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## Business model innovation in entrepreneurship

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**Abstract** The goal of this paper is to advance the understanding of emerging developments in business model design within the field of entrepreneurship. It is widely known that during the start-up process, entrepreneurs need to set up the boundaries of the business and define the product/service to offer. This is a very complex task, especially for new technology-based companies which usually require large investments and have a limited time span (avoiding product obsolescence) to turn the idea into a full-time venture. Although business model design within the entrepreneurship field is a recent topic, it is gaining a growing attention in the literature. The usefulness and predictable power of business models are expected to help entrepreneurs make more informed decisions, thus increasing the chances of success. This article first tackles the specific problems faced by new technology-based firms, linking their needs with the advantages of having a flexible and well-designed business model. Second, different innovative practices aimed at improving business model design are discussed. The paper ends with some recommendations, stressing the need for future empirical work.

**Keywords** Business model · Entrepreneurship · New technology-based firms · Business innovation · Customer development model · Lean start-up

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## Introduction

It is acknowledged that the process of starting up a new venture is a very complex and demanding task, especially in the initial stages, where efforts are mainly focused on building the product that can be commercialised, and where the organizational and financial architecture of the firm has to be developed. Firms operating in the technology-intensive sector may face even some additional constraints such as large investments required to develop the product, or very short product life cycle, and emergence of many copycat competitors. This suggests that technology-based entrepreneurs (those that turn inventions and high-tech concepts into viable businesses) function in an uncertain and evolving environment. In this dynamic setting, innovation speed, product development, customers' behaviours, competition threat, governmental regulations, suppliers, investors, as well as many other environmental factors, have a considerable impact on the organization (Goktan and Miles 2011; Mulders and van den Broek 2012).

All of these essential features regarding the product, operations, and the structure of the new venture are embedded in the business model. According to Teece (2010 p.20), business models reflect "*management's hypothesis about what customers want, how they want it and what they will pay, and how an enterprise can organize to best meet customer needs, and get paid well for doing so*". Put differently, a business model describes how things have to be done to deliver value to customers, where to put the money for the sustainability of the firm, and how to manage the organization. These strategic choices on how to exploit knowledge and manage resources in pursuit of competitive advantage (Andersén 2011; Cegarra-Navarro et al. 2011; Chilton and Bloodgood 2010; Lin et al. 2010) outline the business logic required to earn a profit, and define the landscape in which the company will operate (Casadesús-Masanell and Ricart 2010; Garnsey et al. 2008).

Although business models have been positioned in the agendas of many academics, entrepreneurs, and managers in general, it is quite surprising that literature has a general paucity of serious research on this topic. Perhaps, the rationale behind this absence of specific literature lies in the lack of consensus on the theoretical grounding behind the definition of what a business model is (Teece 2010; Zott et al. 2011). There exists no generally accepted definition of the term "business model" and the diversity of the terminology also may have contributed to spark this debate (Morris et al. 2005). For instance, the terms "business model", "business strategy" or even "economic model" are often used interchangeably.

The strategy of a firm outlines the way the organisation will pursue its goals given the threats and opportunities in the environment and the constraints of its resources and capabilities (Nandakumar et al. 2010). Business models are much broader than strategy in that they establish how firms can potentially create value (Morris et al. 2005). Previous research suggests that business models represent the sources of new value creation and potential competitive advantage (Afuah 2004; Chesbrough 2010; Chesbrough and Rosenbloom 2002; Mahadevan 2000; Voelpel et al. 2005), deliver and capture the mechanisms employed (Teece 2010), and act as drivers of firm performance (Rajgopal et al. 2003). As such, positioned in the intersection of strategic management and entrepreneurship theory (Ordanini et al. 2004; Teece 2010) business models hold promise as unifying units of analysis for entrepreneurial

ventures (Morris et al. 2005). Yet, an incipient empirical research appears to germinate (Brettel et al. 2012; Zott and Amit 2007).

According to Zott and Amit (2010) business model design stands as a key issue for any individual willing to create a new business. Business models integrate basic insights of innovation, business processes and routines (Cavalcante et al. 2011). The purpose of this paper is to highlight the significance of business model design as a key task for the entrepreneur in the process of starting a technology based venture. We therefore explore the interrelationships among business model design, product development, customers' requirements, and innovation management.

