq, McGrath, Gambardella, and McGrahan. Others recognized authors within the field promoted the investigation on the business model (BM) from a scientific sense, suggesting a topic of discussion for its development. The special issue of LRP provokes popularity of the topic, attracting the interest of other scholars on the research of the BM. Since that date, the number of publications increased significantly, becoming a unit of analysis within the academic and business literature.

Nowadays, the special issue on the business model of LRP includes the most cited authors and the most popular articles within this research field. They have contributed to the increase of the interest in the topic, promoting its development and understanding from a theoretical and practical perspective. Since then, the number of publications has increased with an average growth rate of 28,2% annually. The increasing of publications has been even more significant in the recent years, obtained by a total number of publications of

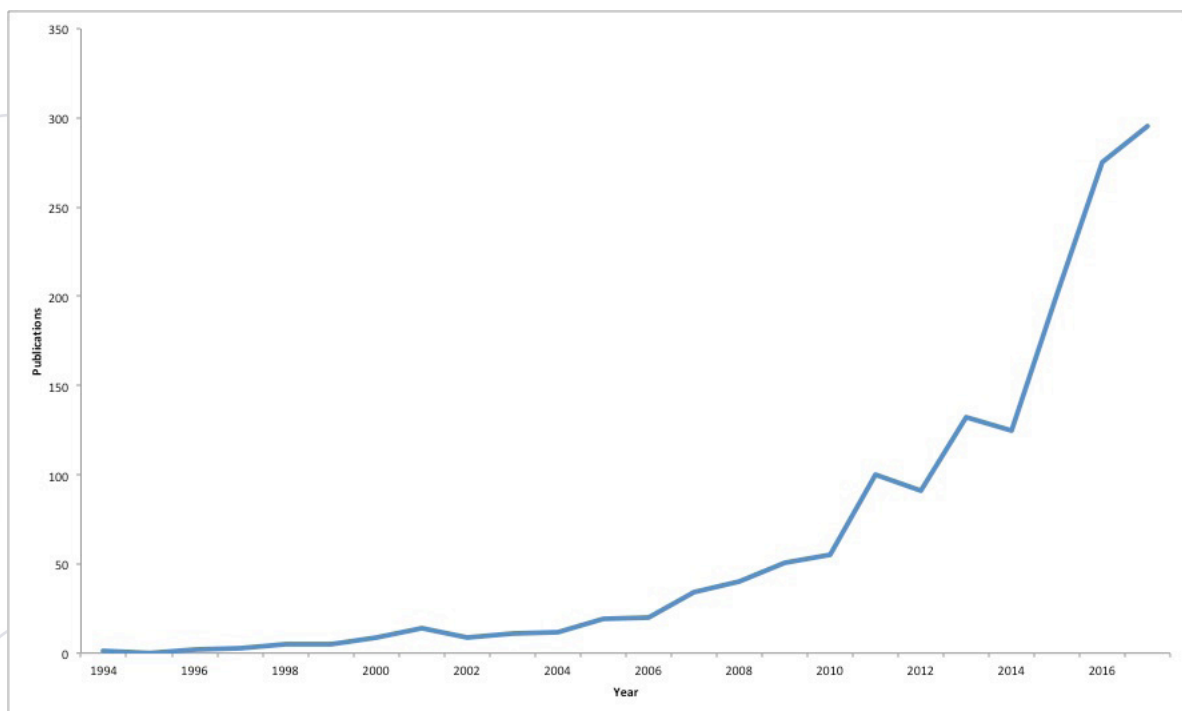


Figure 1. Publication activity documents by year, 1994 – 2017 (Web of Science Core Collection, May 2018).

201 in 2015, 275 in 2016, and 295 at the end of 2017 as shown in table 1. From 2014 to 2017 the number of publications has increased by 136%, and it tends to continue growing in the next years.

Year	Documents	Year	Documents
1994	1	2006	20
1995	0	2007	34
1996	2	2008	40
1997	3	2009	51
1998	5	2010	55
1999	5	2011	100
2000	9	2012	91
2001	14	2013	132
2002	9	2014	125
2003	11	2015	201
2004	12	2016	275
2005	19	2017	295

Table 1: Publication Activity documents by the year 1994 - 2017

This increasing interest in the field has caused that many recognized journals now include the topic in their regular and special editions. Table 2 shows the most productive journals on the subject of the BM based on the number of publications and citations received. The *Journal of Cleaner Production* (31 documents), *Long Range Planning* (21 documents), *Industrial Marketing Management* (19 documents), and *R&D Management* (13 documents) are the most productive. Regarding the number of citations, the most influential journals are the *Long Range Planning* (4361 citations), *Strategic Management Journal* (2434), *Harvard Business Review* (1692), *Journal of Cleaner Production* (1174), and *Industrial Marketing Management* (1019) respectively. Note that the journals include diverse disciplines such as production, marketing, strategy, and management.

Regarding the most relevant authors, Table 3 shows the most productive authors based on the number of publications, as well as the degree of influence that they have within the BM community. The number of citations and citation analysis determined the times that they cited each other. Regarding productivity, Zott, C. (10 publications), Amit, R. (9 publications), Chesbrough, H. (6) Bocken, NMP (6), Ricart, J.

JOURNAL	DOCUMENTS	CITATIONS
Long Range Planning	21	4361
Strategic Management Journal	7	2434
Harvard Business Review	12	1692
Journal of Cleaner Production	31	1174
Industrial Marketing Management	19	1019
Research Policy	10	703
California Management Review	10	609
Journal of Business Research	12	575
Technovation	12	453
MIT Sloan Management Review	7	410
International Journal of Information Management	10	322
Organization & Environment	6	299
Entrepreneurship Theory and Practice	5	272
Management Decision	6	270
European Management Journal	6	234
R&D Management	13	213
Technological Forecasting and Social Change	12	203
Strategic Organization	5	194
Strategic Entrepreneurship Journal	9	158
Business Strategy and the Environment	7	143
Journal of Management Information Systems	6	119
International Journal of Technology Management	7	95

Table 2: The most productive journals in the field of business model research from the 500 more cited articles

E.; Casadesus-Masanell, R. (5) and Christensen, C. M. (5) are the most productive authors. Some of them are also the most cited authors within the field of business model research. The authors Zott, C. (3264 citations), Amit, R. (3235), Chesbrough, H. (1934), Ricart, J.E. (544), Casadesus-Masanell, R. (525), Christensen, C. M. (502) have received more than five hundred (500) citations. Note that some of them are co-authors of their studies.

AUTHORS	DOCUMENTS	CITATIONS
Zott, C.	10	3264
Amit, R.	9	3235
Chesbrough, H.	6	1934
Bocken, NMP	6	342
Ricart, JE	5	544
Casadesus-Masanell, R.	5	525
Christensen, CM	5	502
George, G.	4	374
Ludeke-Freund, F.	4	323
Xu, X.	3	487
Lecocq, X.	3	321
Evans, S.	3	273
Spring, M.	3	212
Mangematin, V.	3	179
Haefliger, S.	3	156

Table 3: The most relevant authors in the field of business model research from the 500 most cited articles

Institutions also focused on the development of the topic. Table 4 presents the most productive institutions (20) according to the number of publications. The institutions with the highest number of documents published in the bibliographic data sample are the University of Cambridge (19), Harvard University (16), the University of Pennsylvania (14), Delft University of Technology (12), the University of California Berkeley (11), and Aalto University (11 publications). Moreover, the most influential institutions on the topic of the business model (BM) based on their number of citations are the University of Pennsylvania (3843 citations), the University of California Berkeley (2400), Harvard University (2304), INSEAD (2257), and the IESE Business School (1619). Other influential institutions with a significant amount of citations are the University of Cambridge (795), Cranfield University (690), the University of London Imperial College of Science, Technology, and Medicine (589), and Erasmus University (474).

Regarding the countries and regions, Table 5 shows the most productive countries according to their number

INSTITUTIONS	DOCUMENTS	CITATIONS
University of Cambridge	19	795
Harvard University	16	2304
University of Pennsylvania	14	3843
Delft University of Technology	12	280
University of California Berkeley	11	2400
Aalto University	11	202
INSEAD	9	2257
IESE Business School	8	1619
Lappeenranta University of Technology	8	157
Politecnico di Milano	7	375
Aarhus University	7	72
University of London Imperial College of Science, Technology, and Medicine	6	589
Cranfield University	6	690
Erasmus University	5	474
Bocconi University	5	111
Grenoble Ecole de Management	5	269
The University of St. Gallen	5	116
Lund University	5	321
Hanken School of Economics	5	320
National University of Singapore	5	56

Table 4: The most productive institutions within the field of business model research from the 500 most cited articles.

of publications, and citations. In this regard, the USA and England are the most productive countries with 145 and 80 documents published respectively, followed by Germany (55), China (41), Netherlands (37), France (36), and Finland (33). Regarding influence based on the number of citations, the most influential countries in the topic of business model are the USA (14363), France (4693), England (3853), Spain (2354), and Germany (2194).

COUNTRIES	DOCUMENTS	CITATIONS
USA	145	14363
England	80	3853
Germany	55	2194
China	41	894
Netherlands	37	1318
France	36	4693
Finland	33	1048
Italy	30	914
Spain	29	2354
Sweden	28	939
Canada	23	840
Switzerland	18	584
Denmark	16	351
Australia	16	478
South Korea	15	578
Belgium	11	634
Brazil	11	230
Norway	9	145
Austria	9	234
Taiwan	5	384

Table 5: The most productive countries within the field of business model research from the 500 most cited articles.

Mapping Business Model Research

To identify the trends of business model research, it is conducted a co-word analysis, using the VOSviewer software to create network visualization maps. First, the co-occurrence of keywords allowed us to identify the current state-of-art of the topic, identifying the most relevant research themes within the field. Then throughout density and overlay visualizations, it identified the most developed keywords within the field and others that might need more attention and development. Second, a cluster analysis was carried out based on the co-occurrence of keywords, which helps us to identify research trends.

The co-occurrence of keywords map determines the number of documents in which they occurred together in titles, abstracts, and keywords. Figure 2 shows this network relation according to the number of links and total link strength. The graphic represents the keywords with circles and their connections with curved lines, clustering the items in different colors. The size

of the circles represents the total link strength of the keyword. Figure 2 shows the most relevant topics within the business model research and their influence on other topics. According to this first map, the keywords of innovation, performance, strategy, management, perspective, value creation, industry, and business model innovation are the keywords with the most occurrences, and with high link strength.

Table 7 shows the list of the most linked keywords within the business model research. It shows the

Keywords	Cluster	Links	Total Links	
			Strength	Occurrences
Business Model	4	135	725	127
Performance	5	126	690	108
Innovation	4	136	655	118
Strategy	3	109	422	69
Management	1	115	386	62
Perspective	5	102	377	61
Value creation	5	106	350	48
Industry	6	105	304	51
Business Model Innovation	1	108	302	50
Competitive advantage	3	86	286	42
Technology	6	89	280	42
Entrepreneurship	6	93	275	45
Firms	3	88	269	41
Firm	5	74	225	32
Performance				
Business Models	6	85	214	41
Dynamic capabilities	5	79	183	28
Organizations	2	84	180	31
Design	1	65	178	29
Capabilities	5	70	176	28
Knowledge	2	74	172	27
Firm	1	73	169	29
Strategies	4	74	168	32
Creation	8	73	168	25
Resources-based view	1	64	142	22
Framework	1	73	141	26

Table 7: The most used keywords in business model research.

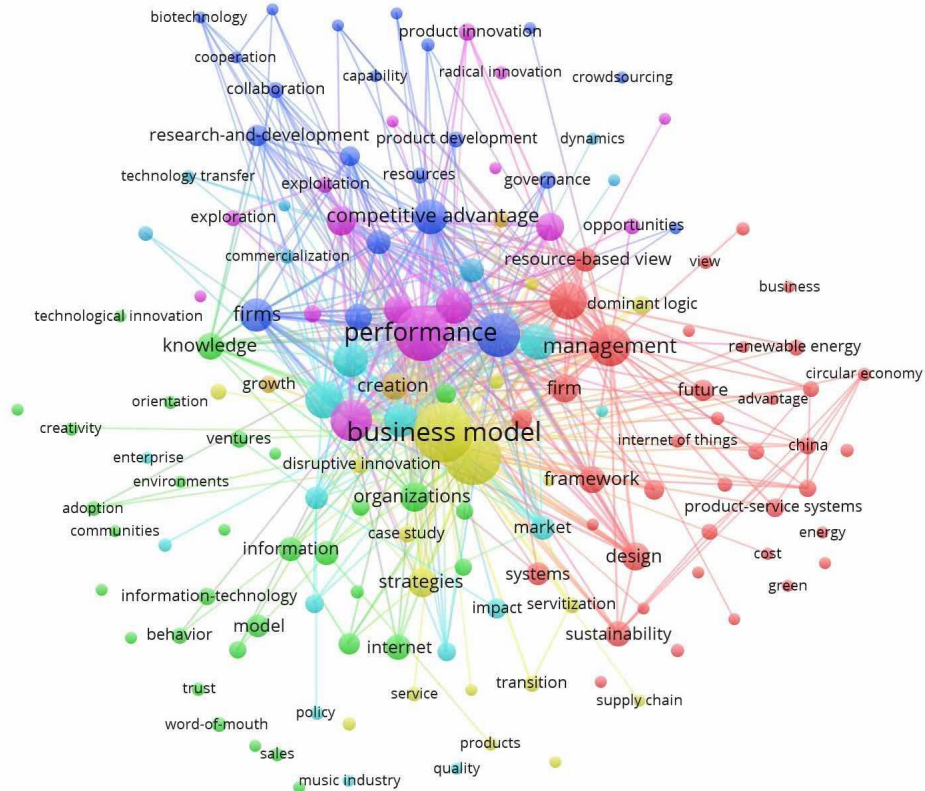


Figure 2: Co-occurrence of keywords network visualization of business model research.

number of links, occurrences, and their total links strength. Keywords such as performance, innovation, strategy, management, perspective and value creation are the top themes in research field. A high number of occurrences of the keyword of the BM, and also a higher total link strength developed in the last years, means that they have a high influence on other topics related to this research field. Other relevant keywords are business model innovation, competitive advantage, technology, entrepreneurship, and firm performance. Note that, resource-based view and dynamic capabilities are the main theories linked with the topic.

Figure 3 shows the density visualization of the co-occurrence of keywords. The development of the topic has been related to innovation and performance themes. Although it expanded to other topics such as entrepreneurship, strategy, value creation, technology, and business model innovation. However, some

developed topics within the field will need more attention for its development and research. For instance, the development of the topic into theoretical groundings such as resource-based theory, dynamic capabilities, knowledge-based view, system theory, open innovation, and service dominant-logic. Appendix A shows the zoom out of the map and hypothetical research direction. Based on the density visualization, the business model research focused on the development of information-systems, sustainability, renewable energy, social entrepreneurship, e-commerce, and technology.

The overlay visualization classified the network connections based from 2011 to 2016. Figure 4 (a) shows the co-occurrence of the keywords over this period and the most recent developments of the BM within other topics. As it can be observed, the keywords associated with the topic in the last years have been in business model innovation, sustainability, renewable energy,

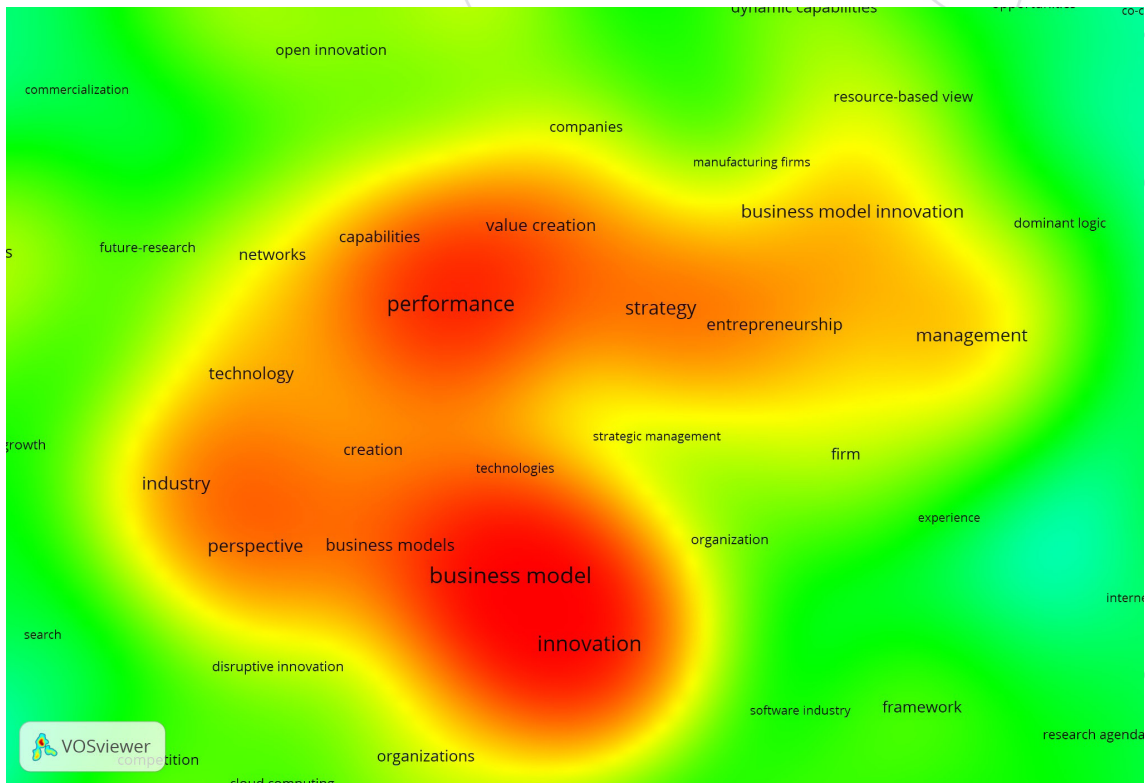


Figure 3: Business model research co-occurrence of keywords density visualization

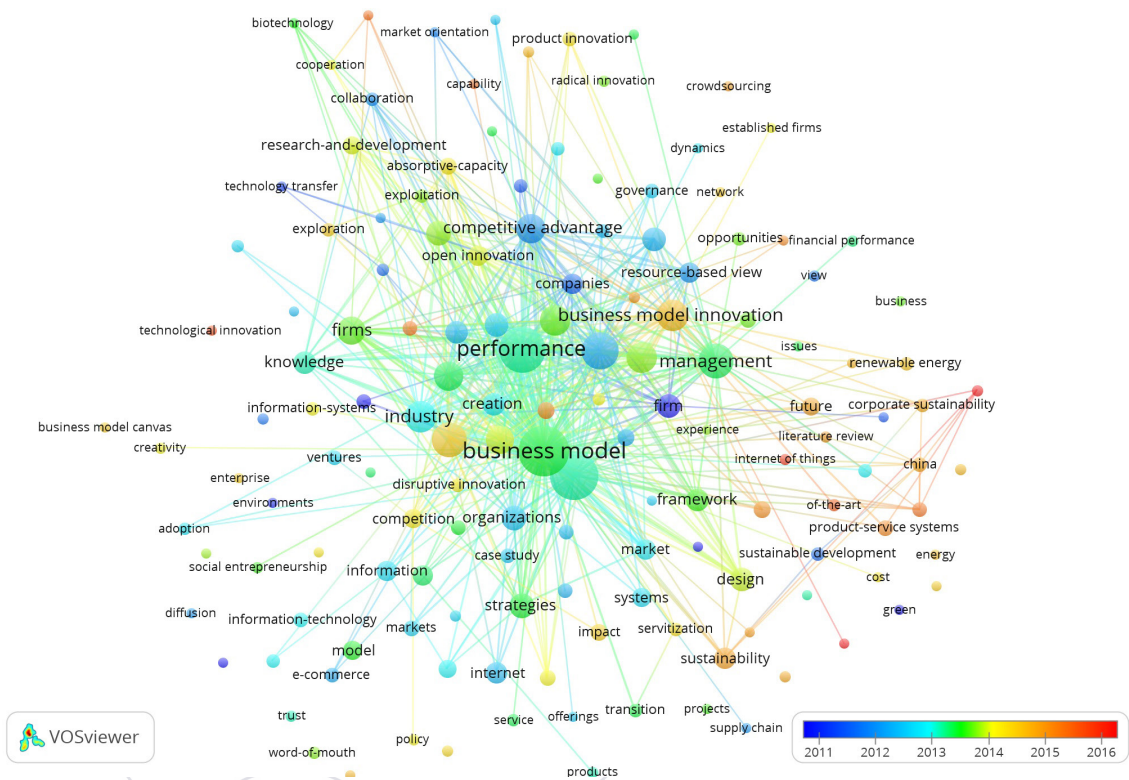


Figure 4: Co-occurrence of keywords overlay visualization of BM research

and innovation. However, if zooms in the graph, it is possible to identify the most recent themes associated with business model research such as circular economy, sustainable business models, and the Internet of things (IoT) as the most recent topics associated within the field. Appendix B shows the detailed zoom in maps.

These visualizations provide an overview of BM research development, identifying the most relevant keywords that co-occurred within the field in recent years. This information allows us to detect research trends of the topic, and research themes that would need more attention.

Trends and future directions of Business Model Research

Based on the co-occurrence of keywords data, it was carried out a cluster analysis. Eight clusters were identified and classified according to the number of links, and its link strength. To identify the research trends, it focused on the high potential topics/items to be developed (as an emerging topic) instead of those with a higher number of links, and link strength developed within the BM literature. Table 6 summaries these clusters and their items. Based on the cluster analysis, and the visualization networks, five main research trends were identified on the topic: Business Model Innovation and Sustainability, Emerging Digital Technologies, Manufacturing and Industry 4.0, Social Entrepreneurship, and Theory development.

Business Model Innovation (BMI) and Sustainability

Business model innovation (BMI) is one of the most co-occurrence keywords within the topic of the BM. The topic of BMI has become very popular within the BM community researchers. One of the first and most relevant studies on this topic is by Chesbrough (2010), who suggest that BMI is a new type of innovation besides the technological process product and organizational innovation. Mitchell & Coles, (2003, 2004) defined and described BMI as the process of changes, improvements, and replacements in more than one business model elements. Another relevant study made by Zott and Amit (2010) describes that the BMI is the process

to add novelties, link activities, and change one or more parties to the BM. The development of the topic also included conceptual frameworks (Bucherer, Eisert & Gassmann, 2012; Wirtz & Daiser, 2017), case studies for its application (Cortimiglia, Ghezzi & Frank, 2016; Sivertsson & Tell, 2015), research agendas (Schneider and Spieth, 2013), and theoretical foundations researches (Fu, Qiu and Quyang, 2006).

It has to consider the issue of BMI as an extension of the BM literature. However, the sustainability issue has emerged from this analytical perspective of the BM, and business model innovation (BMI). The research topic consists not only exploring the sustainability itself, but also the sustainable business models analysis (Schaltegger, Freund & Hansen, 2012; Schaltegger, Hansen & Lüdeke-Freund, 2016), sustainable development (Schaltegger, Freund and Hansen, 2012), and sustainable innovation (Boons and Lüdeke-Freund, 2013). It suggests more attention on the green business models and renewable energies as shown in the co-occurrence of keywords findings. Scholars should continue focusing on this issue, due to the need for more efficient usage of the resources, and an impact reduction on the environment.

Themes such as circular economy will appear more frequently in the business model research, due to the need of shifting to more sustainable and responsible production processes. Based on the establishment of closed production systems, reusing resources and keeping in a loop of production and usage. The companies need to adapt to their existing BM or to create a new one, which will allow reducing the waste, and being environmentally friendly (Urbinati, Chiaroni and Chiesa, 2017). Business models will link to this discussion as a mechanism to adopt a circular economy and other types of sustainability modes.

Business Model and Emerging Digital Technologies

The technological advancements, especially on Information and Communication Technology ICT and Information Systems, have produced new business models. Recently, the interest of research on this phenomenon has increased, and it will continue in the next years. Topics such as e-service, e-commerce, internet-based business models, social commerce (s-commerce), and

Clusters	Keywords
Cluster 1	Advantage, business, <i>business model innovation</i> , challenges, China, circular economy, corporate social responsibility, corporate social responsibility, corporate sustainability, cost, <i>design</i> , economics, energy, financial performance, <i>firm</i> , framework, future, green, internet of things, issues, literature review, <i>management</i> , of-the-art, operations management, organization, product-service systems, projects, renewable energy, research agenda, resource-based view, stakeholders, supply chain management, sustainability, sustainable business model, sustainable business models, sustainable development, sustainable innovation, systems, view
Cluster 2	Adoption, behaviour, business model canvas, cloud computing, communities, creativity, decision-making, determinants, diffusion, e-commerce, entrepreneurs, environments, information, information technology, information-technology, integration, internet, <i>knowledge</i> , model, online, <i>organizations</i> , orientation, product, sales, search, services, software, technological innovation, technologies, trust, ventures, word-of-mouth
Cluster 3	Absorptive-capacity, ambidexterity, biotechnology, capability, co-creation, collaboration, <i>competitive advantage</i> , cooperation, competition, crowdsourcing, <i>firms</i> , governance, market orientation, networks, open innovation, product development, research-and-development, resources, strategic flexibility, <i>strategy</i> , value appropriation
Cluster 4	<i>The business model</i> , case study, consumers, disruptive innovation, dominant logic, information-systems, <i>innovation</i> , manufacturing firms, offerings, products, service, servitization, social media, software industry, strategic management, <i>strategies</i> , supply chain, transition
Cluster 5	<i>Capabilities</i> , complementary assets, <i>dynamic capabilities</i> , established firms, exploitation, exploration, <i>firm performance</i> , future-research, opportunities, organizational learning, organizational change, <i>performance</i> , <i>perspective</i> , product innovation, radical innovation, <i>value creation</i>
Cluster 6	<i>Business models</i> , competition, enterprise, <i>entrepreneurship</i> , evolution, experience, impact, <i>industry</i> , market, markets, music industry, policy, quality, social entrepreneurship, <i>technology</i>
Cluster 7	<i>Commercialization</i> , <i>companies</i> , dynamics, intellectual property, network, start-ups, technology transfer
Cluster 8	<i>Creation</i> , fit, growth

Source: VOS Viewer co-occurrence of keywords analysis made by the author. The italicised keywords are those that have the highest total link strength and number of links.

Table 6: Clusters of the keywords co-occurrence using association strength method

software as a service (SaaS) started to being linked within the business model research to get a better understanding of those new e-businesses (Koh and Kim, 2004). The emerging technologies and new customer behaviors demand new ways of operating, and successful business models are needed to provide services to the trustworthy customer (Kim and Park, 2012). In the context of a new digital era and the widespread of digitization of businesses and society, the BM has become critical for business success, and a focus for academic inquiries (Veit, 2014).

The emerging technologies such as cloud computing in the online information services have changed the traditional online web services. In cloud computing, the data or software are in the cloud, producing new

e-services and products that need a successful BM. Future research on cloud-based services should continue to make out their characteristics, understanding, applications, improvements, and development (Lian, 2015; Gangwar and Date, 2016).

Besides the new way of the firms operations, also new ways of consumption have appeared to take advantage of this new technological context. Services such as transportation, music, accommodation, have developed into online platform-based business models supported by advertisement (Yun, Won, Park, Yang and Zhao, 2017). For instance, regarding the music consumption, in the past, free and illegally was nearly synonymous. The new streaming, free and paid options, which are advertising-supported, has broken this dichotomy, and

there is a transition from free-illegally to paid-legal. However, this also implies changes in the way of operations and collaboration, such as the artists revenues, platform attributes, quality of the sounds, copyright of use, etc. (Weijters, Goedertier and Verstreken, 2014). Further research will be needed to identify the characteristics, applications, and implications of these new business models in different context and industries, and how companies should adapt their operations and strategies to new digital consumers, and exploit their business opportunities.

Business model and Manufacturing (Industry 4.0)

The emerging technologies and its implementation in the manufacturing processes lead to changes in the companies BM, modifying the way that the companies produce and commercialize their products and services (Chesbrough, 2007; Gerlitz, 2016; Schwab, 2016). Internet of things (IoT), robotics, big data, artificial intelligence (AI), virtual reality (VR), and so on, changed the way that companies structure their operations, and hence, their business models. The business model research and scholars started to examine how the new technologies in the context of Industry 4.0 impact on the companies BM. For instance, a study by Arnold, Kiel & Voigt, (2016) explore the influence of Industrial Internet of things (IoT) in different industries and sectors in Germany, finding that companies are facing different changes in their BM, such as workforce qualifications. Within the new business context, as well as the importance of novel key partners networks, due that the way of collaboration has changed in smart manufacturing processes environment.

