Universidad de Alcalá
COMISIÓN DE ESTUDIOS OFICIALES
DE POSGRADO Y DOCTORADO

ACTA DE EVALUACIÓN DE LA TESIS DOCTORAL

Año académico 2019/20

DOCTORANDO: **PERALTA BELLMONT, ALBERTO ANDRÉS**
D.N.I./PASAPORTE: ******9324L**

PROGRAMA DE DOCTORADO: **D432-ECONOMÍA Y GESTIÓN EMPRESARIAL**
DPTO. COORDINADOR DEL PROGRAMA: **ECONOMÍA Y DIRECCIÓN DE EMPRESAS**
TITULACIÓN DE DOCTOR EN: **DOCTOR/A POR LA UNIVERSIDAD DE ALCALÁ**

En el día de hoy 09/09/19, reunido el tribunal de evaluación nombrado por la Comisión de Estudios Oficiales de Posgrado y Doctorado de la Universidad y constituido por los miembros que suscriben la presente Acta, el aspirante defendió su Tesis Doctoral, elaborada bajo la dirección de **JAVIER CARRILLO HERMOSILLA // FERNANDO CRECENTE ROMERO.**

Sobre el siguiente tema: *HOW GOOD IS LEAN STARTUP AT HELPING NEW SUSTAINABLE BUSINESS MODELS SUCCEED?*

Finalizada la defensa y discusión de la tesis, el tribunal acordó otorgar la CALIFICACIÓN GLOBAL[1] de (**no apto, aprobado, notable** y **sobresaliente**): Sobresaliente

Alcalá de Henares, 9 de septiembre de 2019

EL PRESIDENTE	EL SECRETARIO	EL VOCAL
Fdo.: SONIA QUIROGA GÓMEZ	Fdo.:PABLO DEL RÍO GONZÁLEZ	Fdo.: JAVIER AMORES SALVADO

Con fecha 23 de septiembre de 2019 la Comisión Delegada de la Comisión de Estudios Oficiales de Posgrado, a la vista de los votos emitidos de manera anónima por el tribunal que ha juzgado la tesis, resuelve:

☒ Conceder la Mención de "Cum Laude"
☐ No conceder la Mención de "Cum Laude"

La Secretaria de la Comisión Delegada

FIRMA DEL ALUMNO,

Fdo.: PERALTA BELLMONT, ALBERTO ANDRÉS

[1] La calificación podrá ser **"no apto" "aprobado" "notable"** y **"sobresaliente"**. El tribunal podrá otorgar la mención de "cum laude" si la calificación global es de sobresaliente y se emite en tal sentido el voto secreto positivo por unanimidad.

INCIDENCIAS / OBSERVACIONES:

Universidad de Alcalá

VICERRECTORADO DE INVESTIGACIÓN
Y TRANSFERENCIA

En aplicación del art. 14.7 del RD. 99/2011 y el art. 14 del Reglamento de Elaboración, Autorización y Defensa de la Tesis Doctoral, la Comisión Delegada de la Comisión de Estudios Oficiales de Posgrado y Doctorado, en sesión pública de fecha 23 de septiembre, procedió al escrutinio de los votos emitidos por los miembros del tribunal de la tesis defendida por ***PERALTA BELLMONT, ALBERTO ANDRÉS***, el día 09 de septiembre de 2019, titulada, *HOW GOOD IS LEAN STARTUP AT HELPING NEW SUSTAINABLE BUSINESS MODELS SUCCEED?* para determinar, si a la misma, se le concede la mención "cum laude", arrojando como resultado el voto favorable de todos los miembros del tribunal.

Por lo tanto, la Comisión de Estudios Oficiales de Posgrado y Doctorado **resuelve otorgar** a dicha tesis la

MENCIÓN "CUM LAUDE"

EL VICERRECTOR DE INVESTIGACIÓN Y TRANSFERENCIA
F. Javier de la Mata de la Mata
Documento fechado y firmado digitalmente

Copia por e-mail a:
Doctorando: PERALTA BELLMONT, ALBERTO ANDRÉS
Secretario del Tribunal: PABLO DEL RÍO GONZÁLEZ
Directores de Tesis: JAVIER CARRILLO HERMOSILLA // FERNANDO CRECENTE ROMERO

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DILIGENCIA DE DEPÓSITO DE TESIS.

Comprobado que el expediente académico de D./Dª Alberto Andrés Peralta Bellmont reúne los requisitos exigidos para la presentación de la Tesis, de acuerdo a la normativa vigente, y habiendo presentado la misma en formato: ☒ soporte electrónico ☐ impreso en papel, para el depósito de la misma, en el Servicio de Estudios Oficiales de Posgrado, con el nº de páginas: 143 se procede, con fecha de hoy a registrar el depósito de la tesis.

Alcalá de Henares a 9 de julio de 2019

Aurora Juárez Abril

Fdo. El Funcionario

Programa de doctorado en

ECONOMÍA Y GESTIÓN EMPRESARIAL (D432)

How good is Lean Startup at helping new sustainable business models succeed?