This paper is structured as follows. The second section articulates problems that technology-based firms face. The next section reviews the main theoretical foundations behind the emergence of business model research in the field of entrepreneurship. In the following section, we discuss the implications of business models as a source of business innovation, renewal, and continuous improvement. We then provide a systematic overview of the emerging trends in business model design that have emerged in recent years. Some of the main practices discussed include: the introduction of open business models, aiming at capturing innovative strategies that improve the performance of the firm; the use of a business model canvas to better plan and identify the sources of value creation and the links with business strategy; the customer development model to simultaneously explore market and product developments; and the adoption of the lean philosophy to better satisfy customers' needs and use the variety of scarce resources in an effective and efficient way. Finally, in the last section, conclusions and implications are presented.

## Developing a technology-based venture

New venture creation involves many domains (Gartner 1985). According to Timmons (1977), three main elements underline the entrepreneurial process of starting a new venture: the identification or recognition of an opportunity, the configuration of the entrepreneurial team, and the selection of the resources to efficiently exploit the idea. The strategic management literature has emphasised the role of intellectual capital, organisational learning and social networks as determinants of business competitiveness (Fuentes Fuentes et al. 2010; Iebra Aizpurúa et al. 2011; Hormiga et al. 2011). Hence, the combination of a good idea, a skilled entrepreneurial team and a knowledge sharing culture, results in a successful start-up if resources are effectively managed. Developing a new venture involves amassing a broad array of resources and commitments (Stinchcombe 1965).

Because of the ever shortening *shelf life* of opportunities, entrepreneurs have to be constantly in vigil of any innovation that could be introduced into the marketplace, even before there exists demand. Entrepreneurs should see opportunities in situations where others tend to see risks (Reed and Storrud-Barnes 2010; Sarasvathy et al. 1998).

In technology-based firms, technological opportunities are ideas that are created by new advances in a technology (Shane 2003). However, such ideas are usually extremely volatile and fluid, with a very short life cycle, requiring constant updating. This means that entrepreneurs should be innate risk takers, as they are expected to

allocate resources based on market demands or intuitions, as well as decision makers as they have to fix a price in a market where demand is still unknown.

Built upon the above definition, technology-based start-ups can be understood as new ventures where know-how and advanced technological discoveries are capitalised and exploited through new products and services (Klofsten 1994). Accordingly, their chances for success depend mainly on rapid and effective management of knowledge-intensive assets and development and exploitation of the technology (Nonaka et al. 2000).

As new technologies are characterised by their volatile and unpredictable nature, the process of developing a technology-based firm entails an extraordinary level of uncertainty (Aldrich and Fiol 1994), being much riskier than the non-technology-entrepreneurship process. Moreover, these companies tend to operate in a very dynamic and turbulent environment, which is true with majority of innovative opportunities of technology-focused ventures. Thus, it is clear that choosing the right timing and the appropriate strategy for commercializing a technological opportunity is of vital importance.

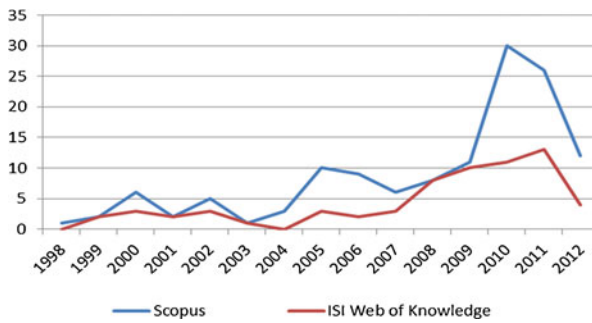
It is in this particular context where business model design has a prominent role in the entrepreneurship literature. Following Castrogiovanni (1991), during the start-up process, entrepreneurs need to establish the boundaries of the business and set up the organizational structure. As the entrepreneurial process is a mechanism for continuous and rapid innovation, early-stage enterprises require business model experimentation to rapidly test the market and validate or reject the business opportunity. According to Amit and Zott (2001), the usefulness of business models in these initial stages stems from their explanatory power in regard to the value creation potential of the new venture (Chesbrough and Rosenbloom 2002), the plans to make money in the long run (Afuah and Tucci 2001), and how the venture will sustain itself over time (Rappa 2001).

