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Paving the way for a new composite indicator on business model innovations

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Abstract

The paper conceptualises business model innovations (BMI) as a fundamental change of the mechanisms and arrangements of how a company creates, delivers and captures value. It translates this definition into a composite innovation indicator that consists of a combination of radical product and radical process innovations, or radical product innovations combined with marketing and organisational innovations. Implementing this definition with empirical data from the Community Innovation Surveys (CIS) in Europe, we find that roughly one out of 20 SMEs has introduced a BMI in the three-year period preceding the surveys. Deepening our understanding of the construct by means of an exploratory analysis of 60 BMI case studies, we find that revenue model innovations have not been captured sufficiently in the CIS datasets. At the same time, they constitute an essential element and characterize a significant number of BMI cases. We suggest that innovation surveys should introduce questions on revenue model innovations and add a few further changes to better capture business model innovations in the future.

Jelcodes:O32,O31

1. Introduction

In the USA, 40% of the 27 companies founded in the last 25 years, that grew their way into the Fortune 500 in the past 10 years did so through business model innovation (Johnson, Christensen, & Kagermann, 2008). David Teece (2010) suggested that the more radical a technological innovation, the greater the need for business model innovation (BMI) in order to capture (part of) the value created by the new technology. Henry Chesbrough (2007, p. 12) seconds: "Today, innovation must include business models, rather than just technology and R&D."

Overall, there is a growing focus on business models and business model innovations (Zott, Amit, & Massa, 2011). However, academic research seems to lag behind business practice (ibid.). In the traditional SME context, Clarysse (2007) put forth that the importance of business model innovation has been highly underestimated in the past, concluding that policy makers can develop measures which help SMEs to look critically at their on-going business and support activities that aim for increased growth. And, indeed, the idea has been taken up in research and innovation policy circles as well: the ERIAB advisory board of the European Commission recommended recently different measures to increase the uptake of business model innovations in Europe, for instance by raising the prominence of the topic in academic education (European Research and Innovation Area Board (ERIAB), 2012).

However, we currently know rather little on business model innovations (BMI). A big part of the growing literature on BMI is conceptual (see the reviews in Krcmar, Friesike, Böhm, & Schildhauer, 2012; Morris, Schindehutte, & Allen, 2005; Osterwalder, Pigneur, & Tucci, 2005; Shafer, Smith, & Linder, 2005; Zott, et al., 2011 to name a few). Others have developed instruments for using the concept in business practice and consulting (Maurya, 2012; Osterwalder & Pigneur, 2009). Empirical evidence on BMI is limited resulting mainly from case studies and very few ad-hoc and mostly non-scientific surveys.[1]

Case studies are well suited to explore the construct. They can capture a broad set of influences within the innovating companies as well as in their environment and are important for developing theory. Usually the case studies on BMI are limited to a small number of cases – an exception is Amit & Zott (2001) who looked at 59 e-business cases – which is suitable for analyzing in depth aspects of BMI management (see e.g. Bucherer, Eisert, & Gassmann, 2012; Ramon Casadesus-Masanell & Tarzijan, 2012; Chesbrough & Rosenbloom, 2002; Desyllas & Sako, 2013; Rohrbeck, Günzel, & Uliyanova, 2012). However, it is impossible to gather from this line of work how important BMI are in different economies, whether there are specific barriers against it in national research and innovation systems, or what the macro-economic consequences of BMI are.

A recent Australian study collated data on 64 pension funds and measured the degree of BMI as the total of up to seven innovations which should impact the business model (Hartmann, Oriani, & Bateman, 2013). The analysis found a positive impact of BMI on operational pension fund performance. Drawing on a unique, manually collected dataset Zott and Amit (2008) find that novelty-centred business models – coupled with product market strategies that emphasize differentiation, cost leadership, or early market entry – can enhance firm performance. Non-scientific surveys implemented by consultancies have suggested that business model innovators are more successful than other types of innovators, see for instance the BCG innovation survey (Lindgardt, Reeves, Stalk, & Deimler, December, 2009) and the IBM CEO survey (IBM Institute for Business Value, 2012). However, at least with regard to the IBM survey, the conceptualisation and the underlying sample introduce some uncertainty about the validity of this result (see below).

Methodologically stronger innovation surveys, such as the harmonized European Community Innovation Survey (CIS) 2010, the Japanese National Innovation Survey 2012 or the US Business

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[1] For a different approach using IPO prospectuses and other documents for 170 companies to extract data on business models see Zott and Amit (2008).

R&D and Innovation Survey (BRDIS) 2010 do not know the concept of BMI. The same applies for the Oslo Manual, the OECD guidelines for collecting innovation data (OECD, 2005). In its most recent third edition it defines and describes four types of innovation: product innovations, process innovations, marketing innovations and organisational innovations with sub-types in each category.

CIS experts have complained about the low use and impact of the CIS dataset, the most comprehensive multi-country data set on corporate innovation (Arundel, 2007; Bloch & Lopez-Bassols, 2009). The development and analysis of complex indicators can be a remedy to this, raising the policy relevance of CIS survey questions (Arundel, 2007). A number of such indicators have been suggested to identify different innovation modes or types (Frenz & Lambert, 2012), generated either in a grounded bottom-up approach by clustering innovation-related variables, or in a top-down prescriptive approach by implementing variable combinations deduced from innovation theory. However, the construct of BMI is also omitted in this line of work.

The present paper aims to close this gap by

- linking the BMI construct conceptually and empirically to established innovation surveys and their definitions,
- identifying gaps in the survey coverage with regard to the BMI construct,
- developing suggestions on how to close these gaps.

The paper goes beyond previous work in a number of regards: it deduces the type of business model innovations from theory in a top-down approach and connects this for the first time with national innovation surveys. It reflects on the gaps in these surveys which encumber the undertaking. It adds a bottom-up exploration of case study data, to shed light on the limitations of the top-down approach and get a better understanding of the sub-types of business model innovators.

We first introduce our understanding of business models and business model innovations in the next section. In section 3 we implement this definition, develop a composite indicator for BMI and measure it with data from CIS 2008 and CIS 2010. In section 4 we use a data set of 60 BMI cases to explore further the limitations of our composite indicator and develop an understanding of different types of business model innovators. The last section summarizes and concludes the paper.

## 2. Business models and business model innovation

2.1 Business models as a heuristic to understand and analyse companies

In science, as Baden-Fuller and Morgan (2010) point out, models are organisms for investigation. For instance, the laboratory mouse is a model that is representative for its class of mammals and experimenting with lab-mice generates insights that are relevant for mammals. In analogy, business models can be considered as representatives of certain genres of firms that can be studied. A number of scholars have suggested using three aspects of value to define the business model construct and distinguish different genres of firms:[2]

> "A business model describes the rationale of how an organization creates, delivers, and captures value." (Osterwalder & Pigneur, 2009, p. 14)

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[2] See in particular: Giesen et al. (2010), IBM Institute for Business Value (2012), Mueller & Volery (2010), Teece (2010), Yunus et al. (2010) or Zott, Amit, & Massa (2011).

Figure 1. Conceptualization of business models (Source: Authors)
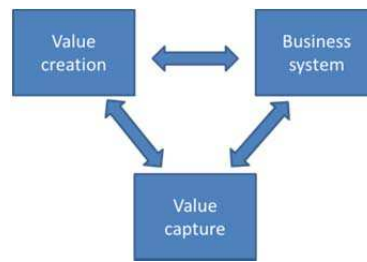
Value creation refers to how and for whom a company (or other organisation) creates value (Morris, Schindehutte, & Allen, 2005). Without value and benefits, users or customers are unlikely and a compelling value proposition is one of the elements of a good business model (Teece, 2010). Taking Google as a well-known example, there can be multiple values that accrue to different types of customers: for internet searchers the comprehensive and sorted list of hits of the Google search engine is the main value; for companies advertising on Google it is the possibility to link up with potential clients which revealed their interest and preferences by means of their internet search. Brandenburger and Stuart (1996) define the value created in an organisation as the buyers' willingness-to-pay for the products of this organisation minus the organisation's suppliers' opportunity costs. Hence, an organisation can create more value by raising downstream willingness-to-pay or reducing upstream opportunity costs in the value chain. The total maximum value that is created in a value chain depends on the end consumers' willingness-to-pay.