Tesis Doctoral presentada por

D. Alberto Peralta

Directores:

Dr. D. Javier Carrillo-Hermosilla

Dr. D. Fernando Crecente

Alcalá de Henares, 2019

Universidad de Alcalá

Olga Cantó Sánchez, Coordinadora adjunta de la Comisión Académica del Programa de Doctorado en Economía y Gestión Empresarial

INFORMA que la Tesis Doctoral titulada "HOW GOOD IS LEAN START-UP AT HELPING NEW SUSTAINABLE BUSINESS MODELS SUCCEED?", presentada por D Alberto PERALTA BELLMONT y dirigida por Dr. Javier CARRILLO HERMOSILLA y Dr. Fernando CRECENTE ROMERO, reúne los requisitos científicos de originalidad y rigor metodológicos para ser defendida ante un tribunal. Esta Comisión ha tenido también en cuenta la evaluación positiva anual del doctorando, tras los informes preceptivos y la presentación de los resultados en el Seminario que tuvo lugar en la Facultad de Económicas el 8 de julio de 2019, habiendo obtenido las correspondientes competencias establecidas en el Programa.

Para que así conste y surta los efectos oportunos, se firma el presente informe en Alcalá de Henares a once de junio de dos mil diecinueve.

Fdo.: Olga CANTÓ SÁNCHEZ

Universidad de Alcalá

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El Dr. D. Javier Carrillo Hermosilla, Catedrático del Departamento de Economía y Dirección de Empresas y el Dr. Fernando Javier Crecente Romero, Profesor Contratado Doctor del Departamento de Economía y Dirección de Empresas de la Facultad de Ciencias Económicas, Empresariales y Turismo de la Universidad de Alcalá,

CERTIFICAN

Que la tesis doctoral con el título "How Good is the Lean Startup at helping new sustainable business model succeed?", elaborada por D. Alberto Peralta Bellmont, ha sido dirigida por nosotros y damos nuestra conformidad a la presentación de la misma para depósito y proceder a su lectura y defensa, de acuerdo con la normativa vigente.

Y para que conste donde proceda, firmamos la presente en Alcalá de Henares, a ocho de julio de dos mil diecinueve.

LOS DIRECTORES DE LA TESIS,

Dr. Javier Carrillo Hermosilla

Dr. Fernando Javier Crecente Romero

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1 Chapter 1. Introduction[1]

We have learnt that we are living in an Era where humans rival in influence with other natural forces (Bressan, 2011). And we also acknowledge that this influence of humans seems to be the root cause of the unprecedented damage and destructive, deprecated behaviors that are contrary to our own best long-term interests. We agree that there are many missed opportunities to restore these damages attributed to science and politics (Wright & Nyberg, 2013). But also, ethics share their part, contributing with no fewer misbehaviors and suspect actions (Martí, 2018). And maybe these two latter have a reflection on the way we have built businesses, which might be serving as very powerful levers for the diffusion of humanly-caused environmental damages.[2] In this sense, businesses and their core engines, their business models (Osterwalder, 2004), form subsystems of the "Anthropocene Society" (Hoffman & Jennings, 2015). Our society's successful entrepreneurs and innovators have hacked, and continue to do so, the environmental system to their benefit, and have perpetuated organizations, ways and practices (Hoffman & Jennings, 2018) that are contributing to the environmental degradation of our Anthropocene era. But we reckon that the innovation of business models, far from being the problem, might be the strongest solution to mend the wrongs we are living today if we are able to focus them on "creating sustainability" (Ehrenfeld, 2009 in Hoffman & Jennings, 2018).

The main contribution of this dissertation sits at the intersection of sustainability and business model innovation, presenting the most relevant elements current and future sustainable business model innovation practices should clarify to include them in the development of new sustainable business models. In the second chapter, we conceptually and qualitatively explore those elements and propose expanding the current knowledge and practices of sustainable business model innovation with the Lean Startup model. This may be an alternative way of producing sustainable business model innovation concentrating on conventional and new elements and combining them in a more experimental, non-linear way. And in the following third and fourth chapters, we quantitatively explore this new combination of elements comparing both the conventional and the Lean Startup ways. Therefore, this dissertation is an

[1] This Chapter's content is mostly based on Peralta & Castellote, 2018

[2] The three stated study approaches to these damages refer to our Era as the Anthropocene (Zalasiewicz et al., 2016), and are: the 'Great Acceleration' (Crutzen, 2002, Zalasiewicz et al., 2016); the 'Planetary Boundaries' (Gillings & Hagan-Lawson, 2014: 2); and the "Ecosystems Breakdowns" (Wright & Nyberg, 2015)

approach to answering the following research question: How can Lean Startup serve as a practice to create sustainable business models? We believe it is one of the first efforts to present Lean Startup as a novel sustainable business model innovation methodology, that effectively integrates sustainable goals and eco-innovation since the inception of any new business model (BM). This is of importance since conventional innovation practices address sustainability late: in the business model mid to late development stages and always from a product perspective, which may cause their high rates of failures.

Lean Startup as a sustainable business model innovation method places the customer and the rest of the valueholders front and central. It does it in a parsimonious, quite rigorous way with a process for testing assumptions about every element of the new BM (Blank and Dorf, 2012, Bosch et al. 2013, Dennehy et al., 2016).