Technologies such as Big Data and digitalization also enabled an innovative business model (Boyd and Crawford, 2012; Brynjolfsson and McAfee, 2014), or reshaped the current one. Manufacturing is continuing to automate and uses robots for its efficiency and productivity, which have a direct impact on employment and labor structures. In the next years, the BM should focus on this matter, especially in how the introduction of these new technologies will transform the current business models and workforce in term of cognitive tasks, and its impact on business and society (Loebbecke and Picot, 2015).

Business model and Social Entrepreneurship

The topics of entrepreneurship and start-ups are linked with the BM, providing tools, frameworks and guidance for its design (Osterwalder and Pigneur, 2010; Gronum, Steen and Verreynne, 2015), and supporting entrepreneurs in transforming innovative ideas into profitable businesses (Cruz, Pimenta, Azevedo Carvalho and Maciel, 2016). Particularly, social entrepreneurship has emerged as a new BM that combines a social goal with a business mentality, which allows creating social innovations and value through sustainability (Witkamp, Raven & Royakkers, 2011). This trend within the business model research has attracted the interest of many scholars to acquire a better understating of the topic, identifying theoretical and practical implications, and limitations.

The social issues demand a new way to be solved in this century (Wilson and Post, 2013). The entrepreneurial orientation has become a new mechanism to mitigate some of these social problems, especially in developing countries throughout the sustainable business model. Social entrepreneurship produced a new market-based ecosystem at the base of the pyramid, which involves new challenges, and different strategic actions (Goyal, Sergi and Jaiswal, 2016). New actors such as social entrepreneurs, and for-profit social enterprises emerged, further research is needed within the business model literature for getting a better understanding of the inclusive BM, and market challenges such as ethical dilemma, market failures, and imperfection, quantifying the social, economic impact of these initiatives (Goyal *et al.*, 2016). The entrepreneurship topic will continue to develop into the research field, but with a certain emphasis on other types of entrepreneurs, such as social and corporate entrepreneurship.

Business Model and Theory development

The major advancements in the field of business model research occurred just in the last two decades. The topic developed exponentially and became very popular within the business and academic literature. However, this research stream still needs theoretical development. The studies conducted have identified different theories in which the topic could be expended for its consolidation. Theories such as innovation and strategic management, resource-based theory, dynamic

capabilities, institutional theory, knowledge-based view, absorptive-capacity, system theory, contingency, and value creation theory among others have been proposed for getting a better understanding of the business model (BM), and for its development within the academic literature (Amit and Zott, 2001).

Resource-based theory and dynamic capabilities (DC) are the two main theories in which the business model research thrived in the recent years based on the bibliographic data, and according to the co-occurrence of keywords. Taking into account that BM structures and organizes their activities and their processes to create, deliver and capture value (Osterwalder and Pigneur, 2010; Teece, 2010; Amit and Zott, 2012), the resource-based view theory perfectly matches for the theoretical development of the BM. Such theory argues that value is created from unique combinations of resources from the value creation Schumpeterian perspective (Barney, 1991), and consider the firm as a bundle of complementary and specialized resources and capabilities, which are heterogeneous within an industry, scarce, not easily traded and hard to imitate (Peteraf, 1993).

From this perspective, the BM would be a valuable resource, and a capability of the firm for creating and capture value, reducing firms costs and increasing their revenues (Barney, 2013). This capability is also interpreted as a firm's differentiation strategy for achieving sustainable competitive advantage compared with the competitors that would not have these abilities or resources. The holistic approach of the topic can help create competitive advantages reducing the imitability since it is more difficult to imitate a BM rather than a product or service in a certain period of time (Chesbrough, 2007; Kindström, 2010). Moreover, specific resources and capabilities will be needed to design, and innovate business models (Kindström and Kowalkowski, 2014). The assumption within this theory is that, even in equilibrium, the firms have different resources and capabilities that they control until some exogenous changes occur, which demand the adaptation or creation of new business models.

Dynamic capabilities (DC) is an extension of the resource-based theory (Teece, Pisano and Shuen, 1997). The BM has been analyzed based on DC focusing on the processes of value creation, product development,

strategic decision-making, alliances, knowledge creation, and their transfer of capabilities. Specifically, the process of business model innovation can be conceptualized as a distinct dynamic capability for exploiting business opportunities and the capacity of the firm to develop valuable and unique BM, and reconfigure the firms competencies and resources accordingly (Mezger, 2014). The changes in the business environment and the emerging technologies require a BM based on the application of competencies and dynamic capabilities to select and apply appropriate resources (Cautela, Pisano and Pironti, 2014). Managerial DC will play a central role to adapt and transform business models, improving the firms performance at the organizational and strategic level (Basile and Faraci, 2015). The bibliographic data shows that the theory development of the field will be a priority for the consolidation of the topic. Besides resource-based theory and dynamic capabilities, other theories will be helpful in the search of theoretical groundings such as system theory (Wei, Yang, Sun and Gu, 2014), contingency theory, transaction cost (DaSilva and Trkman, 2014), knowledge-based view (Bathelt, Kogler and Munro, 2010; Gambardella and McGahan, 2010; Van der Borgh, Cloudt and Romme, 2012; Souto, 2015; Yun, Yang and Park, 2016), etc. The business model literature still is in a developing phase, which brings many opportunities and future directions for theoretical development and empirical investigations.

Conclusion

The literature on the business model is growing in a variety of fields such as strategy, innovation, value creation, information systems, organization theory, marketing, economics, sustainability, entrepreneurship, etc. The topic is considered to be in a developing and consolidation phase regarding conceptualization, typologies, frameworks, applications, and the continuous theory development around the field. The methods used to describe and analyse this research stream is diverse in conceptual and empirical approaches, allowing scholars to examine business models from a heuristic approach, analyzing the antecedents and consequences for value creation, firm focal performance, industry structures, competitive dynamics, technological development, and societal wealth (Demil, Lecocq, Ricart and Zott, 2015).

The paper aimed to analyze the evolution of the business model research identifying its potential research directions. The bibliometric analysis conducted based on the bibliographic data mapping demonstrated that the topic had grown exponentially in the last two decades, and its study has been included in diverse disciplines and research issues. The most notable fields are related to innovation and strategy, sustainability and green business, technological and digital development, entrepreneurship, and theory development. The bibliographic data showed that the most influential institutions are in the USA, the UK, and in Europe, and the most productive journals within the field focus on strategic management, innovation, and clean production. Regarding the authors, the most influential ones affiliate themselves with top worldwide-recognized business schools in the fields of business and strategy. The research trends show that the topic will be developing into sustainability and clean production issues as well as the digitalization and information systems developments that will be leading to the creation of new business models.

The study highlights the resource-based view and dynamic capabilities as the suitable theoretical perspectives, in which the scholars have studied the topic for its development. However, business models can be linked with other conceptual frameworks and theories that would allow to get a better understanding of the topic and to advance in its consolidation such as knowledge-based view, transaction cost, and system theory. It will be needed to continue the theory development of the

field with further conceptual and empirical research, drawing attention to the methodological issues. The co-occurrence of keywords analysis and visualization suggest potential research directions that would also be influenced by other business and technological trends, and by the interest of each institution, author or journal.

However, this study has some limitations. Firstly, it is limited to specific subject areas of management, business, finance, and economics published in the Web of Science database. Secondly, the co-occurrence of keywords and citation activity is based only from on the five hundred (500) most cited articles within the total records, providing a limited number of clusters and significant keywords. However, it has to be cautious to generalize the conclusions. Nevertheless, the descriptive statistical information and graphical maps provide valuable insights about the current state-of-the-art of the topic, its evolution, and future directions. For further researches, it would be necessary to consider the quality of the publications and methodological issues used. It would be interesting to analyze in depth each relevant topic concerning the business model research, or to employ a bibliometric study on a certain journal that complements this study with other mapping techniques (e.g., co-citation, bibliographic coupling analysis) providing a systematic description of the structure of the field. The article tries to provide insights to structure and consolidate the topic within the academic literature, identifying research themes for its future development and consolidation.

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Appendix B

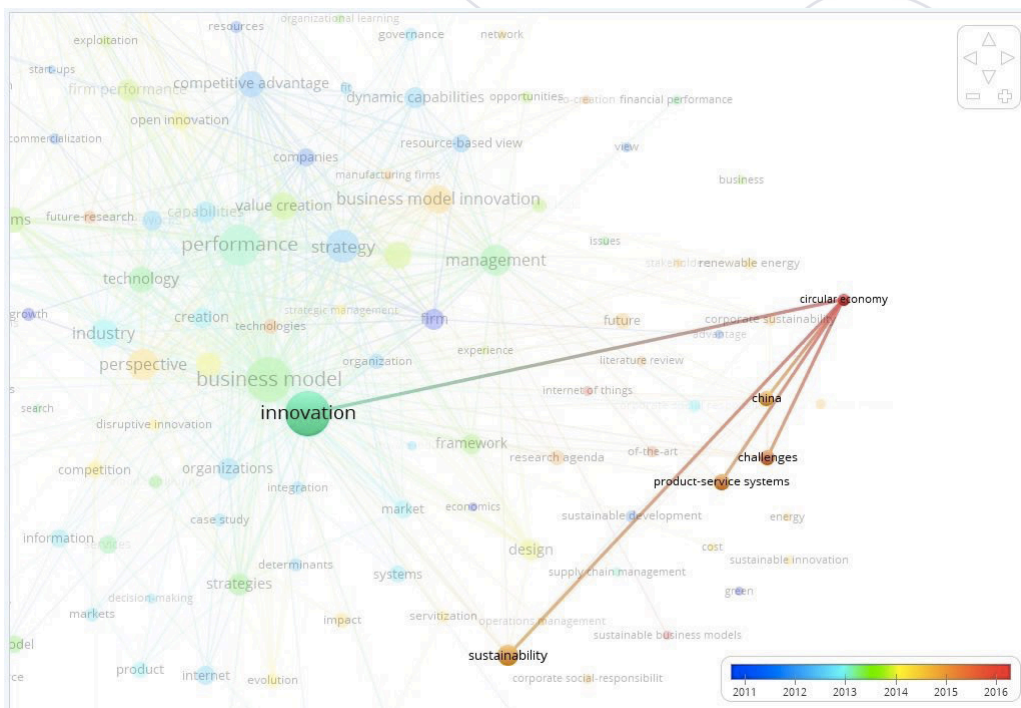


Figure B.1: More recent keyword associated with the business model: Circular economy (VOS Viewer visualization)

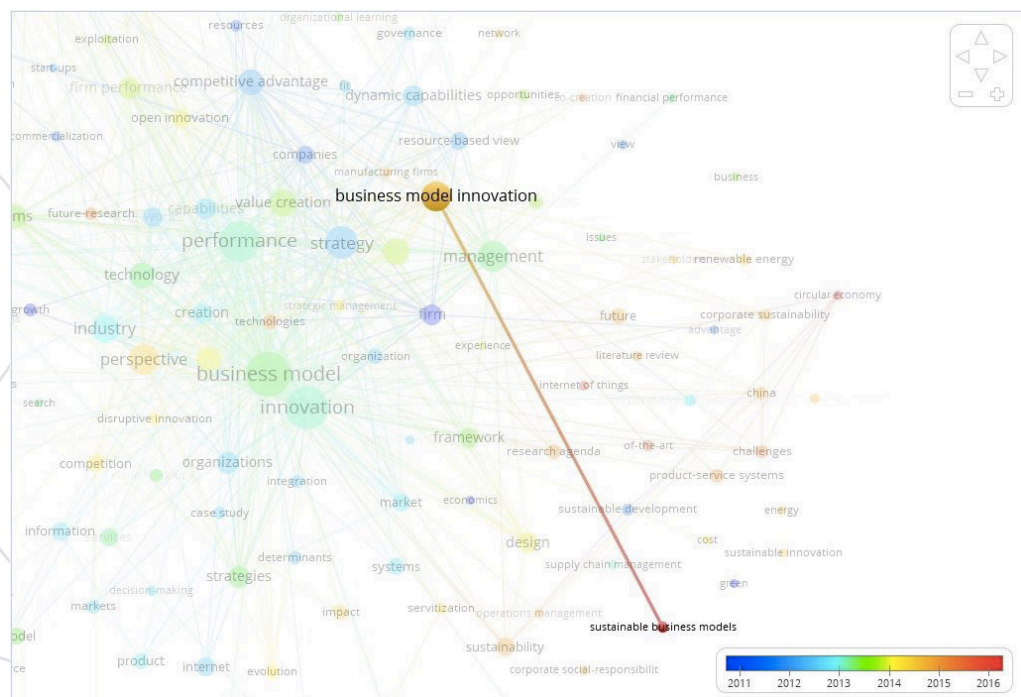


Figure B.2: More recent keyword associated with the business model: Sustainable business models (VOS Viewer visualization)

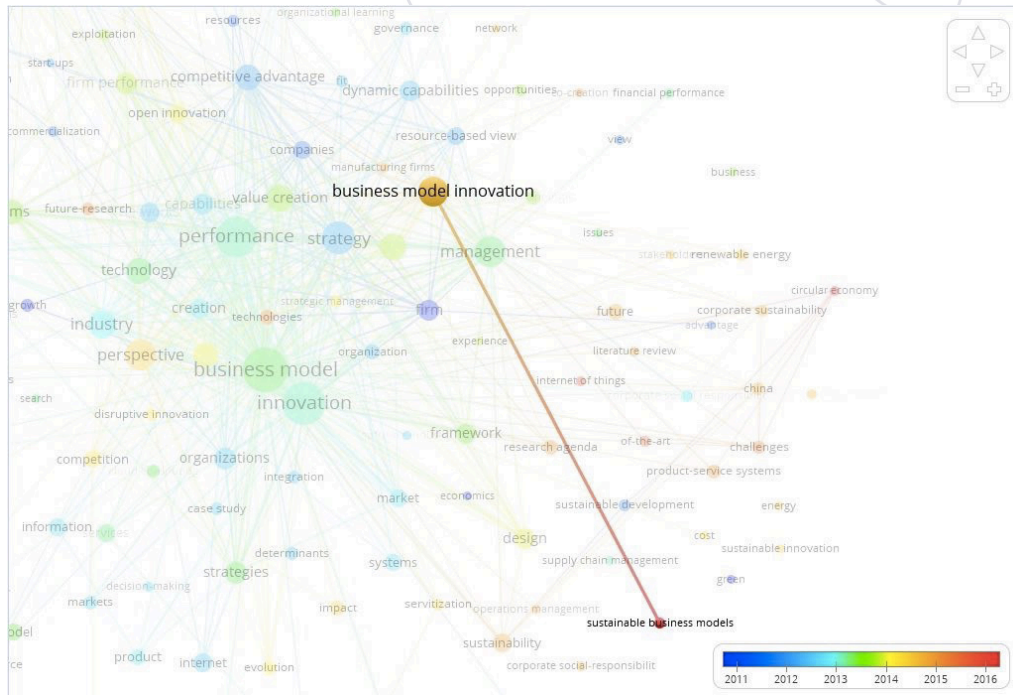


Figure B.3: More recent keyword associated with the business model: Internet of things (VOS Viewer visualization)

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Ex-Ante Business Model Evaluation Methods: A Proposal of Improvement and Applicability

Jose M. Mateu¹ and Alejandro Escribá-Esteve²

Abstract

Purpose: The purpose of this paper is to choose the best method for ex ante business model evaluation, improve it and provide a framework to put it into practice.

Design/Methodology/Approach: After an in-depth review, we chose the best method for ex ante business model evaluation, improved this method, and applied it to a real case study in which business models had been proposed for a Sustainable Smart District project.

Findings: We analysed existing ex ante business model evaluation methods, justifying our choice of the best one. We improved this key question-based method by combining classic management tools and a new, promising procedure. We finally found a strong tool to improve business models before their implementation or, in other words, to improve business model design.

Practical implications: The resulting methodology can be applied in a broad range of situations in which a set of business models needs to be evaluated and ordered before making decisions about their implementation. Accordingly, we think it represents a significant contribution to the field of business model evaluation.

Social implications: We applied this methodology to a set of business models to be used in a new Sustainable Smart District. This term has gained momentum over the last few years because it is understood to be a good way to combat climate change.

Originality/value: We refined and improved an existing methodology for ex ante business model evaluation making it more accurate and credible, and we applied it in the context of a relevant social field, such as the fight against climate change.

Keywords: Business model innovation; Business model assessment; Business model evaluation; Smart city; Smart Sustainable District

Please cite this paper as: Mateu, J. M. and Escribá-Esteve, A. (2019), Ex-Ante Business Model Evaluation Methods: A Proposal of Improvement and Applicability, Vol. 7, No. 5, pp. 25-47

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Acknowledgements: The authors would like to thank the La Pinada team for their cooperation and positive feedback, the EU's Climate-KIC for supporting the project, the two anonymous reviewers for their valuable comments and the journal's editor in chief for his help.

Introduction

The purpose of this paper is to make a contribution to the evaluation of the business models field. To achieve this, we review existing literature in the area about methods that can evaluate business models before being implemented (ex-ante methods), and we propose a scientific advance to improve these methods, in order to compare and select the most promising business models among those available.

Several methods have been proposed over the last few years for business model evaluation. However, most of them are not useful for our goals or have numerous limitations, partly because they have not been specifically developed for this purpose. They often use forecasts for different economic and financial parameters which, in a context of extreme uncertainty, may not be reliable. In this paper, after an in-depth review, we choose a method that has been specifically developed for business model evaluation, such as the one proposed by Mateu and March-Chorda (2016). This method consists of a scale of eight indicators that evaluate eight key factors in a business model.

The implementation of this method in a real case study gave us the opportunity to refine and improve the method. The real case study consisted of the evaluation of a set of 22 services, with their corresponding business models, which had been proposed for development in a new Smart Sustainable District (SSD).

The improved methodology presented in this paper can be applied to a large number of analogous situations. The business model is the cornerstone of the current entrepreneurship paradigm. Accordingly, entrepreneurs must choose the most promising business model for their venture carefully. Similarly, companies that face problematic situations, or firms that are considering diversification or intrapreneurship processes also need to choose the most promising business model. Along these lines, we are convinced that our findings can be useful in a wide range of situations.

The rest of this paper is organised as follows. We start with a systematic literature review of the field of business model evaluation, which focuses mainly on choosing the most suitable method to achieved our goals. Then, once the most suitable method has

been identified, we propose several improvements to the method. Using a real case study, we also test the applicability of the improved method in order to refine our proposal. The paper ends with a discussion of the results, analyses the findings, and provides some concluding remarks and comments about the limitations of the work and possible future developments.

Business Model Evaluation Methods

General approach to business model evaluation methods

Pateli and Giaglis (2004) identified business model evaluation as a sub-domain of business model research, but they considered that the area was still too immature. Research on this topic has increased considerably since then, but there are still important gaps that have not yet been addressed.

D'Souza, Wortmann, Huitema and Velthuisen (2015) identified three different goals for evaluating business models: comparison with competitors, evaluating alternative business models for implementation by a firm, and evaluating business models according to their viability. Our focus centres on the second goal, given our ex-ante applicability requirement.

Our review of business models evaluation literature targeted four systematic reviews on the subject by Alexa (2014), Tesch and Brillinger (2017), Schoormann, Kaufhold, Behrens and Knackstedt (2018) and Steinhöfel, Hussinki and Bornemann (2018).

Alexa (2014) identified eleven business model evaluation methods, and briefly described most of them, focusing on the evaluation criteria they used. Hamel (2000) used four criteria (efficiency, uniqueness, fit and profit boosters); Zott and Amit (2007) evaluated four sources of value (novelty, lock-in, complementarities and efficiency); Afuah and Tucci (2003) used profitability measures and benchmark questions to compare the business model with competitors' models; Morris, Schindehutte and Allen (2005) suggested a method with seven performance indicators, although "it is not clear how it can be operationalized" (Alexa 2014, p. 254); Ballon, Kern, Poel and Tee (2005) proposed a five-step framework to evaluate objectives and scope,

market developments, innovation topics and bottlenecks; Horsti's tool is based on critical success factors (Horsti, 2007); Osterwalder and Pigneur (2010) proposed an evaluation of the big picture as well as SWOTs of each building block in their business model ontology.

Tesch and Brillinger (2017) catalogued 39 business model evaluation methodologies according to two criteria, namely causal vs. effectual and qualitative vs. quantitative evaluation. Both are interrelated, and it is important to clarify these dichotomies.

Traditional entrepreneurship theory (Casson, 2003; Shane, 2003) emerged within a causal perspective. According to this theory, the entrepreneur draws up a business plan to turn the idea or the opportunity into a successful company. The recommendations to draw up this plan include specifying quantitative details, thus quantifying future sales and profits and including them in financial spreadsheets. At the start of this century, some authors pointed out that uncertainty was so high in the business creation environment that it was more than a leap of faith to believe in this comfortable path (Ries, 2011) with planning being seriously questioned in the business creation arena (Gruber, 2007; Brinckmann, Grichnik and Kapsa, 2010; Chwolka and Raith, 2011). The first task of a start-up shifts as a consequence moving to the adoption of a new task: the validation of a business model (Blank, 2006) by means of a learning process (Ries, 2011), of experimentation (McGrath, 2010), and trial and error (Morris, Schindehutte and Allen, 2005; Sosna, Trevinyo-Rodriguez and Velamuri, 2010). To foresee credible future numbers in this context becomes difficult, and often impossible.

Sarasvathy raised the bar seeing that successful serial entrepreneurs, far from planning their ventures, used a more diffuse logic, the so-called effectual logic (Sarasvathy, 2001, 2008). Effectual logic becomes useful when decisions must be taken in a context of significant uncertainty.

Tesch and Brillinger (2017) brought together several qualitative business model evaluation methods under the effectual logic umbrella. These methods are not methods to classify and compare alternative business models. They are actually methods to check and improve a specific business model, through analysing

ontology components and their coherence (Osterwalder and Pigneur, 2010), through a list of key questions (Teece, 2010), suggesting business model choices (Casadesus-Masanell and Enric Ricart, 2010), proposing business model patterns which can be compared with the real or designed ones (Gassmann, Frankenberger and Csik, 2014), through roadmapping (Reuver, Bouwman and Haaker, 2013), and through experimentation and an iterative process of trial and error (McGrath, 2010; Sosna, Trevinyo-Rodriguez and Velamuri, 2010).

Conversely, causal logic enables both qualitative and quantitative methods. On the qualitative side, Tesch and Brillinger (2017) included some papers that adapted traditional management tools, like a SWOT analysis (Martikainen, Niemi and Pekkanen, 2014) and a PESTEL analysis (Yüksel, 2012). Other qualitative methods presented by these authors focused on generating alternative business models rather than on evaluating them, i.e. methods based on morphological boxes (Kley, Lerch and Dallinger, 2011) and methods based on levers to provide new business models (Bosbach, Tesch and Kirschner, 2017).

On the quantitative side, Tesch and Brillinger (2017) included the paper by Gordijn and Akkermans (2001), which measures the value for all of the actors involved, expressing that value in monetary units, although the authors found that estimating precise profit was unrealistic. Other quantitative methods identified by Tesch and Brillinger are based on balanced scorecards and metrics (i.e. Heikkilä, Bouwman, Heikkilä, Solaimani and Janssen, 2016), scenario planning (i.e. Bouwman, Zhengjia, van der Duin and Limonard, 2008), market simulations, predictions and forecasting (Kauffman and Wang, 2008), etc.

Schoormann *et al.* (2018) revised 45 approaches to business model evaluation, and catalogued them into 10 categories (I to X) and 44 subcategories. These categories are: I Benchmark-, Comparison- and Trade Off-oriented Evaluation, II -Economic-/Financial-oriented Evaluation and Metrics, III Mathematical-oriented Evaluation Methods, IV Survey- and Questionnaire-oriented evaluation, V Simulation-based Evaluation Modelling Techniques/Tools, VI Strategy-oriented Evaluation Tools, VII Business Model Ontology-oriented Evaluation, VIII Decision Structuring-oriented Evaluation, IX

Pattern- and Key Question-based Evaluation and X Value Proposition-oriented Evaluation Tools.

Finally, Steinhöfel, Hussinki and Bornemann (2018) found 21 relevant papers focused on tools, methodologies and approaches to evaluate business models.

In the specific field of smart cities, Diaz-Diaz, Munoz and Perez-Gonzalez (2017) developed a comprehensive method to evaluate business models, but it cannot be considered as an ex-ante method, because although the new business model is evaluated before its implementation, it is evaluated by comparing it to the previously existing model. Therefore, it is not useful to evaluate and compare totally new business models before their implementation.

Finally, we made a new search, in order to update these reviews. As both of the latest reviews are based on articles published up to January 2018, we searched for articles published in 2018 and 2019 in the Scopus and Web of Science databases (the search was carried out in July 2019). We used the same search criteria used by Steinhöfel, Hussinki and Bornemann (2018), namely articles containing 'business model*' in the title as well as one of these textual streams: 'analy*', 'assess*', 'compar*', 'control*', 'estimat*', 'evaluat*', 'examin*', 'measur*', 'monitor*', 'test*' or 'valuat*'. This search produced 118 articles in Scopus and 112 articles in the Web of Science which, after removing 39 duplicate papers, yielded a total of 191 articles.

Adding the lists by Alexa (2014), Tesch and Brillinger (2017), Schoormann *et al.* (2018) and Steinhöfel *et al.* (2018), and subtracting duplicated papers, we obtained a total of 98 articles directly related to business model evaluation methodologies. Adding our less refined list of articles from 2018 and 2019, we ended up with a final list of 299 articles.

Required characteristics of an ex-ante business model evaluation method

We now turn our attention to the characteristics that a good business model evaluation method must have in order to meet our goal. As we stated before, this paper aims to develop and propose an improved ex-ante method that can compare alternative potential business models. Consequently, we will not consider

methods that compare new business models with current ones, or methods that only suggest improvements to a specific business model without any way of comparing them. We intend to develop a proposal that may help decision-makers to choose a business model as early as possible during the entrepreneurial process, in order to avoid wasting time and effort, yet ensuring the choice is as rigorous as possible. In this sense, we discarded the methods based on unrealistic numerical forecasts, and the methods that only provided qualitative information, which is difficult to check from one business model to another.

We aimed to develop a method that used numerical indicators derived from the business model definition, not from the hypothetical behaviour of the business model once launched. As these indicators try to measure a hypothetical construct (the goodness of the model to a certain extent) we demanded validity and reliability (Bannigan and Watson, 2009), completeness (indicators had to be able to cover all the possible values the variable can take), exclusivity (no overlapping) and precision (Cea D'Ancona, 1999).

Finally, the proposed method had to be useful to evaluate business models used in different industries and sectors.

Consequently, from our list of 299 methods we removed those that focused on evaluating real companies' business models (e.g. Brea-Solís, Casadesus-Masanell and Grifell-Tatjé, 2015), methods focused on improving current business models (e.g. Diaz-Diaz, Munoz and Perez-Gonzalez, 2017), those that proposed evaluation methods to be applied ex-post (e.g. Horsti, 2007), methods defined for a specific industry (e.g. Shin and Park, 2009), those based on financial forecasts or similar 'unrealistic at this stage' numerical indicators (e.g. Gordijn and Akkermans, 2001), methods that only evaluated specific business model characteristics which were not sufficient to forecast the success of the business models (Hamel, 2000) and methods that did not have a manageable level of operationalisation, like simple lists of questions (e.g. Osterwalder, 2007, or Teece, 2010), or variables that were difficult to operationalise (e.g. Morris, Schindehutte and Allen, 2005). Many papers were excluded for more than one of these reasons. The result was a short list of two methods

from which to choose: Ishida, Sakuma, Abe and Fazekas (2006) and Mateu and March-Chorda, (2016).

The method drawn up by Ishida *et al.* (2006) offers an exhaustive list of indicators catalogued in five categories, namely Business concept, Environment analysis, Technology Competitiveness Analysis, Modelling, and Profitability analysis. Each category includes between 6 to 12 indicators that are scored from 1 to 5, making a total of 38 indicators.

Mateu and March-Chorda's methodology (2016) proposes a scale for ex-ante business model assessment consisting of eight indicators that evaluate eight key factors in the model. The evaluation is carried out by answering specific questions about the model that is being analysed. Possible answers are 1, 2, 3, 4 and 5. Table 1 shows the questions in their generic formulation.