Business system. However, it is not enough to create value, but the organisation needs to deliver this value to the customers and the costs of doing so need to be lower than the generated revenues; otherwise the business model will be unsustainable. From this follows that part of the business model is the entire business system which has been defined as "the 'system of works' (the production/delivery system) that a firm designs - within and beyond its boundaries - to produce and deliver its goods or services to its target customers" (Itami & Nishino, 2010, p. 364). The business system reflects the business architecture and how the organisation internally mobilises its capabilities and organises its activities. It also includes the division of labour between the organisation and its external trading partners and how this is controlled. Companies such as Wal-Mart and Dell have created a competitive advantage by making changes to their logistics which saved costs, promoted service quality to customers and increased revenues and profits.

On the one hand, the business system functions as a learning system as well. Examples like Toyota or Google show that doing the work of value creation and interacting with clients, partners and other stakeholders can result in further organisational learning and innovation (Itami & Nishino, 2010, p. 366). In addition, the business system consists in the installation of subsystems, processes and assets which are hard to replicate and serve as barriers for competitors to imitate the business model (Teece, 2010) - e.g. take the assets and competencies needed to bring a new pharmaceutical compound through clinical trials and evaluate its effectiveness for treating particular diseases. On the other hand, however, the business system and the capital which is "frozen" in it may also constitute a barrier to changing an existing business model and make it difficult and time-consuming for incumbent firms to react to new entrants with more effective business models.

Value capture. The third crucial element of a sustainable business model was mentioned already: it is the logic of how to *capture value* from whatever group of users or customers who benefit from the value created (Chesbrough & Rosenbloom, 2002). The value appropriation has been depicted as the outcome of bargaining between the clients, the firm and the firm's suppliers (Brandenburger & Stuart, 1996). This bargaining results in a distribution of shares of value. However, important is not only who appropriates how much, but also what influences the bargaining position and what contributions justify value claims. Drawing on an analysis of multiple cases, Amit and Zott (2001) see four different grounds on which e-businesses can claim value: a) they increase the efficiency of transactions; b) they bundle goods and generate complementarities; c) they lock in clients through

switching costs or network externalities; 4) transaction content, structure and governance are novel.

Not necessarily all beneficiaries of an organisation need to become revenue sources as well, as the example of Google, Skype and other so-called "freemium" business models shows, which offer a product (often case a service) and charge only a selection of their users. Capturing value was one of the challenges of many dot.com companies and even large companies such as Yahoo! had problems in the beginning to convert value into profit (Shafer, Smith, & Linder, 2005). The revenue model might not be limited to economic revenues only, but include other types of revenue as well, such as social revenue as in the case of social businesses (Yunus, Moingeon, & Lehmann-Ortega, 2010), environmental or health-related revenues. This wider understanding of revenue and value is particularly important if we extend the business model concept beyond the private for-profit sector and include social business, NPOs, or the public sector.

2.2   Business model innovation

Experimenting with the business model is common management practice. Managers conduct thought experiments, simulations or real experiments in order to find out whether changes to the business model would raise overall success (Baden-Fuller & Morgan, 2010). Baden-Fuller and Stopford find that "…[s]*tagnating organizations need experiments, and to learn from them, if they are to succeed in rejuvenation."* Sosna et al. (2010) demand that the trial-and-error learning approach has to involve all levels of the firm and Osterwalder et al. (2005) argue that a systematic approach to understanding and designing business models is conducive to innovation.

Following our definition of business models, we consider business model innovations (BMI) as changes of all three components of business models, 1) value creation, 2) business systems, and 3) revenue generation. This includes innovations in the form of newly introduced goods or services (Mitchell & Coles, 2003) or changes to processes of producing and delivering products, but it requires also that these technological innovations are complemented by "organizational and business model changes as well as alterations in the business network" and how these are linked (Rohrbeck, Günzel, & Uliyanova, 2012, pp. 9-10). BMI is then a composite type of innovation combining more basic types of innovation (Björkdahl & Holmén, 2013). Of note, it does not contradict Amit and Zott's (2012) suggestion of three ways through which BMI can occur, namely by adding novel activities ("content"), linking activities in novel ways ("structure") or changing one or more parties performing the activities ("governance"), but it requires that these activities somehow connect to creating, delivering or appropriating value.

In addition to combining changes in different areas of the business and its partner network, and creating and appropriating value in a different way, the literature generally agrees on the fundamental character of the changes resulting from business model innovations (Bock, Opsahl, George, & Gann, 2012; Cavalcante, Kesting, & Ulhoi, 2011; Markides, 2006; Yunus, et al., 2010).[3] BMI might go beyond "only" doing business in a new way in the company. It can acquire the character of disruptive innovation at market level which attracts new customers or causes customers to consume more and it enlarges the market.

Examples of business model innovations have been discussed frequently in the literature:

- BMI that mainly employ a new approach to *creating value* to the customers are, for instance, shifts from products to services. Chesbrough (2007) points to GE Aircraft, where the engines unit switched the value proposition from selling jet engines to its clients to selling flight hours with the engines rented from GE Aircraft and serviced by the company, shifting the risk of

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[3] This is challenged by Bucherer, Eisert & Gassmann (2012) who, however, employ a rather narrow definition of radical innovations as characterised by a "discontinuity along the two most important dimensions on a macro-level perspective" (ibid., p. 192) which are industry and market. Using a softer definition and setting radical innovations equal to new to the market/industry, the innovations which they described as incremental would also qualify as radical.

downtime from the airline customer to GE. Similar approaches have taken hold in other industries, such as automotive (leasing cars instead of selling), office equipment or construction tools (renting out equipment instead of selling).

- An example for a very successful business model innovation that applied a different *business system* than the one dominating at that time in the industry is Dell Computer's direct-to-user (consumers and businesses) business model (Teece, 2010). By working directly with the users and implementing innovations in the distribution system Dell could offer personal computers for significantly lower prices than its competitors. Chesbrough (2010) describes an example from the music industry, Radiohead's 2007 launch of the new CD "In Rainbows" for 60 days on the WWW. Site visitors could choose whether and how much they wanted to pay for the download and the enormous publicity that this sales strategy generated contributed to higher sales when the CD was later launched in regular commercial channels.

- Good examples of innovative approaches to *generating revenues* and capturing some of the value in the company are again the sponsor-based business model of Google (main revenue from advertisers, see Casadesus-Masanell & Zhu, 2013, on this type of business models) or "freemium" business model of Skype (cheap premium services on top of a free service which helped to scale up the user base in a short time period). Another example is the "pay as you go" approach, used for instance by the auto insurance Progressive with its Pay-As-You-Drive (PAYD) offer (Desyllas & Sako, 2013). It required a fundamentally new revenue model, taking into account self-selection effects of clients for which the new value proposition was attractive.

We next try to operationalize this understanding of BMI with existing data on innovation in firms.

3. Mapping business model innovation in Europe and beyond by means of innovation survey data

Mapping the BMI construct on the existing types of innovations as defined by the OECD and others and implemented in national innovation surveys has several advantages: 1) It makes use of existing data and contributes to raising the relevance of such data by means of exploring new composite indicators (Arundel, 2007; Bloch & Lopez-Bassols, 2009). 2) The underlying data result from multi-national conceptual and empirical work under the umbrella of the OECD and (within Europe) Eurostat. Significant efforts have gone into question development and sampling with the purpose of raising the consistency and comparability of the resulting data across countries (Arundel, O'Brien, & Torugsa, 2013). Hence, the resulting data sets are certainly the best available data sets on innovation in firms and superior to scientific ad-hoc surveys or non-scientific data sets assembled by consultancies. 3) Generating comparable primary data on BMI for a set of countries would be a costly and time-consuming undertaking with questionable prospects of success, given that the underlying constructs of business models and business model innovations lack a widely accepted meaning both in science and business (G. George & Bock, 2011, 2012).

In this section we will first define and explain composite indicators for measuring BMI, describe the available data for measuring the construct and show first results.

3.1 Methodology

In order to measure BMI we need to obtain data on innovations that change the value proposition, how the value is created and delivered to users and clients, and how some of this value leads to revenues which are captured by the firm. National innovation surveys do not use the value concept, but they distinguish up to four other types of innovations as suggested by the OECD (2005):

> "156. A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics." (p. 48)

"163. A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software." (p. 49)

"169. A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing." (p. 49)

"177. An organisational innovation is the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations." (p. 51)

In order to relate innovations in the areas of value creation, value delivery and value capture to these types of innovations, we developed three propositions (see Table 1). They map the three components of our business model definition on the four innovation types distinguished by the OECD.