Together with that first research question, we have identified a second complementary question: What are the elements that drive the entrepreneurs' usage of Lean Startup and conventional New Product Development (NPD)[3] (York & Danes, 2014) when developing sustainable business models and how are these elements meeting those elements? Both questions test if this novel sustainable business model innovation practice and its conventional alternative support innovators find ways of enhancing:

1. their market success (measured by their ability to sell repeatedly, and to scale) (Blank, 2013; Frederiksen & Brem, 2017), as an economic measurement
2. their ability to meet the complementing two key elements of sustainable business model innovation: the creation of societal (internal, including employees, and external) and environmental value, rightly balanced with economic success (Boons & Lüdeke-Freund, 2013; Elkington, 2013; Yang et al., 2017); and the collaboration with the full range of valueholders, as an extension of the stakeholder concept (Donaldson & Preston, 1995; Hart & Sharma, 2004; Mattingly et al., 2004)
3. their solutions to bridge the Design-Implementation gap (D-IG) that all corporate business model innovation projects face (Geissdoerfer et al., 2017)

[3] There are multiple references and terms referring to the conventional approach to product, and business model, development, but the most widely cited are "product development process" (Blank, 2009), "new product development" and "stage-gate model" (R. G. Cooper, 2000, 2014)

But before we introduce the concept of sustainable business model innovation and Lean Startup as a sustainable business model innovation practice, we describe next the relevant aspects of BMs and sustainable business models.

1.1 What is a business model anyway and what does it consist of?

The term business model (BM) has been present in scientific discussions for over fifty years now. The notion of a BM concept began with its conceptualization and first use with Bellman et al. (1957, in Osterwalder et al., 2005). Since, key authors such as Chesbrough and Rosenbloom (2002), Richardson (2008), Zott and Amit (2010), Teece (2010) and Osterwalder and Pigneur (2010) contributed to the literature on the concept and on the processes to develop BMs. From there, several differing perspectives have emerged, but we concentrate on Bocken and colleagues classification (2013):

1. Teece (2010) and Osterwalder and Pigneur (2010) describe a BM as the ways an enterprise creates and delivers value to customers and others and captures value and "converts this into profit". Osterwalder and Pigneur (2010) describe nine elements of a BM: customer segments, customer relationships, channels, revenue streams, value proposition, key resources, key activities, cost structure and partnerships. In this dissertation we adopt this perspective of BMs.
2. Zott and Amit (2010) think the BM is an activity system, more of a network, and describe its activities ('what'), its structure ('how'), and who performs the activities ('who'). They advocate for the development of BMs with a network-centric rather than a single firm-centric perspective (Bocken et al, 2013). Value seems no longer created by individual models acting autonomously, but by acting together with parties external and internal to the model through informal or formal commitments (Beattie and Smith, 2013).

1.1.1 Sustainable business models and their relevance today

Sustainable business models (sustainable business models) are relatively new in the academic literature. Citing Stubbs and Cocklin (2008), Geissdoerfer and colleagues (2018) trace back the first reference of sustainable business models to 2008. According to these latter authors, sustainable business models are a simplified visual representation of the elements forming a business model (BM), the interrelation of these elements, and the interactions of those elements (or thanks to those elements) with its stakeholders as they together produce the flow of value among them. That visualization then helps understand how the BM produces, delivers and captures value (Osterwalder, 2010) for its success, measured through impact and growth rates.

sustainable business models build on the triple bottom line approach (Stubbs & Cocklin, 2008), and that defines sustainable business models purpose and help measure their performance along these three dimensions. sustainable business models success is established by the value they provide to conventional stakeholders, and to the environment (internal and external), and society (internal and external) also included as stakeholders.

In summary, sustainable business models produce, deliver and capture economic, social and environmental values from and for a wide range of stakeholders (Bocken et al, 2013). The benefits from deciding for such type of BMs are widely described in the literature, ranging from improved efficiency, resilience to external shocks, better relationship with employees and communities, to higher profitability (Sachs, 2015, Nidumolu et al, 2009) and survival rates.

In Section 1.2, we briefly review the existing perspectives of sustainability and we introduce our conceptual proposal to fill the under-researched gap of business model innovation from a sustainable standpoint.

1.2 Sustainability perspectives on business modeling

In their seminal paper on sustainable business models, Stubbs and Cocklin (2008) acknowledged that sustainability was itself a contested concept. It still is. They rightly cited the World Commission on Environment and Development report (1987), which referred to environmental, social, and economic aspects of sustainable development, as an effort to agree on a common definition of the concept. But its implementation has resulted on its two most common, and different, perspectives (Carrillo-Hermosilla et al, 2009):

1. The neoclassical (traditionalist) economic worldview (e.g. Wagner, 2007; Walley and Whitehead, 1994; Palmer et al., 1995; Simpson and Bradford, 1996; Xepapadeas and de Zeeuw, 1999 in Schaltegger et al., 2012) sees sustainability as a secondary, instrumental, concept to be pursued only if it maximizes shareholder's value, advocates for the company's self-interest, or is imposed by legislation or pressure from stakeholders (namely, customers) to retain credibility/legitimacy. In short, firms trade-off between "(better) environmental or social performance on the one hand and (worse) economic performance or competitiveness" on the other (Schaltegger et al., 2012). This *traditionalist* understanding fosters a production cycle that reflects a "linear take-make-waste approach", which could in turn favor a linear way of innovating organizations and their business models. These models opt for environmental performance or competitiveness, as antagonists(see for example: Xepapadeas & De Zeeuw, 1999; Simpson & Bradford, 1996; Palmer et al., 1995; Walley &