1. How would the value proposition bring utility to the customer? To what extent?
2. Are all the necessary complements already available? If not, can we obtain those complements or develop them conveniently and at a reasonable price?
3. How large is the market in terms of both customer volume and purchasing power?
4. How difficult will it be to explain the benefits of the value proposition to the potential customers?
5. Would the potential customers be ready to pay the price and make the effort the new business model requires?
6. Will it be costly for us to offer the value proposition?, or, on the contrary, will it give us an attractive margin?
7. Are there many alternative value propositions competing for the same customers? How valuable are those alternative options? How strong are those competitors?
8. Does the new Business Model provide a mechanism to hold the imitators at bay?

Table 1: Questions for ex-ante business model evaluation method (Mateu and March-Chorda, 2016).

Mateu and March-Chorda's methodology (2016), in addition to fulfilling all our conditions, has several advantages. First, it is a good answer to Alexa's statement, i.e., "there is a need for simple and versatile instruments" (Alexa, 2014, p. 259). Second, it is clearly focused on the business model, thus enabling the isolation of this key element from other concomitant

factors like entrepreneurs' capabilities or the environment. Third, it considers a wide range of relevant business model factors (Steinhöfel, Hussinki and Bornemann, 2018).

The general template used to evaluate business models using this methodology includes the questions and some elements to facilitate the evaluation, such as examples of well-known models that could obtain a particular score, as well as a description of extreme cases (1 and 5) for each indicator (see Mateu and March-Chorda, 2016).

Refining and Improving Mateu and March-Chorda's Methodology

A relevant issue in this methodology is related to who carries out the evaluation. In the original formulation of Mateu and March-Chorda's method, evaluation was entrusted to management experts or people that were familiar with the sector. The varying nature of the eight indicators suggests that each could be best rated using different techniques and entrusting them to different authors.

Indicator 1, for example, is related to the value that the business model gives to the potential customer. Therefore, it would be useful to find out the opinion of these potential customers in order to evaluate this indicator. This also holds true for indicator 3 to a certain extent, because this indicator tries to measure not only the size of the market but also the part of the market that is interested in the value proposition.

According to Teece, "a good business model yields value propositions that are compelling to customers" (Teece, 2010, p. 174). How can we measure to what extent a business model is compelling to customers? Traditional marketing has been postulating for decades the advantages of using market research to answer this question (Kotler and Keller, 2016). Bearing in mind that a number of core marketing activities are part of a business model (Ehret, Kashyap and Wirtz, 2013), including value proposition delivery, recent scholar's works have recovered the link between business model research and marketing (Coombes and Nicholson, 2013; Klimanov and Tetriak, 2019). In fact, some authors

have already used surveys with potential customers in order to evaluate the value proposition of the business models, and especially to compare different business models (Ghezzi, Georgiades, Reichl, Le-Sauze, Di Cairano-Gilfedder, and Managiaracina, 2013; Piscicelli, Ludden and Cooper, 2018).

The rest of the indicators require more expert knowledge. Only an expert in management can, for instance, evaluate aspects such as the effort required to implement a business model before this model is comprehensively defined (indicator 2).

Consequently, we refined the method introducing a mixed evaluation in which each indicator was evaluated using the most suitable process.

To evaluate the indicators for each of the business models, we used the following processes and rules. Indicators 1 and 3 were rated with a survey answered by the future residents of the district. Indicators 2, 4, 5, 6 and 8 were rated by experts, that is to say, the authors of this study, who individually rated each model for each indicator. When scores diverged they were discussed to reach a consensus.

Finally, indicator 7 was also rated by experts, though on this occasion, we used Porter's Five Forces Analysis (Porter, 1980). Indicator 7 is focused on measuring the number and strength of competitors. Porter's Five Forces Analysis centres specifically on measuring competitive rivalry. It is particularly useful when it is not only the competitors' force that is relevant. For instance, in many of the services, customers could choose a self-service option or just go without the service. Consequently, we think that it is important to open the scope of the analysis taking other agents into consideration. This led us to use a traditional, broad-scope method, Porter's Five Forces Analysis (Porter, 1980). In fact, the five competitive forces are used as five of the 12 indicators to analyse the environment by Ishida et al.'s (2006) business model evaluation method.

The Five Forces Analysis takes into consideration the rivalry of existing competitors, but also four additional forces: (1) the threat of substitutes or alternatives to satisfy the need, (2) the bargaining power of suppliers,

(3) the bargaining power of customers, and (4) the threat of new entrants.

Five Forces Framework has been criticised from the perspective of the Dynamic Capabilities Framework (Teece, 2007), because of its limited ability to describe competition in dynamic environments. However, most of Teece's criticisms are not relevant in this context. Teece criticises Porter's tool because it does not take into account factors which in Mateu and March-Chorda's evaluation method are assessed by other indicators, not by indicator seven, such as factors that impact imitation and appropriation issues (evaluated in Indicator 8), the role of complementary assets (evaluated in Indicator 2), network externalities (evaluated in Indicator 6) and factors inside the company that constrain choices (this is not relevant to us because we are evaluating the business model in isolation). In conclusion, although other minor criticisms made by Teece remain unanswered, the Five Forces Method fits the need and the context correctly.

Testing the Improved Method: Application to a Real Case Study

After introducing the refined method, we applied it to our case, in order to test whether it was applicable and useful for decision-makers.

We applied our improved formulation of Mateu and March-Chorda's methodology to a project for a *smart city* which is being developed in the Valencia region of Spain. We defined a *smart city* as a 'forward-looking city performing well in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens' (Diaz-Diaz, Munoz and Perez-Gonzalez, 2017; following Giffinger and Gudrun, 2010).

The term *smart city* has gained momentum over the last few years (Mora, Bolici and Deakin, 2017), not only among academics, but also among a wide range of practitioners, such as local authorities and private real-estate developers. As an example, the Spanish network of smart cities (*Red Española de Ciudades Inteligentes*) is made up of 65 Spanish towns and cities.

The European Union promotes and supports communities of universities, companies and other organisations centring on a specific global challenge, under the name of Knowledge and Innovation Community (KIC). Climate-KIC is a European Union Knowledge and Innovation Community working towards a prosperous, inclusive, climate-resilient society founded on a circular, zero-carbon economy. Climate-KIC has four areas of focus: (1) urban transitions, (2) sustainable production systems, (3) decision metrics & finance and (4) sustainable land use. The first of these areas pursues the challenge of creating the climate-resilient and zero-carbon towns and cities of tomorrow. Climate-KIC's urban transitions include initiatives on different scales, such as buildings, districts and even whole cities. The Smart Sustainable Districts initiative (SSD) is focused at district level, with twelve district projects from European cities being supported through the SSD programme so far, such as the Queen Elizabeth Olympic Park, in London, and Moabit West, in Berlin.

La Pinada has been one of the SSDs in Climate-KIC since 2017, and it is similar to the rest of the SSDs in its intention to build an innovative and sustainable district in all its dimensions: intelligent use of energy and water, sustainable mobility, circular and shared economy, integration with nature, social cohesion, community vitality, and local shops and services, all backed by socially and environmentally responsible suppliers.

La Pinada is to be built as a district of the metropolitan area of Valencia, in Spain, and it is set to house around a thousand families in a 25 Ha area. It is a peculiar project insofar as it is going to be developed almost entirely with private investment and because it is going to be built via a co-creation process, in which its future residents will be taking part. In fact, these future inhabitants are already giving their opinion about all the relevant decisions that will affect the appearance of the district, the characteristics of the buildings and the kind of services they want the district to provide.

A long list of possible services has been identified. Some of them have been suggested by the future inhabitants during a series of co-creation sessions. The rest have been suggested by other teams involved in the Climate-KIC's SSD Programme. As the original list of models was too long, we extracted a shorter list for this article, which is included in Table 2. The specific

questionnaire we gave to the La Pinada team, in order to gather information about the different models, is included in Appendix 1, as well as the answers for Model C, which are provided as an example.

These services have been chosen under the premise that they contribute to the objectives established for a SSD. Accordingly, they must be environmentally friendly and they must improve the inhabitants' quality of life, but beyond this, they must be sustainable from an economic perspective. This means that these services must also be managed from a business perspective.

The economic viability assessment, as defined by La Pinada team, pursued a twofold objective:

1. To assess the economic viability of the business models proposed to start up each of the services.
2. To prioritise their implementation, in order to start with the models that have the greatest potential.

Business model evaluation methods are required to achieve these goals. We applied our refined methodology. We found this methodology to be specially suited to this case. Similarly, we found this case to be particularly useful, because most of the situations that required business model evaluation only included a small number of business models that had to be evaluated. A significant number of business models enables us to test the methodology in depth, as well as to obtain more interesting findings.

Details about this application are summarised below.

1. Value creation condition

As has been said, we appealed to the stakeholders, that is to say, the potential customers (future residents of the district), to rate indicator 1. We asked them about the value they saw in each of the business models. The survey asked them to rate this value on a scale from 1 (totally useless) to 5 (extraordinarily useful). Appendix 2 shows the details of this survey. It offered only a brief description of the business models, because giving all the details would have discouraged respondents from completing the survey.

Code	Service/Business model	Short value proposition description
A	Collective transport to the city centre	A means of transport (bus), with a scheduled timetable, to transport the neighbours between the neighbourhood and different points in the city centre.
B	Launderette service	Available washers and dryers in a specific area of each building.
C	Car-sharing	Electric cars available for hours or days.
D	Advisory service	An expert that can help to better control subscriptions and personal accounts.
E	Second-hand shop	To sell objects in good condition that are no longer needed, and to buy them.
F	Appliance rental store	Physical store that offers limited-use and high-priced appliances (Thermomix, steam wagons) for a short period of time.
G	Bike repair	To have the premises, the tools and the spare parts to repair or self-repair bikes and similar devices.
H	General repairs	To solve the small setbacks that may arise in the day to day running of a house (internet connections, moving furniture, home repairs)
I	Elderly care	Personal care for elderly people.
J	Fitness centre	Facilities and qualified personnel to stay fit
K	Orchard rental	To rent an urban orchard
L	Reception of goods and delivery of packages	Reception point for receiving and sending packages, including home delivery.
M	Local removal firm	Transport of personal objects from one place to another
N	Ambulance service	Ambulance that allows immediate transport to the hospital
O	Property management	Building administration service
P	Bike sharing	System of shared bicycles within the neighbourhood
Q	Service exchange platform	A platform through which people do jobs in exchange for virtual currencies or in exchange of other services carried out by others
R	Take-away meals	Shop of traditionally cooked meals to take away
S	Toy library	Allows children and adults to have a greater variety of toys
T	Household cleaning service	House cleaning service, by people at risk of exclusion
U	Central purchasing body	Buying together provides better offers and lower negotiated prices.
V	Rental of spaces for activities	To rent common areas on the ground floor of the buildings to organise events

Table 2: List of services to be evaluated

The survey was sent to all available emails in the La Pinada database (1,093 emails, belonging to people that had showed interest in the project at some stage). The emails were sent at the beginning of September 2018, and respondents had until 16th September to respond. 352 people opened the survey, but only 30 completed questionnaires were received.

As the focus of the article centres on the definition of the methodology, not on the analysed business models, the lack of representativeness of the sample is not deemed to be relevant.

Additionally, although the sample is not representative of the whole group of potential customers, it

is representative of the most motivated and committed members. The current entrepreneurship paradigm gives an outstanding role to these most highly motivated members of the market, making them lead-users (Hippel, 1986). In fact, the value proposition must be focused on these lead-users, turning them into the beachhead that can clear market access (Moore, 1991).

We used the average of the 30 answers as the scores for indicator 1, for each of the models. These scores are shown in the column of indicator 1 in Table 4 (included in the Results Section of this article).

2. Complete value proposition condition

We adapted this indicator to answer the question: how much effort will be required to implement the business model? We assigned a score to each model for this indicator based on the experience and management knowledge of the authors of this study.

To do this, we had to add some premises. These included applying minimal investment as a criterion. Accordingly, any required asset would be rented if possible, instead of buying them, at least initially (until the viability of the model was demonstrated). This would be the case of a bus for model A, for example.

On the other hand, the majority of the models are not radically new or hard to implement. Therefore, the majority of the models obtained a high score in this indicator (from 3 to 5). The specific rubric was as follows:

- Rated with a score of 5: easy to implement models that require very low economic investment, and do not need any sophisticated technological resources or particularly qualified staff.
- Rated with a score of 4: models that require a small economic investment (such as the refurbishment of a space facilitated by the La Pinada organisation, or the purchase of some equipment) and/or to hire qualified staff with specialisations which abound in the labour market (tax advisors, for example).
- Rated with a score of 3: models that require a more significant economic investment or sophisticated technological resources. Although an asset such as a bus or minibus can be rented, with or without a driver, the supplier will demand a certain minimum commitment, which will raise the required investment, although not as much as if the vehicle has to be purchased. Conversely, we understand sophisticated technological resources as being the software and other elements required to start up a more innovative service.
- Rated with a score of 2: models that require a larger-scale investment, for example, to buy

goods that cannot be rented, are expensive or are hardly accessible.

- Rated with a score of 1: models that require major investment and/or cutting-edge technological adaptations.

3. Sufficient size of the market condition

The approach of the proposed models is to provide services to the neighbourhood, and this significantly limits the target audience. Consequently, we have limited the maximum score for this indicator to 3. By doing so, we maintain the comparability of our evaluation with that of other models in other works.

The specific score was assigned based on the willingness to use the services of the 30 future neighbours who responded to the survey. The survey question that addressed this goal was: would you use this service if it were available at a reasonable price? The answer could vary between 1 (I would not use it) and 5 (I would always use it, or almost always).

As already mentioned above, and in order to maintain comparability with the general scale, the means of the 30 responses for each service were adjusted to a scale between 1 and 3, that is, they were divided by 5 and multiplied by 3. The results are shown in Table 4, included in section 5.

4. Access to the potential customer condition

The geographical concentration of the main potential market of all the proposed services greatly facilitates their communication and promotion. On the other hand, the genesis of the neighbourhood requires the participation of the neighbours and their engagement in local activities. This explains the high score assigned in this indicator to the majority of the models. In summary, the target audience of communication is close at hand and it is willing to listen, and this makes it easy to promote the services.

Based on this we established the following rubric:

- Rated with a score of 5: models which are obviously useful (they do not need any explanation),

regardless of whether the service is of interest to a particular resident.

- Rated with a score of 4: models which, given their professional foundation, require a certain degree of explanation in order to show their value or usefulness.
- Rated with a score of 3: models which, given their novelty value or innovative nature, represent a change in the way potential customers now solve the specific need that is served.
- Scores 1 and 2 have no meaning in this context.

5. Willingness to make an effort condition

Different and sometimes opposing factors should be taken into consideration to evaluate this indicator. These factors had to be balanced out to reach just one score. One of these factors is, for example, the extra cost incurred by the potential customer in the way the new model aims to solve the need which has been fulfilled in a different and cheaper way up until now. Another example is the extra effort the potential customer must make for the same reason.

Based on this, and using an expert evaluation, we propose the following rubric. For descriptive purposes, we used the reverse order from the one we used in previous indicators (from 1 to 5 in this case).

- Rated with a score of 1: services usually offered for free.
- Rated with a score of 2: models that offer services that the customer can self-provide or can hire at a low cost and with little effort.
- Rated with a score of 3: models that offer services for which the customer has comparable alternatives, though with different attributes. A score of 3 was also given to models that are more neutral in character compared to the existing alternatives.
- Rated with a score of 4: models that provide significant added value to potential users. This would be the case of a service that provides something occasionally or that gives an advantage when needed (such as buying second-hand goods or renting them).

- Rated with a score of 5: models for which we understand that the effort required of users will be made willingly.

6. Affordable costs condition

We rated this indicator for each model based on our experience and management knowledge. Rates were low for the majority of the models, because they involve a high degree of personal effort and, consequently, there are no economies of scale.

Based on this, we use the following rubric (ordered from 1 to 5).

- Rated with a score of 1: models based almost exclusively on personal effort, with no economies of scale.
- Rated with a score of 2: models that have a certain degree of economies of scale in secondary activities of the value chain, or can delegate certain activities to the customer via technology. The first case would be the case of models that require a physical space for their provision, in so far as they can benefit from economies of scale in terms of the rental cost.
- Rated with a score of 3: models that involve better economies of scale.
- Rated with a score of 4: models that only require sporadic or occasional staff participation, that is, the user does not require assistance from staff during the service.
- Rated with a score of 5: models with excellent economies of scale, network economies or others.

7. Superiority over competitor condition

As stated above, we applied the Five Forces Analysis to rate this Indicator. Accordingly:

- We rated each of the five forces for each of the models as LOW, MEDIUM or HIGH.
- Suppliers have low bargaining power for the majority of the models, because they compete in mature markets.
- The score attributed to rivalry depends on the advantage offered by proximity. If many of the

services are out of the district it is difficult to operate them. In this case, rivalry must be rated as LOW. When proximity is not an advantage, the model must compete against competitors both online and from the city. In this case, rivalry is rated as HIGH.

- Once the service is established, the threat of new entrants will be LOW, because the small size of the direct market will discourage potential new entrants.
- The definitive score is calculated by subtracting to 5 all the forces that have been rated as HIGH. For each force qualified as MEDIUM, only a half point is subtracted.

Our knowledge and experience using the aforementioned criteria gave the scores shown in Table 3.

8. Entry barrier existence condition

Applying the general rubric (Table 1), we observed that the assessment would be low in general for this indicator, as there are no elements of significant differentiation or innovation that can be protected legally (patents) or network effects or other analogous mechanisms. Scores of 5 in this indicator are therefore meaningless.

For some of the models, the most significant protection comes from the size of the investment required, which, when targeting a reduced market, discourages potential competition. However, to take advantage of this fact, the first-mover advantage would have to be activated (reducing time to market, for example).

Mod	Substitutes	Suppliers	Competitors	Customers	New entrants	Score
A	LOW	LOW	LOW	HIGH	LOW	4
B	LOW	LOW	LOW (far)	HIGH	LOW	4
C	MEDIUM	LOW	LOW	HIGH	LOW	3.5
D	MEDIUM	LOW	HIGH	HIGH	HIGH	1.5
E	HIGH	LOW	HIGH	LOW	LOW	3
F	LOW	LOW	LOW	HIGH	LOW	4
G	LOW	LOW	LOW	HIGH	LOW	4
H	MEDIUM	LOW	HIGH	MEDIUM	MEDIUM	2.5
I	LOW	LOW	HIGH	MEDIUM	MEDIUM	2
J	HIGH	LOW	MEDIUM	HIGH	MEDIUM	2
K	HIGH	LOW	LOW	LOW	LOW	4
L	MEDIUM	MEDIUM	MEDIUM	HIGH	LOW	2.5
M	LOW	LOW	HIGH	HIGH	MEDIUM	2.5
N	MEDIUM	LOW	HIGH	MEDIUM	LOW	3
O	LOW	LOW	HIGH	MEDIUM	HIGH	2.5
P	HIGH	LOW	MEDIUM	HIGH	LOW	2.5
Q	HIGH	LOW	LOW	LOW	LOW	4
R	HIGH	LOW	MEDIUM	HIGH	LOW	2.5
S	HIGH	LOW	LOW	HIGH	LOW	3
T	MEDIUM	LOW	HIGH	HIGH	MEDIUM	2
U	MEDIUM	MEDIUM	LOW	LOW	LOW	4
V	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	3.5

Table 3: Scores for indicator 7 using the Five Forces Analysis (Porter 1980).

Therefore, we applied the following rubric:

- Rated with a score of 4: models that have network effects, or other similar effects, that would help a first mover to gain a competitive advantage.
- Rated with a score of 3: models that are easy to imitate but which have a considerable entry barrier given the volume of investment they require and the small market they serve.
- Rated with a score of 2: models that are easy to imitate but could have first-mover advantages at local level.
- Rated with a score of 1: easy to imitate models where it is difficult to establish any barrier to deter copies.

Evaluation Results

Table 4 sets out the score obtained by each of the models in each of the eight indicators on the scale, in line with the rules presented above.

The set of eight indicators evaluates each model briefly, but at the same time provides a wealth of information, given that it evaluates relevant criteria of a very different nature.

In any case, when evaluating a significant number of models in each of the indicators, an important volume of data is obtained (176 pieces of data). This volume may be hard to manage in some cases, such as when the goal is to prioritise the models and establish an order for their implementation. Therefore, it would be

		1	2	3	4	5	6	7	8	Avg.	Int.
A	Collective transport to the city centre	4.03	3	2.15	5	4	3	4	3	3.52	3.66
B	Launderette service	3.76	3	2.15	5	2	2	4	3	3.11	3.35
C	Car-sharing	4.45	3	2.13	3	4	2	3.5	3	3.13	3.52
D	Advisory service	3.45	4	1.59	4	2	1	1.5	2	2.44	2.73
E	Second-hand shop	4.17	4	2.21	5	3	2	3	2	3.17	3.52
F	Appliance rental store	3.66	2	1.93	5	3	2	4	2	2.95	3.25
G	Bike repair	4.10	4	2.12	5	4	1	4	2	3.28	3.64
H	General repairs	3.93	3	1.95	5	3	1	2.5	2	2.80	3.25
I	Elderly care	4.34	4	1.78	5	3	1	2	2	2.89	3.35
J	Fitness centre	4.00	2	2.23	5	3	4	2	3	3.15	3.36
K	Orchard rental	4.17	3	2.23	4	4	3	4	3	3.43	3.62
L	Reception of goods and delivery of packages	3.82	4	1.93	5	1	3	2.5	3	3.03	3.14
M	Local removal firm	3.25	5	1.52	5	5	1	2.5	2	3.16	3.19
N	Ambulance service	3.54	2	1.71	5	1	1	3	3	2.53	2.89
O	Property management	3.32	4	1.76	5	4	1	2.5	2	2.95	3.13
P	Bike sharing	4.46	2	2.40	4	3	2	2.5	3	2.92	3.47
Q	Service exchange platform	4.00	3	2.16	3	4	4	4	4	3.52	3.50
R	Take-away meals	3.82	2	1.97	5	5	3	2.5	3	3.29	3.45
S	Toy library	4.14	5	2.22	5	5	3	3	2	3.67	3.78
T	Household cleaning service	3.96	5	2.01	5	4	1	2	2	3.12	3.43
U	Central purchasing body	4.29	3	2.31	3	5	4	4	4	3.70	3.74
V	Rental of spaces for activities	4.07	4	2.16	5	5	4	3.5	3	3.84	3.80
		3.94	3.36	2.03	4.59	3.50	2.23	3.02	2.64	3.16	3.40

Table 4: Scores obtained by each model in each of the indicators on the scale, average scores and scores obtained through the emulation of intuitive assessment

necessary to obtain a sole (or brief) assessment for each model.

Next, we present two ways to obtain a sole evaluation of each model, using the set of scores obtained by the model in the eight indicators.

Average score

In this case, we obtained the sole model evaluation by averaging the assessment obtained by the model in the eight indicators. In practice, this meant giving the same weight to each of the eight indicators. Table 4 shows this evaluation in its penultimate column.

Intuitive assessment

Intuitive model assessment is deemed to be an evaluation that would be given without carrying out a detailed analysis like the one conducted here. Mateu and March-Chorda (2016) showed the correlation between their eight indicators evaluation and a purely intuitive assessment. This allowed us to estimate the intuitive assessment of a model as a linear combination of the scores obtained by this model in each of the eight indicators on the scale.

$$E_i = \sum_j p_j E_{ij}$$

Where:

E_i is the intuitive assessment of the model i

P_j is the weight assigned to indicator j in the linear combination (j takes values between 1 and 8).

E_{ij} is the rating of the model i in indicator j (in our case they are the numbers showed in Table 4 for each of the models)

Table 5 shows the weights that Mateu and March-Chorda (2016) found when emulating the intuitive assessment through this linear combination of the eight indicators on their scale. As we can see, indicators 1 and 3 were the ones that received greater consideration or greater weight.

Table 4 shows the intuitive assessment of the models in its last column, by means of the linear combination and the weights included in Table 5.

Indicator	Weight
1. Value creation	0.33
2. Complete value proposition	0.04
3. Sufficient size of the market	0.25
4. Access to the potential customer	0.10
5. Willingness to make an effort	0.05
6. Affordable costs	0.05
7. Superiority over competitors	0.12
8. Entry barriers existence	0.10

Table 5: Weights for each indicator in a sole evaluation that emulates intuitive assessment, through a linear combination of the eight indicators put forward by Mateu and March-Chorda.

Discussion

Figure 1 shows the original models according to both aggregation profiles (*average score* and *intuitive assessment*). It shows the most highly rated models in the upper right quadrant. They are models A, G, K, Q, S, U and V.

By contrast, the evaluated models with the poorest results appear in the lower left quadrant. They are models D and N.

In any case, Table 4 and Figure 1 respond to the specific objectives established, that is, to evaluate the potential viability of the different models and facilitate their prioritisation, thus becoming the most useful tool for the managers of the project.

This can also be a starting point for additional research on the improvement of the business models. The score obtained by many of the models in indicators 3, 6 and 8 points to the need to improve the business models in certain directions:

- 1. Are there new customer segments we could serve?** The most obvious response is to expand the target audience of the services, offering these services to potential customers outside the district. This will have advantages and disadvantages that need to be taken into account in order to reformulate (to improve) the models.
- 2. Another question that can give us clues for improvement is: are there activities we would be better outsourcing to partners?** To a certain

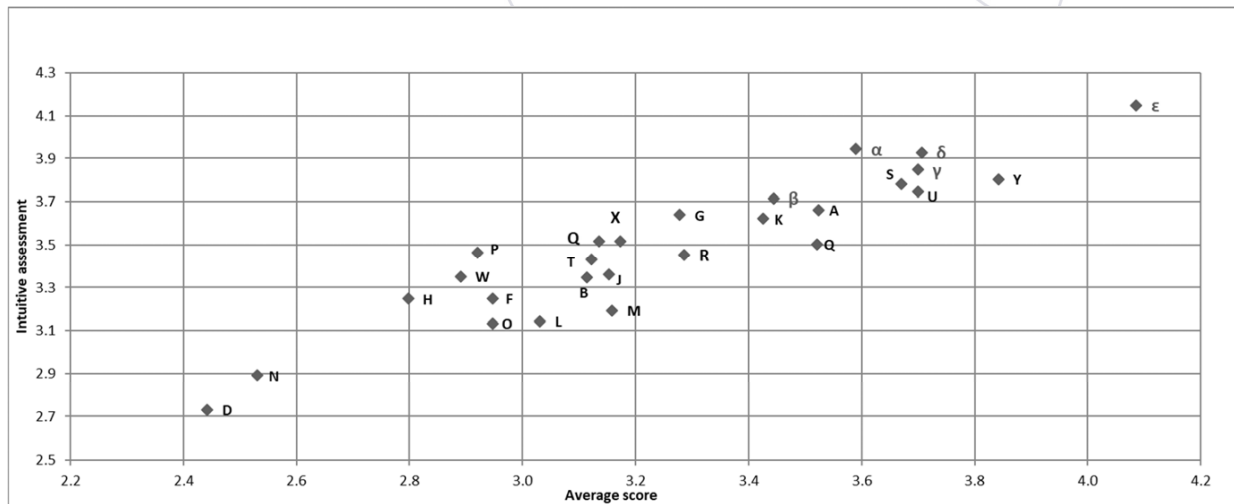


Figure 1: Presentation of the models according to their average score and their intuitive assessment

extent, this dovetails with the following: are there key resources that could be provided more efficiently and/or cheaper by suppliers or partners?

3. Are there ways we could reduce our cost structure? This is an important question which, given the impossibility of applying economies of scale when the target audience is so small, we could change as follows: can we activate alternative economies in order to reduce costs?

The last of these suggestions (the search for economies of scope) points to the need to reformulate the models with a broader perspective instead of simply improving the elements of the model independently. In other words, in order to find more effective ways to improve the models, with fewer disadvantages, we must take into consideration the systemic effects derived from the interaction of the different elements in the business model.

There are several logics or mechanisms which explain the low score obtained by many of the models in indicators 3, 6 and 8. They include the following:

1. The threat of not reaching the critical mass, and consequently the viability threshold, due to the lack of clients.
2. Incurring high unit costs due to the lack of customers and, as a consequence, implying that the necessary resources work below their optimum activity level.