Table 1. Mapping of the business model construct on innovation types

Business model component	Innovation types	Proposition
Value creation	Product innovation	1. New value propositions will in many, if not in most cases, coincide with product innovations.
Business system	Process innovation, organisational innovation	2. Changes of business systems can be in the form of changes in the production processes as well as internal and external organisation and division of labour along the value chain.
Value capture	Process innovation, marketing innovation	3. A new approach for capturing value will coincide with a process and/or marketing innovation.

This results in a delimitation of business model innovations as a composite type of innovation at the intersection of the four types of innovation defined by the OECD as shown in the figure below (grey area covered by segments I-V).

Figure 2. Business model innovation as a composite type of innovation (Source: Authors)
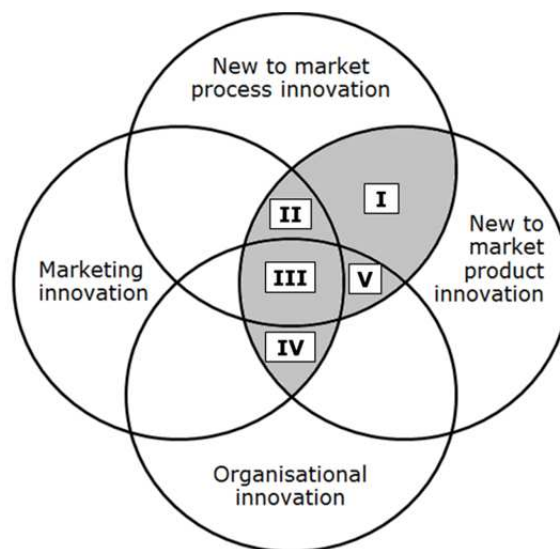
This operationalization encounters two challenges:

- A BMI requires in our understanding that the different types of innovations are not implemented independently of each other, for instance in different business units, but they need to be connected to justify a classification as BMI. The OECD Oslo Manual (2005) suggested asking for combinations of innovations which, however, has not yet been picked up by innovation surveys. In order to reduce the risk of including companies with disconnected innovations we limit the analysis to SMEs (firms with < 250 employees). This lowers the number of false positives that is companies which introduced different innovation types in different business units or areas, because SMEs usually do not have many organisational

subunits and they lack the resources to engage in many unrelated innovation projects simultaneously. This also reduces the influence of firm-size differences on country-level indicators, as it has been found that firm size can have an influence on how the innovation questions in CIS are interpreted by respondents (Arundel, O'Brien, & Torugsa, 2013).

- As we have argued above, business model innovations should be perceived as fundamentally novel and radical changes of how innovating companies do business (and not just as an incremental adjustment). The OECD (2005) suggests three different degrees of novelty: new to the firm, new to the market, and new to the world. New to the firm reflects the lowest degree of novelty and new to the world the highest. The harmonised CIS, however, uses the full range of novelty measures only for product innovations; for process innovations CIS only asks for new to the firm and new to the market. For organisational and marketing innovations it is limited to new to the firm (Eurostat, 2010). The characteristic "new to the market" tries to assess whether the innovation has been introduced by other competing firms before, and whether the responding firm is an innovation leader or an innovation adopter. However, for non-product innovations, including processes, the market is not an adequate point of reference; "new to the industry" could be more appropriate for such innovations. However, in particular small companies in industries with many players might not know whether their competitors already use organisational methods, marketing approaches, or business processes which they introduced only recently. The validity of the responses to such a question could be dubious. The CIS questionnaire underlying the data used for this paper did not include questions on the novelty of organisational and marketing innovations. Relying on the existing measures, we restrict the understanding of radical innovations to products and processes introduced as market firsts.

The OECD Oslo Manual recommendations on measuring different types of innovations, their degree of novelty and connections between them have not been implemented one to one in all national innovation surveys. Only the European Community Innovation Survey (CIS) included questions on radical product, radical process, organisational and marketing innovations in harmonised questionnaires for 2008 and 2010 (Eurostat, 2010). Neither the Swiss ETH-KOF innovation survey, nor the US Business R&D and Innovation Survey (BRDIS), nor the Japanese National Innovation Survey included sufficient questions on non-technological innovation and the novelty of innovations up to 2010/2011.

This article uses only CIS 2008 and 2010 micro-data for the available European countries. For CIS 2008 these are 11 countries which were made available by Eurostat on CD-ROM. The CIS 2010 dataset covered 16 countries for which data could be accessed in the Eurostat Safe Centre in Luxembourg.

3.2   Results of the mapping

Overall 6.3% of the small and medium sized enterprises from 11 countries and different sectors were classified as business model innovators according to CIS 2008 (see Figure 3, see also Table 7–Table 11 in the annex for more detailed country and industry level data). For a slightly different selection of 16 countries the share of business model innovators went down to 5.5% in CIS 2010. Across countries we find Portugal having the highest share of business model innovators with approximately 10% of all SMEs and it is notable that Portugal has high shares for all industries (see annex tables). Taking CIS 2010 Cyprus, Italy and Luxembourg have rather large shares of BMI as well. In Romania, Hungary, Latvia and Bulgaria the share of business model innovators is lowest with less than 2% of all SMEs. Whereas in most countries for which data in both data sets is available the share of BMI has gone down, it rose in Latvia. Drastic changes, like the drop in the BMI rate in the Czech Republic from 8.3% (the second highest) in 2008 to 3.0% in 2010 require further analyses.

Arundel (2007) explains the implausibly high innovation indicators of some countries, like Portugal and Spain, with the markets which they take as reference points: firms serving less developed domestic markets will more often state that they introduced new products than firms serving more

sophisticated international markets. Arundel suggests including only firms which are active on comparable markets, e.g. international markets. Implementing this with CIS 2008 and calculating the indicator for exporting firms only, we get an overall ratio of business model innovators of 9.1% of all exporting SMEs, or +2.8 percentage points compared to all SMEs (see Table 8 in the annex). Though Portugal still has the highest ratio of BMI (12.1%), other countries in the sample are closer by, in particular the Czech Republic (11.8%), Norway (11%), and Italy (11.1%).

The share of BMI varies between NACE divisions from 1.7% in energy to 12.2% in publishing, telecommunications, computer programming & consultancy and information services. This industry is also the only one in the dataset showing a rise of the share of BMI between 2008 and 2010 (up from 10.4% in CIS 2008).