## Business models in entrepreneurship literature

Business models can lead to more informed decisions in the context and management of new ventures (Harms et al. 2007). Although previous studies investigated business models and the process of starting up a new venture separately, the combination of these two streams of research is a recent topic in the entrepreneurship research field.

In order to ascertain the growing importance of this topic in the scientific community in recent years, we conducted searches in two of the most commonly used databases: Scopus and ISI Web of Knowledge. In both cases we searched for papers that simultaneously include the keywords “business model” and “entrepreneurship” in their abstracts. Our search identified 132 papers included in the Scopus and 65 in the ISI Web of Knowledge. Figure 1 shows how papers are distributed over time. From this figure, it is evident that the research interest in business models in entrepreneurship began around 1998, showing two peaks in 2005 and 2010 in terms of the number of contributions.

Due to the lack of a consistent framework (George and Bock 2011), prior research on business models with an entrepreneurial lens has shown in fragmented research questions and findings. Some scholars have focused their attention on how business



**Fig. 1** Distribution of papers indexed in Scopus and ISI Web of Knowledge databases simultaneously addressing the subjects of “business models” and “entrepreneurship”

models should be formalised (Morris et al. 2005; Tracey and Jarvis 2007), while others conceived business models as a tool that represents entrepreneurial opportunities (Franke et al. 2008; Markides 2008). Perhaps the approach that has generated the greatest interest among academics is the one that considers the relationship between business model design and firm performance (Zott and Amit 2007, 2008), although some authors suggest that business model evolution is inherently uncertain (Heirman and Clarysse 2004). Despite the diversity of approaches, we can observe a common trait. Research contributions tend to address “what business models do” rather than questioning “what business models are” as in the strategic organizational literature (Doganova and Eyquem-Renault 2009).

Since the scope of this paper is to better understand the potential effect of appropriate business model design on firm performance, we focus on those articles that discussed or tested this relationship. Several quantitative analyses have failed in finding convergent results concerning the relationships between the efficiency of business model planning and profitability or survival of the firm (Delmar and Shane 2003; Locke and Latham 2002). In a couple of recent works, however, this relationship was proven to be significant (Zott and Amit 2007, 2008). The results of these studies confirmed that the business model, used as an independent variable, was linked to firm performance. Thus, following this line of thought business models can be conceived as a key organizational design tool that may help predict business success.

As previously pointed out, the process of starting up a venture is an arduous and complex task, where many variables have to be considered. It is something that goes well beyond the own motivation of an individual to create a new venture. It is an adventure that depends on the transactional links with external stakeholders: customers, suppliers and partners. This means that a start-up is a human institution designed to deliver new value in the form of a product or service under conditions of extreme uncertainty (Ries 2010). Resulting from this fuzzy environment, many start-ups fail, and a large number of those that survive end up being acquired by larger companies. However, according to Ries (2010), most of these failures could have been avoided if entrepreneurs would have put more emphasis on customer feedback. This requires sound knowledge about the customers and their behaviour.

Centring our attention on the demand side, we observe that in the real world, customers want fast but accurate solutions to their perceived needs (Teece 2010). As

these demands in the high-tech sector should be provided rapidly in view of the high rate of obsolescence of technologies or disruptive technology of competitors (Christensen 1997), finding an appropriate response in a short period of time is essential. This is especially the case when the customer does want not only improvements in the existing products or services but also requires entrepreneurs to provide innovative products that do not yet exist. This implies that entrepreneurs have to figure out what customers want in an uncertain environment, and build a sustainable value chain to address these demands (Lee et al. 2012).

According to Teece (2010), the ideal business model rarely appears in the early stage of emerging businesses. Going one step further in this direction, Shirky (2008) argues that those new ventures that are more likely to succeed are those that do not have a perfect business model template but a flexible one that allows the entrepreneur to introduce change and readjustments. Clearly, designing a new business model requires intuition, creativity, and a deep understanding of user needs (Teece 2010). Similarly, the work of Brettel et al. (2012) demonstrates that entrepreneurs should explicitly focus on the relationship with their key customers when designing business models of their ventures. As new start-ups tend to have less routine in processing their transactions, they should design more than just one business model to handle their competitors.

According to Andries and Debackere (2007), business models should be adjusted in parallel to the firm's life cycle evolution. In this sense, business models are opportunity facilitators for entrepreneurs, representing the cognitive link between the business appraisal of the opportunity and its exploitation (Fiet and Patel 2008). Hence, business models reflect the architecture of value creation and delivery, specifying the instruments that will be used to meet customers' needs.