Whitehead, 1994). We expect here that the linear innovation approach of this perspective connects with a defensive strategy and adoption of end-of-pipe technologies (Carrillo-Hermosilla et al, 2009; Luken, 1999)

2. The ecological modernization (revisionist) perspective sees sustainability as an alternative to achieve economic growth through environmental innovation and use of new technologies. According to Mol (2006), BMs developed under the *revisionist* view are ecology-inspired and environment-induced. They have transformed their core practices to be profitable by reducing the costs of compliance and production, improving their competitiveness and positively connecting environmental and economic performance (Porter & Van der Linde, 1995a and Porter & van der Linde, 1995b, in Carrillo-Hermosilla et al., 2009). Beyond their economic tactics, this type of BMs would creatively improve the welfare of stakeholders and minimize the environmental impact (Jaffe et al., 1995). And dynamically, they would take on consideration the interests of all stakeholders, even the future ones. They, for example, compensate harmful activities, usually by considering closed-loop processing and "co-opetitive" approaches. Under this perspective, BMs act extending the shareholders' interests and try to balance them with the rest of relevant stakeholders and valueholders. In this research, we adopt this latest perspective, although we add to the concerns raised by Aragon-Correa and Rubio-Lopez (2007) when developing corporate proactive environmental strategies (potentially leading to corporate self-destruction: Wright & Nyberg, 2013)

1.2.1 Sustainability and business model innovation: Business model eco-innovation

In the revisionist perspective, BMs seeking sustainability must face change. This is due to the adaptation to their markets and stakeholders. In their case, they want to succeed and grow using a triple bottom line approach, adding to the challenges that conventional BMs have. In short, they need business model innovation.

Business model innovation could be acknowledged as a "fundamental shift in the purpose of business and almost every aspect of how it is conducted" (Bocken et al, 2013), although other less radical forms of business model innovation should be included in this definition (Blank, 2015a). And if we consider the eco-perspective of innovation, Geissdoerfer et al. (2017) and Bocken et al. (2013) help us understand that innovation of a sustainable business model "offers a potential approach to deliver the required change [to address triple-bottom-line goals]

through re-conceptualizing the purpose of the firm and the value creating logic, and rethinking perceptions of value" (Bocken et al, 2013).

But although business model innovation is related as a source of competitive advantage these days there is a deficit of attention among scholars and practitioners about business model eco-innovation and its methods. In other words, although eco-innovation is being addressed extensively acknowledging stakeholder engagement, long-term sustainability (based on the triple bottom line) and impact of public and private governance in how corporations are integrating it in their strategies (most of them from a supply-side, He et al., 2017), few to no reviews on eco-innovation have noted the relationship between it and new business model development as worth mentioning. That means that the most relevant eco-innovation papers and authors connect their constructs with the development of goods, services, processes and even organizations to improve corporate competitiveness, but disconnect eco-innovation from the ways organizations create, deliver and capture value, and prevent leaving value uncaptured (Yang et al., 2017). Moreover, those few authors connecting eco-innovation and business models concentrate only on theorizing and properly integrating those eco-innovated products, services, processes with working BMs to achieve a healthy triple bottom line. To date and to the best knowledge of this author, there is even a greater vacuum in the literature if we would consider eco-innovation of BMs as driven by valueholders' needs and interests, not by sustainable products or extended value proposals.

1.2.2 A revisionist approach to business model eco-innovation

Broadly speaking, if innovation refers to changes on how something is done, eco-innovation refers to changes that improve the environmental performance (Carrillo-Hermosilla et al., 2009, 2010). This does not mean that the motivation for eco-innovation needs to be only environmental. It also can and do depart from socially and/or economically motives. But with eco-innovation, the changes also benefit the environment.

The eco-innovation concept builds on the case of improving "economic success through voluntary social and environmental activities" (Schaltegger et al., 2012). This *revisionist* perspective of innovation advocates for the joint production of voluntary sustainability efforts and corporate economic success, fostering the possibility of win-win potentials. This latter is connected with the idea of a triple bottom line (TBL), which in its simplest terms makes eco-innovation efforts focus on economic, environmental and social value added (or destroyed) (Elkington, 2013). Moreover, the dimensions of eco-innovation (Carrillo-Hermosilla, et al., 2009, 2010: Table 1.1) might be a more useful and comprehensive framework than the TBL to measure

the implementation of the win-win potentials. They examine innovation outputs and throughputs in BMs along four perspectives: Design, user, product-service and governance aspects. And extending the applicability of these four dimensions, we use them here to define business model eco-innovation (sustainable business model innovation) as the 'changes that improve economic, social and environmental performance of business models along the design, user, product-service and governance dimensions of eco-innovation.'