Figure 3. Percentage of companies with less than 250 employees and a business model innovation by country in CIS 2010 and 2008 (Source: Authors)
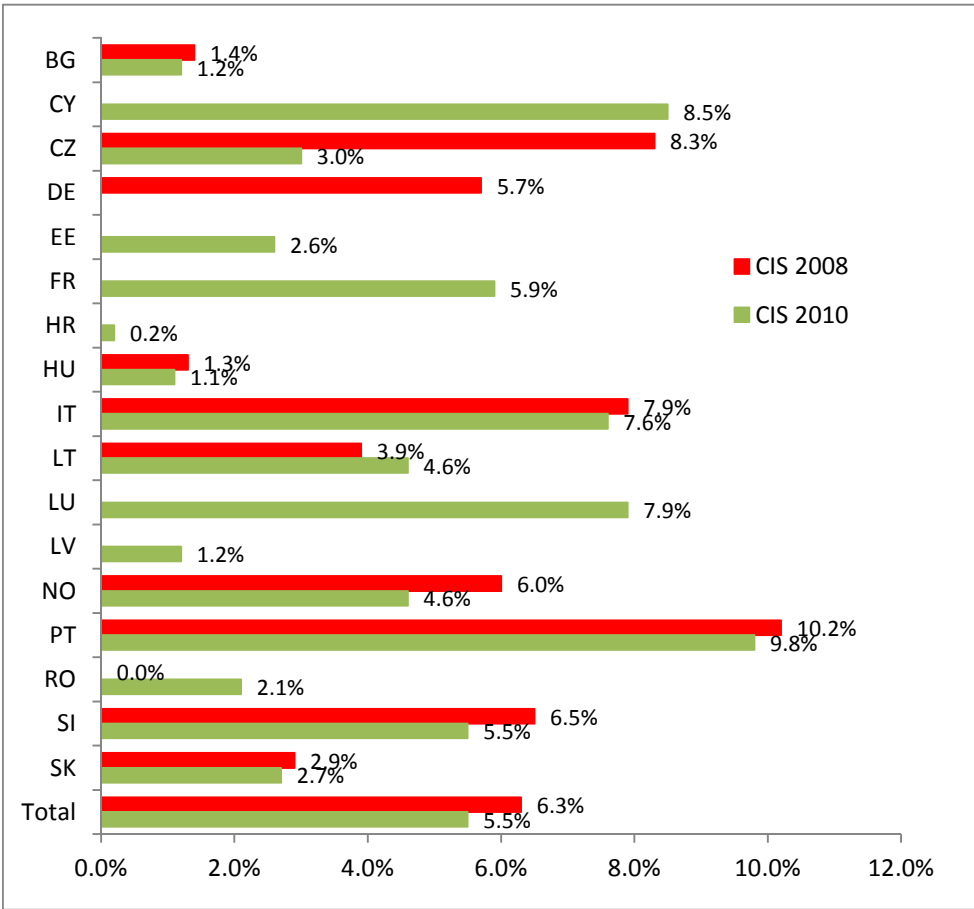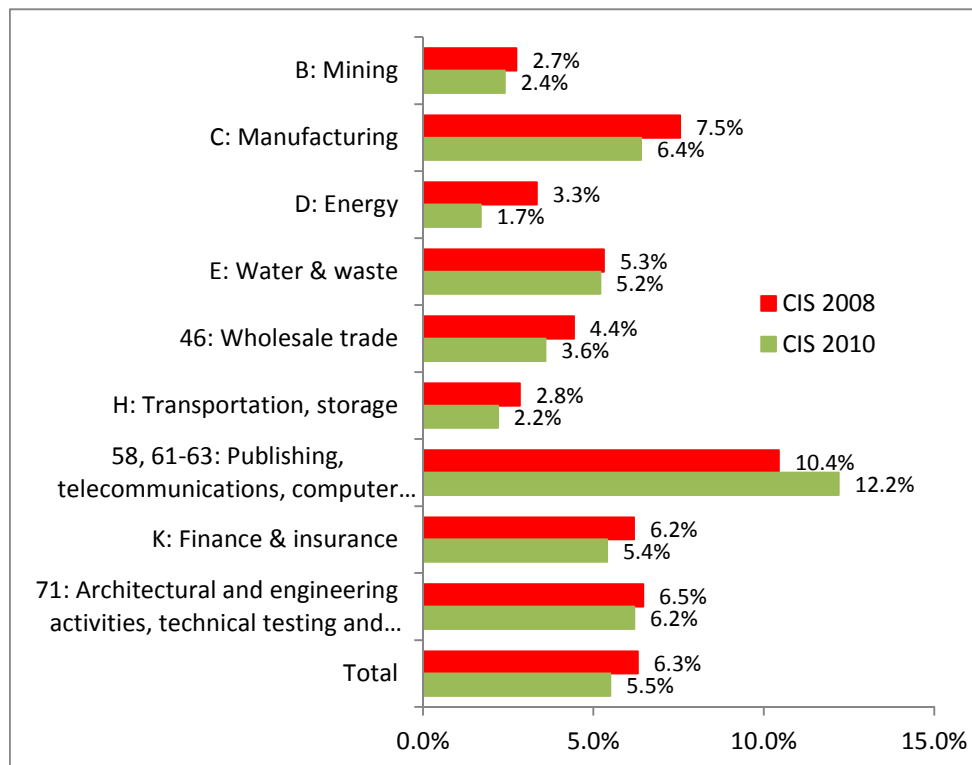
Figure 4. Percentage of companies with less than 250 employees and a business model innovation by NACE division in CIS 2010 and 2008 (Source: Authors)

We lack good sources for comparing this data in order to evaluate its reliability. One possible source is the above mentioned IBM survey which for different reasons should be used with care: The survey conceptualised BMI as a separate type of innovation, which might have produced inconsistent questionnaire responses, as the concept of business models still lacks a shared meaning in the business world (G. George & Bock, 2011, 2012). The sampling frame and strategy of the survey have not been published and it is unclear, what business population is represented by the data. The sample of the 2006 survey seems to have consisted of 70% service firms from 3 sectors (Communications, Distribution, Financial services) and 30% industrial firms, but it is not published what "industrial" covers (Bock, Opsahl, George, & Gann, 2012). Last but not least, the cited publications of survey results fail to state the reference period, i.e. when innovations were introduced.

Bock et al. (2011, p. 286) had access to the 2006 IBM survey and based on their data we get a share of business model innovators of 19.2% (=107/556) across all survey respondents (see Table 5 in the annex). The share varies between 16.5% and 25% according to firm size classes and industries without any consistent pattern. It is highest in Japan with 30%, followed by 22.6% in the Americas. In Europe and China the share is lowest, with less than 15% of all surveyed companies having been identified as business model innovators. However, we do not know whether the IBM data set is reliable and whether the shown magnitude of BMI among large firms is plausible.

In order to generate a better basis for comparison, we also measured the share of business model innovators according to our operationalization among all CIS 2010 respondents with at least 250 employees. The results are shown in Table 10 and Table 11 in the annex. The BMI share among large innovative companies in Europe is 178.7% and 3.4 times higher than among SMEs (without knowing whether the innovations were really introduced in connection to each other); it is 3.8 percentage points higher than in the IBM surveys (Europe: 14.9%, see Table 5 in the annex); in both surveys finance companies are most often business model innovators. The patterns point into the right direction and raise our trust in the CIS results, though we are sceptical with regard to a reliable measure of BMI in large firms.

4.   Reviewing cases of business model innovation

4.1   Methodology

Our second approach was to further explore the characteristics of business model innovations by means of a multiple-case comparison. Methodologically case studies are suitable for the analysis of social phenomena with many and diverse contextual influences, dealing with different forms of empirical material at the same time (George & Bennett, 2004; Yin, 2003). One of the main goals of case studies is therefore the elaboration of the conditions under which a proposition or theory is valid or not (Miles & Huberman, 1994). This can be done with a single case, while further cases may raise the quality of the generalization by identifying further conditions and specifying the theory.

Due to time and resource restrictions it was not possible to develop original cases for the contract within which the research was done. Using selected search terms (see Table 2) we identified more than 400 "candidate" cases that were likely to deal with BMI in the teaching case repository "The Case Centre" (formerly ECCH, http://www.thecasecentre.org/educators/). Of note, the search terms were not limited to BMI in the private sector only, as the contract also requested the inclusion of public sector cases and a specific analysis of the role of BMI in commercializing academic research results.

Table 2: Overview of cases study search terms

Search term	No of 'hits'
Business model innovation	113
Business logic	15
Business model change	13
Business transformation	8
Disruptive technologies	110
Public sector AND innovation	38
Public procurement	2
Value creation AND public sector	3
Start-up AND business model	143
Total	**445**

From the gross sample we selected 60 BMI case studies after further, more detailed inspection and filtering based on our BMI definition (see Table 12 in the annex). Fifty of the sixty cases were from for-profit enterprises (of which 25% in manufacturing and 75% in service companies), 4 cases were from NPOs and 6 cases from public sector organisations. Geographically, 65% of the cases are European, 18% US American, 10% Asian and 4 cases from other countries worldwide.

The 60 cases were then coded with the Atlas.ti software for text analysis using a hierarchical code system with five top-level categories: stakeholders, functions, drivers & barriers, context, innovations and values. All cases were pre-coded by research assistants and then subjected to code revisions by the three senior researchers. Several cases were coded by two coders in parallel and the resulting differences were resolved after extensive case discussions. The analysis presented her only uses 14 codes which relate to innovations.

In order to get a better overview of the combinations of different types of innovations, we ran cluster analyses of the 60 cases using 14 different variables on innovations (all coded 0/1, see Figure 5 on the variables). The clusters were obtained by a combination of clustering methods: first, we ran a two-step cluster analysis and two hierarchical cluster analyses with different association algorithms (Ward and average linkage between groups). Second, we identified the "core" cases which were joined consistently in the three outputs and calculated the cluster centre values of the 14 variables for the resulting four clusters of core cases. The cases for which cluster membership varied by cluster algorithm were then added using the K-means clustering routine. Cluster centres

were recalculated after all cases were added to one of the clusters. In a final step, clusters 1 (5 cases) and 4 (8 cases) were merged, as they very closely related for all variables except for two organisational innovations, introduction of new business practices and new forms of work organisation.