Built upon these arguments, business models can be defined as "stories that explain how enterprises work" (Magretta 2002 p. 97). Consequently, firm performance can be operationalized as a function of specific business model characteristics (Zott and Amit 2007), symbolising the fit with the strategy (Zott and Amit 2008).

Business models have also been studied from an economic perspective. Based on the work of George and Bock (2011), business models represent a core building block of the entrepreneurial enactment process. In this framing, business models become an extremely useful instrument for finding partners and investors, as they contain all the information related to how the firm is planning to create value that can generate the revenues that will guarantee sustainability survival of the firm (Doganova and Eyquem-Renault 2009).

### **Business models as a source of innovation and continuous improvement**

While innovation is usually focused on products or services, it is now increasingly on developing business models that leverage the firm's unique core competence (Anthony 2012). When starting up a business, firms may try multiple business models at the same time (Brown and Gioia 2002).

Today, there is a general consensus that business models, as a source of innovation, are important vehicles for business transformation and renewal (Zott et al. 2011). They may represent a component of innovation commercialisation that is managed

separately, but in accordance with the value innovation process (George and Bock 2011). A considerable number of scholars have studied business models from this perspective, where innovation is a key success factor for firm sustainability performance (Chesbrough 2010; Demil and Lecocq 2010; Johnson et al. 2008; Sosna et al. 2010).

Innovation within business models can be manifested in three different ways. On the one hand, business models can themselves represent a form of innovation (Mitchell and Coles 2003), by introducing new methodologies or modifying the internal operations of the firm improved efficiency, but without altering the essence of the product/service delivered. On the other hand, technological breakthrough may enable the firm to become the first mover in the market. This is the technology-push approach that typically takes place in large companies. To remain at the cutting edge of innovation and maintain leadership in the market, firms develop initiatives that may include the offering of secondary products or adapting the existing products to other contexts. This so-called disruptive innovation, may encompass little changes in the business model, and can be the key to the renewal of the business (Christensen 1997). There is also the demand-pull approach, where business models should be reformulated to fulfil new customer needs and business environments (Tece 2010).

Some scholars contend that to profit from innovation, entrepreneurs need to excel not only at product innovation but also at business model design (Tece 2010). This suggests that from their original design, business models should be flexible enough to allow the entrepreneur to anticipate problems, rapidly correct potential deviations from the targeted objectives, and project the natural evolution of technology and society (Delmar and Shane 2003). Thus, business models take shape through a process of experimentation (McGrath 2010). This reinforces the idea that a company does not necessarily confine itself to one business model but can have several simultaneously (Baden-Fuller and Morgan 2010). All these considerations give rise to the argument that defining, adjusting and/or improving a business model is a complex art that needs further research efforts. Particularly, in recent years new trends in the design process have emerged.

### **Emerging business model practices**

The search for a flexible and appropriate business model is an imperative for any start-up. Following Blank's (2006) thesis, this search can be divided into two main stages. First is the business model design step, following trial-error dynamics. That is, testing several hypotheses regarding the product/service being offered or operational functions of the firm. This iterative process is expected to help set the boundaries of the organizational structure. Once a robust business model is formulated, the second phase consists of its application. It is here where the business model should prove its scalable and reproducible character. Effective management is then needed to prevent the organization from becoming too big to fail (Fleck 2010). By using the concept of scalability, Blank (2006) suggests that the business model driving the start-up should be at the largest scope which demands the least amount of change in its structure. That is, the business models should accommodate small but powerful modifications that can make significant contribution to firm performance.

The following practices incorporate the philosophy of trial-error in testing the appropriateness of a business model. Although they have different foundations, they are all highly related.

### Open Business Models

Firms need to innovate in response to changing customer demands and life styles. Moreover, innovation is recognized to play a central role in creating value and sustaining competitive advantage of the firm (Huang and Yu 2011; Naranjo-Valencia et al. 2011; Rowley et al. 2011). Nevertheless, sustainable and efficient innovation requires a totally new approach.