Dimension	Description
Design	From an environmental perspective, there are two different design rationales to eco-innovations: redesigning human-made systems to reduce their environmental impacts, versus the search for minimization of those impacts. When these two perspectives are combined with the degree of compatibility/rupture of eco-innovations with the established techno-economic system, three different approaches can be proposed to identify the role and impacts of eco-innovations: • Component addition: "end-of-pipe" solutions minimize negative externalities on the environment, leaving existing processes unchanged • Sub-system change: eco-efficient solutions and the optimization of sub-systems lead to a reduction of negative environmental impacts • System change: This involves the redesign of systems towards eco-effective solutions, reducing the environmental impacts on the ecosystem and society at large
User	All innovations target certain markets. Apart from economic demands, eco-innovations also cover sustainability issues. Firms can learn about both by engaging with current and potential users: • User development: firms need to identify which (current and potential) users may provide inputs for the innovation process • User acceptance: firms need to understand and anticipate the demands of their users if they want their (sustainable) solutions to be successful
Product-service	A "product-service system" provides value to customers through a "function" combining products and services targeted at specific needs. These systems are

	embedded in business models and comprise sustainability aspects. The more radical an eco-innovation is, the greater the change in the underlying "product-service system", including production, delivery, consumption and disposal activities within a network. • Changes in a product-service deliverable imply changes in the underlying "product-service system" and, thus, in the value delivered to the customer, influencing the customer's perception of its relationship with the firm • Changes in the product-service process imply changes in the process of how and with whom the product/service is provided and, thus, in the value delivered
Governance	The more radical and systemic the eco-innovations are, the higher is the likelihood that stakeholders beyond the boundaries of the firm will be involved. The growing importance of knowledge-related cooperation has recently been stressed. Firm governance is required in order to overcome potential obstacles and to renew and maintain cooperative relationships with all stakeholders. Firm governance can also fulfill social expectations of firm behavior.

Table 1.1. Describing the dimensions of eco-innovation (Carrillo-Hermosilla et al., 2009, 2010)

To answer our research questions, our analysis concentrates on sustainable business model innovation to develop sustainable business models. Here, the BM is not a static entity, but a dynamic and evolving one (Lindner et al., 2010; van Putten and Schief, 2012). It links future planning (strategy) and the operative implementation (process management: Wirtz et al., 2016). This dynamic nature calls for a change and reinvention towards sustainability, in what we call sustainable business model innovation. According to the so-called "Porter Hypothesis" (Porter & Van der Linde, 1995a and Porter and van der Linde, 1995b in Carrillo-Hermosilla et al., 2009), BMs are eco-innovated after stringent environmental regulation forces polluting firms to seek innovations to reduce the cost of compliance and production. If a revisionist strategy is enacted in the organization, then those eco-innovations should improve the firm's competitiveness and lead to a positive relationship between environmental and economic performance (Carrillo-Hermosilla et al., 2009; Aragon-Correa & Rubio-López, 2007; Wright & Nyberg, 2013).

Next, in Section 1.3, we describe sustainable business model innovation strategies, the steps to follow to deliver new sustainable business models and we present the specific case of the

Cambridge Business Model Innovation Process (Geissdoerfer et al., 2016) as an update of the most profusely used and studied sustainable business model innovation alternative.

1.3 Business model eco-innovation strategies

If anyone aims to eco-innovate a BM, the advisable strategy is to follow systematic, on-going processes to create it (Schaltegger et al., 2012). But this can happen through several alternatives ranging from the creation of positive (or less negative) impacts for the business, the environment (internal and external) and the society (internal and external), to changes in the way a BM creates, delivers and/or captures value. And this means that a team willing to eco-innovate a BM, whether renovating it or creating one (or several) complementary new BM, can opt for eco-strategies, conventional market strategies, or both.

In the cases of existing BMs, or sustainable business models, willing to improve their current success or growth rates through sustainability, they can opt for either or both of two basic complementary sustainable innovation alternatives: (1) using existing approaches to sustainability to continuously adapt specific aspects of their BM design and delivery; and (2) creation of new sustainable business model – in the case of incumbents to add new sustainable business models to their existing BMs. Both may be key to holistically improve sustainable performance and create greater economic, environmental and social value, as suggested by Stubbs and Cocklin (2008), Porter and Kramer (2011), Yunus et al. (2010), FORA (2010), and Bocken et al. (2013); see Exhibit 1.1 for a decision map towards sustainable business model innovation.