3. The difficulty to incorporate certain key resources due to the impossibility of assuming their cost. This would be the case of certain members of staff; perhaps not in operational tasks but certainly in organisational tasks (executive staff).

In view of these mechanisms, solutions emerge not related to increasing the size of the target audience, but to sharing certain resources or by synchronising certain activities across different models, in line with the search for the aforementioned economies of scope.

For instance, the unqualified staff required by the Household cleaning service (model T) could manage the Launderette service (model B) when they did not have to perform the previous task. Something similar could be applied to the staff in charge of the Appliance rental store (F), the Second-hand shop (E) or the Bike repair service (G). Sharing and optimising human resources can in this case also be extended to material resources, such as physical space, maintenance tools or other kind of equipment.

This sharing of resources could, if not neutralise, at least palliate the threats discussed above:

1. The critical mass should not be reached for a given service, but for a specific resource, by sharing it among several services.
2. More efficient use of resources would reduce downtime, increasing the percentage of time actually

spent on customers. Lower prices could thus cover the cost of resources, by not having to finance idle time in those resources.

3. The margin for administration and organisation, extended to the group of jointly managed services, would allow financing more efficient human resources for these tasks. This would mean increasing management knowledge, and enabling virtuous systemic circles to be activated that would ensure the viability of the services.

Based on this analysis, we grouped most of the services initially proposed into five higher level services (those shown in Table 6). The names proposed are merely illustrative. We have assigned codes consisting of Greek letters to differentiate them from those used in the initial services. Some of the original models are not grouped.

An interesting fact can be highlighted here. During our research for a robust method to evaluate business

models before their implementation we found a strong tool to improve business models before their implementation or, in other words, to improve business model design. All of this thanks to the details provided by Mateu and March's methodology and our improvements.

Conclusions and Future Developments

In this paper we have tackled the issue of choosing the most promising business models before implementing them. To do this, we chose Mateu and March-Chorda's business model evaluation methodology. Their eight independent indicators enabled us to break down their scale and use the most suitable ways to rate each of the eight indicators on the scale. In fact, the varying nature of each indicator suggested the most suitable way to rate each one. Table 7, summarises the ways we defined to award a score to each of the indicators, thus improving this useful evaluation method.

Code	Service/Model and description	Models	1	2	3	4	5	6	7	8	Avg.	Int.
α	La Pinada, Mobility This could group the services oriented to facilitate the sustainable mobility of the residents	A, C, N and P	4.62	3	2.60	5	4	3	3.50	3	3.59	3.94
β	La Pinada, Professional services This could group the services that require qualified staff	D, G, H and O	4.20	4	2.35	5	4	2	3.00	3	3.44	3.72
γ	La Pinada, Personal services This could group the services that require low qualified staff	B, I, J, M and T	4.36	5	2.44	5	4	3	2.80	3	3.70	3.85
δ	La Pinada, Circular economy This could group the services oriented to facilitate savings and the efficient and sustainable use of long-lasting products	E and F	4.41	4	2.57	5	4	3	3.67	3	3.71	3.93
ϵ	La Pinada, Community resources Focused on managing community resources	K, L, S and V	4.55	5	2.64	5	5	4	3.50	3	4.09	4.15
			4.43	4.20	2.52	5.00	4.20	3.00	3.29	3.00	3.71	3.92

Table 6: Proposal of grouped or higher-level models

Indicator	Description	Scoring
1	Value creation condition	Research into potential market/ lead users (survey or others)
2	Complete value proposition condition	By experts
3	Sufficient size of the market condition	Research into potential market/ lead users (survey or others)
4	Access to the potential customer condition	By experts
5	Willingness to make an effort condition	By experts
6	Affordable costs condition	Five Forces Analysis by experts
7	Superiority over competitor condition	By experts
8	Entry barrier existence condition	By experts

Table 7: Improved business model evaluation method summary.

The set of eight indicators provided a wealth of information. It allowed us to explore and propose an interesting way to improve the case study's original business models, thus grouping them into higher level business models.

We provided two ways to offer a sole assessment for each model, departing from the information provided in the eight indicators: average score and intuitive score (using a linear combination also provided by Mateu and March-Chorda). This suggests a possible field for future research, based on new specific profiles for evaluation. What weightings would experts give to different indicators (expert profile)? Which evaluation profile could highlight the models with the greatest potential for extraordinary profit (or extraordinary losses)? Conversely, which evaluation profile could highlight the most conservative models (those that will probably generate little profits or small losses)? Identifying new and useful evaluation profiles suggests an interesting

and fruitful avenue for improving decision-making paradigms.

A more ambitious line of research would be to compare the ex-ante evaluation obtained by each potential business model with the results of the model after implementation, although this possibility would only be possible for business models that had been effectively implemented.

In summary, we refined and improved Mateu and March-Chorda's ex-ante business model evaluation methodology, making the measurements calculated for each indicator more accurate and credible. This refined and improved methodology is useful when a set of business models has to be evaluated and ordered. We applied this methodology to a set of business models to be used in a new Sustainable Smart District, thus drawing interesting conclusions, though this method can also be applied in a broad spectrum of other situations.

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Appendix 1: Example of business model description (Model C.- Car sharing)

1. What need does the model address? What problem does it solve? What wants does it satisfy?	It offers a personal mean of transport available by hours.					
What value attributes complement the value proposition?	It avoids the need to have a personal car, or use it systematically. It uses low pollutant and low consumption electric cars.					
To what extent does it meet the need or solve the problem	It can avoid the purchase of a car, which is a major expense.					
2. Is it a need or want shared by most of the residents or only by some of them?	It is probably a broadly shared want or need.					
Could the model serve residents outside the neighbourhood?	Initially not, maybe depending on which areas it could be used in.					
3. How is the service provided? (describe the system and resources required to provide the service)	It depends on whether we work together with a company in the sector or we decide to start from scratch. Investment is greater in the second scenario, as we would have to buy cars and create the platform. In the first scenario, the cost is smaller.					
3.1. How difficult would it be to start up and run the service? What particularly complex elements does the model require?	It would be complex because cars would have to be bought, the platform created, areas of use defined and rates established, etc.					
3.2. What initial investments does the model require for start up? (include an estimate if known)	Depending on the model, the investment could be very high.					
3.3. What are the main recurring costs associated with the provision of the service? (include an estimate if known)	Maintenance of the platform, vehicles, and customer service system.					
3.4. Will the model compete with the service provided by companies outside the neighbourhood that offer an analogous service?	Direct competition: people who prefer to have their own car, and public transport.					
4. Would the potential customer be ready to pay the price and put in the effort required by the new business model?	Probably.					
Which of these income formulas are contemplated in the model (either exclusively or simultaneously)?	Free for all Periodic fee (flat rate) Pay per use Other (to specify)	<table border="1"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>X (*)</td></tr> <tr><td> </td></tr> </table>			X (*)	
X (*)						
	(*) A one-off payment plus a payment based on kilometres travelled					

Appendix 2: Survey

We would like to find out your opinion about some services that we are thinking of setting up in the neighbourhood. All of them will feature the environmental and social concerns that characterise the project. It is also important to know how useful you would find these services, and if you would use them.

We would like you to rate these services with a score ranging from 1 to 5, depending on how useful they would be to you. Give a score of 1 to those services you find totally useless, a score of 5 to those that you would find totally useful, or scores 2, 3 or 4 for intermediate ratings.

Let us show you an example. Choose the answer that best fits how useful you would find a service that consists of...

... a means of public transport (bus), with a set timetable, which connects the neighbourhood with several key places in Valencia					
	Of no use at all	Of limited usefulness	Of average utility	Quite useful	Extraordinarily useful
	1	2	3	4	5

For this service, please answer this question as well: would you use this service if it was available at a reasonable price? (select the option that best describes your willingness to use it).

... a means of public transport (bus), with a set timetable, which connects the neighbourhood with several key places in Valencia	I would not use it	I would use it occasionally	I would use it sometimes	I would use it very often	Always or almost always
	1	2	3	4	5

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Dr José M. Mateu completed PhD in Management, Degree in Civil Engineering and Master's Degree in Business Strategy. He worked for more than 20 years in the private sector, where he held management positions in different sectors, such as aeronautics, telecommunications and consulting. He taught Strategy and Marketing at several business schools in Spain, and was in charge of a couple of public initiatives aimed to support entrepreneurs. He wrote nine books about entrepreneurs, business creation and marketing, and recently returned as a Lecturer to the Academia, where he teaches Air Transport Exploitation, at the Universitat Politècnica de València. His PhD Thesis was framed in the field of Business Model Innovation, and he has published some articles about this subject in prestigious journals.



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Designing Performance Measurement Systems Using Business Models

Marco Montemari¹, Maria Serena Chiucchi², Christian Nielsen³

Abstract

Purpose: The purpose of this paper is to explore how business models (BMs) can guide the design of a performance measurement system (PMS) and to shed light on the advantages and disadvantages of using BMs as a platform for designing a PMS and identifying key performance indicators (KPIs).

Design/Methodology/Approach: First, a normative approach is adopted to both reflect on the process leading from BMs to KPIs and highlight the role of concrete BM tools that management can use in this process. Second, a case study illustrates the applicability of the process and explores advantages and disadvantages that may arise when using the BM as a basis to identify KPIs.

Findings: Designing KPIs from the BM increases the relevance of the resulting PMS. Furthermore, BM tools support the identification, coordination, and prioritization of value drivers (VDs) (and the related KPIs), increasing the likelihood that managerial choices are focused on corporate value creation. However, the path leading from the BM to KPIs is strenuous and complex and it requires an in-depth knowledge of BM tools.

Research limitations/Implications: While the general limitations of case-based research should be acknowledged, the wider-ranging implications of the research are important not only for BM researchers, but also for scholars and practitioners working with management control.

Practical Implications: The paper describes a practical implementation process that managers can use to map their company's BM, to identify and organize VDs, and, from that design, KPIs. This process has the potential to support the decision-making process in choosing relevant KPIs based on the BM, to aid in the management of the company's performance and to help manage, innovate, and benchmark the BM itself.

Originality/Value: This paper advances our knowledge by addressing the usefulness of BMs from a performance measurement perspective.

Keywords: Business models, Business model configurations, Performance measurement systems, Key performance indicators, Benchmarking.

Please cite this paper as: Montemari, M., Chiucchi, M. S., Nielsen, C. (2019), Designing Performance Measurement Systems Using Business Models, Vol. 7, No. 5, pp. 48-69

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Introduction

The intricate connection between key performance indicators (KPIs) and results, whatever the type achieved, has been expressed by many scholars over the last decades:

- “What you measure is what you get” (Kaplan and Norton, 1992, p. 71)
- “You get what you measure and reward” (Wallace, 1997, p. 290)
- “What gets measured, gets done” (Otley, 1999, p. 368)
- “If you want to manage it, you’ve got to measure it” (Lyons, Gumbus and Bellhouse, 2003, p. 35)
- “What you don’t measure you’ll never know until it’s too late” (Adams and Neely, 2000, p. 19)
- “If your performance measures do not reflect your business model, then you’re probably not getting what you bargained for” (this paper).

The business model (BM) concept has caught and held the attention of academics and practitioners over the past fifteen years (Fielt, 2013; McGrath, 2010; Zott, Amit and Massa, 2011), as evidenced by the plethora of frameworks and tools devised to design (Chatterjee, 2013; Ricart, 2011) and innovate (Gassmann, Frankenberger, and Csik, 2014; Taran, Nielsen, Montemari, Thomsen and Paolone, 2016) BMs in companies. Recent reviews (cf. Foss and Saebi, 2017; Nielsen, Lund, Montemari, Paolone, Massaro and Dumay, 2018; Wirtz, Göttel and Daiser, 2016) underscore the maturity of the field. Scholars have addressed issues such as which BMs work best in various contexts (Chesbrough, 2007; Jansson, Ahokangas, Iivari, Perälä-Heape and Salo, 2014), and which ones generate the highest value (Peyton, Lueg, Khusainova, Iversen and Panti, 2014; Yrjölä, 2014), are sustainable (Bocken, Short, Rana and Evans, 2014), or offer scalability opportunities (Nielsen and Lund, 2018; Sang Un Chae and Hedman, 2015; Thompson and MacMillan, 2010). There has also been recent interest in understanding what happens when internal elements of the business model change (Demil and Lecocq, 2010; Lund and Nielsen, 2014), and what happens to it when the external environment changes (Cavalcante, 2013; Wei, Yang, Sun and Gu, 2014).

As has been argued from multiple perspectives, it is evident that the features of BMs significantly affect

the performance of companies (Rédis, 2009; Zott and Amit, 2007, 2008). Nielsen, Roslender and Bukh (2009) and Nielsen and Montemari (2012) further argue that a BM is the natural platform upon which the organization operationalizes and executes its strategy. This point is stressed by Osterwalder and Pigneur (2010), who note that BMs essentially describe how value is created, delivered, and captured. Adding complexity to the matter, Taran *et al.* (2016) argue that when companies compete using different BM configurations, they are not creating value in the same manner and thus, will likely have different value drivers (VDs). Therefore, BMs ought to have important implications for the design and implementation of performance measurement systems (PMSs). However, questions remain about how that coupling is created. Answering such questions offers an important contribution to furthering our knowledge of how to manage different types of BMs.

Currently, no studies have explicitly addressed the link between BMs and PMSs. In fact, there has been little discussion about how the BM perspective can support performance measurement and management at all (Montemari and Chiucchi, 2017; Nielsen *et al.*, 2009; Nielsen and Roslender, 2015), despite a common understanding that the BM is useful for identifying VDs and for extracting key performance indicators (KPIs) (Bititci, Garengo, Dörfler, and Nudurupati, 2012; Hoque, 2014; Melnyk, Bititci, Platts, Tobias, and Andersen, 2014), especially from the abstraction-level of taxonomies (Nielsen, Lund and Thomsen, 2017). Hence, the research question guiding this paper is: How can BMs guide the design of a PMS?

By adopting a normative approach to understand the process leading from BM design to performance measurement, and by illustrating this with a case study, this paper explores the advantages and disadvantages of utilizing BMs as a platform for designing PMSs. The structure of the remainder of the paper is as follows. Section 2 presents theoretical perspectives relating to BMs and KPIs, Section 3 describes the method chosen to answer the research question, Section 4 describes the process leading from BM to the design of a PMS, Section 5 presents the case study, and Section 6 discusses the findings of the paper and concludes by highlighting the main contributions.

2. Theoretical perspectives

To understand how PMSs are designed, this paper analyses the links between BMs, VDs and KPIs. This section initially outlines the connection between VDs and KPIs before discussing the link between BMs and VDs.

The relevance of value drivers for identifying key performance indicators

Since the seminal piece by Johnson and Kaplan (1987) entitled "Relevance Lost - The Rise and Fall of Management Accounting", the theme of multidimensional performance measurement has caught the attention of academics and practitioners alike. Prior to Johnson and Kaplan's work, PMSs were focused only on the financial aspects of performance, that is, on costs and efficiency, and this hindered their ability to capture other fundamental dimensions of performance, such as innovation, customer satisfaction, personnel competencies, product and process quality, and timeliness. This drawback led to the proliferation of PMSs aimed at measuring both financial and non-financial dimensions of performance, such as the Balanced Scorecard (Kaplan and Norton, 1992), the Smart Pyramid (Lynch and Cross, 1991), and the Performance Prism (Neely, Adams and Kennerley, 2002), to name a few.

Following this notion, a PMS can be defined as a set of KPIs used to quantify both the efficiency and the effectiveness of managerial actions (Neely, Gregory and Platts, 2005, p. 1129). The use of KPIs is widespread in contemporary companies (Bititci *et al.*, 2012, p. 305) in guiding the decision-making process of managers to improve value creation (Kaplan and Norton, 2004). KPIs "selected for their perceived ability to give information beyond the number per se" (Catasús and Gröjer, 2006, p. 188), can be used as inputs for the managerial decision-making process. In other words, KPIs are devices for intervening with people, objects, and processes; this implies that when KPIs are present, specific actions are expected (Miller and O'Leary, 2002). KPIs should therefore not merely conform to a description of past events, but should assist managers in making sense of the present and outlining future trajectories (Mouritsen, 2004).

KPIs can be of a financial or non-financial nature (Johnson and Kaplan, 1987). Financial KPIs are expressed in monetary units and typically stem from income

statement or balance sheet components. They may provide management with information on profitability, sales, costs, and liquidity across relevant dimensions of performance (product lines, channels, customers, geographical areas). Non-financial KPIs are not expressed in monetary units and typically assess the activities that a company deems relevant to achieving its strategic objectives. Like financial KPIs, non-financial KPIs may express dimensions such as resources, activities, and effects, despite the non-monetary unit (Nielsen, Bukh, Mouritsen, Rosenkrands, Johansen and Gormsen, 2006). Typical non-financial KPIs concern customer relationships, employees, operations, quality, cycle-time, and innovation.

As mentioned at the beginning of the section, research has highlighted the need to balance financial and non-financial KPIs to effectively measure a company's performance (Eccles, 1991; Kaplan and Norton, 1992; Lynch and Cross, 1991; Nanni, Dixon and Vollmann, 1992). This need stems from the inability of financial KPIs to adequately represent company performance by themselves (Lev, 2001). One of the problems with financial KPIs is that they are lagging measures, meaning that they merely measure outcomes of managerial actions, taking focus away from what actually generates the results (Kaplan and Norton, 1996). Non-financial KPIs, on the other hand, typically represent leading measures, as they capture the causes of the company's success (Eccles, 1991). In a sense, leading non-financial indicators "drive" the results of the lagging financial indicators.

According to Nielsen *et al.* (2017), identifying the VDs that affect performance is an important step in the identification of KPIs. A value driver refers to any factor that influences the total value created by a company (Montemari and Nielsen, 2014), and it is with reference to these factors that measurement should take place. Ferreira and Otley (2009) argue that a VD is a key activity, competency, or attribute that is considered a critical prerequisite for the success of an organization. Therefore, the identification of VDs and the alignment between VDs and KPIs are considered a critical stage in several performance measurement frameworks proposed in the literature (Franco-Santos, Kennerley, Micheli, Martinez, Mason, Marr, Gray and Neely, 2007, pp. 797-798; Neely *et al.*, 2005, p. 1231). It is important to underline that

different labels have been adopted to describe and discuss VDs in the literature. Kaplan and Norton (1996, p. 116) use the term “critical performance attributes” (e.g. channel mix, cash-to-cash cycle, image and reputation, customer relationship, employee capabilities) to identify VDs and classify them into the Balanced Scorecard’s four perspectives (customer perspective, internal perspective, innovation and learning perspective, financial perspective). Dixon, Nanni and Vollmann (1990, p. 29) use the notion of “performance drivers” (e.g. integration with customers, new product introduction) in their Performance Measurement Questionnaire (PMQ) aimed at assessing whether a company’s PMS encourages continuous improvement. Finally, Neely, Adams and Crowe (2001, p. 8) use the term “strategic strands” to develop KPI categories based on the five facets of their Performance Prism (stakeholder satisfaction, strategies, processes, capabilities, stakeholder contribution).

According to Chartered Global Management Accountants (2013, p. 54), KPIs that are well designed are able to grasp the company’s VDs, catch managerial attention and create guidelines for action, thus increasing the likelihood that the KPIs will be used for managerial purposes (Neely, Richards, Mills, Platts and Bourne, 1997). Even though defining what really matters to companies may appear simple to managers, research has shown that mistakes are often made in this crucial stage (Neely *et al.*, 2005; Neely and Bourne, 2000). This decreases the effectiveness of the PMS as a whole (Bourne, 2008), reducing its ability to guide the managerial decision-making process.

Thus, the ability to express the company’s value creation process and identify the VDs and how they combine with one another is particularly relevant in the design and selection of useful KPIs (Bukh, 2003, p. 50; Montemari and Nielsen, 2013, p. 537; Neely, Mills, Platts, Richards, Gregory, Bourne and Kennerley, 2000, p. 1121). Consequently, it is important to use frameworks that are capable of uncovering those VDs that managers can influence, because this will allow performance to be steered (Neely and Bourne, 2000, p. 4).

Identifying and organizing value drivers through business model tools

BMs enable an understanding of how value is created, delivered, and captured (Osterwalder and Pigneur,

2010). In particular, the BM concept allows entrepreneurs and managers to conceptualize the company as a set of interrelated strategic choices concerning: 1) the target customers; 2) the value proposition offered to the target customers; 3) the channels used to reach the target customers; 4) the relationships to develop with the target customers; 5) the key activities and key resources needed to develop the value proposition; and, 6) the partners needed to access key activities and key resources (Morris, Schindehutte, and Allen, 2005). By considering these aspects, the BM concept links the company’s strategic initiatives with the processes and activities that lead to the delivery of value. We call these VDs. Different companies have different sets of VDs, depending on what they need to deliver to customers.

According to McGrath (2010), companies create value in different ways because they adopt different BM configurations that in turn rely on different VDs. BM configurations are considered ideal-type examples that describe the behaviour of companies with certain characteristics operating in the real world (Baden-Fuller and Morgan, 2010; Baden-Fuller, Guidici, Haefliger and Morgan, 2017), thus providing managers, practitioners, and academics with formulas that have already been tried and tested in practice (Gassmann *et al.*, 2014; Taran *et al.*, 2016). For instance, “channel maximization” (Linder and Cantrell, 2000) is a BM configuration focused on creating a broad distribution of the offering by using as many channels as possible. An example of this BM configuration in action is the Coca Cola Company, which uses all the possible channels (small retailers, large retailers, corner shops, restaurants, etc.) to ensure the availability and visibility of its brand to the customers and to increase market share. Core VDs of this BM configuration include the company’s own channels and the network of partner channels, as well as all the activities around channel development (channel scouting and channel contracting) and outbound logistics management (Taran *et al.*, 2016).

By contrast, “disintermediation” (Johnson, 2010) is a BM configuration that aims to deliver the offering directly to the final customer through the company’s own retail outlets, sales force, or web sales, rather than through intermediary channels such as distributors, wholesalers, retailers, agents, or brokers. Dell, for

example, cuts out the retailer and uses customer relationship management (CRM) approaches to capture data on customers' preferences and then respond with the desired products before its competitors can. The main feature of this BM configuration concerns sales of the product exclusively through the company's own channels. Thus, a key VD in this case is establishing close contacts with the customers through personal sales experience so that they can enjoy attractive lower prices, superior service, and customization of the product/service (Dane-Nielsen and Nielsen, 2017).

As illustrated above, different BM configurations have different value creation logics and therefore activate very different sets of VDs. While BM configurations play a relevant role in identifying the VDs of a given company, the Business Model Canvas (Osterwalder and Pigneur, 2010) is a useful tool when it comes to visualizing and organizing the VDs. The nine blocks of the Business Model Canvas pertain to the four main areas of a business: customer interface (customer segments, channels, customer relationships), products and services (value proposition), infrastructure (key activities, key resources, key partnerships), and financial viability (revenue streams, cost structure). Positioning VDs on the Business Model Canvas reveals which building blocks they relate to, which may in turn draw attention to the building that deserve closer managerial focus. More importantly, the Business Model Canvas illustrates how the building blocks are related to one another (Osterwalder and Pigneur, 2010).

For example, VDs associated with "channel maximization" (Linder and Cantrell, 2000) mainly relate to channels (own channels and partner channels), key activities (channel scouting, channel contracting, and outbound logistic management) and key partnerships (network of partner channels). These three building blocks are closely connected with one another in this BM configuration. A managerial action regarding a key activity (e.g. improving channel scouting) is likely to also impact the channels (e.g. increasing availability and visibility of the brand through new channels) and key partnerships (e.g. growing the network of partners). On the other hand, VDs linked to the "disintermediation" BM configuration (Johnson, 2010) are mainly related to channels (company own channels) and customer relationships (close contact with the customers). Here too,

the relationship between these two building blocks is very intense, because a managerial decision concerning channels (e.g. activating a new company own channel) is likely to influence customer relationships (e.g. the opportunity to collect additional data on customers' preferences through that new company own channel).

The literature on BMs recognises that BMs significantly affect a company's performance (Rédis, 2009; Zott and Amit, 2007, 2008). Nielsen *et al.* (2009) recognize the usefulness of BMs for linking relevant KPIs to company strategy and Nielsen and Roslender (2015, p. 265) further argue that they have the potential to enable the "entangling of indicators". Entanglement is an important process that decreases the risk that individual KPIs will end up being uncoordinated and unrelated to the company's means of value creation. McGrath (2010) and Nielsen and Montemari (2012) acknowledge that BMs help managers design KPIs that reflect the critical dimensions of firm performance, providing information on what can increase or decrease a company's competitiveness. Montemari and Chiucchi (2017) further recognize that BM configurations can enable the transition from BM to measurement through strategic themes, i.e., an intermediate level of analysis that acts as a bridge between the BM and the items to be measured. Montemari and Chiucchi (2017) thus call for further research on the use of BM tools for measurement purposes.

While it is recognized that BMs can be useful structures for the purpose of identifying relevant KPIs, the current research is still in an early phase. As argued by Bromwich and Scapens (2016, p. 6):

A current 'hot topic' in practice is business models. While much of the content of these models is based on management accounting information, accounting researchers do not seem to be particularly interested in the area. If researchers are to contribute to new practical innovations they need to become involved earlier in the life of those innovations.

Hence, there is a gap regarding the relationship between BMs and performance measurement, as well as a need to understand the process that leads from BMs to performance measurement (Heikkilä, Solaimani, Soudunsaari, Hakanen, Kuivaniemi and Suoranta,

2014; Montemari and Chiucchi, 2017; Nielsen *et al.*, 2017). In light of this, the contribution of this paper is to answer the following research question: How can BMs guide the design of a PMS? In so doing, the paper also explores the advantages and disadvantages of utilizing BMs as a platform for designing PMSs.

Methodology

In order to answer the research question, this study followed a two-step process. First, to fill the gap identified in the literature above, a normative approach was adopted, identifying the potential steps in the process that can lead from BMS to KPIs and highlighting the role of BM configurations and the Business Model Canvas. Such an approach is appropriate for the purpose of prescribing tools, models, standards, and procedures, and recommending how things should be conducted (Ryan, Scapens and Theobald, 2002). In the second phase, the study applied this process to the data collected in a case study in order to test the applicability of the process and to identify advantages and disadvantages. The case study was conducted on two companies that jointly deliver a mobile tracking service. It is illustrative in nature (Berg and Lune, 2012, p. 338), as it aims to apply the process leading from BMs to performance measurement in a concrete setting and to study enablers and barriers that may be encountered when using BMs for performance measurement purposes.

The case was chosen purposefully (Patton, 1990) because these two companies needed to measure their performance and were in the process of designing systems for this purpose (Lund, 2014). In particular, there was frustration resulting from a lack of understanding of the value creation process and both companies were experiencing difficulty identifying and managing their VDs.

Data collection

The basis for this case study consists of four semi-structured interviews conducted with the main actors of the companies involved. This data collection method was chosen because it provides the interviewer with a high degree of flexibility. In particular, the researchers can pay attention to key themes that surface during the interview, increasing their ability to explore the reasoning behind the respondents' actions and interpretation

of reality (Kvale and Brinkmann, 2009; Qu and Dumay, 2011). Important themes were identified and formed the main sections of the interview guide:

Single company level:

1. the company's background and overall business;
2. the main factors that affect the value creation of the company and how they are linked to one another;
3. KPIs used in the managerial decision-making process.

Mobile tracking service level:

1. the company's aims in the mobile tracking service;
2. the company's role in the mobile tracking service;
3. the main factors that affect the value creation of the mobile tracking service and how they are linked to one another.

The interviews made extensive use of reflective questions by asking the interviewees for examples, stories, and anecdotes to accompany the points being made, as suggested by Kreiner and Mouritsen (2005). This encouraged the respondents to provide detailed information and, in turn, triggered other related stories and thoughts. The aim of this process was to understand how the value creation logics came "into action" in the companies.

Data analysis

The interview transcripts were analysed through a structural coding approach (Krippendorff, 1980); a coding tree reflecting the key themes of the interview guide was applied to the interview transcripts. This coding approach allowed us to identify the BM configuration (and the related VDs) of the mobile tracking service, using the BM configurations portfolios suggested by Gassmann *et al.* (2014) and by Taran *et al.* (2016). Next, a Business Model Canvas of the mobile tracking service was constructed in order to highlight the crucial aspects of its BM configuration and to reveal where (in and between which building blocks) the VDs were coming into action. Finally, the resulting Business Model Canvas was used as a platform to design KPIs aimed at measuring the VDs deployed when delivering the mobile tracking service.