Instead of being a process far removed from the market, innovation needs to be more open and closer to consumers. Open Business Models take their origin from the notion of Open Innovation introduced by Chesbrough (2003). Based on the principle that if a company stays isolated from outside entrepreneurs, it will not be exposed to and exploit the best ideas and opportunities. The best way to generate new ideas that may lead to innovation entails expanding the firm's boundaries. The Open Innovation process involves firms opening themselves to the market, looking for new and fresh ideas from external sources. The underlying rationale behind the concept of Open Innovation is that *"no company is smart enough to know what to do with every new opportunity it finds, and no company has enough resources to pursue all the opportunities it might execute"* (Wolpert 2002 p. 80).

From an entrepreneurial point of view, Open Innovation makes its entry in business model design as a new way to capture additional new ideas that may lead to improving the performance of the business. According to Gambardella and McGahan (2010), Open Business Models can encourage additional business model innovations in complementary markets as a result of the reshaping of downstream activities and capabilities.

The adoption of Open Innovation in business models calls for open designs, meaning that business models should be conceived in such a way that allow sharing or licensing of new technologies (Chesbrough 2007, 2010). Likewise, the business model itself can become a valuable intellectual property (Rappa 2001; Rivette and Kline 2000). The concept of Open Innovation in the entrepreneurship literature is similar to the one of collaborative entrepreneurship, which is *"the creation of something of economic value based on new jointly generated ideas that emerge from the sharing of information and knowledge"* (Miles et al. 2006 p. 2).

### The Business Model Generation Canvas

To support the creation of highly complex ventures that deal with the fragile and volatile technologies, new procedures for creating and testing business models have emerged. One of these developments is the Business Model Generation Canvas, proposed by Österwalder and Pigneur (2010) and Österwalder et al. (2005), a conceptual instrument that helps make right decisions at the right time for business model development. In a simplified scheme, it contains the objects, concepts and their relationships, expressing the logic underlying the business. This way, it is possible to assess, how the business is conceived with respect to the added value, the customer relationships, the creation process and the financial aspects.



The business model generation canvas is structured in nine building blocks: 1) customer segments, 2) value proposition, 3) channels, 4) customer relationships, 5) revenue streams, 6) key resources, 7) key activities, 8) key partnerships, and 9) cost structure. Each block contains a set of questions to validate the model and corroborate its internal strength.

To facilitate the understanding and analysis of all the pillars of a business, the nine blocks suggested by Österwalder and Pigneur (2010) can be grouped by the area of ontology, using a similar criterion used in the Balanced Scorecard (Kaplan and Norton 1992). Four main areas are envisioned: product, customer, infrastructure and finance. The area of the product (block 2) describes the value proposition of the business, that is, the products and services delivered to the market. Blocks 1, 3 and 4 are related to customer engagement, defining the targeted audience, the demands, how customers perceive the value delivered, and which type of relationship the company is maintaining with each segment of clients. The infrastructure management area (blocks 6 to 8) refers to the functions of logistics and production, and articulates the relationships between key partners (e.g., employees, suppliers or partners) and the company. Finally, information regarding the sustainability of the company, cost structure, and how the company is going to earn revenues (blocks 5 and 9) can be considered under the financial area.

According to Hulme (2011a), the use of canvas is essential for the learning cycle of a start-up. It is expected to help entrepreneurs in four ways. First, it involves entrepreneurs undertaking an exercise of constant reflection, developing the business model using a graphical tool where all the elements are related to each other, providing cohesion to the overall business model. Second, it allows entrepreneurs, customers, employees, executives, and even competitors to understand how the business articulates its different components. Therefore, by using this format, the canvas facilitates communication with the different stakeholders, becoming the starting point of creative discussion about new business opportunities, how to align activities with the mission and vision of the firm, and facilitates the identification of risks and failures. Third, it forces entrepreneurs to simultaneously consider each of the elements of the business individually but also as a whole. This is extremely important as entrepreneurs tend to concentrate on specific parts of the business, ignoring other key components. Fourth, the use of a graphical tool contributes to increase business creativity and innovation. The canvas incorporates the design thinking methodology, being easier to bring stakeholders to the discussion and brainstorming sessions, which encourages creative developments based on the needs and desires of customers.

The usefulness of the use of canvas and its popularity among entrepreneurs have led to new improvements of the methodology. Perhaps the variation that has the generated greatest interest is the Business Model Framework (BMF) developed by Hulme (2011b), which consists of two additional complementary blocks that consider the planning and assessment of growth and competitive advantage of the firm.