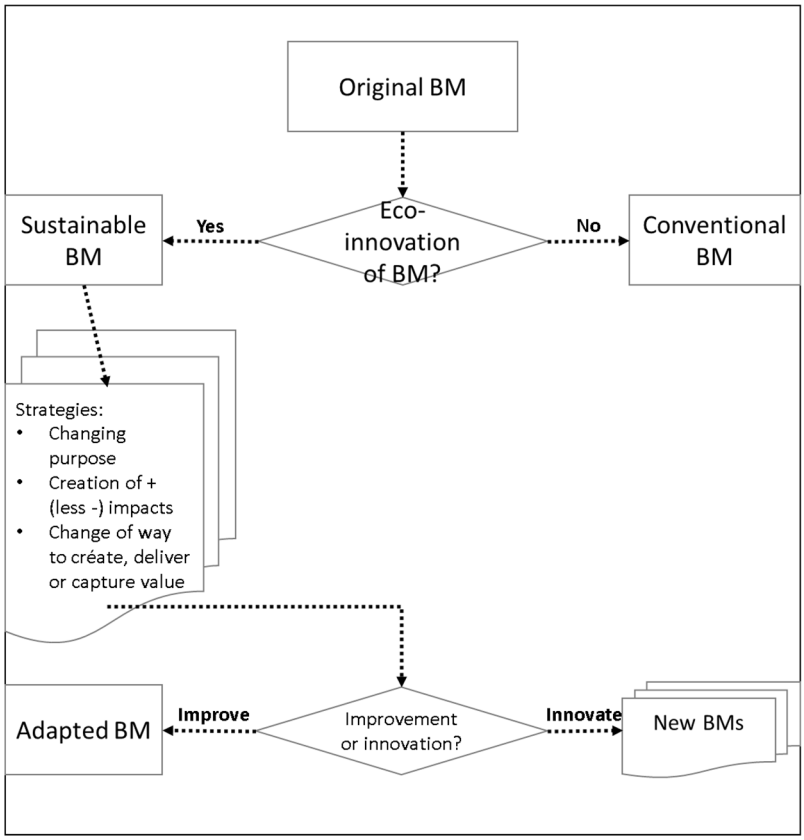

Exhibit 1.1. Decision map based on alternatives for eco-innovating a business model

As stated, sustainable business model innovation theoretical approaches (Breuer and Lüdeke-Freund, 2014, Joyce et al., 2015, Evans et al., 2017, Tukker and Tischner, 2006; and Upward and Jones, 2015) are not common (He, et al 2017) and again "focus only on individual phases of the innovation process or specific types [of value propositions] such as the Product Service Systems (PSS)" (Geissdoerfer et al., 2016). Evans et al. (2014) provided an initial attempt at describing a sustainable business model innovation process. Theirs is a solid approach worth reviewing here : They integrate sustainability into the value proposition, and from a sound and sustainable value proposal, they develop sustainable business models (Evans et al, 2017). Our chapter 3 will introduce another approach for the same aim: The lean startup.

1.3.1 The Cambridge Business Model Innovation Process

Based on the framework of Evans et al., Geissdoerfer and colleagues (2016) developed the Cambridge Business Model Innovation Process (CBMIP) which helps understand how sustainable business model innovation can be deployed by innovators. The model builds a conceptual bridge over the design-implementation gap (*ibid*), which prevents companies from actually creating new successful sustainable business models. This bridge creates sustainable business models departing from a potential problem/solution unfit (addressed by the value proposal), and

"consists of eight sequential but iterative phases or steps" grouped into three stages (Concept Design, Detail Design and Implementation: Exhibit 1.2).

In each of the steps or stages the CBMIP identifies corresponding activities and challenges, in an effort to visually map the planning and execution of new sustainable business models in different industries, companies, and operations.

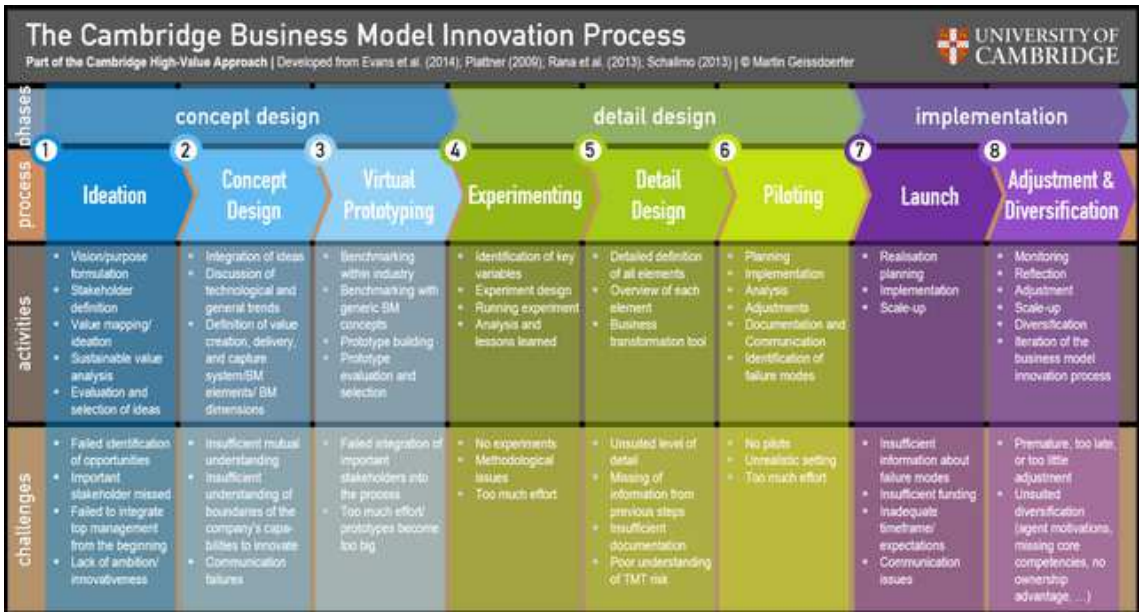

Exhibit 1.2. The Cambridge Business Model Innovation Process (Geissdoerfer et al., 2016)

The CBMIP is usually well understood by researchers and practitioners as it reflects the "conventional" way of developing new business models. Practically, its representation of the stage-gate process sequentially integrates eco-innovation tools like Evan's five-step process (Evans et al., 2014), value mapping (Short et al., 2012; Bocken et al. 2013, 2015), Sustainable Value Ideation (Geissdoerfer et al, 2016), or the business model canvas (Osterwalder & Pigneur, 2010).