4.2   Results of the multiple case comparison

We started the case comparison by assessing the presence of the four innovation types, product innovations, process innovations, organisational innovations and marketing innovations, in the cases. In 6 out of the 60 cases no new products were introduced. These are usually cases with overall few references to innovation and if so, predominantly in the area of process innovations. In another 10 cases we did not find any process innovations, or a combination of organisational and marketing innovations. Taking our conceptualisation of BMI, these 16 cases (27%) would be false BMI positives in the sample.

In another 16 out of 60 cases all types of innovation were implemented (sector III in Figure 2 above). These cases are from a variety of industries and as frequent among European cases as among non-European cases. In 9 cases (15%) we recorded no process innovation, but product, organisational and marketing innovations (sector IV in Figure 2). Eight of the nine cases originated in Europe and one in Africa. Nineteen cases out of the 60 (32%) covered product and process innovations and eventually – but not always – also marketing and organisational innovations (sectors I, II, and V in Figure 2). These cases do not show any particular features with regard to location or public/private origin.

This first overview with the top-level types technological and non-technological innovations currently identified and measured in innovation surveys raised some doubts about our top-down delimitation of BMI. We followed up on this and extended the analysis in three ways:

- First, we looked for indicators for radical innovation, e.g. allusions to fundamental changes, practices deviant to what is usually done in the industry, products that were new to the national markets, global pioneers, etc. In 35 out of the 60 cases (58%) such references were made. They related to all four types of innovations. According to our definition, a combination of incremental innovations (as in 25 of our 60 cases) would not classify as a BMI. However, it should be noted that the case study authors might not have been able to observe the degree of novelty consistently, in particular if they lacked contextual knowledge of industry practices and markets. So, the chosen method probably rather underestimates the ratio of cases with radical innovations and we therefore do not exclude any cases from the remaining analysis even though they might not point to fundamental innovations.
- Second, we recoded all cases with regard to the innovation type and went one level "deeper": In line with the Oslo Manual (1995) we distinguished the subcategories of product, process, marketing and organisational innovations (as shown in Table 3). For instance, we distinguished between the introduction of new goods and new services generating a more precise understanding of the implemented product innovations.
- Third, we looked for references to changes of how the focal actors (companies, NPOs, public entities) capture value, i.e. change the revenue model. We proposed above that new revenue models should be visible in changes of processes and marketing methods as well (see Table 1). However, only 12 of the 60 cases (20%) point to process and marketing innovations in connection with new revenue models, whereas another 14 cases (23%) do not contain this combination, though they describe changes of the revenue models. Hence, the additional category of revenue model innovations was introduced. A corresponding code was added and all cases were recoded.

The result is shown in Figure 5 (see also annex Table 6). In 77% of the 60 cases we encountered service innovations. New goods are considerably less frequent in only about a quarter of all cases.

Fairly common was also the introduction of new logistics, new promotion activities, and new revenue models which appeared in more than 40% of all cases.

Figure 5: Innovations occurring in BMI cases by type (see also Table 6 in the annex)
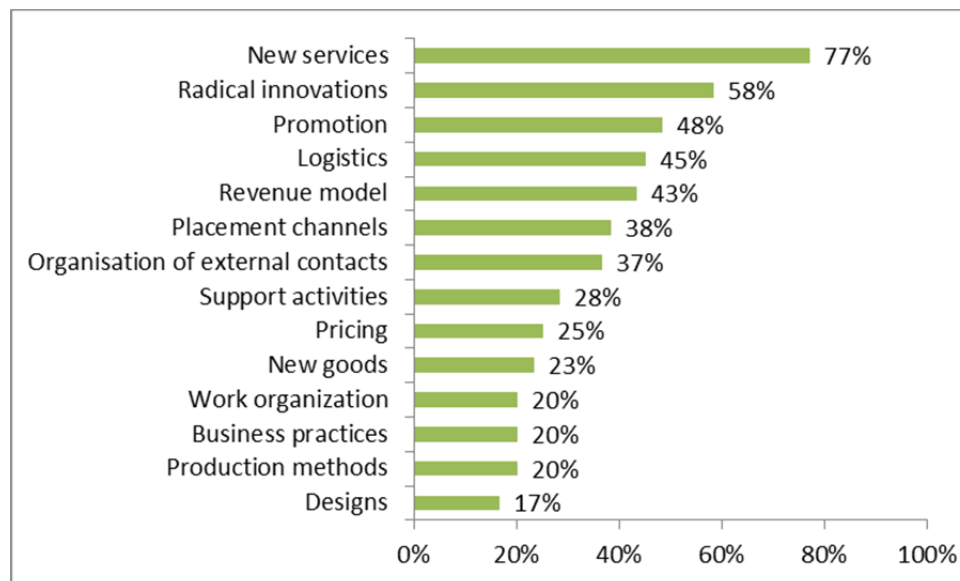
The next analytical step consisted in a clustering of the 60 cases for the 14 variables on innovation outputs as described above. The final solution consists of three clusters (see Table 3 on the frequencies of the cluster variables per cluster and Table 4 on sample cases):

- *All-round goods innovators.* This is the smallest cluster with only 13 cases, but overall the highest innovation activity. Different to the other two clusters, in this cluster innovations have a strong focus on introducing new goods and less on services. The optimization of production methods is also more common, as well as the optimization of internal organizational routines and supply arrangements. Raising the market success of the products (by means of new designs, new placement channels and product promotion innovations) also play important roles. In virtually all cases there was a reference to radical changes. However, the revenue models remained unchanged. The clustered companies have a clear focus on consumer goods, such as electric vehicles and motorcycles (Think, Harley, Ducati), home appliances (Realfleet Amadana, Haier), or food (Bel, Ready Seafood).

- Among the *revenue model innovators* the situation is different. They represent approximately 30% of all cases. We find e-commerce and mobile commerce offers (Alibaba, Klarna, paybox.net, ZOPA), companies offering new services in developing markets (MPedigree, Eight19) and a range of new services in different industries such as newspaper (Maghound, Metro/Que), automobiles/mobility (CarMax, Better Place), telecommunication (Nokia, T-Mobile Austria/tele.ring), fashion (Moda Operandi), health (Laastari), or insurance (PAYD). The strong focus on service innovations and revenue model changes – and product pricing – is notable, as is the absence of goods and innovations of the organisation of work. We also found frequent reference to radical changes.

- *Small scale business model innovators.* This is the largest cluster consisting of nearly one half of the sample. In the cases of this cluster we find all types of innovations less often than in the full sample, except for process innovations (only support activities), new placement channels to market products, organisational innovations (but only innovations in the organisation of work).

Innovations are less often described as radical. The cases in this cluster appear as mainly oriented to introducing new services and the corollary activities to do this successfully.[4]

Table 3. Innovations by types and clusters

	All-round goods innovators		Revenue model innovators		Small scale BMI		Total	
	N	In %	N	In %	N	In %	N	In %
Product innovations	13	100%	19	100%	21	75%	54	90%
New goods	12	92%	2	11%	0	0%	14	23%
New services	7	54%	18	95%	21	75%	46	77%
Process innovations	8	62%	12	63%	19	68%	39	65%
Logistics	7	54%	8	42%	12	43%	27	45%
Production methods	7	54%	4	21%	1	4%	12	20%
Support activities	2	15%	7	37%	8	29%	17	28%
Marketing innovations	11	85%	19	100%	14	50%	44	73%
Designs	7	54%	2	11%	1	4%	10	17%
Placement channels	8	62%	4	21%	11	39%	23	38%
Pricing	3	23%	11	58%	1	4%	15	25%
Promotion	10	77%	15	79%	4	14%	29	48%
Organisational innovations	9	69%	8	42%	15	54%	32	53%
Business practices	5	38%	2	11%	5	18%	12	20%
Organisation of external contacts	7	54%	7	37%	8	29%	22	37%
Work organization	4	31%	0	0%	8	29%	12	20%
Revenue model innovations	1	8%	15	79%	10	36%	26	43%
Radical innovations	12	92%	15	79%	8	29%	35	58%
Total	**13**	**100%**	**19**	**100%**	**28**	**100%**	**60**	**100%**