### Customer Development Model

Among innovation determinants, market orientation has a close relationship with firm success (Zhang and Duan 2010). Nevertheless, many start-ups invest a great deal of

time and efforts in developing and perfecting the product they are going to offer without ever showing it, even in a rudimentary form to prospective customers until it is completely finished. This is the traditional way of making a product: a linear progression from an idea to product development, followed by several internal tests before its launch to the general audience. Nevertheless, this logic presents some drawbacks when it comes to introducing the product to new markets (Blank 2006). First, this procedure does not guarantee customer acceptance as it focuses on execution instead of discovery and learning, a very risky attitude in entering new markets. In addition, it does not integrate marketing, production, sales, and business development, meaning that the resulting product may generate unrealistic expectations, biased by the overenthusiastic mind-set of entrepreneurs who fail to see the big picture. Based on these arguments, it follows that one of the main reasons for failure among start-ups is their lack of a process for discovering their markets, identifying their customers, and validating their assumptions from the very initial stages.

According to Blank (2006), the Customer Development process helps overcome the abovementioned flaws. Similar to the new product development process (Cantarello et al. 2011; Yang and Li 2011) the Customer Development model is a four step iterative process which includes customer discovery, customer validation, customer creation, learning and company building. By using this approach, it is possible to simultaneously explore market and product developments. Figure 2 schematises this process, comparing the different stages with those of the Product Development process. As shown in Fig. 2, each of the stages meshes and supports seamlessly the on-going product development. Thus, the Customer Development model is not a replacement for the Product Development model, but a necessary complement.

“Customer discovery” is the first step, which focuses on understanding customer problems and needs, and helps decide whether there is a real market for the product/service. Thus, this step involves discovering if the core of the business model makes sense. The “Customer validation” step tries to build a replicable sales roadmap. Accordingly, a group of early customers with a repeatable sales process corroborates

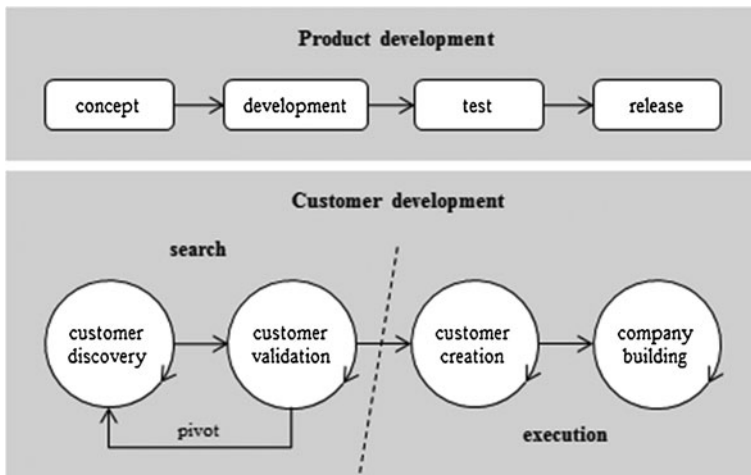


Fig. 2 Product and customer development processes

the business model, verifying the existence of customers, the perceived value of the product, and the appropriateness of pricing and channel strategies. This stage is a key checkpoint in understanding whether the firm has a product that customers want to buy and a roadmap of how to sell it (Blank 2006). Thus, as shown in Fig. 2, there is an additional iterative loop going back to customer discovery. The third step consists of “customer creation”, that is to create and derive end user demand, based on the success the company has achieved in early sales. This stage may vary from firm to firm, as it is highly dependent on the type of market entry. Finally, “company building” constitutes the last step of this model. It encompasses the start-up evolution from informal learning and discovery oriented customer development teams to formal departments capable of exploiting the company’s early market success.

Notice that one important implication of this process is that each step is represented as a circular track with recursive arrows, stressing the iterative character of the process. By doing this, the model ensures the firm has reached enough success to carry on to the next stage. Thus, it assumes that going backwards is a natural and valuable part of the learning process that improves the robustness of the business model. One of the main consequences of this iterative process is that it keeps the start-up at a low cash burn rate until the company has verified and approved its business model by finding a sufficient number of customers (Blank 2006). This suggests that start-ups cycle through the first two stages (customer discovery and customer validation) several times in their search for the value proposition that can be later translated into sales. This means that firms do not constitute their non-product development teams (i.e., sales, marketing, etc.) until they have a real proof that the business is a viable entity. Once this evidence is obtained, the execution steps follow (customer creation and company building), capitalising the opportunity identified.