Although the original model covers a broad spectrum of challenges, grouped by steps, it could be strengthened with the addition of two contributions from Carrillo-Hermosilla and colleagues (2010), and Bocken and colleagues (2014): The eco-innovation dimensions and the archetypes for new sustainable business models.

1.3.2 Conventional Product Development and eco-innovation dimensions

Carrillo-Hermosilla and colleagues (2009, 2010) identified different eco-innovation dimensions, which can help organize the challenges that eco-innovation poses on a new or revised BM. Consequently, these dimensions (see Table 1.1) would also drive the activities in each step of the CBMIP aligning them with the corresponding goals set for each dimension; Table 1.2

describes which CBMIP phase/s cover each eco-innovation dimension). Each dimension is then addressed by its corresponding CBMIP phase through this latter's specific challenges and activities. As an example, the Concept Design and Detail Design phases of the CBMIP, covering activities, tasks and challenges related to ideation, conceptualization, prototyping, experimentation, detail designing and piloting might well cover the component addition dimension requirements. Both models complement each other, and the dimensions act as the roadmap, with each dimension being the milestones to arrive to. In other words, an innovator or founder willing to launch a new sustainable business model can use the CBMIP to map its process, and the dimensions to set the milestones he/she needs to reach.

Eco-innovation aspects	Eco-innovation dimensions	CBMIP phases affected by eco-innovation dimension
Design		
	Component addition	Concept design Detail design
	Sub-system change	Detail design
	System change	Detail design Implementation
User		
	User development	Concept design
	User Acceptance	Detail design Implementation
Product/service		
	Change in product service deliverable	Concept design
	Change in product service process	Concept design
Governance		
	Government-level changes	Concept design Implementation
	Company-level changes	Implementation

Table 1.2. Proposed relationship of the dimensions of eco-innovation and the phases of CBMIP (developed from Carrillo-Hermosilla, et al., 2010 and Geissdoerfer, et al., 2016)

In Chapter 2, we use the eco-dimension framework similarly to assess the reach of the Lean Startup model as a sustainable business model innovation practice, and Chapters 3 and 4 show

a comparison and these two practices and others in terms of usage by eco-preneurs and entrepreneurs in general.

1.3.3 Conventional Product Development and sustainable archetypes

Bocken and colleagues (2014) proposed archetypes of new sustainable business models that surely help to assist the process of embedding sustainability into the CBMIP. Their eight archetypes, seen in Table 1.3, could be used as aids when planning specific sustainable strategies (the result of the business strategy is a business model, according to Casadesus-Masanell and Ricart, 2010) to reformulate incumbent firms' corporate strategy, or complement the creation of new market entrants' overall strategy.

Business model archetype	Type of business model innovation	CBMIP phase affected by type of BMI
Maximize material and energy efficiency	Technological	Concept design
Create value from waste	Technological	Concept design
Substitute with renewables and natural processes	Technological	Concept design
Deliver functionality rather than ownership	Social	Concept design
Adopt a stewardship role	Social	Implementation
Encourage sufficiency	Social	Implementation
Repurpose for society/environment	Organizational	Implementation
Develop scale up solutions	Organizational	Implementation

Table 1.3. Proposed relationship of the sustainable business model archetypes and the relevant phases of CBMIP. The Table shows which phase is primary for each BM type (developed from Bocken, et al., 2014 and Geissdoerfer, et al., 2016)

Briefly, the next chapters use this archetype framework and the eco-dimensions to frame the object of analysis of this dissertation, the Lean Startup method, as a valid alternative sustainable business model innovation practice. The content of the next chapters is described in the next Section 1.4.

1.4 Quick overview of next chapters

With this Chapter, we have approached sustainable business model innovation from a conventional perspective presenting the overall context for sustainable business model

innovation and how this is understood and executed widely across corporations, startups and other organizations.

We have described that it is through the use of BMs in general and sustainable business models in particular that we, humans, have found powerful ways to rival in influence with other natural forces (Bressan, 2011). And this influence seems to be at the root of the damage and destructiveness we are seeing in our planet[4]. In this sense, we believe that the businesses core engines, their BMs (Osterwalder, 2004), form subsystems of the "Anthropocene Society" (Hoffman & Jennings, 2015) and that innovators and founders have hacked, and continue to do so, the environmental system to their benefit, and are contributing to the environmental degradation of our era. Part of the problem might be found in the extended and widely used stage-gate process to develop products and BMs. Far from being the problem, we believe these powerful BMs might be the strongest solution to mend the wrongs we are living today if we are able to focus them on "creating sustainability" (Ehrenfeld, 2009 in Hoffman & Jennings, 2018). In the next chapters, we present an alternative, sustainability-designed practice, called Lean Startup, which might help with that task.