Table 4. Examples illustrating the three BMI clusters

Cluster	Example	Source
1 "All-round goods innovators"	*Realfleet Amadana, Japan* The founders set up REALFLEET as a business similar to a specialty store retailer of private label apparel (SPA). In the SPA model, the developer of the brand would control the entire business process from manufacturing to retail. This new business model should raise consumer-orientation in home appliance production. While limiting the sales volume for each model, REALFLEET decided to outsource manufacturing to other companies rather than trying to build a production facility in-house. Likewise, recognizing that features and functions of home appliances available in the current market far exceeded what customers really needed, the company pursued simple product designs and dropped many unnecessary functions. In addition, the company focused on using readily available maturing technologies in well-established product categories (e.g., coffee makers, telephones, calculators) rather than attempting to develop cutting-edge technologies on its own. While pursuing a focused and simplified approach in production and technology development, REALFLEET set premium prices for its Amadana product line to convey the extra value created by the brand and also to secure enough profits to continuously invest in design development. Amadana products were displayed and sold in over 300 non-traditional retail outlets such as interior stores and fashion apparel shops instead of the typical home appliance wholesalers and distributors.	Yang (2008)
2 "Revenue Model Innovators"	*Laastari: a retail health clinic chain, Finland* Laastari, the first retail health clinic chain in Europe, offers fast and low-cost treatment for common illnesses in convenient locations (shopping centres, grocery stores, pharmacies). To ensure quality and standardize care practices across all locations, customized decision-support software was developed. It included comprehensive standard-of-care protocols for each condition in the service offer. The care protocols were built into the system as a checklist based on national clinical quality guidelines of Finland, allowing for detailed case documentation of all patient visits. Since all the information was captured via a web-based application on an iPad, nurses had to adhere to the triaging protocol and the quality-control framework when registering and treating patients. Laastari used both, traditional as well as social media channels for marketing. The	Aggarwal (2013)

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[4] We see in this cluster also limitations of our methodology: even though some cases in this cluster appear as not so innovative in our analysis, they are probably strong cases for BMI, such as Skype or Xerox. However, the case descriptions do not always bring this fully to light, in particular if they were written with a different perspective and did not focus on business model innovation.

Cluster	Example	Source
	company invested in local radio, newspapers, search engine optimization (through Google keyword search), and a presence on Facebook and Twitter. Revenue in the initial stages originated from direct cash payments by patients. There was significant uncertainty, however, about integrating private and public payers into the business, as this was the first retail clinic chain launched in a predominantly single payer system.	
3 "Small Scale BMI"	*12Snap: From B2C Mobile Retailing to B2B Mobile Marketing* 12Snap started off as a mobile auctions provider in Germany in 1999/2000, employing "guerrilla" marketing activities, at football games and involving German "celebrities". In a process of different innovative steps, the company developed an entirely different value proposition, business system and marketing approach. In order to reduce costs, the company shifted from the "high-touch" business model, where all operations were handled internally, to a "low-touch" model in which 12Snap simply entered the products into the database while an external logistics provider handled the actual fulfillment. Next, it scaled down the shopping component by limiting the product choice and added entertainment and mobile marketing offers instead. This new approach was referred to as the "Media Model", the power of which to attract and maintain active customers had been demonstrated by NTT DoCoMo in Japan. 12Snap's shift towards mobile marketing again led to internal restructuring, outsourcing and staff lay-offs. Additionally, the 12Snap subsidiaries in the UK and Italy built up small local technology teams who worked directly with local salespeople. Marketing also changed and the above mentioned promotion activities became obsolete.	Enders (2002)

5.   Conclusions

First, the paper deduced from the literature on business models and business model innovations (BMI) a composite indicator to identify business model innovators and measure BMI across countries. The composite indicator uses the definitions and data on innovations resulting from the work of OECD and Eurostat working groups. It operationalizes BMI as a combination of new to the market product innovations and new to the market process innovations, or new to the market product innovations, organisational innovations, and marketing innovations.

We find that two problems in the innovation survey questionnaires and datasets complicate this exercise:

1) Innovation datasets do not include whether different types of innovations were implemented independently of each other or in connection. We resolved this by limiting the analysis to SMEs with fewer than 250 employees assuming that they do not have the resources to implement different innovations independently of each other.

2) The degree of novelty of an innovation is currently only assessed for product innovations and to some extent for process innovations. The novelty of non-technological innovations is not covered and we are not aware of any previous attempts to measure this. We resolved this in this paper by limiting the requirement of a fundamental change to products and processes.

The implementation of the indicator with data from the Community Innovation Surveys CIS 2008 and 2010 shows that approximately one out of 20 SMEs has introduced a business model innovation within the previous three years before the survey. The rates vary considerably across countries, from 0.2% in Croatia to 9.8% in Portugal in 2010. The differences are not easy to explain, e.g. answering why the BMI share in Portugal is more than double the share in Norway requires further analyses. One possible explanation are differing degrees of exporters and sophistication on international versus domestic markets (Arundel, 2007). Taking this into account, the share of BMI among exporting companies increased to 9% in the underlying dataset. At industry level, we see decreases of BMI in SMEs between 2008 and 2010 in most industries, except for publishing, telecommunications, computer programming & consultancy and information services. The most conservative sector is the energy sector, where the rate of BMI even went down from 3.3% in 2008 to 1.7% in 2010.

Second, the paper engaged in a multiple case comparison of 60 teaching cases of BMI taken from a teaching case repository. We found another weakness of the suggested composite indicator on BMI and the underlying innovation surveys: In more than one quarter of the included cases the chosen specification of BMI was not found. This might have been due to errors in the sampling – inclusion

of BMI false positives – or to an incomplete conceptualisation of BMI. Both reasons apply to some extent. The sampling was challenging, as the necessary pre-screening of the cases – to identify what innovation types are present – took considerable time and almost required to previously read in-depth and code the cases. The coding results showed that in particular innovations of the revenue models were difficult to identify with the available innovation types. A new type of revenue model innovations was consequently introduced which applied to more than 40% of the cases and, in particular, served to identify another 8 cases (13% out of 60) as business model innovators.

Cluster analyses of the innovation variables to distinguish types of business model innovators generated three clusters which can be distinguished from each other:

- All-round goods innovators predominantly introduced new goods and new promotion schemes for their products.
- Revenue model innovators, on the other hand, predominantly introduced a new service to which a change of the revenue model was connected. They also focused on new promotion schemes as well as pricing strategies.
- Small scale BMI introduced new services as well. They did not change production methods, designs, or their pricing. They lagged behind with regard to most other innovations as well, and revenue model innovations are less common. Their main achievement is the introduction of a new service accompanied by some process and organisational changes.

The analysis suggests that revenue model innovations are an important aspect of BMI that is currently difficult to cover in datasets resulting from national innovation surveys. Designing and testing questions on revenue model innovations would be a first step to change this.

The analysis shows that business model innovators are only a small fraction of companies in most countries and industries. If policy makers want to improve the conditions for BMI and lower the barriers against it, they are well advised to first improve the information basis by providing the resources for a better measurement and quantification of business model innovators in both SMEs and large companies.