### The lean philosophy

Technology-based start-ups usually undertake less long-term planning than firms that operate in other environments. Yet, they need to be more flexible as they have shorter life cycles. This context, as previously pointed out, requires entrepreneurs to process information quickly, make rapid decisions, and act faster than competitors do.

In this setting, it becomes more evident than ever the need for a procedure of having a flexible, agile and lean process to allow entrepreneurs to meet user requirements in a fast and effective way. Literature on manufacturing and supply chain management has already discussed the key advantages of combining agile and lean principles to accelerate product development, instead of considering them in isolation (Naylor et al. 1999; Shah and Ward 2003). Although the terms agile and lean are sometimes used interchangeably, they actually have different meanings. The agile methodology consists of iterative and incremental developments where requirements and solutions evolve, encouraging rapid and flexible responses to change, that progressively improve the product and reduce the overall cost (Beck et al. 2001). The lean manufacturing process leverages the learning from short cycles, employing a regimen of continuous improvement that aims at reducing waste and improving production rates (Shah and Ward 2003).

Recent developments suggest that these concepts are also being spread to other disciplines and being increasingly incorporated within the management domain. This

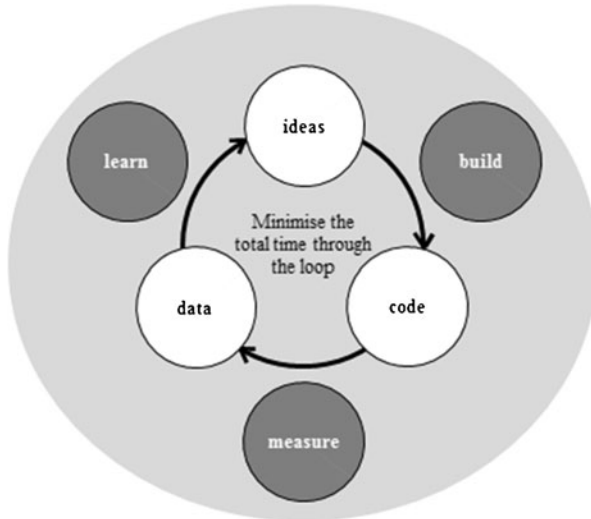
is the case of the lean start-up approach. “Lean start-up” is a term used by Ries (2011) that brings together the principles of customer development, agile methodologies and lean practices. By using short and frequent cycles for tests and corrections, this approach aims at changing the way firms are built and products are designed, helping companies to succeed in a business landscape riddled with risk. Particularly, it seeks to minimize costs, waste and time to market, giving new products the best possible chance to get off the ground and into the hands of customers (Gehrich 2012). Even though the lean start-up approach is still in an embryonic stage, it has attracted much attention in recent years among entrepreneurs, technologists and investors. Yet, this research topic certainly constitutes an interesting research stream to better understand the process of starting up a new venture.

According to Ries (2011), the rationale behind the lean start-up approach is to optimize the utilization of scarce resources by using smaller and faster iterations for testing a vision continuously so as to get a desired product to customers' hands faster. To accomplish this goal, lean start-ups strive to minimize the expenditure of resources for anything but the creation of value for the customer.

Despite fast developments in the high-tech sector and the globalization of markets have opened tremendous opportunities for technology-based firms, decision-making in early stages proves to be a challenge (van Riel et al. 2011). To reduce risk involved in making a large amount of investment for a new venture, Ries (2011) introduced the notion of the Minimal Viable Product (MVP), a prototype that implements only the most necessary features of the product to test fundamental business hypotheses and get customer feedback in early stages. MVP allows entrepreneurs to focus more on knowing who their customers are, what habits they have, and how to attract and retain them. Operating this way, start-ups can have early on-going interactions with customers, and thus, have a better chance of success without requiring large amounts of outside funding to launch the product.