The process leading from business models to the design of a performance measurement system: the role of business model tools

This section explores the process leading from the BM to the design of a PMS; it identifies the key steps and highlights the role of BM configurations and the Business Model Canvas. The proposed process consists of four steps (Figure 1):

The aim, rationale, and characteristics of each step are described below:

1. Matching the company's BM to one or more BM configurations and identifying the relevant VDs

The aim of this step is to identify the BM configurations and VDs that most closely resemble the company's BM, i.e., its strategic objectives, how the company operates, and the distinguishing elements of its BM. This is an important phase because different BM configurations have different value creation logics and thereby utilize different sets of VDs. This means that each BM configuration results in a different set of VDs. BM configurations, therefore, guide and facilitate the identification of a given company's VDs – a critical prerequisite to performance measurement. Several portfolios of BM configurations have been proposed in

the literature (Linder and Cantrell, 2000; Rappa, 2001; Johnson, 2010; McGrath, 2010; Osterwalder and Pigneur, 2010). The most complete BM configuration approaches to date are those used by Gassmann *et al.* (2014) and by Taran *et al.* (2016), who present lists of 55 and 71 BM configurations, respectively. These portfolios offer a variety of BM configurations to choose from and provide a frame of reference for the different value creation logics (and the related VDs) that can be adopted by companies. Once the company's BM is matched to one or more BM configurations, a list of relevant VDs distinguishing the chosen BM configuration(s) can be drawn up. Information used to identify the BM configurations can be collected through interviews and focus groups with key company representatives who possess in-depth knowledge of the company's strategy and operations.

2. Positioning the VDs according to the building blocks of the Business Model Canvas

Once the relevant VDs are identified, a Business Model Canvas can be constructed in order to identify where (in and between which building blocks) the VDs come into action and therefore, also who in the company holds the levers to manage certain VDs. This enables practitioners to highlight those building blocks that deserve closer managerial attention.

1. Matching the company's BM to one or more BM configurations and identifying the relevant VDs

2. Positioning the VDs according to the building blocks of the Business Model Canvas

3. Establishing KPIs in order to measure VDs

4. Interpreting the KPI trends and the relationships among them to manage the company's performance and to manage, innovate, and benchmark the BM

Figure 1: The process leading from BMs to measurement

3. Establishing KPIs in order to measure VDs

The aim of this step is to establish KPIs that should be positioned in, and potentially, between the building blocks of the Business Model Canvas. In this step, the performance measurement literature on rules and guidelines for designing KPIs can be helpful. For instance, combining the principles identified by Globerson (1985) and Maskell (1989), the design process should take into account the following:

- a. the purpose of each KPI must be clear;
- b. it is more advisable to use ratio-based KPIs than absolute numbers;
- c. it is more advisable to use objective KPIs than subjective ones;
- d. non-financial KPIs should be adopted;
- e. KPIs should be simple and easy to use;
- f. KPIs should provide fast feedback;
- g. KPIs should be under the control of the evaluated organizational unit;
- h. KPIs should be designed to stimulate continuous improvement rather than simply monitor;
- i. KPIs should foster benchmarking among companies that operate in the same business;
- j. KPIs should change if circumstances change.

At this stage, it is beneficial to pinpoint relationships among KPIs, and particularly to understand which KPIs are leading and which are lagging.

4. Interpreting the KPI trends and the relationships among them in order to manage the company's performance and to manage, innovate, and benchmark the BM

The aim of this step is to exploit the information content of the KPIs in three interrelated ways:

- a. by guiding managerial decision making towards the pursuit of the company's strategy, i.e., defining strategic objectives, defining actions to achieve these objectives, and assessing the extent to which the objectives have been achieved;
- b. by identifying and managing strengths and weaknesses in the BM and evaluating the validity of the strategy, i.e., highlighting opportunities to innovate the BM;
- c. by benchmarking the performance of the BM against similar BMs.

It is important to highlight that the four-step process presented here should not be considered prescriptive for any given situation. Rather, a flexible and iterative approach is required when applying the process in order to take into consideration the features of the company concerned and the information needs of its management.

The illustrative case study

Description of the mobile tracking service

The mobile tracking service aims to use location data through a technological platform that can track mobile devices with activated Bluetooth senders, thereby generating anonymous information on the geographic location of people at any given point in time. The location data on people's movements has the potential to be highly valuable for retailers, real estate companies, retailers' associations, and shopping malls in order to support their marketing and managerial decision-making processes. For example, a shopping mall manager may be interested in having information on how long people stay in the shopping mall, how much time people spend in each area of the shopping mall, which path people follow around the shopping mall, how they get to the shopping mall, where people start their shopping trip, and where they walk to afterwards. The availability of this information has the potential to improve the mall manager's decision-making process with regards to staffing, shop locations and shop mixture, advertising panel locations, and the pricing of leasing contracts.

The provision of this service involves two main actors: Detector and Consultant. Detector is the technology provider for the service, as it has created and continues to improve upon technological solutions for detecting people's movements and flows. Using its technological competencies, Detector produces the Bluetooth senders that track mobile devices within a given area. Consultant is the channel through which Detector reaches its market. Through its commercial competencies, Consultant needs to understand the final customer's needs, explain the advantages of using Detector's technological solution, and support Detector in improving the tracking system by discovering the needs of the customers and by validating the precision of the software/technology. In other words, Consultant

is the bridge between Detector and the final users of the location data. Detector and Consultant create economic value through the sale of the Bluetooth senders and the related consulting hours needed to support and maintain the technological platform.

This brief description of the mobile tracking service illustrates the intensity of interactions between the involved companies as their technical and commercial competences can foster (or hinder) value creation. Long-lasting relationships with customers are established through Consultant's reputation and image, allowing Detector to broaden its customer base and further develop its business. In addition, Detector provides high-quality technical solutions that could be difficult for Consultant to find elsewhere.

Thus, alignment of the highly-specialized competences and capabilities of the individual companies is essential in order to meet the customers' expectations and needs. However, in 2012, the time period this paper is focused on, the service was experiencing some problems due to Consultant not deploying its commercial competencies properly, as well as customers' unwillingness to pay for the mobile tracking system because they did not have a clear picture of the strengths and the weaknesses of the solution. This situation was exacerbated by a relatively large employee turnover rate on the Consultant team; the customers could not identify a stable team with which to build a close relationship based on frequent interaction. Therefore, the value creation process stalled. In such a context, identifying the VDs and developing a set of KPIs can be helpful for measuring the joint efforts of the involved companies.

Analysis: Applying the process and deploying business model tools to design key performance indicators

Step 1: Matching the mobile tracking service to one or more BM configurations and identifying the relevant VDs

Our analysis of the interview transcripts allowed us to identify the BM configuration of the mobile tracking service, which, in turn, highlighted its distinguishing VDs. Among the portfolio of BM configurations identified by Gassmann *et al.* (2014) and by Taran *et al.*

(2016), the mobile tracking service matches the profile of the "Leverage customer data" BM configuration. It is aimed at collecting, processing, and analysing data on customers in order to provide companies with value-added information regarding customer profiles, behaviours, and attributes. The decision-making process can benefit from this information in terms of generating personalized advertising, discovering dependences between customers' attributes, creating customer loyalty programs, responding to customers' needs in a more effective manner, and grouping customers with similar features (Gassmann *et al.*, 2014).

This BM configuration and its typical VDs are successfully deployed by Amazon, which uses sales data to craft personalized recommendations or customized webpages, thus stimulating further purchases. Another successful example is Google, which generates revenues by placing customized advertisements among search results through the AdWords service. The mobile tracking service adopts a similar rationale as its aim is to generate data on people's movements and flows, which can be highly valuable for retailers, real estate companies, retailers' associations, and shopping malls by supporting their marketing and their managerial decision-making process. In order to pursue this value creation logic, Detector and Consultant use the following VDs, embedded in the BM configuration of "Leverage customer data":

- understanding customers' needs;
- developing effective marketing and sales;
- creating, developing, and maintaining the technological platform;
- growing reputation and image;
- building relationships with a wide range of partners (retailers, retailers' associations, shopping malls, real estate companies, local governments);
- developing a broad customer base;
- building close contacts with the customers;
- developing technological competencies and commercial competencies;
- performing Research and Development (R&D);
- growing reliability and trust;
- developing locked-in relationships, i.e., long-term relationships, with customers.

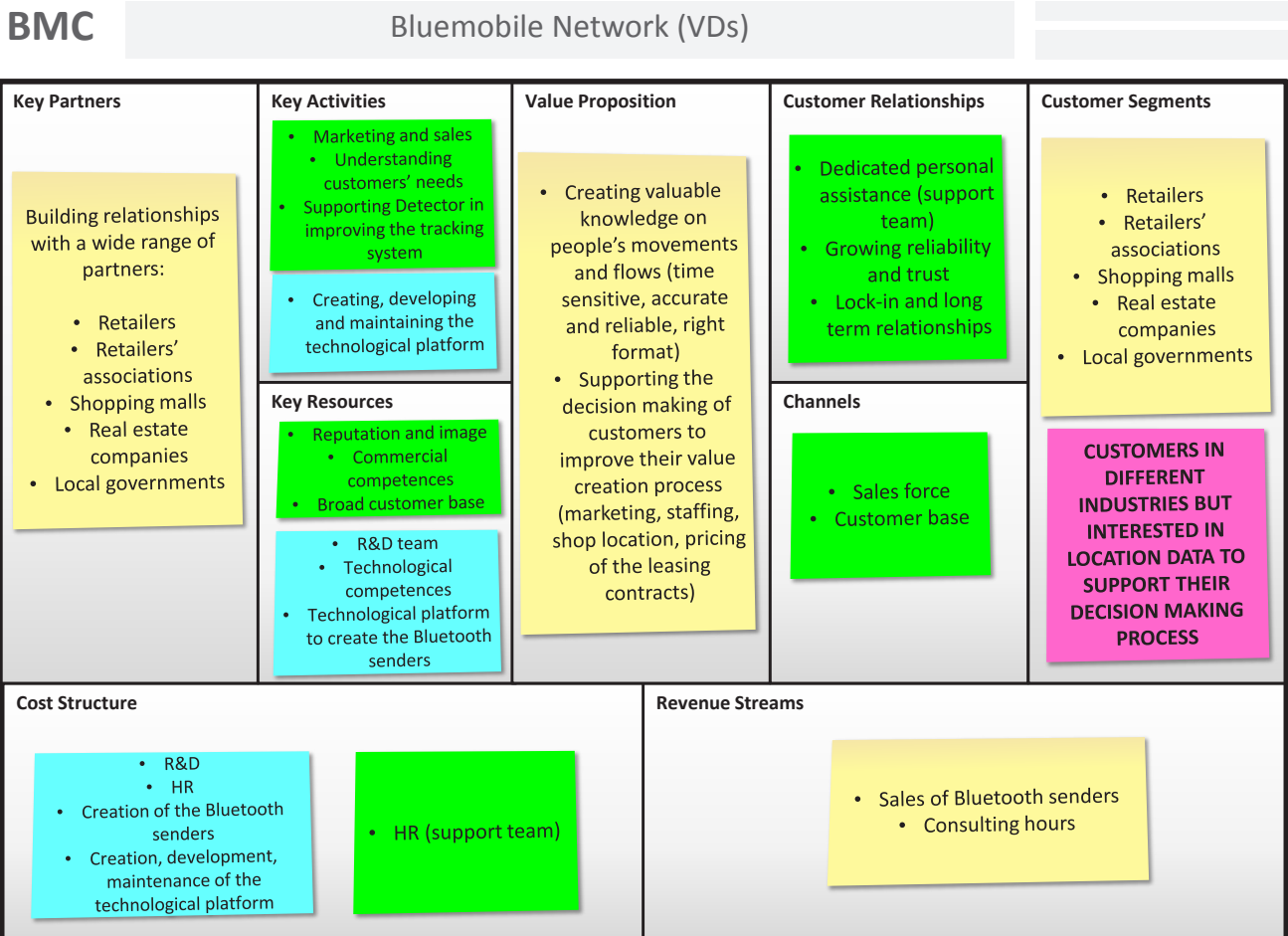
Step 2: Positioning the VDs according to the building blocks of the Business Model Canvas

The creation of the Business Model Canvas helps to visualize the VDs activated in the mobile tracking service and illustrates its overall value creation logic. Figure 2 illustrates the Business Model Canvas, displaying the roles of the involved companies in the value creation process. Green notes identify the contribution of Consultant to the provision of the service; blue notes identify the VDs activated by Detector; and yellow notes identify the VDs that Consultant and Detector should jointly manage.

The creation and analysis of the Business Model Canvas clarifies the roles of the involved companies, where (in and between which building blocks) each VD comes into action, which building blocks deserve closer managerial attention, and who should manage them. The positioning of the VDs between the building blocks is a

particularly significant task. For example, the VD “performing R&D” simultaneously influences three building blocks (key activities, key resources, and cost structure). R&D is a key activity that concerns the creation, development, and maintenance of the technological platform; the R&D team is a key resource needed to perform the activity, and that generates expenses, which is why it has also been positioned in the cost structure building block. The VDs “locked-in and long-term relationships with customers” and “growing reliability and trust” have been positioned within customer relationships, as these VDs identify the nature of the relationships that the case companies aim to build with their customers.

In particular, Figure 2 reveals that the VDs managed by Consultant are crucial in the customer interface area of the Business Model Canvas, i.e., the customer relationships and channels building blocks. Consultant is the bridge to the customer segments. Its sales force and



Yellow: Consultant and Detector; Green: Consultant; Blue: Detector

Figure 2: The Business Model Canvas and the VDs of the mobile tracking service

dedicated personal assistance-based customer service should allow it to penetrate the customer base and establish long-term relationships with customers. The VDs activated by Consultant on the left side of the Business Model Canvas are aimed at improving the customer interface area of the mobile tracking service; the key resources (reputation, image, commercial competencies) should be deployed through key activities (marketing and sales, customer insights) so that the customer interface functions properly, i.e., by improving the effectiveness of the customer relationships and the channels.

To summarize, the analysis reveals that Consultant deploys its VDs and creates value primarily on the right-hand side of the Business Model Canvas, while Detector comes into action in the value configuration area on the left-hand side of the Business Model Canvas; its key resources (R&D team, technological competencies, technological platform) and key activities (exploiting and improving the technological platform) are VDs that are deployed to create and improve the Bluetooth senders to be sold to the customers. In such a context, the information that Consultant obtains directly from the customer can support Detector in improving the tracking system. The Business Model Canvas shown in Figure 2 also reveals a number of VDs that should be jointly managed by Detector and Consultant. For example, the value proposition building block is a common area because the aim of the service is to create valuable knowledge regarding people's movements and flows in order to support customers' decision making that will improve their value creation process.

Customer segments themselves also represent a VD because the value proposition targets customers in different industries (retailers, retailers' associations, shopping malls, real estate companies, local governments) that need location data to support their managerial decision-making process. This means that the technology used is scalable and that Consultant and Detector can replicate this value creation logic in other industries.

The two financially-oriented building blocks of the Business Model Canvas are cost structure and revenue streams. The cost structure building block reflects the rationale of the BM: Detector incurs costs related to the value architecture of the BM (R&D, human resources, technological platform creation, etc.) on the left side

of the Business Model Canvas, while Consultant incurs costs concerning the customer interface of the BM (human resources committed to marketing and sales and customer service) on the right side. The revenue streams are a common area and both Consultant and Detector capture value through the sale of the Bluetooth senders and the related consulting hours needed to implement and improve the tracking system.

In sum, constructing and analysing the Business Model Canvas allows us to understand how the VDs actually work in providing the mobile tracking service. The Business Model Canvas illustrates the particular ways in which value is generated or destroyed, and hopefully, captured; it therefore has the potential to reveal the strengths and weaknesses of the service provision. An awareness of the strong and weak points provides the companies involved with the opportunity to maximize the former and minimize the latter. In this way, the companies can make the value creation process less fragile.

Step 3: Establishing KPIs to measure VDs

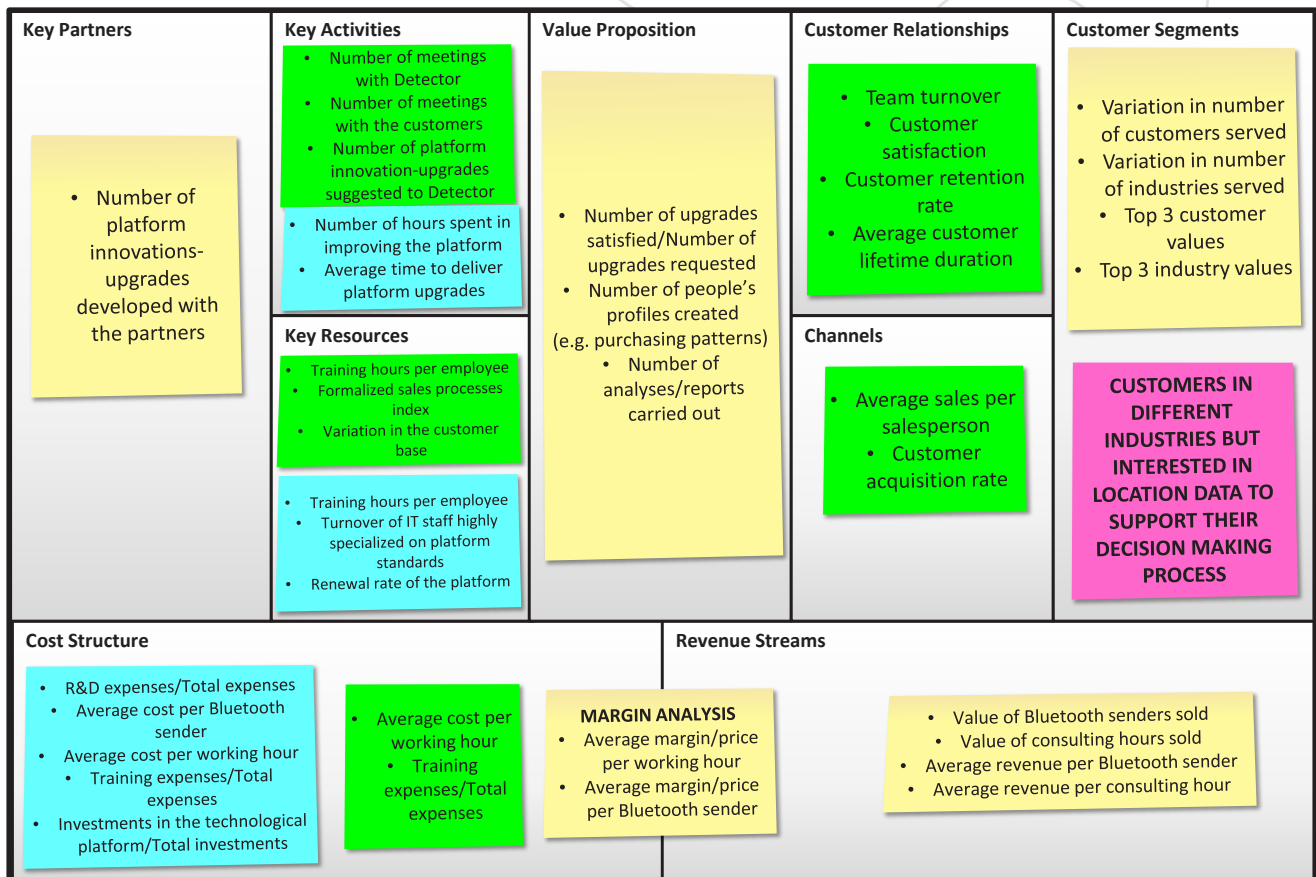
Our analysis shows that the usefulness of the Business Model Canvas could be further increased if it were used as a platform for establishing KPIs to measure VDs. Doing so would reveal how the BM is performing. Figure 3 shows the set of KPIs established from the VDs included in the Business Model Canvas. These KPIs were created according to the design principles mentioned in Section 4. For example, the KPI "Average customer lifetime duration" was established in the customer relationships building block to measure the VD "Locked-in and long-term relationships with customers"; the KPI "Training hours per employee" was created in the key resources building block to measure the VD "Developing technological competences"; and the KPI "Average sales per salesperson" was positioned in the channel building block to measure the VD "Developing effective marketing and sales".

Step 4: Interpreting the KPI trends and the relationships among them in order to manage the performance of the mobile tracking service and to manage, innovate, and benchmark the BM

The design of KPIs at a BM level can primarily be used to measure and monitor the outcomes in each building block and how the outcomes are related to one another, thus supporting managerial decision making. In other

BMC

Bluemobile Network (KPIs)



Yellow: Consultant and Detector; Green: Consultant; Blue: Detector

Figure 3: The Business Model Canvas and the KPIs of the mobile tracking service

words, it is beneficial at this stage to pinpoint relationships among KPIs in order to understand which KPIs are leading and which are lagging. For example, Consultant's KPI "Customer acquisition rate" (channels) could be a leading indicator to compare against the measure "Variation in number of customers served" (customer segments), which could in turn affect the trends of the measures "Value of Bluetooth senders sold" and "Value of consulting hours sold" (revenue streams). Raising awareness regarding this chain of relationships could lead Consultant's management to develop and implement specific actions aimed at increasing the "Customer acquisition rate" in order to improve the scores of the connected KPIs in the customer segments and revenue stream, with the final aim of improving the ability to capture value.

Similarly, Detector's KPI "Number of hours spent on improving the platform" (key activities) could drive the

measures within the value proposition building block, such as "Number of people's profiles created," which could in turn affect Consultant's "Customer satisfaction" (customer relationships). Here too, identifying these cause-effect relationships could motivate Detector's management to intensify efforts relating to platform improvement, particularly as this would support Consultant in increasing overall customer satisfaction.

Along these lines, designing KPIs based on the BM can provide managers with relevant information on the timing of actions in the building blocks, i.e., the time it takes for a KPI of one building block to begin to influence the measures in related building blocks. A KPI that grasps Detector's key activities (e.g. "Average time to deliver platform upgrades") will probably not affect the value capture of the BM (e.g. "Value of Bluetooth senders sold") in the short run, but it will need a temporal lag of several months. In contrast, leading KPIs

related to customer segments (e.g. “Variation in number of customers served”) could influence the lagging indicators in the revenue streams with a much shorter timeframe. The lack of an immediate effect on the revenue streams may simply mean that it takes time for actions to increase the company’s ability to capture value. Therefore, management actions that may seem ineffective in the short run (because they generate no immediate effects) might be reconsidered when managers become aware of their potential effects in the medium and long run.

KPIs could also support the process of BM innovation, i.e., the process of refining and updating it. The rationale behind the BM, the VDs, and the relationships among them are, by nature, not fixed. Establishing and observing a given set of KPIs might help to test the relationships among VDs (and their related building blocks) as well as understand whether and how the relevance of the VDs (and their related building blocks) varies over time. In other words, the trends in the KPIs may signal a timing, persistence, or intensity that is not consistent with what was initially considered in the BM. This could provide useful information on possible actions to take in order to innovate the BM over time. For example, a decrease over time in KPIs related to the revenue streams, such as the “Value of Bluetooth senders sold,” may signal the need to innovate the value capture mechanisms of the BM by considering alternative options, such as subscriptions, renting, or pay per use (Johnson, 2010).

Similarly, a combined decrease over time in the “Customer retention rate” and “Average customer lifetime duration” in the customer relationships building block may highlight the need to innovate the customer interface of the BM by considering a reconfiguration using, for example, lock-in mechanisms, bait-and-hook mechanisms, or reverse bait-and-hook mechanisms (Gassmann *et al.*, 2014; Osterwalder and Pigneur, 2010). If the managers choose to carry out such BM innovations, the VDs (and their related KPIs) should be modified accordingly. Some VDs and their related KPIs may lose relevance, while other new ones may be identified or crafted in order to monitor the new cornerstones of competitive advantage (Bourne, Mills, Wilcox, Neely and Platts, 2000; Kaplan and Norton, 1996). This happens because “fine-tuning” one building block may

entail new challenges and issues in the other ones in terms of key resources to grab, key activities to perform, value propositions to craft, or customer segments to target. Thus, the design of KPIs at the BM level can be used to measure and monitor outcomes in each building block, and also has the potential to stimulate BM innovation.

Finally, KPIs designed based on the BM can support not only managerial decision making (for internal purposes), but also the benchmarking process (for external purposes). By taking the value creation process as the point of departure, KPIs can enable the benchmarking of companies that have adopted the same or a similar BM configuration and that therefore rely on the same or similar VDs. For example, the performance of the mobile tracking service can be benchmarked against the performance of companies adopting the same BM configuration, i.e., “Leverage customer data”. For this BM configuration, several key dimensions of performance can be identified and then compared through KPIs: profitability (“Average margin/price per working hour”), openness (“Number of platform innovations-upgrades developed with the partners”), breadth (“Number of industries served”), R&D intensity (“R&D expenses/Total expenses”), attractiveness (“Customer acquisition rate”), timeliness (“Average time to deliver platform upgrades”), and efficiency (“Average cost per working hour”). From an external standpoint, KPIs can act as a reference point and provide information for use in comparing the BMs of different companies, thus contributing to increased awareness regarding the organization’s relative position. In other words, measuring performance at the BM level can provide additional performance dimensions to benchmark, thus improving and/or refining the benchmarking processes.

Discussion and Conclusions

The purpose of this paper was to investigate how BMs can guide the design of a PMS, thus responding to a number of calls for more research in this area (Bromwich and Scapens, 2016; Heikkilä *et al.*, 2014; Nielsen *et al.*, 2017). In order to answer the research question, a normative approach was adopted and a model for how a PMS can be designed so that it corresponds to the characteristics of a company’s BM has been proposed. The process that leads from a BM to the design of KPIs starts

from the identification of one or more BM configurations that clarify the value creation logic of a company's BM, followed by the identification of the relevant VDs. The VDs are then positioned within the Business Model Canvas in order to understand where (in and between which building blocks) the VDs come into action and which building blocks therefore deserve closer managerial attention. Finally, KPIs are established to measure VDs, and their trends and relationships are used to manage the company's performance and to manage, innovate, and benchmark the BM. These are crucial aspects for the design of a PMS (Franco-Santos *et al.*, 2007; Neely *et al.*, 2005; Nielsen *et al.*, 2017).

In order for the BM tools to have a value-added role in PMS design, a number of aspects emerge. On the one hand, BM configurations lead to the identification of the VDs and the related KPIs. This includes understanding the rationale of the BM and its value creation logic. It also improves the underlying structure for measurement and creates a direction for action, thus diminishing the risk of poor design. The BM configurations force managers to focus only on critical VDs, helping to answer the question, "What should we measure?". The Business Model Canvas, on the other hand, supports the coordination and prioritization of the VDs (and the corresponding KPIs), with the building blocks representing the key performance areas to focus on in the process of positioning the VDs and identifying the KPIs. All in all, the BM strengthens the relevance of the PMS because it directs the measurement process towards the focal aspects of value creation.

A BM-based PMS should accomplish the following:

- a. guide managerial decision making towards the pursuit of the company's strategy by defining strategic objectives, defining actions to achieve those objectives, and assessing the extent to which the objectives have been achieved;
- b. identify and manage strengths and weaknesses in the BM and evaluate the validity of the BM, i.e., reveal opportunities to innovate the BM;
- c. benchmark the performance of the company's BM against similar BMs.

In this paper, the applicability of the normative model has been illustrated through a case study. The study

highlighted the applicability of the model and the advantages of using BMs to design PMSs. It has also highlighted some areas where care and attention are required. For example, the application of the normative model to the mobile tracking service revealed that the process leading from BMs to KPIs is a complex one, and the case is made for utilizing "PMS designers" who have an in-depth knowledge of BM configurations and the Business Model Canvas. Knowledge of both tools and of how they interact is crucial for informing management decisions.

From a theoretical perspective, the paper contributes to addressing the research gap around how to move from the BM to the design of a PMS by proposing a normative model and testing its applicability. In so doing, the paper confirms that BMs are useful units of analysis for designing KPIs (McGrath, 2010; Montemari and Chiucchi, 2017; Nielsen and Montemari, 2012). BMs help to uncover and organize crucial aspects of the value creation process, like the company's value proposition, key partnerships, key channels, customer segments, and customer relationships. Moreover, the paper pushes this line of reasoning even further by identifying other advantages and disadvantages of using BMs for measurement purposes. On the one hand, designing KPIs from the BM increases the relevance of the resulting PMS because there are BM tools to support the identification, coordination, and prioritization of the VDs. This increases the likelihood that the managerial decision making will focus on the critical aspects of value creation. On the other hand, the process that leads from the BM to KPIs is a deceptively complex one.