Acknowledgement

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Annex

Table 5. Business model innovators according to the IBM CEO survey 2006

	Firms in survey	Business model innovators	
	N	N	In %
Sector			
Communications	86	14	16.3%
Distribution	179	35	19.6%
Financial services	129	26	20.2%
Industrial	162	32	19.8%
Size class (employees)			
0–5,000	192	35	18.2%
5,001–10,000	105	22	21.0%
10,001–15,000	79	13	16.5%
15,001–20,000	81	16	19.8%
20,001–25,000	48	12	25.0%
25,000+	51	9	17.6%
Geography			
Americas	137	31	22.6%
Europe	201	30	14.9%
Japan	67	20	29.9%
China	49	6	12.2%
India	38	7	18.4%
Other Asia	64	13	20.3%
All firms	**556**	**107**	**19.2%**

Source: Authors' calculation according to Bock et al. (2011, p. 286)

Table 6. Innovation related quotations in 60 BMI cases

	Quotations	Cases	in % of all cases	Quote/ case
Products	125	53	88%	2.4
New goods	33	14	23%	2.4
New services	93	46	77%	2.0
Processes	84	39	65%	2.2
Logistics	45	27	45%	1.7
Production methods	13	12	20%	1.1
Support activities	26	17	28%	1.5
Marketing	128	45	75%	2.8
Designs	15	10	17%	1.5
Placement channels	40	23	38%	1.7
Pricing	17	15	25%	1.1
Promotion	56	29	48%	1.9
Organisational	70	32	53%	2.2
Business practices	19	12	20%	1.6
Organisation of external contacts	36	22	37%	1.6
Work organization	15	12	20%	1.3
Revenue model	39	26	43%	1.5
Radical innovations	58	35	58%	1.7
Total	505	60	100%	8.4

Source: Authors

Table 7: Weighted percentage of companies with less than 250 employees and a business model innovation in the period 2006-2008 by core NACE categories and countries in **CIS 2008**

Country	Industry classification by NACE									Total
	B	C	D	E	46	H	58, 61-63	K	71	
BG	0.0%	1.7%	B	B	0.5%	0.1%	3.7%	1.4%	1.6%	**1.4%**
CZ	5.2%	9.5%	5.8%	8.0%	7.8%	4.0%	13.1%	8.7%	6.9%	**8.3%**
DE[A]	0.0%	6.5%	0.0%	2.3%	3.3%	2.7%	7.6%	4.0%	7.1%	**5.7%**
HU	B	0.9%	0.9%	0.3%	1.7%	0.4%	4.3%	1.9%	2.8%	**1.3%**
IT	3.5%	9.9%	4.7%	6.6%	4.5%	3.5%	12.8%	7.4%	7.6%	**7.9%**
LT	6.5%	4.0%	B	5.3%	B	0.0%	7.9%	11.5%	4.7%	**3.9%**
NO	2.3%	5.9%	0.9%	4.6%	5.0%	1.8%	12.6%	2.5%	7.5%	**6.0%**
PT	5.4%	9.3%	B	15.6%	9.7%	9.0%	25.8%	15.7%	14.1%	**10.2%**
RO[C]	0.0%	0.0%	B	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**
SI	0.0%	8.5%	B	5.2%	2.6%	2.3%	13.7%	8.6%	4.7%	**6.5%**
SK	0.0%	3.9%	4.4%	0.0%	B	2.0%	0.8%	1.7%	1.4%	**2.9%**
Total	2.7%	7.5%	3.3%	5.3%	4.4%	2.8%	10.4%	6.2%	6.5%	**6.3%**

Notes: Companies with BMI have been identified according to the methodology established in Section 0. Only companies with less than 250 employees are included in the analysis. As this size classification is not available for Estonia, Ireland, Cyprus and Latvia no results have been calculated for these countries. Spain did not collect data on radical process innovations and had to be excluded from this specification.

Industries: B: Mining; C: Manufacturing; D: Energy; E: Water & waste; 46: Wholesale trade; H: Transportation, storage; 58, 61-63: Publishing, telecommunications, computer programming & consultancy, information services; K: Finance & insurance; 71: Architectural and engineering activities, technical testing and analysis.

[A]: Results for Germany are unweighted, since no weights are available in the CIS 2008 dataset for Germany.

[B]: Due to confidentiality rules of Eurostat, values for these cells had to be deleted.

[C]: Very low values occur due to the fact that process innovation new to the market is reported as nearly inexistent in the CIS 2008 dataset.

Source: Calculation of the authors based on Eurostat CIS 2008 data.

Table 8: Weighted percentage of companies with less than 250 employees, competing on international markets and a business model innovation in the period 2006-2008 by core NACE categories and countries in *CIS 2008*

| Country | Industry classification by NACE | | | | | | | | | Total | Share of exporters |
	B	C	D	E	46	H	58, 61-63	K	71		
BG	0.0%	3.2%	[B]	[B]	1.2%	0.2%	6.0%	0.0%	6.5%	**2.7%**	12.1%
CZ	16.3%	13.0%	23.9%	9.0%	11.8%	4.5%	18.6%	12.1%	8.9%	**11.8%**	35.5%
DE[A]	0.0%	8.3%	0.0%	4.8%	6.4%	3.8%	7.8%	16.7%	13.8%	**8.4%**	41.8%
HU	[B]	1.3%	8.1%	0.0%	2.0%	0.8%	8.4%	8.3%	4.1%	**1.8%**	31.1%
IT	3.9%	12.6%	24.1%	13.6%	6.6%	5.1%	14.6%	11.0%	11.2%	**11.1%**	30.3%
LT	8.2%	5.6%	[B]	4.1%	3.7%	[B]	13.2%	0.0%	9.1%	**4.3%**	31.1%
NO	4.3%	9.4%	0.0%	3.0%	12.0%	1.5%	19.6%	1.9%	13.8%	**11.0%**	45.0%
PT	6.1%	11.6%	[B]	23.0%	10.1%	8.2%	30.4%	16.9%	20.5%	**12.1%**	38.6%
RO[C]	0.0%	0.0%	[B]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	20.0%
SI	0.0%	10.9%	[B]	0.0%	4.4%	1.9%	17.0%	10.2%	6.5%	**8.5%**	42.5%
SK	0.0%	4.8%	19.7%	0.0%	1.1%	[B]	0.0%	0.0%	3.6%	**3.1%**	40.6%
Total	4.8%	10.3%	10.6%	8.8%	6.4%	3.5%	14.2%	9.2%	10.7%	**9.1%**	33.7%

Notes: Companies with BMI have been identified according to the methodology established in Section 0. Only companies with less than 250 employees are included in the analysis. As this size classification is not available for Estonia, Ireland, Cyprus and Latvia no results have been calculated for these countries. Spain did not collect data on radical process innovations and had to be excluded from this specification.

Industries: B: Mining; C: Manufacturing; D: Energy; E: Water & waste; 46: Wholesale trade; H: Transportation, storage; 58, 61-63: Publishing, telecommunications, computer programming & consultancy, information services; K: Finance & insurance; 71: Architectural and engineering activities, technical testing and analysis.

A: Results for Germany are unweighted, since no weights are available in the CIS 2008 dataset for Germany.

B: Due to confidentiality rules of Eurostat, values for these cells had to be deleted.

C: Very low values occur due to the fact that process innovation new to the market is reported as nearly inexistent in the CIS 2008 dataset.

Source: Calculation of the authors based on Eurostat CIS 2008 data.

Table 9: Weighted percentage of companies with less than 250 employees and a business model innovation in the period 2008-2010 by core NACE categories and countries **in CIS 2010**

Industry classification by NACE

Country	B	C	D	E	46	H	58, 61-63	K	71	Total
BG	2.8%	1.3%	1.3%	1.0%	0.7%	0.1%	3.8%	2.2%	0.9%	**1.2%**
CY	5.7%	9.7%	A	23.3%	4.6%	6.9%	25.9%	6.2%	15.8%	**8.5%**
CZ	4.4%	3.1%	0.9%	4.3%	3.6%	0.5%	4.7%	8.4%	1.9%	**3.0%**
EE	0.0%	2.8%	7.9%	0.0%	1.2%	1.2%	8.1%	13.0%	3.0%	**2.6%**
FR	2.8%	6.2%	2.8%	8.6%	4.9%	1.3%	16.6%	3.8%	8.3%	**5.9%**
HU	1.2%	1.0%	0.0%	1.5%	0.5%	1.0%	3.7%	1.6%	2.9%	**1.1%**
IT	1.5%	9.1%	2.6%	5.1%	4.2%	3.1%	15.0%	8.1%	8.8%	**7.6%**
LT	2.2%	3.4%	0.0%	3.5%	2.3%	5.2%	14.0%	20.4%	8.8%	**4.6%**
LU	A	10.4%	A	11.1%	9.3%	3.9%	11.6%	2.8%	7.6%	**7.9%**
LV	0.0%	2.0%	A	1.1%	0.3%	0.0%	1.7%	2.2%	4.2%	**1.2%**
PT	6.4%	9.3%	A	16.6%	8.6%	7.1%	27.8%	9.7%	15.7%	**9.8%**
RO	0.6%	2.4%	0.9%	2.3%	1.1%	1.5%	5.7%	3.4%	1.9%	**2.1%**
SI	0.0%	8.4%	8.5%	3.3%	2.0%	0.6%	9.9%	4.6%	4.1%	**5.5%**
SK	3.1%	3.5%	0.0%	1.9%	1.7%	1.9%	3.6%	2.6%	3.8%	**2.7%**
HR	0.0%	0.2%	0.0%	1.0%	0.1%	0.3%	1.1%	1.5%	0.0%	**0.2%**
NO	0.9%	5.7%	1.4%	4.6%	1.8%	0.4%	12.2%	5.1%	4.3%	**4.6%**
Total	2.4%	6.4%	1.7%	5.2%	3.6%	2.2%	12.2%	5.4%	6.2%	**5.5%**

Notes: Companies with BMI have been identified according to the methodology established in Section 0. Only companies with less than 250 employees are included in the analysis. Spain, Finland, Ireland, Sweden and Germany did not collect data on radical process innovations and had to be excluded from this specification. Netherlands has implausible values for business model innovators and also had to be excluded from this specification.