Discovery and learning represent the fundamental cornerstones of the lean start-up philosophy. By way of synthesis, Fig. 3 illustrates the build-measure-learn diagram, a modernized version of the Plan-Do-Check-Act cycle attributed to Deming in the 1950s. This validated learning circle outlines a series of activities to capture the customer's feedback and make decisions about new product functionalities (Gehrich 2012). It begins in the build stage where a set of ideas take shape. Once the prototype or MVP is built and codified, it is presented to customers. Using different qualitative and quantitative techniques customer response is measured. The information gathered may provide specific learning that serves to validate or reject the hypotheses proposed, which in turn initiates the next iteration process.

In Fig. 3, it can be inferred that the central activity of a start-up is to turn ideas into products, measure customers' response, and learn whether to pivot or persevere (<http://theleanstartup.com/>). Pivot experiments are attempts to validate a part of the business model and gain valuable new understanding of it. The use of performance indicators to measure the continuous development process is the core component of the lean start-up methodology (Maurya 2012). The measures obtained may help entrepreneurs test hypotheses about the product, strategy, and engine of growth, align business and product efforts, prioritise objectives, and eventually improve the entrepreneurial outcomes. Once all the hypotheses are tested and the MVP turns into the final product, the next step is optimization, striving for efficiency or scale. Aardvark,



**Fig. 3** Build-learn-measure diagram

DropBox, Grockit, Votizen, and Wealthfront are just a reduced list of successful technology-based firms that have already begun to employ this philosophy.

### Discussion and conclusions

Technological advances and new computing developments have established new regimes of communication in the knowledge society, transforming the traditional balance between customers and suppliers. These changes imply managers need to select alternative strategic responses to technological change, managing how to best deliver this technology to customers (Jagoda et al. 2010; Schiavone 2011). For this purpose, a more customer-centred model is needed, requiring businesses to constantly re-evaluate their value propositions to ensure their offer matches well with customer demands. Also, this changing environment has intensified the entrepreneur's need to update in a simple way any modification in the operation and structure of the venture. Thus, entrepreneurs need to design flexible business models that enable them to efficiently re-shape strategic choices that outline the business logic according to market demands.

According to Casadesús-Masanell and Ricart (2010) and Anthony (2012) firms can compete through their business models. Business models are powerful tools for entrepreneurs, either in venture creation or venture change stages. All businesses, either explicitly or implicitly employ a particular business model (Teece 2010). Yet, business models represent a unique opportunity to unlock the entrepreneurial process, evaluate firm configuration effects, and describe and forecast entrepreneurial outcomes (George and Bock 2011).

This paper has articulated that business models are a central construct in entrepreneurship research. Our literature review reveals that although literature is still scarce, research in business model design within the field of entrepreneurship is acquiring

increased attention among academics and managers. It does not only consist of discovering how to create a more successful business, but in exploring how firms can better learn from their own experience and improve their entrepreneurial outcomes.

In this paper we have briefly reviewed four of the main practices that are gaining popularity in recent years. These emerging trends in business model design highlight the importance of not only listening to customers but also co-create new values or products with customers (Lee et al. 2012). It is also important to make better and faster business decisions regarding operational efficiency and the use of scarce resources. This is especially true for new technology-based firms, which operate in a dynamic sector where innovation and speed are key premises. As these firms confront unique trade-offs that established businesses with deeper resources and stable life cycle are not likely to face, technology-based ventures should rapidly create or improve effective solutions that accommodate customer needs.

Open innovation, customer development processes, agile developments or lean methodologies have ushered in new ways to build products unlike anything we have ever experienced, facilitating the creation of technology-based firms. In addition, a new innovation paradigm, “co-innovation,” which incorporates convergence, collaboration, and co-creation in the innovation platform, presents a new horizon to entrepreneurs (Lee et al. 2012). All these approaches converge in the use of quick iterations and train scheduling to build new features and products. This trial-error philosophy for validating the hypotheses of the business model and the appropriateness of the product/service offered is what really makes these practices so valuable. Indeed, this logic boosts innovation and fosters the creation of products in a much faster time span, helping entrepreneurs to start a venture with greater assurance of success.

Our aim in this paper has been to open new pathways for future research on business models and entrepreneurship. From here, several research questions appear to be of great interest in this respect: Is there any connection between firm performance and how the business model is designed? Does an accurate business modelling design process make a new venture more robust or more successful? How start-ups, from their early stages of the life cycle, can have a greater impact in the marketplace? How new technology-based firms can improve the fit between their value proposition and customer demands? Based on these queries, future research efforts should be directed to empirically test the potential connections between business model design, business strategy and firm performance.

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