The current paper also confirms that BMs can support the process of "entangling" the KPIs (Nielsen *et al.*, 2009, p. 9; Nielsen and Roslender, 2015, p. 265) and explores the underlying reason: the BM provides a context in which KPIs can be designed, coordinated, prioritized, and then interpreted because it embeds the key performance areas (the building blocks) where VDs and KPIs are positioned. This, in turn, helps avoid the risk that KPIs may end up being untied from the company's flow of value creation. Moreover, the paper refines the process proposed by Montemari and Chiucchi (2017) for moving from the BM to the design of a PMS by adding an additional step, namely the positioning of the VDs in the building blocks of the Business Model Canvas to

improve the coordination and prioritization of the VDs (and the related KPIs).

Furthermore, this work contributes to the literature stream on BM innovation, a topic that has recently caught the attention of researchers and practitioners alike (Lüttgens and Montemari, 2016; Schneider and Spieth, 2013; Wirtz *et al.*, 2016). Indeed, the highly competitive global business environment is forcing companies to renew their BMs more frequently; thus, managers and practitioners need tools that can support them to respond to this challenge (Taran *et al.*, 2016). This paper shows that KPIs can also lead to identifying and managing the strengths and weaknesses of the BM, thus revealing opportunities to innovate the BM itself. Finally, the paper confirms that KPIs designed from BMs can facilitate the process of benchmarking companies that have adopted the same or a similar BM configuration and that rely on the same or similar VDs (Nielsen *et al.*, 2017).

From a practical standpoint, this article describes an implementation process that can be adopted by managers to map the BM of their companies, to identify and organize the VDs, and to design KPIs. This process can also be useful for managers who have already mapped the BM of their companies and who aim to exploit this platform not only for strategy operationalization purposes, but also to design a PMS. As stated above, such a plug-in function has the potential to support the decision-making process used to manage the company's performance and to manage, innovate, and benchmark the BM.

In closing, it is important to acknowledge the limitations of this paper. General limitations of case-based research should be acknowledged. Further research avenues could investigate the design of a PMS through interventionist case studies that put BM tools into practice and could investigate not only the design phase of KPIs, but also the implementation and use phases.

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Business Model Communication and Financial Performance in cross-national acquisitions

Margit Malmlose¹ and Rainer Lueg²

Abstract

Purpose: The purpose of this study is to explore the link between external business model communication and financial performance for ten cross-national acquisitions by Danish companies.

Methodology: We tie stakeholder and shareholder theory to Magretta's (2002) model, which capture a holistic approach to the analysis of newsletters and financial data. We further apply Fairclough's (1992) critical discourse analysis and regression analyses to analyze the communication process and the accounting data after the acquisition, respectively.

Findings: The study identifies a lack of business model communication in an acquisition process. Furthermore, our analyses show that 15 years after the acquisitions, the acquirers have generally not established substantial links between their own business models and the business models of the acquired companies. As to the quantitative analyses, above average narrative communication has a weak link to company performance. Antecedents of good communication are the number of stakeholders that have to be addressed, as well as the anticipated disruptive events after the acquisition.

Research limitations: The analytically indicated links between external communication and financial performance have limitations due to a small sample and due to the complex organizational set-up where the acquired organizations' financial performance is quickly absorbed into the parent company.

Originality: This study is novel in its approach of applying a longitudinal qualitative as well as quantitative approach to business model identification in mergers and acquisitions. Furthermore, it provides linkages and discussions of business model conceptualization with stakeholder and shareholder theories.

Keywords: business model change; corporate communication; performance measurement; discourse analysis; comparative case study; Denmark; mergers and acquisitions.

Please cite this paper as: Malmlose, M. and Lueg, R. (2019), Business Model Communication and Financial Performance in cross-national acquisitions, Vol. 7, No. 5, pp. 70-89

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Introduction

This study investigates the relationship between how a cross-national acquisition is conveyed officially and the different financial statement data. We explore the public newsletters of the event to see how the cross-national acquisition is communicated. We have special focus on the inherent business purpose of the acquisition and thus its influence on, as well as its presentation of, the company's business model. The data is historical in the sense that it represents a time span with much focus on cross-national acquisitions in a Danish context, namely 1998-99. It furthermore follows up on the existence of the companies after 2010. According to Magretta (2002), the concept of 'Business Model' was a buzzword during the internet boom. Therefore, although our sample does not consist of internet businesses, the late 1990s is of particular interest when investigating the actual application of business models in official statements, while at the same time comparing it to the financial state of both the mother company as well as the acquired company.

We apply Magretta's (2002) model in this analysis since it precisely focuses on this time period and we seek to 'tell a good story' (p. 87), thus aiming at integrating stakeholders and financial results. In the particular event of an acquisition, the narrative supports the communicated value of the acquisition, whereas the financial data support a sustainable financial motive behind the acquisition. These two perspectives are interrelated and together they capture the platform of a business model which connects financial results with the underlying value creation (Nielsen and Roslender 2015). This becomes particularly essential during organizational changes such as an acquisition. Numerous approaches exist to develop, sustain and analyze a company's business model (Magretta 2002; Stahl 2004; Osterwalder and Pigneur 2005; Zott et al. 2011), e.g. the Business Model Canvas (Osterwalder and Pigneur 2010). However, no research has yet investigated the role of business models during acquisitions. Since Magretta's (2002) model acts as a loose frame, her model proves viable in investigating such a scarce and unexplored area.

Acquisitions require careful planning and communication due to the changing elements involved. This study is original in the sense that it focuses on the specific

circumstances of cross-national acquisitions capturing both a business model change during acquisition, but also a cross-national synergy attempt between two originally separate business models. In addition, we investigate a longitudinal success factor of the outcome of the acquisition. This demonstrates whether the original message and the business model have in fact turned out to be sustainable. Thus, the paper investigates (1) *How a business model is communicated externally at the time of acquisition?* (2) *How the story told correlates with the parent company's financial results during and after the acquisition?* And (3) *How are the original acquisitions sustained 12 years after the acquisition?*

Denmark represents an interesting setting with a boom in foreign acquisitions beginning from around 2000. Denmark is a relatively small nation with a limited number of large companies. However, during the past 20 years, Danish companies have built sustainable global competitiveness and reputation, as stated in the Global Competitiveness Report 2011-2013: "*the country benefits from what is one of the best-functioning and most transparent institutional frameworks in the world (5th) and an excellent infrastructure for transport as well as electricity and telephony. Denmark also continues to receive a first-rate assessment for its higher education and training system, the positive result of a strong focus on education over recent decades*" (The World Economic Forum 2011, p.2). The size of Denmark along with the global growth makes Denmark an interesting choice for representing foreign acquisitions. We chose ten mid-size/large Danish companies that underwent mergers and acquisitions between 1998 and 1999. We adopted the list from the Danish Competition Authority. The years 1998-1999 illustrate a period with attention on mergers and acquisitions, which fostered an increased focus from the Danish Competition Authority. Likewise, the late 1990s was a time following after the evolution of the information technology which changed the power structures in companies (Ströh and Jaatinen 2001; Terreberry 1968; Morgan 1997) and introduced the concept of 'Business Models' (Magretta 2002). Information became easily accessible for companies, particularly during the 1980s and 1990s resulting in a globalization boom, and thus forced organizations to legitimize themselves towards several stakeholders (Meyer and Rowan 1977; Nørreklit and Wit

2001; Madsen 2000; Morgan 1997). We analyze the ten companies' press releases accompanying their merger with other companies in order to investigate how the organizations handled the external communication. Likewise, we investigated the financial statement data in the years following the acquisition, and compared the data to the quality of the external communication.

The remainder of the paper is structured in the following way: First, we conduct literature reviews on M&As as well as on the role of stakeholders and shareholders in business model communication. Second, we explain the methodology of our study. Third, we present and discuss our results. The analysis is divided into three topics; the legal announcement communication; the correlation of communication to the financial results; and the definition of the current state of the acquired company within the parent company.

Literature Review

How messages are received and perceived can be crucial for organizational survival (Clutterbuck 2001), and in cross-national acquisitions the urgency of communication increases. Discourses are shaped through written and spoken language (Fairclough 1992, 2001, 1995), and the meaning of the business model through discourses becomes vital. For example, Apple has proven to be a dominant international success story in creating the true narrative, which has enabled sustaining power and thus financial success (Bergvall-Kåreborn and Howcroft 2013; Montgomerie and Roscoe 2013). Thus, legitimacy is a crucial part of communication, both through narratives and financial statements (Durocher 2010; Brown and Forster 2013; Holm and Zaman 2012), and the company's business model is a major part of legitimizing the internationalization process (Johansson and Abrahamsson 2014). The organization's emphasis on communicating its international actions, such as an acquisition is crucial. It is challenging to assess the degree of legitimacy, as well as the presentation of the business model, through newsletters, fiscal reporting, and webpages. Nevertheless, there are some pointers to what constitutes a well communicated message (Fairclough 2001; Ferguson 2000) as well as what characterizes a good business model (Osterwalder and Pigneur 2005; Osterwalder

2004). Despite an increased focus on communication, few studies have shown interest in this area (Clutterbuck 2001). Segars and Kohut (2001) investigate the communication on financial performance to the shareholders through newsletters and CEO letters. Their study examines the content of the CEO letters, searching for themes, and correlating the themes with the financial performance of the company. Their findings suggest a classification of low and high performance organizations and their themes. This proposes a link between external communication of the organization and their accounting data exposed through their financial performance. Adding the M&A dimension, a supplementary focus is on the post-merger integration phase where the CEO and the managers have often been identified as poor communicators at the time of the acquisition (Clemente 2001).

The central part of our study is the particular situation of acquiring a cross-national company. Several elements are crucial in this setting. The processes of an organizational change are often challenging in various ways. It is of particular importance that emphasis is put on the legal announcement of the acquisition (Cartwright and Cooper 1996). This review will focus on the two angles of the study; the communication (narrative) part, and the financial performance identified through financial statement data, both of which are important elements of a business model and according to Magretta (2002), they are two tests which should add up for a successful business model. Additionally, we relate the narrative and the financial data with the business model change. Many sources propose that the term business model *change* can be used interchangeably or as a supra/sub-concept (Ahlgren Ode and Lagerstedt Wadin 2019). We specifically use the term business model change in line with Malmrose et al. (2014). They approach the business model change concept from a performance management perspective that assesses different states of business models. This perspective belongs to the general field in business models that emphasizes value creation, value capture, and a clear link to strategy (Zott et al. 2011). This distinguishes us from other perspectives that focus on the processes instead of the outcomes of the business model change (Kringelum and Gjerding 2018; Wirtz and Daiser 2018, 2017).

Stakeholder theory and the story to be told

According to Magretta (2002), it is important to tell a good story when approaching the customer and wishing to add customer value. The idea is to emphasize the elementary importance of the organization's existence. Nielsen and Roslender (2015) highlight that the business model adds to the understanding of how in particular relationships with customers are prerequisites for shareholder value. This has also appeared to be the driving force of Apple which, on the contrary, has put little emphasis on a sustaining and balanced supplier relation (Bergvall-Kåreborn and Howcroft 2013). However, according to a more traditional understanding of stakeholder theory, stakeholders are equally significant in a continuous legitimization of the organization's existence. Freeman and Reed (1983) identified three groups of stakeholders; formal or voting, economic, and political. The formal group is the stockholders, the directors, and the minority interests. The economic group is the suppliers, the debt holders, the customers and the unions, and the political group is the government, the consumer groups, and others. Magretta (2002) states that *'a successful business model represents a better way than the existing alternatives'* (p. 88). Thus, it becomes relevant to capture investors, employees, and other vital stakeholder groups in the narrative story of an acquisition situation. Therefore, we document the inclusion of stakeholder groups in the legal announcement.

Another important stakeholder group is the competitors. The organization might want to withhold some information from the public and the external interest groups because it does not want the competitors to have access to internal strategic knowledge (Li and Sun 2012). The acquisition is often a competitive move, and therefore prior announcements are not made. Legitimacy becomes even more vital in this discussion. Accounting as well as business model research often integrate the role of legitimacy through the financial statements (Durocher 2010; Holm and Zaman 2012; Jan et al. 2017). The increased power and knowledge that the ordinary customer gains through the easy information access such as the internet has resulted in changes in the organizational strategies (Ströh and Jaatinen 2001; Terreberry 1968; Nichols 1998). This is also due to a widespread application of business

models during a period where the personal computer and the internet emerged (Magretta 2002). It is therefore significant for organizations to incorporate external legitimated structures, because the organization is built on a relationship with the external environment (Morgan 1997; Meyer and Rowan 1977; Nørreklit and Wit 2001; Svendsen and Laberge 2005; Magretta 2002). Meyer and Rowan (1977, p.346) comment that "Organizations are structured by phenomena in their environments and tend to become isomorphic with them". Nørreklit and Kølsten de Wit (2001) speak of how "The firm itself does not act: its employees do", "the company is not identical with the top management's intentions and actions but is created through the synthesis of the actions performed by the individuals in the company". In other words, several stakeholder groups, and in particular the employees, play an active role in the organizational identity. This highlights the need to extend the Magretta (2002) framework by acknowledging other stakeholder groups in the business model change.

Legitimacy with the external environment has additionally led to programs such as the Corporate Social Responsibility (CSR). Companies use such programs to gain good reputation and thereby competitive advantage (McWilliams and Siegel 2000; Brown and Forster 2013). A further attempt to measure the different stakeholders' values has been made through organizational data mining. It is a tool to help managers spot patterns and trends that may help improve an organization's strategic plan and corporate sustainability (Ajami et al. 2003). Similar performance measurement systems such as total quality management, balanced scorecard, quality circles, and various types of performance measurement packages (Jakobsen et al. 2011b) have developed in order to handle the organization's intangible assets. Likewise, other studies have shown reported stakeholder management to be positively related to organizational financial performance (Sonpar et al. 2008; Choi and Wang 2009; Tse 2011). Therefore, incorporating how the companies tell the stories of their business model is important (Fielt 2013). The legal announcement of the acquisitions should reflect this; both in order to legitimize the organization but also in order to sustain value for stakeholders in the future.

Shareholder theory and the numbers to be counted

Another aspect of the Magretta (2002) business model definition is the numbers. Magretta (2002) focuses on tying the narrative to the numbers and thereby stating that there should be a balanced connection between the story of the organization and its financial performance. Magretta (2002) further states that spreadsheets have made it possible to model businesses before they are launched, and they are therefore essential in establishing a positive return possibility. Yet, financial performance found in accounting data is often seen as a sole measure for performance where value maximization is the goal. According to Jensen (2002), the stakeholder theory makes managers unaccountable for their actions and makes the managers lose focus because they are so busy fulfilling different stakeholders' interests. He believes in enlightened value maximization with stakeholders' tradeoffs in mind. As several other authors state (Nørreklit et al. 2008; Tse 2011; Sundaram and Inkpen 2004), multiple performance measures limit the focus on the true value of the company. Jensen (2002) argues that multiple objectives limits the core focus. A similar view is mentioned by Friedman (1970) who argues that the organization's social responsibility is to make a profit. Friedman (1962) contends that the primary responsibility of a company is to maximize the wealth of its shareholders. By doing this, the company contributes to society's social welfare by selling products thus creating employment and thereby growth in the economy. This is the classic view of value maximization and agent theory where the ultimate goal and belief is an ideal world (Covaleski et al. 2003). The two methods of pursuing this goal is to generate future cash flows and to control costs (Tse 2011).

There is criticism that shareholder theory does not sufficiently incorporate or consider behavioral aspects of managers who are often not rational (Tse 2011; De Bondt et al. 2008). Managers are risk takers focusing on maximizing their own gains and not that of the shareholders, especially when their performance is linked to an incentive scheme (Low 2009). Additionally, studies show that managers are overly confident, often overestimating their own abilities (Shefrin 2007), and they have a so-called 'better than average effect' (Russo and Schoemaker 1992). This overconfidence and the link of performance to incentive schemes have been blamed for the recent financial crisis (Tse 2011).

Though the financial numbers are important in a business model context, the critics of the shareholder theory – in the light of the financial crisis – support the argument that focus should be on other stakeholders as well, when pursuing the creation of organizational value. Studies on linking shareholder value maximization to corporate social responsibility (Martin et al. 2009) illustrate the possibility of connecting the shareholder perspective to business model numbers and its narrative. With the business model, we seek to capture the value drivers of the company in order to understand how to perform financially. Both the stakeholder and the shareholder theories have the objective of creating a financially sustainable company. The approaches are different, but in a business model context, we can draw benefits from both views and thus enlighten and understand our aim of the business model creation.

Mergers and Acquisitions

The concern for stakeholders becomes increasingly complex in the situation of an M&A with two different corporate cultures, often with different nationalities, which makes a stakeholder perspective further relevant in order to legitimize the actual business acquisition. Unfortunately, a high rate of M&As is unsuccessful. A study by Sinetar (1981) shows that between 50 and 80% of all M&As are financially unsuccessful. This has recently been confirmed by an article by Forbes claiming that approximately 50% of all mergers do not succeed (Sher 2012). These unsuccessful M&As are often due to the neglect of post-closing integration of the different corporate cultures (Lynch and Lind 2002). Tying this to a business model perspective, an M&A failure illustrates a failed business model. According to Magretta (2002, p. 90) *'When Business models don't work, it's because they fail either the narrative test (the story doesn't make sense) or the numbers test (the P&L doesn't add up)*. Most M&As are seen as having financial or value-maximizing motives mainly to maximize shareholders' wealth (Cartwright et al. 1995), which then would fail in the narrative test. The managers' overconfidence has also been suggested to exist during M&As where managers feel that they have grander skills than others in extracting values from acquisitions leading to over-estimated synergies in acquisitions (Doukas and Petmezas 2007). Achieving synergies may be even more challenging in international M&As. In addition to the different corporate

cultures, international M&As also deal with two sets of national belief systems. In particular, subjective logic and social logic are challenging in larger international organizations. A model presented by Nørreklit (2000) illustrates how only a small area of different subsidiaries in multinational organizations is based on common logic and assumptions. Social logic arises from common ideas, interpretations, and patterns of thought used by a group, but only a fraction of this social logic is shared in cross-border operations (Nørreklit 2000). Therefore, planning and cross-cultural awareness are crucial when acquiring a foreign company. Global organizations have to work especially hard to develop a strategy that will deliver the right message and thereby create circulating stories that are consistent with the corporate culture and vision (Solomon 1999). Harrington (1996) states that an ethical balance across stakeholders is ideal. Thus to succeed financially in an M&A situation, it becomes even more urgent what the story is, who the story includes, and to whom the story is addressed.

Despite the challenges and complexities of M&As, international M&A activity is continuously increasing. In 1999, the year of this study's acquisitions, cross-border M&A activity grew by more than one third, to a total value of \$720 billion (Child et al. 2000). There are also other advantages than merely shareholder maximization. An additional advantage of a foreign acquisition is a rapid entry into another market with access to distribution channels, existing management experience, established brand names, and reputation (Douglas et al. 2001). This reputation is particularly important when establishing the business models of the foreign acquisitions. There is little extant literature, however, that specifically deals with foreign M&As and business model changes. In general, Aversa et al. (Aversa et al. 2017) suggest M&As as a legitimate mean to add to a company's business model portfolio. Yet, the authors believe that companies have not made use of M&As to the optimal extent. In their conceptual paper, Sohl and Vroom {, 2017 #6549} specifically conjecture how a high degree of *relatedness* of the acquired business model might positively affect the acquirer's performance. This conjecture is not fully shared by the conceptual work of Christensen et al. (Christensen et al. 2016), there are thus no signals of consent in this scarce stream of literature. The authors argue that M&As with unrelated business models support companies in profitably

disrupting the market, and that alignment of existing and acquired business models counteracts this end.

Methods and Data

Various approaches exist to research the narrative presentation of the acquisition. This study seeks to analyze newsletters released at the legal announcement of the acquisition along with a longitudinal view of the external communication through webpages and an accounting focus through financial statements (Abrahamsson et al. 2019). Fairclough's (1992) critical discourse analysis is applied and combined with a content analytical approach (Phillips 2002). Critical discourse analysis is a social semiotic tool that focuses on the social dimensions of the *linguistic* meaning in any media of communication and the production, the interpretation, and the implications in social processes as cause and effect of the ideology. Fairclough (1995, p.65) says that "*The representation of discourse in news media can be seen as an ideological process of considerable social importance [...] and that the finer detail of discourse representation, which on the face of it is merely a matter of technical properties of the grammar and semantics of texts, may be tuned to social determinants and social effects*". Thus the small technical linguistic details have a social effect and moreover reflect the larger social determinants, and therefore newspaper articles are highly suitable for analyzing business model themes and changes in the external communication. It is a flexible tool that allows the user to identify issues on different levels.

Furthermore, a discourse analysis focuses on the content of the text, and what the sender decides to communicate to external stakeholders. This type of content analysis is useful in examining trends and patterns in what corporations hold and value and it enables stakeholders to receive information on strategic preferences (Ajami et al. 2003). The analysis addresses three different categories of information; (1) the information itself, the kind of information and the amount of information that the acquirer provides, (2) the language used, as in what types of words, grammar constellations, and the linguistic approach, based on Fairclough's critical linguistic discourse level of text analysis (Fairclough 1992); and (3) the discursive practice which illustrates the first hand impression of the communicated text, such as the number of newsletters released, the

availability, the length of information, the longitudinal persistence in information giving, and the inclusion of stakeholders.

We compare the results from the discourse analysis to accounting data. The accounting data consist of stock prices before and after acquisition of the parent company, the revenues, the EBIT, the assets, the number of employees, and the number of nations in which the parent company is represented.

Data

We selected ten Danish companies from a list of legal mergers and acquisitions (M&As) in Denmark in 1998-1999, listed by the Danish Competition Authority. The acquisitions happened in the same period. A single nation sample eliminates any confounding external factors in our analyses. We have gathered all publicly available written communication from the ten companies (electronically or on paper, according to availability) (Abrahamsson et al. 2019). The time span stretched from the announcement of the M&A up to 15 years after the M&A. The written communication includes M&A-related news releases; publicly available company newsletters; company webpages; and the companies' annual reports. We drafted a scorecard that maps the content and form of the news releases. It conveys how the speech genre unfolds, which stakeholders it includes, as well as whether or not the text is structured and informative. In addition, we collected financial information from the acquired company as

well as the parent company both before and after the acquisition, along with a longitudinal examination of the development of these accounting data (Abrahamsson et al. 2019). We accumulated the scores from the discourse analysis in order to compare them to the accounting data.

The narrative scorecard

We developed a scorecard in order to make the news releases comparable. This scorecard comprises Fairclough's three main analytical areas: information, language, and general impression. Due to the general information availability, it is crucial that the organization is direct, accurate, and inclusive in its information giving (Nye 1999; Cartwright and Cooper 2000). The indicators are chosen according to Fairclough's (1992), Cartwright and Cooper's (2000), and Dwyer's (1999) recommendations while integrating business model reflections on the elements chosen. The scorecard encompasses and analyses information such as the exact time of acquisition, the price of the acquisition, the information on the acquired firm, the plans, the corporate and national cultural challenges, the continuous information during the acquisition (information level and frequency), the motivation, as well as the possibility for asking questions and giving feedback. While these elements mainly feature factual circumstances, the motivation relates to the ability of presenting, in a comprehensible manner, how 'the pieces of the business fit together' (Magretta, 2000 p. 91). In other words, what is the interest in this acquisition? If the information is available and/or addressed,

Danish company	Acquired company (country)	Date on announcement of acquisition (newsletter)
Danisco	Sidlaw Plc (UK)	December 17th, 1999
Icopal	Izolacja S.A. (Polen)	January 27th, 1999
Danfoss	Woodley Electronics Group Ltd (UK)	January 1st, 2000
NEG Micon	TAIM E'olica S.A. (Spain)	May 26th, 2000
Radiometer	Proscience PTY Ltd (Australia)	July 26th, 2000
Vest-Wood	Sweedoor (Sweden)	December 22nd, 1999
DFDS	Lisco (Lithuania)	April 23rd, 2001
GN Great Nordic	ReSound Corporation (US)	May 10th, 1999
Vestas	Italian Wind Technology S.r.l. (Italy)	July 21st, 2000
Falck	Nederlandse Veiligheidsdienst (Holland)	June 10th, 1999

Table 1: Company and acquisition information

a score of 1 is given. If it is not available, a score of 0 is given. The language analysis and the scores are based on language importance highlighted by Kaye (2010) and Dwyer (1999) such as the kind of language used (positive, sympathetic, official, monologic), the style of the newsletter, the use of examples, the jargon, the clichés, or the metaphors along with the use of understating powerful words; for example whether the language is active or passive. The analysis focuses on the positive attributes of the language style, which is crucial to support the representation of a clear business model (Fielt 2013). Thus, the linguistic scores are set such that 1 illustrates a suitable communication language. For example, the use of a certain jargon is seen as a negative communication approach since it may be difficult for outsiders to comprehend (Cartwright and Cooper 2000; Dwyer 1999). Therefore the score of 1 is achieved by no use of jargon. The overall impression comprises the length of newsletter, the readability, the layout, the emphasis of main points, the clear message, that the newsletter is persuasive as well as being inclusive of the stakeholders, the employees, the shareholders, and the customers. This is particularly vital in communicating the business model. The presentation of why this acquisition is beneficial and thus better than the existing way is addressed by main points and an overall clear message (Magretta, 2002, p. 88). In other words, it has to be communicated clearly how this acquisition creates value (Fielt 2013). The different stakeholders are crucial in the legitimization of the business model and in particular the customers in relation to value creation (Fielt 2013; Magretta 2002). Thus, the information and general impression reflect the narrative/the story told and the available financial numbers, whereas the language analysis is more technical and represents the supportive discursive part.

We compare the comprised scores with the financial statement data and the organizational variables described above, in order to identify links between the financial performance and the communication during a foreign acquisition process.

Results

Firstly, we analyze the newsletters through a discourse analysis. Secondly, we show the different financial organizational measures. We compare the two parameters to see if there are any links between them. Finally,

we follow the acquired company and its development during the next 15 years in order to get a longitudinal impression of the success of the acquisition and the business model change.

The communicated narrative in the newsletters

Similarities exist as to how the companies score when it comes to information, whereas there are larger diversions regarding the linguistics and discursive practices. Out of 33 possible points, the highest score is GN Great Nordic with 27 points.

Great Nordic has a general inclusive flow when presenting information and using linguistics, which are stated as crucial parameters in communicating the company's business purpose in the business model literature (Fielt 2013). On the other hand, Radiometer only scores 15 and generally has a poorly written statement.

Of the ten companies, seven are within some type of electronic or development industry, whereas the remaining three companies are in the industries of construction, logistics, or services. This factor alone shows a discursive practice that the electronic and development organizations are the most sophisticated (Abrahamsson et al. 2019). They constantly improve their portfolio by, among other things, acquiring foreign companies during the years 1998-2000.