Industries: B: Mining; C: Manufacturing; D: Energy; E: Water & waste; 46: Wholesale trade; H: Transportation, storage; 58, 61-63: Publishing, telecommunications, computer programming & consultancy, information services; K: Finance & insurance; 71: Architectural and engineering activities, technical testing and analysis.

[A]: Due to confidentiality rules of Eurostat, values for these cells had to be deleted.

Source: Calculation of the authors based on Eurostat CIS 2008 data.

*Table 10: Weighted percentage of companies with 250 employees or more and a business model innovation in the period 2008-2010 by core NACE categories in **CIS 2010**.*

Industry classification by NACE

	B	C	D	E	46	H	58, 61-63	K	71	Total
Total	9.2%	22.0%	9.0%	7.6%	12.3%	8.5%	20.1%	27.6%	19.5%	**18.7%**

Notes: Companies with BMI have been identified according to the methodology established in Section 0. Only companies with at least 250 employees are included in the analysis. Included countries are: BG, CY, CZ, EE, FR, HR, HU, IT, LT, LU, LV, NO, PT, RO, SI and SK. Spain, Finland, Ireland, Sweden and Germany did not collect data on radical process innovations and had to be excluded from this specification. Netherlands has implausible values for business model innovators and also had to be excluded from this specification.

Industries: B: Mining; C: Manufacturing; D: Energy; E: Water & waste; 46: Wholesale trade; H: Transportation, storage; 58, 61-63: Publishing, telecommunications, computer programming & consultancy, information services; K: Finance & insurance; 71: Architectural and engineering activities, technical testing and analysis.

Source: Calculation of the authors based on Eurostat CIS 2008 data.

*Table 11: Weighted percentage of companies with 250 employees or more and a business model innovation in the period 2008-2010 by countries in **CIS 2010**.*

Total for country

BG	CY	CZ	EE	FR	HR	HU	IT	LT	LU	LV	NO	PT	RO	SI	SK	Total
9.6%	45.0%	14.8%	23.0%	21.5%	2.9%	13.1%	23.6%	22.6%	18.6%	13.5%	13.1%	40.3%	8.8%	30.6%	12.7%	**18.7%**

Notes: Companies with BMI have been identified according to the methodology established in Section 0. Only companies with at least 250 employees are included in the analysis. Spain, Finland, Ireland, Sweden and Germany did not collect data on radical process innovations and had to be excluded from this specification. Netherlands has implausible values for business model innovators and also had to be excluded from this specification.

Included NACE sectors are: B: Mining; C: Manufacturing; D: Energy; E: Water & waste; 46: Wholesale trade; H: Transportation, storage; 58, 61-63: Publishing, telecommunications, computer programming & consultancy, information services; K: Finance & insurance; 71: Architectural and engineering activities, technical testing and analysis.

Source: Calculation of the authors based on Eurostat CIS 2008 data.

Table 12: Overview of included cases

Type	Case Name	Country	Continent	Industry	Published	Cluster
PRS	Moleskine	Italy	Europe	Stationeries	2012	1
PRS	Harley-Davidson	USA	USA	Motorcycles	2004	1
PRS	Bank Accord	France	Europe	Banking	2007	3
PRS	Alibaba	China	Asia	Retail, e-commerce	2008	2
PRS	ESB International	Ireland	Europe	Electricity, engineering	2008	3
PRS	Nokia	Finland	Europe	Mobile handsets, music industry	2009	2
PRS	Naxos	Germany Hong Kong	Asia	Music Industry	2009	1
PRS	Maghound Enterprises	USA	USA	Media	2009	2
PRS	Better Place	USA	USA	Electric cars & mobility	2009	2
PRS	Laastari	Finland	Europe	Health care	2013	2
PRS	Think	Norway Switzerland	Europe	Electric cars & mobility	2010	1
NPO	Max Foundation	Bangladesh Netherlands	Asia	Non-profit, development	2011	3
PRS	RedBus	India	Asia	Transport	2013	3
PRS	CarMax	USA	USA	Car retail	2008	2
PRS	Bel	France	Europe	Food	2012	1
PRS	Ducati	Italy & USA	Europe	Motorcycles	2003	1
PRS	MyAlert	Spain	Europe	Mobile entertainment	2005	3
PRS	Klarna	Stockholm	Europe	e-commerce	2011	2
PRS	12Snap	Germany UK Italy	Europe	Mobile marketing	2002	3
PRS	Realfleet Amadana	Japan	Asia	Home electronics	2006	1
PRS	ING Belgium Retail	Belgium	Europe	Banking	2011	3
PRS	Zopa	UK	Europe	Retail finance and banking	2013	2
PUS	Finland's Public Sector	Finland	Europe	Health, public sector	2013	3
PRS	Webraska Mobile Technologies	France	Europe	Mobile technology	2004	3
PRS	Jamba!	Germany	Europe	Mobile entertainment	2006	3
PRS	Rainbow Animation	Italy	Europe	Film production	2011	2
PRS	Eight19	UK	Europe	Energy (solar power)	2013	2
PRS	paybox.net	Germany	Europe	Mobile payment	2003	2
PUS	Go Procure eGov	Australia	others	Public sector	2005	3
PRS	Webvan	USA	USA	Online retail	2005	3
PRS	Printeurope.com	Finland	Europe	IT (software)	2001	3
PRS	Secure Works	USA	USA	Internet security	2010	3
PRS	mPedigree	Ghana/Nigeria	others	Health care	2013	2
PUS	VDAB	Belgium	Europe	Public sector	2012	3
PUS	Velib - Bikesharing	France	Europe	Public sector, transportation	2010	2
PUS	Thinks Bumpy Ride	Norway	Europe	Electric cars & mobility	2008	1
PRS	Curana BVBA	Belgium	Europe	Bicycle parts	2010	1
NPO	CDI	Brazil	others	Non-profit, education	2009	3
PRS	T-Mobile	Austria	Europe	Telecommunication	2010	2
PRS	Better Place	div.	others	Electric cars & mobility	2009	2
PRS	Novo Nordisk	Denmark	Europe	Energy	2009	3
PRS	Moda Operandi	India	Asia	Fashion retail	2013	2
PRS	Living PlanIT	UK	Europe	Architecture, building technology	2010	2
PUS	IMEC	Belgium	Europe	Public sector, research	2008	3

Type	Case Name	Country	Continent	Industry	Published	Cluster
PRS	NanRenWa	China	Asia	e-commerce	2013	1
PRS	Boston.com PS	USA	USA	Media, newspaper	2000	3
PRS	Metro vs Que	Spain	Europe	Media, newspaper	2005	2
PRS	Ready Seafood	US	US	Food retail	2010	1
PRS	Haier	China	Asia	Consumer elect.,home appliances	2013	1
NPO	MYC4	Denmark	Europe	Non-profit, microfinance	2009	3
PRS	Skype	Sweden	Europe	Telecommunication	2009	3
PRS	Boo.com	International	–	retail, e-commerce	2001	3
PRS	HRNet	UK	Europe	IT HR management	2002	3
PRS	LAN Airlines	Chile	others	Air transport	2012	3
PRS	XEROX	USA	USA	Office equipment	2002	3
PRS	PAYD Insurance	USA	USA	Insurance	2012	2
PRS	Berlingske	Denmark	Europe	Media, newspaper	2012	3
PRS	JP Politikens Hus	Denmark	Europe	Media	2012	3
NPO	KIVA	Denmark	Europe	Non-profit, microfinance	2009	3
PRS	Cewe Color	Germany	Europe	Printing	2011	1

Types: PRS: private sector; PUS: public sector; NPO: not for profit organisations

Source: Authors