The first distinctive feature of the newsletters is that three out of the ten newsletters are written in Danish. Considering that it concerns an acquisition of a foreign company, this does not give a good impression or inclusion of the acquired company and its stakeholders. The newsletter provides information on the location, the timing, and also e.g. on the size of the acquired company, and the number of employees. The acquisition price, however, appears in only half of the newsletters. Likewise, only one newsletter reflects upon the cultural and corporate challenges, though with a solution oriented focus and a note of timing of the different parts of the integration. The other newsletters do not address this concern. Finally, but most importantly, the newsletters generally lack the inclusion of the customers in their statements. Only one company, Danfoss, includes the customers in their presentation of an acquisition. This indicates a lack of innovative strategies stemming from external impulses, which are

Firm Scorecard	1	2	3	4	5	6	7	8	9	10
	Danisco	Icopal	NEG Micon	Radiometer	Vest-Wood	Falck	DFDS	GNGreat Nordic	Vestas	Danfoss
Information										
Time of acquisition	1	1	1	1	1	1	1	1	1	1
Price of acquisition	1	1	1	0	0	1	1	1	0	0
Acquired Firm Information	1	1	1	1	1	1	1	1	1	1
Future Plans/Strategy	1	1	1	1	1	1	1	1	1	1
Corporate and national cultural challenges	0	0	0	0	0	0	0	1	0	0
Continous information during the acquisition	1	1	0	0	1	0	0	1	0	0
Motivation	1	1	1	1	1	1	1	1	1	1
Feedback/further info	0	1	0	0	1	0	1	1	1	0
	6	7	5	4	6	5	6	8	5	4
Linguistics										
positive language	1	1	1	0	1	1	1	1	1	0
sympathetic language	0	0	0	1	0	1	1	1	0	0
non official language (not focused on law s and paragraphs)	0	1	0	0	0	1	1	1	1	1
non monological language (inviting for dialogue)	0	0	0	0	0	0	0	0	0	0
Style match reader	1	1	0	0	0	0	1	1	1	0
Use of metaphors	0	0	0	0	0	0	0	0	0	0
No use of jargon	1	1	1	0	0	0	0	1	1	1
No stock phrases	1	0	1	1	1	1	1	1	1	1
No cliches	0	1	0	1	1	0	1	0	1	1
No run on sentences	0	1	1	1	1	1	1	1	1	1
High affinity and intensifying adjuncts (pow erful language)	1	0	0	1	1	1	0	1	0	1
No ambiguous words	1	1	1	1	0	0	1	1	0	1
Use of concrete nouns	1	1	0	0	1	0	0	1	0	1
Active wording	1	1	1	1	1	1	0	1	1	1
Spelling	1	1	1	1	1	1	1	1	1	1
No unknown abbreviations	1	1	0	0	0	1	0	1	1	1
	10	11	7	8	8	9	9	13	10	11
Discursive practice (first hand impression)										
length of newsletter	1	1	1	1	1	0	1	1	1	0
readability	1	1	1	0	0	0	1	1	0	1
layout	1	1	1	0	1	1	1	0	1	1
highlighting main points	0	1	0	0	1	1	0	0	0	0
clear message (direct discourse representation)	1	1	1	1	0	0	1	1	0	1
persuasive and positive	1	1	1	0	1	1	1	1	0	1
Stakeholder inclusion:										
employees	0	0	0	1	1	1	0	1	0	1
shareholders	1	1	1	0	1	0	0	1	0	0
customers	0	0	0	0	0	0	0	0	0	1
	6	7	6	3	6	4	5	6	2	6
Total score	22	25	18	15	20	18	20	27	17	21

Table 2: Assessment of Business Model communication with a discourse analysis scorecard

typically driven by customers (Malmrose et al. 2014). Thus, the acquisitions are not mentioned to be driven directly by customer demands.

The discursive practice generally indicates that the companies continuously inform during the acquisition process, that they use several types of information, that they consider the readability, and that they send a direct message to all stakeholders. All newsletters state the fact of the acquisition and therefore it may appear to contain authoritative language which is a closed unified language system, using static linguistic in a single voice (Bakhtin 1986). It gives a neutral message, and then the receiver may decide for him- or herself how to process the message. Creating the possibility for the reader to give feedback or ask questions may add positive traits to the organization since it will signal interest in its surroundings and stakeholders (Cartwright and Cooper 2000; O'Hair et al. 1998). Five of the ten newsletters give the possibility of feedback or questions. Stakeholder inclusion, however, is scarce. As mentioned above, only one newsletter includes the customer, a few include the employees, and half of the newsletters address the shareholders. However, all newsletters focus on sales and the financial consequences of the acquisition, highlighting the market growth, the sales increases, and the increase in assets. Thus, indirectly, there can be purposes stemming from external (the customers) or internal (the employees) shareholders through knowledge sharing impulses, which have previously been documented to drive business model change (Malmrose et al. 2014).

The linguistics is overall positive which emphasizes opportunities, using words like "advantages" and "prospect". However, these types of words mostly relate to financial figures, e.g.:

"GN Great Nordic estimates that ReSound Corporation has significant growth potential and considerable synergies will be realized both within production and sales" and "The acquisition is part of GN Great Nordic's goal that Group companies take leading positions with the highest profit margins in their respective sectors".

Thus, we find a lack of narrative storytelling, and the use of sympathetic language is scarce. On the contrary, we detect a financial enthusiasm in most of the

newsletters. Restructuring and hiring/firing situations remain absent. Except from GN Great Nordic, where the closest to a sympathetic language is: *"During this period a number of obligations must be fulfilled according to the privatization agreement for LISCO, amongst others related to the staff"*. This indicates a focus on the numerical aspects of the business models, whereas the narratives and the storytelling are infrequent.

The text embeds social practice and social form to participate in constructing a social reality (Fairclough 1992, 1995; Wittgenstein 1953). Therefore, the type of language used is vital when the organization wants to signal that the external stakeholders are involved. The authoritative speech genre suggests a general top-down communication line within the organization and a focus on the financial performance. It also neglects the business model as a total entity by disregarding the narrative story that tells about the company and its knowledgeable assets through the employees and the customer relations.

The influence of the narrative communication on financial data

We compare financial growth and employee information to the scores of the information level and the quality of the newsletters. Information from the acquired subsidiaries has created obstacles due to different nationalities and the fact that, at the point of data collection, some of the parent companies had already fully integrated the acquired companies. However, with assistance from employees, whom we contacted, made it possible to get most of the information. In cases of non-official information, they provided us with an estimate. The information gathered is separated into information on the parent company and information on the acquired company.

The parent company

We study the following measures on the parent company: Score M&A communication; the change in EBIT; the change in assets; the number of countries; the number of employees; the share capital. We explain all variables in the footnote of Table 3. The table shows the descriptive statistics, the result of the correlation analysis with *Score M&A communication* with all other variables, and the variance explained between them (R²). Since our sample consists of only ten companies,

we opted for the non-parametric Spearman correlation analysis. We could only identify large-size effects, because the statistical power of a ten-company-analysis is by definition low (Cohen 1988). To avoid *false negatives* (i.e. stating a relationship is not significant even though it really is), we do not report p-values. Instead, we analyze if the coefficients point into the most sensible directions.

We measure the success of the acquisition by the development of EBIT of the acquiring company two years after the acquisition. We deduct the development of EBIT two years before the acquisition (*difference in difference approach*) as an appropriate benchmark of how the company performed previously (Wooldridge 2009). While seven of the ten companies had an absolute

positive development in EBIT, only four of them outperformed their benchmark (which is what we measure). We find that good communication is positively related to the benchmarked EBIT ($r=0.159$) and that it explains almost 10% of the EBIT's variance ($R^2=0.095$). Further factors than good communication explain the rest of the variance.

We further tested four variables to check the validity of the EBIT finding. We argue that above average communication on the acquisition purpose, indirectly presenting the business model change, is especially important during an acquisition if the company needs to convince a large number of stakeholders (including shareholders), all of which are considered crucial in business model innovation (Malmrose et al. 2014; Christensen et al.

Variable name	Comparison to "Score M&A Communication"		Descriptive statistics				
	Coefficient	R squared	N	Mean	Standard deviation	Min	Max
Score M&A communication	1.000	n/a	10	20.400	3.688	15	19
Change in EBIT	0.308	0.095	10	-53.1%	1.435	-391%	145%
Change in assets	0.281	0.090	10	26.1%	0.298	-11.0%	77.2%
Number of countries	0.268	0.035	10	33.5	22.741	5	80
Number of employees	0.410	0.043	10	26,461	66,392	1,700	215,000
Share capital	0.171	0.028	10	611.3	533.0	6.0	1,502.8

We opted for an non-parametric correlation test with all variables and Score M&A communication due to the small sample size. We report Spearman's rho as the correlation coefficient. We do not report significance levels, because with this small sample size, significance levels might lead to false negatives (Cohen 1988). The variables in the table are defined as follows:

Score M&A communication	is measured using a scoring system for the information, linguistics and discursive practices the acquiring company applies in its newsletter announcing the merger in either 1998 or 1999.
Change in EBIT	measures the change in EBIT of the acquiring company in percentage points two years after the acquisition, net of the change in EBIT two years before the acquisition in percentage points. Thereby, we account for the benchmark the company has to beat with the acquisition ("difference-in-difference-approach").
Change in assets	measures the increase in assets after the acquisition in percent.
Number of countries	measures the number of countries in which the Danish acquiring company is active.
Number of employees	measures the full-time-equivalents of the Danish acquiring company at the time of the acquisition.
Share capital	measures the market capitalization in million Danish kroner of the Danish acquiring company at the time of the acquisition.

Table 3: Relationship of Business Model communication on financial performance measures

2016). As expected, we find that companies communicate better if they need support for growth (reflected in the change in assets; $r=0.281$; $R^2=0.090$), are active in more countries ($r=0.268$; $R^2=0.035$), have a higher number of employees ($r=0.410$; $R^2=0.043$), and have a higher market capitalization, i.e. more shareholders ($r=0.171$; $R^2=0.028$). These findings support the findings of Abrahamsson et al. (2019) that the stock market awards the frequency of business model innovation which corresponds to the number of countries represented particularly. The number of nations where the organization is represented appear to be relevant, since the more experienced the organization is in different national contexts, the more likely it is that it would consider its mode of communication, and how it legitimizes itself with the different stakeholders across cultures (Kostova and Zaheer 1999). For example, Icopal and Danfoss have nicely written newsletters compared with many of the others, and both of these organizations are, at the time of the acquisition, represented in 50 nations or more. Radiometer with the poorest drafted newsletters only operates in 14 nations. The number of employees within the organization is an alternative way to estimate the size and representation of the organization.

4.2.2 The acquired company

We had access to the number of employees of the acquired company as well as to the revenue development of the previously independent companies one year after the acquisitions. As for the acquiring companies, we find that there is better communication if the acquisition target has many stakeholders, measured in the number of employees (not reported in a table; $r=-0.236$; $R^2=0.026$). Three out of the ten acquired companies develop a direct fall in revenue. Interestingly, we find that decreasing revenues are related to above average communication ($r=-0.281$; $R^2=0.063$). We conjecture that the acquiring companies anticipated this decrease and tried to prepare stakeholders for this by using strong communication. Of course, this is only a tendency. As an opposing example, Vestas acquired the largest company, Italian Wind Technology S.r.l. with 7,000 employees. However, Vestas did not communicate in any extraordinary mode in the newsletter, and it did not mention the employees or the particular situation of the acquisition and its influence on the employees in Italy.

The aftermaths: the acquisitions 15 years down the road

The acquisitions took place around the turn of the millennium. We have analyzed all the parent companies' annual reports, along with the acquired companies, 15 years later. Danisco sold Sidlaw again in April 2001 due to decreasing profits. Danfoss shut down Woodley Electronics Group from the UK. Three other companies (NEG Micon, Icopal and Vestwood) became M&A targets themselves and now belong to venture capital companies. Vestas bought NEG Micon. The parent companies Radiometer, GN Great Nordic, and Falck completely integrated their M&A targets SenDX Medical, Resound Corporation, and Veiligheidsdienst, respectively. The final two companies have sustained their names due to either branding or other local advantages of maintaining a degree of independence. However, they operate in the same fiscal accounts as the parent companies.

The acquisition process is complex, and the analysis has shown various outcomes. Some companies have been able to stay within their operating areas and thereby sustain a similar business model as before the acquisitions. Other companies may have given the parent company a boost in its financial results the first couple of years, after which they seemed to disappear into the parent company's core values, business areas and thereby changing to the business model of the parent company. Only two acquired companies have been able fully to sustain the business provided through their original names; Lisco, taken over by DFDS, operates ferries under the original names and services, and Italian Wind Technology S.r.l., taken over by Vestas, retains statements in their name and locations in Italy.

In a long term perspective, it becomes clearer that the acquired companies go through company turnarounds and business model changes due to the acquisitions. The companies' narratives vanish during or after the acquisitions. The companies' financial numbers either decrease or disappear through integration into the parent company (alternatively: further takeovers, shutdown, liquidation), so after a few years, they cannot be analyzed separately.

In two of the companies, the term business model is explicitly applied as a concept explaining the companies'

values and business. It is noteworthy that the two companies now belong to private equity funds. These equity funds operate within a more professional environment and with a different professional focus (Robertson 2009). They have invested in the companies with the intention of selling them with profits in later years, which may explain this more focused professional approach. Vest-Wood even names their own model 'the Vest-Wood model', *"An important cornerstone for continued controlled growth is a coherent process-oriented business model, the Vest-Wood model which expresses the ideal principles that will structure the organization"* (From the corporate web-page).

None of the other eight companies focus on their business model or the acquired company's business model during the acquisition in their newsletter or later in the integration process and the final definition of the organization. This again suggests that the acquisitions have failed the narrative test (Magretta, 2002, p. 90) and have rather focused on the financial value and not necessarily on any other type of business values such as for example well-educated employees, customer value, or market knowledge. It also aligns with the findings of Abrahamsson et al. (Abrahamsson et al. 2019) who suggest that stock markets only react positively to large and well-communicated business model changes.

Discussion and Conclusions

The aim of this study has been to provide insights into the presentation of the business model, focusing on narratives and financial results during a cross-national acquisition, comparing this communication with the financial results and how the acquisition has been sustained in a longitudinal perspective. While we are not able directly to determine the application of an internally applied business model in the acquisition process, we are able to discuss the external presentation of the business purpose of the acquisition which would demand that it is of crucial importance that innovative impulses are represented during a business model change, such as the customers and the employees as highlighted by Malmrose et al. (2014). Thus, in this discussion, we contribute to an unexplored business model area of external representation of business changes compared with financial data. We synthesize

the theoretical narrative storytelling and the financial data presentation (Magretta, 2002) mirrored in shareholder and stakeholder considerations.

Segars and Kohut (2001) argue that a causal link exists between the quality of written communication and financial performance. In this study we have indicators of such a link. Yet, it is not clear nor univocally since, we e.g. observe Icopal where the external presentation of the business change was strong but the benchmarked performance was negative, and the opposite observation was found for Radiometer with a weak external presentation of the acquisition, yet the financial results were positive. Additionally, large discrepancies exist in the stakeholder attention, where most companies, except Icopal and GN Great Nordic, devote little attention on stakeholders. Thus, this study firmly identifies an intense complex setting where other factors influence the business model presentation through communication and financial success. One of the only consistent findings is the external presentation quality which is related to the number of stakeholders (the employees in the acquiring and target companies; the number of countries where the company is active; the size of the shareholder base) and the prospect of disruptive future events (growth in assets at the acquiring company or decline in revenues at the target company). Yet, the reason for these consistent findings may be found in the fact that these organizations typically have in-house resources such as communication and human resource employees to support acquisition activities.

From a business model perspective, a remarkable dominant discourse is the financial data in the newsletters. Simultaneously, the narrative stories and the communication of the complete business model is to a large extent neglected. It may be discussed whether the business model belongs to a legal announcement in an acquisition newsletter, but according to Osterwalder (2004, p.16) the business model should combine the organizational stakeholders and this forms the link between the business strategy, the business organization, and the information communication technology. It is also debatable to what extent the business model of the parent company should be aligned with the acquired company. However, the corporate business strategy has large elements of positioning the

company and its subsidiaries in the market (Porter 1980), and is therefore crucial in a specific organizational context change which most acquisitions represent, whether this is on corporate or subsidiary level. As Magretta (2002, p.5) states *"Profits are important not only for their own sake but also because they tell you whether your model is working."* Therefore, a business model is far more than financial indicators, and this was also emphasized recently by Nielsen and Roslender (2015). In case of an acquisition this appears to be a relevant notice. With the interrelatedness of narrative storytelling and financial performance, a hybrid emerges to stakeholder theory in this discussion. This study supports the notion that the communication process often neglects stakeholders. Yet, they are still essential for the organization, in particular in recent years due to the financial crisis (Tse 2011). The communication in the newsletters and the obvious aims of the acquisitions belong to the realm of shareholder theory, and in most cases revenue also increased. However, none of the stories told appeared to be strong narratives. This could have been the reason for the actual implications that the companies had to be sold again or even closed down indicating a lack of sustainability of the acquisition. The strong focus on financial performance undermined the importance of the intangible story telling which appears to be a continuous problem for many organizations (Biondi and Reberieux 2012). In at least half of the cases, the acquisition did not become a financial success in terms of positive returns

and increased assets, as often highlighted as the aim in the newsletters. This supports the need for a refocus on stakeholders and the core business model in specific situations such as organizational changes and acquisitions (Shefrin 2007; Russo and Schoemaker 1992; Tse 2011). The increased complexity in social practice due to technology advances, globalization, and information access (Fairclough 1992; Morgan 1997; Ströh and Jaatinen 2001) are additional reasons for an increased pressure of legitimacy where the organizational business model is pivotal.

Though this study identifies a lack of business model communication in an acquisition process, the analytically indicated links between external communication and financial performance have limitations due to a small sample and due to the complex organizational set-up where the acquired organizations' financial performance is quickly absorbed into the parent company.

Despite its limitations, this study has entered an unexplored area of a stakeholder and shareholder view integrated in the business model change communication which calls for further future research. Rich academic literature exists in both theoretical areas and would thus enable such research. Moreover, future research on business models in more specific situational contexts, such as acquisitions, is called for, in order to add to the more scarce business model theoretical groundings.

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Business Model Innovation – A Gamble or a Manageable Process?

Yariv Taran¹, René Chester Goduscheit² and Harry Boer³

Abstract

Purpose: Any business model innovation process involves a certain level of uncertainty, complexity and, in effect, risk. A sloppy approach towards the management of risk may result in catastrophic, sometimes even fatal, consequences to a company's core business. Although risk, risk appetite and risk management are relatively well-established concepts, their role in business model innovation is not well understood. The objective of this paper is to investigate how the risk associated with the innovativeness of a business model innovation, an organization's risk appetite, and its risk management approach interact to affect the success or failure of a business model innovation process.

Design: Retrospective case studies of business model innovations undertaken by three industrial companies provide the empirical basis for this paper. These companies were selected based on their relatively successful, yet somewhat different, business model innovation experiences over the years, and focused on the, in total four, cases in which they failed to implement their new business model attempts successfully. The reasons that led to these failures are discussed.

Findings: Important factors explaining the business model innovation failure of these cases, appear to be the company's risk appetite, the risk associated with the radicality, reach and complexity of the business model innovation, the company's awareness of these risks and their management, and especially the association between these factors.

Originality: There are many lessons to be learned from the aftermath of a failed attempt in terms of what not to do and what to improve a next time. The cross-case analysis produced six testable propositions that enhance our understanding of business model innovation success/failure, with particular focus on the characteristics of the business model innovation, overall innovation management, risk, risk awareness, risk appetite and risk management, and the interaction and fit between these six constructs.

Keywords: Business Model Innovation; Risk Management; Retrospective case studies.

Please cite this paper as: Taran, Y., Goduscheit, R. C., and Boer, H. (2019), Business Model Innovation – A Gamble or a Manageable Process?, Vol. 7, No. 5, pp. 90-107

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Introduction

Business model innovation is risky business. Many business model innovation attempts result in an innovation failure (e.g. Christensen, Bartman and Van Bever 2016). Especially if a company follows a first mover strategy, arguing from a “no risk no reward” aphorism, a sloppy implementation approach towards business model innovation may result in catastrophic or even fatal consequences to the company’s core business (e.g. Taran 2011). Thus, managers should recognize that taking risks, while at the same time controlling them, is fundamental to the successful development and implementation of a sustainable business model. However, although there is a considerable body of literature on risk management, particularly in relation to project management (e.g., Chapman and Ward 2004; Kendrick 2003) and product innovation management (e.g., Keizer, Halman and Song 2002); Keizer and Halman 2007), it has not yet been fully incorporated into other core business decision-making processes (Deloitte ERM survey 2008), including business model innovation. This paper seeks to enhance the understanding of the potential interaction between risk, risk appetite and risk management in the context of business model innovation.

Literature Review

Risk, Risk Management and Risk Appetite

The term risk refers to “*uncertainty of outcome*” (Chapman and Ward 2004). Risk management has been defined as “*the systematic application of management policies, procedures and practices to the tasks of communicating, consulting, establishing the context, identifying, analyzing, evaluating, treating, monitoring and reviewing risk*” (ISO/IEC Guide 73 2003).

Although companies have successfully adopted risk management in their internal audit, treasury, insurance, health and safety, and legal functions, it has not yet been fully incorporated into core business processes related to future growth, such as strategic planning, capital allocation, and performance management (Deloitte & Touche 2008). This seems to imply that *unrewarded risks*, in the sense that no premium is obtained from managing them – only the potential for loss is reduced, are the main driver in today’s

risk management practices. Apparently, managing *rewarded risks*, which are part and parcel of decision-making processes associated with future growth, is not yet fully embedded in organizational change and innovation processes, including business model innovation.

Furthermore, even if companies attempt to manage rewarded risks systematically, for example, in project management (e.g. Kendrick 2003; Chapman and Ward 2004) or product innovation management (e.g. Keizer and Halman 2007), they essentially assume that those risks can be managed in isolation from the rest of the system. Organizations tend to perceive risk merely in terms of technical and market uncertainty and not in terms of a more comprehensive understanding of the organization and the resources that are available (Dillon, Lee and Matheson 2005). Recent surveys and studies (e.g. Taplin 2005; Deloitte and Touche 2008), however, have shown that a growing percentage of managers worldwide are interested in applying risk management more proactively and holistically. Yet, despite the benefits gained by applying risk management to enhance risk responsiveness (e.g. COSO 2004) and strategic decision-making (e.g. Hoyt and Liebenberg 2011), an over-abundance of risk management processes may be problematic as well, in the sense that it may overload the organization with too much time-consuming control and bureaucracy (cf. Taran, Boer and Lindgren 2013). Thus, although risk management is important, finding the right balance between risk and risk management is a serious challenge.

Risk appetite is “*the total impact of risk an organization is prepared to accept in the pursuit of its strategic objectives*” (KPMG 2009, p. 3). HM Treasury (2006, p.3) developed a risk appetite scale, which aims at helping companies to map various possible impact categories (e.g. reputation and credibility; operational and policy delivery; financial and legal/regulatory compliance) and to determine their corporate risk appetite on a scale ranging from:

1. *Averse* – Avoidance of risk and uncertainty is a key objective.
2. *Minimalist* – Low degree of inherent risk, but with a limited potential of reward.

3. *Cautious* – Preference for safe options that have a low degree of residual risk.
4. *Open* – Willing to consider all options and choose the one that is most likely to result in successful delivery.
5. *Hungry* – Eager to be innovative and to choose options based on potentially higher rewards.

A Business Model Innovativeness Scale 1

Through the years, essentially three approaches have been proposed to measure innovativeness. The first approach, associated with business model innovation *radicality*, considers business model innovation as a radical change in the way a company does business (Chesbrough 2007, Linder and Cantrell 2000). Linder and Cantrell in particular clearly attempt to draw a line in suggesting what can and cannot be defined as business model innovation.

The second approach defines innovativeness in terms of, what might be called, the *reach* of the innovation (e.g., Rogers 1983, Garcia and Calantone 2002). A suitable scale measures the degree to which an innovation in terms of “new to whom”, which could range from new to the company, via new to the market and new to the industry, to new to the world.

The third approach considers measuring the innovativeness of a new business model through its *complexity*, where any change in any of the (core) building blocks or the relationships between them could be considered as a form of business model innovation (Amit and Zott 2001; Osterwalder, Pigneur and Tucci 2004; Magretta 2002). In line with Abell (1980) and Skarzynski and Gibson (2008), business model innovation could then be considered in terms of the number of building blocks that are changed simultaneously: any change in one of the building blocks would constitute a simple innovation, while simultaneous changes in all of the building blocks would be the most complex form of business model innovation.

If these three approaches are combined, a three-dimensional space, first proposed by Taran, Boer and Lindberg (2008) and later published in Taran *et al.*

(2015), emerges, which helps in qualifying the innovativeness of a new business model (Figure 1):

- *Radicality* – How new (incremental vs. radical) is each building block (see Table 1 for different examples).
- *Reach* – To whom is the innovation new?
- *Complexity* – Number of building blocks changed simultaneously.

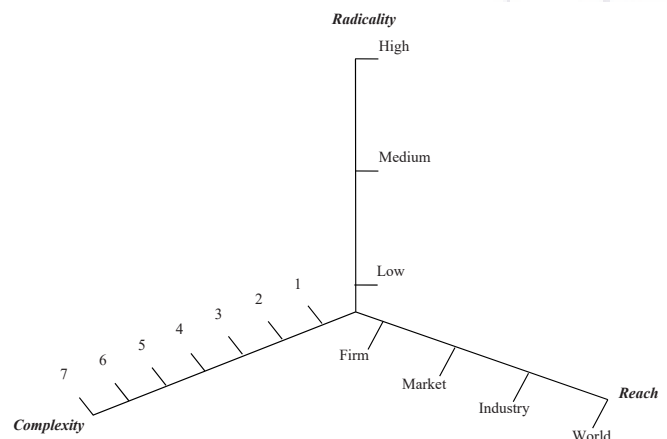


Figure 1: A Three-Dimensional (Business Model) Innovativeness Scale (Source: Taran *et al.* 2015)

In this space, any business model innovation can be positioned in terms of its *degree* of radicality, reach and complexity. Some changes are more radical and/or complex than others, and some (e.g. radical product innovation, incremental process improvement) are better understood than others (e.g. a holistic, new to the world departure from all business models known so far).

Research objective

The basic assumption behind this paper is that the risks involved in business model innovation increase with the radicality, reach and complexity of the innovation. While risk, risk appetite, risk management and, to a certain extent, business model innovativeness and innovation management are relatively well-established constructs, their role and interaction in business model innovation processes are not well understood. The objective of this paper is to investigate how these constructs interact to affect the eventual outcome of a business model innovation process, in terms of its “success” or “failure”.

¹ Most of this section is from Taran, Boer and Lindgren (2015), with permission from the authors.

Building block	Incremental innovation "Do what we do but better"	Radical innovation "Do something different"
Value proposition	Offering "more of the same"	Offering something different (at least to the company)
Target customer	Existing market	New market
Customer relationship	Continuous improvements of existing channels	New relationship channels (e.g. physical/virtual, personal/peers/ mass awareness)
Value chain architecture	Exploitation (e.g. internal, lean, continuous improvements)	Exploration (e.g. open, flexible, diversified)
Core competences	Familiar competences (e.g. improvement of existing technology)	Disruptive new, unfamiliar, competences (e.g. new emerging technology)
Partner network	Familiar (fixed) network	New (dynamic) networks (e.g. alliance, joint-venture)
Profit formula	Existing processes to generate revenues followed-by/or incremental processes of (cost) retrenchments	New processes to generate revenues followed-by/or disruptive processes of (cost) retrenchments

Table 1: Incremental and Radical Orientation to Each Building Block (Source: Taran et al. 2015)

Research Design

Case Studies Description

Four retrospective case studies of business model innovation processes undertaken by three industrial companies (Table 2) provide the empirical basis for this paper. The companies were selected based on their relatively successful, yet somewhat different, business model innovation experiences over the years, and focused on

Alpha	Beta	Gamma
Large global company, which is specialized in developing, manufacturing and marketing (for the most part) professional audio products	Large global company, specialized in developing, manufacturing and marketing flexible electrical/electronic control and instrumentation solutions within power production, marine and offshore	Large IT company, which is specialized in providing IT solutions for primarily public organizations
Two failure cases (A and B)	One failure case (C)	One failure case (D)

Table 2: Company Descriptions

the, in total four, cases in which they failed to implement their new business model attempts successfully.

Data gathering techniques

Given the exploratory nature of this research, the case study methodology was adopted (Yin 2003). Multiple qualitative data gathering methods were used to ensure the validity and reliability of the research. The desk research involved gathering of information through books, articles, websites, as well as documents received from the three companies. The field research consisted of semi-structured interviews (for interview guide see Appendix A), e-mail correspondence and company visits. The questionnaire used to guide the interviews covered all six constructs (business model innovativeness, innovation management, risk, risk appetite, risk management, success/failure) plus contextual variables (e.g. company background, strategy, open/network-based innovation) and was semi-structured in order to allow the respondents maximum freedom to explain their views on the new business model and their understanding of the innovation process, and the researchers the possibility to discover unexpected yet relevant issues. The interviews were held with the companies' middle managers (e.g. technology/innovation, product, project or marketing managers).

In Alpha, 18 hours of interviews were conducted, and in Beta seven hours of interviews in total. In Gamma, the interviewees represented the eleven organizations involved in that company's business model innovation. More than 25 hours of interviews were recorded.

Analytical Focus

The cross-case analysis focused on identifying and analyzing the similarities and differences between the four focal business model innovation experiences. In order to increase the credibility of the research, the data gathering and analysis of all cases focused on the following, theory based, criteria:

- *Characteristics of the business model innovations*, in terms of radicality (how new?), reach (new to whom?) and complexity (Table 1 and Figure 1).
- *Overall innovation management*. Here, the innovation process of each company was analyzed using Tidd and Bessant's (2009) innovation model of "Search-Select-Implement".
- *Risk, risk appetite and risk management*, including the analysis of: 1) both strategic and operational risks occurring, 2) the risk appetite of each company over the years, and 3) the way risks were managed (e.g. explicitly, implicitly, stage-gate oriented).
- *Fit*. Looking for the interaction between the business model characteristics, overall innovation management, risk, risk appetite, risk management and the outcomes (success/failure) of the business model innovation process, the analysis particularly focused on the "fit" between these constructs, reasoning that the higher the risk appetite of a company, the higher the likelihood that it will pursue a more innovative business model, which will involve greater risk which, in turn, needs to be managed more tightly in order for the new business model to be realized and become a success.

Given the exploratory character of the case studies, additional criteria emerging from the case studies were also actively sought, but not found.

Data Gathering Results

Table 3 summarizes the case study data gathered. As that table illustrates, the cross-case analysis focused on the selection of dimensions describing similarities

and differences between the three companies' experiences (e.g. Eisenhardt 1989).

Cross-case analysis and Proposition Development

The cross-case analysis produced six propositions, which are organized according to the four criteria formulated above.

Characteristics of the Business Model Innovation and Success Rate

Company Alpha: Throughout the years, company Alpha engaged in seven business model innovations. Four cases were very successful², one case partly succeeded, and in two cases, the company failed to succeed (cases A and B). The successful cases involved the exploitation of existing technology, or the development and exploitation of new technology-based products, together with a partner, in a market segment new to company Alpha. The two failure cases, presented here, were attempts to outsource marketing and sales (case A) and production (case B), respectively, to a third party. Two factors caused their failure. First, the partner did not match the company's high quality standards. Second, they realized in a later phase (particularly case A) that the market was too small to play a significant part in the company's turnover (i.e. low reach).

Company Beta: Over the years, this company engaged in three business model innovations experiences, two of which became a success, while one attempt failed (case C). The successful cases involved the application of existing, and the development of new, competences and technologies for a new market segment, followed by an acquisition. These innovations were rather risky for the company, both in terms of investment as well as time constraints, and involved the development and exploitation of new technology for a new market segment. In case C, a failure, the company "pushed" a self-developed radically new product into the market in an attempt to exploit a new emerging technology,

² The success of the business model innovations was measured by their profitability, where *successful* cases were highly profitable for the company, *partly successful* cases were the ones with small profit margins, and *failure* cases were those who failed to bring any profits, or worse. See Taran et al. (2015) for more information on the successful cases of companies Alpha and Beta.

	Alpha	Beta	Gamma
The four failure business model innovation cases	<ul style="list-style-type: none"> • Case A – New business unit offering existing technology-based products to a new market (studios), plus outsourcing of marketing and sales to a partner (low radicality, low reach, high complexity). • Case B – Outsourcing the manufacturing of one of the products – failure (low radicality, low reach, high complexity). 	<ul style="list-style-type: none"> • Case C – New technology-based product, aimed at serving existing and potential new customer segments. After one year of heavy investment in the product, the project was terminated due to incongruity with customer demands (product shape and size; price – too expensive) – (low radicality, low reach, high complexity). 	<ul style="list-style-type: none"> • Case D – New IT solution based on approaching shift in technological opportunities within metering utility consumption. The project was terminated due to strategic shift within the company and lack of believe in customer demand (high radicality, high reach, high complexity, given the difficulty in network structure among the participating organizations).
Overall innovation management	<p>Search processes - No search process in any of the cases. <i>“It was just something that came up along the way”</i>. One project was managed proactively in search of a radically new business model (Case B). Otherwise, it was internal competences chosen to be used elsewhere.</p> <p>Selection and implementation processes - Following a stage-gate model, radical innovation ideas are handled with extra awareness. A slower process, which always starts with small steps and then grows slowly. Radical ideas follow gates similar to those of incremental ideas. The difference is, though, that it takes more time to move from gate to gate.</p>	<p>Search processes - Recognized as one of the weaknesses of the company. They do not really have any systematic processes to manage radical, or even incremental, innovation ideas. It is something that usually just <i>“pops up”</i>. They give more attention to ideas that come from their main customers.</p> <p>Selection and implementation processes - A stage-gate model is used to move the business concept idea through a maturity roadmap and development process. Many complaints about the fact that there is not enough market research behind ideas proposed. In effect, lacking understanding of the potential market and sales volume.</p>	<p>Search processes - Initial idea developed by area director of the company. In continuation of this initial idea, ten additional organizations were involved into the further development of the business idea and the business model underlying the project.</p> <p>Selection and implementation processes - An open, network-based approach to develop and test the business idea. A development process, which was marked by a substantial number of iterations and radical shifts in the overall business model.</p>
Risk, risk appetite and risk management	<p>Used to be between “open” and “hungry”. Currently moving towards “open” – “cautious”, and taking fewer risks. Intending to move to ‘hungry’ again in future.</p> <p>No explicit risk management processes, but rather a project culture and a project/ innovation model that is structured by many gates aimed at continuity and reducing the risks throughout the innovation process. It is not an advanced risk management model, or one that applies a risk assessment method, but nonetheless a very sufficient model to reduce many risks through the innovation process.</p>	<p>Used to be between “cautious” and “open”. Moving towards “open” and “hungry”. Willing to take chances and aim high, but aware of the risks involved in that.</p> <p>No explicit risk management processes were identified. However, their innovation processes are highly controlled, to insure that strategic decisions made at the gates are being implemented adequately at the stages throughout the innovation process, and, the company considers those control processes as a form of risk reduction.</p>	<p>Mostly “averse” but moving towards an “open” approach. Focusing on a new market position in the aftermath of a privatization process.</p> <p>No explicit risk management processes were identified. Yet, they perceived the openness approach as a form of risk mitigation and sharing, by opening up both the business model and its innovation process, which would be the fundament of the project. The company stated that the project was not so much an internal development project, but rather something, in which all the participating organizations should be able to mirror themselves (i.e. risk sharing).</p>
Fit	None	None	None

Table 3: Summary of the Case Data

without any idea of how customers would respond. The market place failed to pick up the new product.

Company Gamma: This company was very eager to meet the new challenges of a post-privatization period (during the innovation project the ownership of company Gamma shifted from a number of different public organizations to an investment fund). The company had little experience with business model innovation, since it had always relied on a familiar and fixed group of customers within the public sector. Actually, the target customers of the company were to a large extent also the company’s owners. Consequently, case D actually concerned a fundamental innovation experimentation for company Gamma.

Table 4 provides more details on the data gathered by visualizing the business model innovation cases through their degrees of innovativeness in terms of radicality, reach and complexity.

On the aggregate scale combining radicality, reach and complexity, cases A, B and C were low in radicality and reach. Case D, however, was high in radicality and reach. All cases were highly complex. Case A involved the establishment of a new business unit offering incremental improvements to existing products, combined with outsourcing of marketing and sales to a partner. Case B concerned outsourcing of manufacturing to a partner which, however, failed to result in a competitive product. Alpha was a highly competent design company, pushing new products into the marketplace and with a successful history of collaborative technology development. However, they seemed to have underestimated the complexities involved in establishing a successful operational collaboration through outsourcing. In Beta, new product development activities were

usually based on market-pull. Case C failed because the company “pushed” a radically new product into the market without any idea of how customers would respond. Gamma’s case D was a radical and new to the industry innovation, which went far beyond the company’s previous innovation experiences.

Moreover, the case studies suggest that business model innovation failures are situated at the “extremes” of: 1) low radicality and reach, and 2) high radicality and reach.

Proposition 1: *Even if the radicality and reach of a business model innovation are low, companies may underestimate its complexity, particularly if the innovation does not build on the company’s experiences with previous innovations.*

Proposition 2: *If a company does not have the disruptive exploration capabilities and commitment required to support a radically new and high reach business model innovation, the innovation process is likely to fail.*

Yet, however tempting it may be to propose that companies best stay away from the extremes, the more compelling reason for these failures seems to be the lack of prior related knowledge (Cohen and Levinthal 1990). Alpha was a technology developer, without any experience with operational collaboration. Beta understood how to translate market requirements into new products, but did not understand how to push new technology into the market place. Gamma overplayed its hand by trying to accomplish a new to the industry innovation, which went far beyond its previous experiences.

Case	Radicality (to the core business)		Reach	Complexity (to the core business)	
	Case - A	Case - B		Case - C	Case - D
Alfa	Case - A	Low: VP; PN	Low: new to the company	High: VP; TC; VC; PN; CR; PF	
	Case - B	Low: VC; PN	Low: new to the company	High: VP; TC; VC; CC; PN; PF	
Beta	Case - C	Low: VP; TC	Low: new to the company	High: VP; TC; CC; VC; PN; CR; PF	
Gamma	Case - D	High: VP; TC; VC; PN	High: new to the industry	High: VP, TC, VC, PN, PF	

VP=value proposition; TC=target customer; VC=value chain; CC=core competences, CR=customer relation;

PN=partner network; PF=profit formula.

Table 4: Radicality, Reach and Complexity of the Four Cases

Overall Innovation Management

Company Alpha: In most business model innovations ventured by this company, there was never a search process for new business models. Rather, ideas were slowly developed along the way based on the company's existing core competences (e.g. technologies, know-how). The company simply considered it obvious that existing competences would give them relatively easy access to other industrial settings. It seems that the company had a prevalence for generating an idea, testing it first internally, starting with a low scale production process, and considering growth in due course (e.g., through a joint venture, or a new business unit). This *inside-out* replication of previous business model innovation processes seemed to be a winning formula for the company, and was expected to work in any (future) business model innovations. However, in cases A and B, one of the key challenges for the company was to find the right partner to work with, and here the company failed.

Company Beta: Just like company Alpha, company Beta never implemented a formal search process for new business models. Radically new ideas emerged in the course of time, either through existing technological development capabilities, cost reduction programs, or as a reaction to emerging competitors' technologies, which was the trigger of case C. The failure of case C, caused by a pure "technology push" strategy, made the management team even more aware of the need to understand customer demands as a basis for selecting future innovation ideas.

Company Gamma: The innovation process was marked by a rather wide and creative search for new business models. At an early stage, company Gamma realized that the developed concept would be marked by a significant level of complexity, which would go beyond the complexity of the products and services the company had produced hitherto. The entire network of organizations involved in the project was invited to a co-creation process in order to enable them to mirror themselves in the final outcome of the process. The two project managers of company Gamma (there was a shift during the process) and the area director who initiated the project, explicitly stated that the intention was to invite everybody into the process. Both project managers were willing to

accept the inherent risks of this open innovation (cf. Bogers, Chesbrough, Heaton and Teece 2019) process experimentation (e.g. the risk of knowledge spill-over to potential competitors; the risk of one of the participating organizations to be inspired and develop their own solutions without the participation of company Gamma). Sadly, though, this high level of inherent risk acceptance did not work to their benefit. The business model innovation failed and in the aftermath company Gamma chose to reduce its network and be more cautious, i.e. accept less risk.

In all three cases, results indicate that experimentation, learning from previous experiences and using the lessons learned, have significant impact on the success (or failure) of business model innovation.

Proposition 3: *Insufficient experimentation and lack of learning from failures increase the likelihood of business model innovation failure.*

Risk, Risk Appetite and Risk Management

Company Alpha: The company's risk appetite used to be "hungry", but they gradually took fewer risks and moved towards "cautious". In the past, the company was more willing to take risks, and experimented with new, rather than "more of the same", products and business models. However, due to a significant downturn in the company's profits during the last couple of years, which was partly related to the financial crisis and resulted in the hiring of a new CEO, the strategy of the company changed significantly and, with that, also its risk appetite.

The innovation process of the company was very structured and followed many gates. The process and gates were the same for all innovations. The company did not apply any *explicit* risk assessment/management processes. Rather, they considered the gates as (implicit) risk reduction processes: all ongoing business development projects had to meet each requirement at each gate before green light was given to proceed to the next stage. An additional mechanism used to reduce risks was associated with time. That is, despite the fact that the innovation process and the gates remained the same for all types of innovations, the time taken to move from gate to gate increased as the level of

radicality, reach and/or complexity increased. This gave the company the flexibility to proceed with more caution and to terminate projects that were expected to be unsuccessful without too many consequences. Yet, it was also apparent to the management team that despite the fact that the decision-making and implementation processes were well designed for technological success, the company did not really possess adequate processes to predict the possible success in the market place, that is, commercial success. Consequently, the management team was very keen to search for new, more structured ways to deal with risk-benefit projections and increase the likelihood of commercial success of future innovations. Those new processes, according to the company's innovation director, are not meant to increase control but rather to reduce uncertainty as regards future sales.

Company Beta: The company used to focus on electronics and instruments that were used in switchboards in factories. It was very traditionally oriented, and had relied upon North Europe as its sales market. The company's risk appetite used to lay somewhere between "cautious" and "open", but had grown significantly since the early nineties and was leaning towards "open" and "hungry" at the time of the study. This is partly due to a replacement of the senior management, but also because sales volume had grown and new technologies had emerged that opened up new opportunities for the company. Willing to take chances, the company was aiming high, even though they were aware of the risks involved.

Company Beta did not have an explicit risk management process in place. Instead, with each gate, the company set a high level of control requirements. In doing so, decision makers did not question the risks involved the innovation process, but rather insured that decisions made will be efficiently executed (e.g. investments, resources, time). Thus, unlike company Alpha, which gave the innovation team the flexibility to manage the stages freely from gate to gate, in company Beta, the control processes were very formal, continued also through the stages from gate to gate, but did not consider any risks.

According to one of the managers, the innovation processes involved a lot of paperwork and forced the innovation team to spend a lot of time on completing

checklists instead of managing the process forward, which, however, had very little impact on output effectiveness. In its *technological* innovation projects, company Beta used scenario planning. Performed by the business intelligence unit, this method involved the development of three sales forecast scenarios: an optimistic, a realistic, and a conservative scenario. These scenarios used to assist the company with analyzing the actual "as-is" business progress (e.g. better than expected, as-planned, worse than expected). However, those scenarios were not applied in any of the *business model* innovation processes.

Company Gamma: Historically, this company serviced a substantial number of customers within the public sector. The strategic focus was not to expand the market or to innovate products and services. Instead the primary goal of the company was to stick to the current customers, products and services. This risk-averse approach to business modeling and innovation was revised as a consequence of the privatization of company Gamma. The privatization process ran in parallel with the innovation project and drove the initial stages of the project in terms of involving external organizations in the innovation process and the development of the business model.

Company Gamma did not have an explicit risk management process in place either. Yet, unlike the other two companies, the company was willing to *accept*, that is, to tolerate, a substantial risk during the entire innovation process. They saw the involvement of some of the potential customers (the utility companies) as a way to minimize the risk if a failure outcome should occur. Furthermore, it was very important for the company to have the customers "on board" to ensure market fit to the project objective. In effect, here too, risk mitigation activities were only partly and, then, implicitly initiated. The area director addressed this issue by stating that the end-result of this open innovation process could potentially result in little to no positive impact to the organization overall and possibly even with an (affordable) loss. This "all-in" gambling by the company was often mentioned during the network meetings, and the project managers as well as the area director emphasized that the project should not be perceived as a "Gamma project" but rather as a "network project", which consisted of all the organizations involved. The project was closed down as a

consequence of a strategic shift within company Gamma. A new area director sought to get an overview of the various projects within the business area. He did not see any potential in this particular project, nor a fit between this project and the newly-planned overall strategy, closed down the project and fired the project manager.

In all three companies, the top management risk appetite had a strong but different impact on the company's corporate risk appetite. While the replacement of the CEO in company Beta, and the privatization process that took place in company Gamma turned both companies to be risk hungrier in their pursuit of new business opportunities, Alpha's experience made the company more risk averse.

Proposition 4: *The top management has great influence on the risk appetite of the company. Fit between the corporate strategy of a company and top management's risk appetite should be one of the selection criteria for top managers.*

However, in none of the three companies an explicit risk management program was in place. Risks were managed implicitly, that is, embedded in the innovation stage-gate process design (companies Alpha and, to a lesser degree, Beta), or not managed at all (company Gamma). In effect, problems continued to manifest themselves in different ways. At the time, many of these problems seemed to have a tolerable impact along the process, e.g. unexpected but solvable surprises; goals and objectives that required redefinition during the process; accepted solutions that were rejected in a later phase; implemented solutions that were less effective or glamorous than anticipated; and/or schedule and budget overruns. Yet, the cumulative effect resulted in the business model innovation project to fail in all four cases. Clearly, the companies were unhappy with their risk mitigation processes, but none of them had any solution – they did not really know, and never learned, how to optimize the process and, particularly, how to manage risk proactively.

Proposition 5: *The absence of dedicated risk management program to a business model innovation initiative increases the likelihood of the initiative to fail.*

The interaction Between Risk, Risk Appetite, Risk Management, And The Role Of Risk Awareness

On an aggregate level, the four failure cases indicate that risk (due to the business model innovativeness), risk appetite and risk management and, more importantly, the interaction between these constructs, play a significant role in the success or failure of business model innovation initiatives.

The concept of interaction or “fit” plays a central role in various theories, including manufacturing strategy (e.g. Skinner 1985), organization theory (e.g. Mintzberg 1979) and innovation theory (e.g. Boer and During 2001), but has not been used so far to understand the relationships between business model innovation and risk management. Miles and Snow (1994), for example, discuss the dynamics of internal-external fit. They argue that “minimal fit” is necessary to ensure a company's survival, “tight fit” frequently results in excellent administration, while “early fit” may enable a company to sustain an unusually high level of performance over an extended period of time. Yet, they were also aware of the fact that “fit” has its limitations as well – even “Hall of Fame” companies may suffer from downturns in performance (e.g. due to unexpected external hazard impact).

In cases A, B and C, companies Alpha and Beta were “open” to take risk, but although the business model innovations they pursued were relatively complex, they were also rather incremental and new to the company only, i.e. low reach (Table 4) and, in effect, low risk initiatives. Neither company applied any risk management mitigation activities. In case D, it was company Gamma's limited *risk awareness* that seems to have led to complacency when it ran a highly innovative (radical change, new to the industry, complex; Table 4), i.e. a high-risk, initiative. In effect, the company did not apply any risk management either. In short, the companies' risk appetite and awareness, the innovativeness of, and, consequently, risk associated with, the business model innovations pursued and, finally, the effort the companies put into risk management, did not fit together.

Although it can be argued that a perfect fit between risk, risk appetite, risk awareness, risk management

and business model innovativeness will not automatically ensure business model innovation success (and vice versa), it will increase the probability of success substantially. Both Alpha and Beta had multiple successful business model innovation experiences in their past, and it has been observed (e.g. Taran *et al.* 2015) that fit, particularly between the companies' risk appetite and the business models' innovativeness and associated risks, was much better in the successful cases than in the failure cases. For example, in its successful attempts (e.g. a new joint venture; new business unit development), company Alpha built slack (e.g. Galbraith 1973) into the process by taking more time to get from gate to gate as the level of radicality, reach and/or complexity increased. This gave the company the flexibility to proceed with more caution and to terminate those projects that were expected to be unsuccessful without too many consequences. In addition, company Alfa also mapped each innovation project's timetable as red, yellow or green to illustrate both its readiness to meet the next gate requirements deadline, as well as the sense of urgency for its process completion.

The results indicate that compared to incremental, low reach and simple business model innovations, the importance of ensuring alignment between a company's risk appetite, risk awareness and risk management approach increases in more radical, higher reach and more complex business model innovations.

Proposition 6: *The likelihood of launching a successful new business model increases if the company's risk appetite, risk awareness, the innovativeness of the new business model, and the risk management approach adopted, align with the risks associated with the intended innovation.*

Conclusion

Despite two decades of intense research, business model innovation still lacks a solid theoretical basis, particularly with respect to the antecedents, contingencies, and outcomes (Foss and Saebi 2017). In this paper, we focused on how the risks associated with the innovativeness of a business model innovation initiative, an organization's risk appetite, and its risk

management approach interact to affect the success or failure of a business model innovation process.

Contribution

The cross-case analysis produced six testable propositions. Together, these propositions seem to suggest the following picture.

Risk appetite and *risk awareness* seem to play a significant role in business model innovation decision-making. The top management's personality, risk appetite, and assessment of the company's economic position and outlook overall, tend to have great influence on selecting new business model innovation initiatives. As such, it is imperative for companies to consider whether the various internal stakeholders' and also external partners' risk appetites and awareness are aligned, in order to reduce the likelihood of future conflicts when designing the company's innovation portfolio. This proposition is also confirmed by, for example, Rogers (1983), who argued for the important role that key stakeholders' perceptions have in "setting the innovation stage".

Additionally, it is vital to consider the *strategic aggressiveness* as part of business model innovation decision-making. Top management perception greatly affects its appreciation of the nature of the innovation, and may lead to underestimation of the difficulties involved, even, or perhaps especially, at the two business model innovation extremes of:

- Incremental (radicality), new-to-the-company only (reach), but highly complex business model innovations initiatives. Risk-averse managers may have the impression (possibly, illusion) of "safe enough" business model experimentation, but may risk that the innovation will have little or no positive impact in the market place.
- Radical, new-to-the-industry or new-to-the-world (reach), highly complex business model innovations, which in most cases depart from the company's previous strategy and do not, consequently, allow building on experiences with previous innovations.

Although the likelihood of failure seems to be largest at these extremes, they are fundamentally different, so that it is quite important to distinguish between

the two. The first can be considered to reflect a reactive strategy (cases A, B, and C), whereas the second is a much more proactive initiative (case D). Being too defensive and, in effect, unambitious may lead to failure, while pursuing a proactive initiative requires managers to appreciate the high uncertainties and the consequent risks inherent in the process, which in many cases go beyond the scope of the company's existing core competences and capabilities and requires *non*-prior related knowledge (*cf.* Cohen and Levinthal 1990).

Companies should not overlook the importance of *learning from failure* either. There are many lessons to be learnt from the aftermath of a failed attempt in terms of what not to do and what to improve on for a next time. Sadly, the cases presented here indicate that due to locked-in path dependency trajectories (Nelson and Winter 1982), companies tend to "simply" repeat successful business model innovation processes and to, equally "simply", drop unsuccessful approaches, rather than learning from them. The inherent danger is that a company fails to learn how to approach innovations that are essentially new to the company, which, in turn, may decrease its growth potential significantly.

Taking a *risk management and alignment* perspective, even if 1) a company's risk appetite and awareness fits its economic position and outlook, and 2) the company estimates the nature and characteristics (radicality, complexity, reach) of the intended innovation correctly, and 3) the company is prepared, if necessary, to learn new approaches, business model innovation is still loaded with risks. Hence, risk management and, more

importantly, its alignment with the other key constructs (i.e. the actual risk associated with the innovativeness of the business model innovation and the company's risk appetite) is of paramount importance in any business model innovation process. Furthermore, it appears that adopting a widely used approach such as the stage-gate process (Cooper 1993) to manage a business model innovation process is not enough. The three companies' experiences suggest that incorporating dedicated risk management processes (Chapman and Ward 2004) in a business model innovation process, whether that process is stage-gate driven or not, can help reduce the likelihood of innovation failure. Moreover, as case C suggests, risk management can also potentially facilitate meeting customer demands. Too much focus on technological aspects combined with insufficient attention for commercial aspects and, possibly, a "push" strategy, may lead to technical success but commercial failure (*cf.* e.g. Voss 1988).

Further Research

The empirical investigation performed in this research involved four retrospective case studies, based on mostly qualitative data. There are several well-documented advantages to this methodology, such as richness and depth, but also weaknesses related to, amongst others, generalization. Accordingly, the case study results and propositions developed here should be tested on a larger scale, using a mix of comparative and longitudinal case studies as a first step, aimed at enriching, sharpening and adding to the propositions presented here. Thereafter a larger case or questionnaire-based survey may be used to test and generalize the propositions developed.

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APPENDIX A: INTERVIEW GUIDE

Only the questions relevant to this paper are listed here. Company information (e.g., location, size, structure, products, and markets) were inferred from company documents and checked with the interviewees.

Core constructs	Interview questions												
Characteristics of the business model innovation:	<ol style="list-style-type: none"> 1. How many business model innovations did the company experiment with over the past couple of years? 2. From a business model perspective, what did these innovations involve, i.e. which building blocks were changed? 3. Please map each of the business model innovation initiatives according to the three-dimensional innovativeness space (Figure 1 in the paper). 												
Overall innovation management:	<ol style="list-style-type: none"> 4. How many of those business model innovations were successful, partly successful or a failure? 5. Why did you choose to engage in each of these business model innovations? Was it a response to some kind of threat (reactive), or did you take advantage from an emerging opportunity (proactive)? Which of the innovations would you rate as 'idea push', which as 'market pull'? 6. Who made the choice for each of those innovations (e.g. R&D manager, management team, stakeholders)? 7. The rationality of choices: Based on what data analysis did you make the choice (e.g. cost-benefit financial analysis, business plan, "gut feeling")? 8. Did you apply similar innovation processes to all innovations (incremental/radical) or different ones? 												
Risk, risk appetite, risk management and interactions between constructs:	<ol style="list-style-type: none"> 9. Based on the table below, how would you characterize the company? <table border="1" data-bbox="363 1010 1479 1473"> <thead> <tr> <th data-bbox="363 1010 730 1048">How [risk] hungry is the company?</th> <th data-bbox="730 1010 1479 1048">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="363 1048 730 1086">Averse</td> <td data-bbox="730 1048 1479 1086">We never take risks</td> </tr> <tr> <td data-bbox="363 1086 730 1167">Minimalist</td> <td data-bbox="730 1086 1479 1167">Preference for extra safe options that have a low, or no, degree of risk and only have a potential for limited reward.</td> </tr> <tr> <td data-bbox="363 1167 730 1247">Cautious</td> <td data-bbox="730 1167 1479 1247">Preference for somewhat safe options that have a low degree of risk and may only have limited potential for reward.</td> </tr> <tr> <td data-bbox="363 1247 730 1395">Open</td> <td data-bbox="730 1247 1479 1395">Willing to consider all options and choose the one that is most likely to result in successful delivery while also providing an acceptable level of reward (despite medium level of risks that we need to take through the innovation process).</td> </tr> <tr> <td data-bbox="363 1395 730 1473">Hungry</td> <td data-bbox="730 1395 1479 1473">Eager to be innovative and to choose options based on potential higher rewards (despite greater risk).</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">HM Treasury (2006)</p> 10. How, if at all, were risk management processes used through the business model innovation process? 11. To what extent did you consider through the innovation process the interaction between the level of risk, and the way you chose to organize for each business model innovation? 12. What did you learn from that experience for next time? 	How [risk] hungry is the company?	Description	Averse	We never take risks	Minimalist	Preference for extra safe options that have a low, or no, degree of risk and only have a potential for limited reward.	Cautious	Preference for somewhat safe options that have a low degree of risk and may only have limited potential for reward.	Open	Willing to consider all options and choose the one that is most likely to result in successful delivery while also providing an acceptable level of reward (despite medium level of risks that we need to take through the innovation process).	Hungry	Eager to be innovative and to choose options based on potential higher rewards (despite greater risk).
How [risk] hungry is the company?	Description												
Averse	We never take risks												
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Cautious	Preference for somewhat safe options that have a low degree of risk and may only have limited potential for reward.												
Open	Willing to consider all options and choose the one that is most likely to result in successful delivery while also providing an acceptable level of reward (despite medium level of risks that we need to take through the innovation process).												
Hungry	Eager to be innovative and to choose options based on potential higher rewards (despite greater risk).												
In case the innovation process involved open/network-based innovation:	<ol style="list-style-type: none"> 13. How do you experience your organization's attitude / openness to formal / informal networks? 14. What did you perceive as the theme of the network (how clearly it was formulated)? 15. Based on what criteria were partners selected (past relationships, brand new partners, strategic options / limitations, customer base, partners' existing technology)? 16. Who was leading the network - how (positive/negative) did you experience his/her role? 17. What was your overall experience of the network meetings - progress/non-progress? 18. If you look back on the course of the network - can you point to any key times, meetings, events, etc. where the network/innovation project took a decisive turn? 												

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