The second chapter presents a conceptual and qualitative answer to our research questions. In this under-review paper, we study a set of three cases of startups that used Lean Startup for sustainable business model innovation with different marks in terms of dependence, speed, urgency, experiments, validated learning and the rest of the characteristic elements of Lean Startup. They also show differences across the eco-innovation dimensions, but they mark high in nearly all aspects of the Design, User, Product and Governance dimensions. We believe this is might be a result of the special attention of Lean Startup to valueholders, a subset of the social, environmental and economic stakeholders influencing new businesses.

The third chapter is dedicated to exploring the comparison of stage-gate process and Lean Startup in a subset of the innovators' population, namely the entrepreneurs and eco-

[4] The three stated study approaches to these damages refer to our Era as the Anthropocene (Zalasiewicz et al., 2016), and are: the 'Great Acceleration' (Crutzen, 2002, Zalasiewicz et al., 2016); the 'Planetary Boundaries' (Gillings & Hagan-Lawson, 2014: 2); and the "Ecosystems Breakdowns" (Wright & Nyberg, 2015)

entrepreneurs.[5] In this chapter[6], we acknowledge that the sustainable business model innovation debate is mostly focusing on the use of certain practices and tools to implement sustainable objectives in new firms. Our chapter contributes to this debate examining the factors influencing the entrepreneur's election of the practices to develop sustainable business model innovation. We conducted an empirical analysis on a population of Spanish entrepreneurs (N=234) and applied a sound behavioral framework and the PLS-SEM algorithms to factor out those elements.

The fourth chapter[7] examines how the constructs influencing the entrepreneurs' election of the practice to design and test new sustainable business models connect with their use of such eco-innovation practices. We present a comprehensive model aiming at explaining the use of experimentation practices by entrepreneurs, based on an empirical analysis of our sample of Spanish entrepreneurs (N=234). Using the PLS-SEM algorithms and a sound behavioral model, we modeled eleven constructs (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit, Costs, Speed, Funding, Security and Behavioral Intention).

Our final chapter concludes presenting a summary of how Lean Startup can serve as a process to create sustainable business models. Beyond the fact that it may be one of the first efforts to present Lean Startup as a sustainable business model innovation methodology, our contribution shows it effectively integrates sustainable goals and eco-innovation. This integration happens since the inception of a new business model. This is of importance since conventional innovation practices address sustainability late: in the business model mid to late development stages and always from a product perspective, which may cause their high rates of failures.

1.5 Methodologies in this dissertation

In the second chapter, we have used conceptual and qualitative methods to approach our first research goal and describe Lean Lean Startup as a process to create sustainable business models.

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[5]Many authors have extensively used the term "sustainable entrepreneurs" in the literature: Hall et al. (2010); Hockerts and Wüstenhagen (2010); Larson (2000); Parrish and Tilley (2010); Pastakia (1998); Schaltegger and Wagner (2011); Schaltegger (2002); Tilley and Parrish (2009) (in Klewitz & Hansen, 2014). These entrepreneurs combine ecological and social issues with economic profit in their business models; "social and/or environmental goals can have the same, sometimes even higher priority than economic goals" (Klewitz & Hansen, 2014)

[6] The Journal of Corporate Social Responsibility and Environmental Management (IF: 4.918) has published this chapter

[7] Currently under-review in the Special Issue on Business Experimentation for Sustainability of the Journal of Cleaner Production (IF: 6.352)

We believe it is one of the first efforts to present Lean Startup as a novel sustainable business model innovation methodology, as it effectively integrates sustainable goals and eco-innovation since the inception of any new business model (BM).

The third and fourth chapters are devoted to quantitatively fulfill a second complementary research goal: We state the entrepreneurs' usage differences of Lean Startup and conventional New Product Development (NPD)[8] (York & Danes, 2014) when developing sustainable business models. This analysis helps us compare Lean Startup and NPD along several constructs, for example:

1. their market success (measured by their ability to sell repeatedly, and to scale) (Blank, 2013; Frederiksen & Brem, 2017), as an economic measurement
2. their ability to meet the complementing two key elements of sustainable business model innovation: the creation of societal (internal, including employees, and external) and environmental value, rightly balanced with economic success (Boons & Lüdeke-Freund, 2013; Elkington, 2013; Yang et al., 2017)
3. the collaboration with the full range of valueholders, as an extension of the stakeholder concept (Donaldson & Preston, 1995; Hart & Sharma, 2004; Mattingly et al., 2004)

These chapters 3 and 4 present our exploratory analyses using the PLS-SEM algorithm and bootstrapping. We decided to use PLS due to its power "to simultaneously examine relationships among measured variables and latent variables" (Hair, Jr. et al., 2014) and "its robustness in the face of data noise and missing data" (Garson, 2016).

But let's start first describing Lean Startup as a sustainable business model innovation practice, with its rationale, elements and relationships, in the next chapter.

[8] There are multiple references and terms referring to the conventional approach to product, and business model, development, but the most widely cited are "product development process" (Blank, 2009), "new product development" and "stage-gate model" (R. G. Cooper, 2000, 2014)

2 Chapter 2. Speeding Up Eco-Innovation of Business Models Through Social and Environmental Valueholders: A Lean Startup Approach

2.1 Introduction

Academics address eco-innovations—innovations that reduce the environmental impact caused by consumption and production activities, improving sustainability performance (Carrillo-Hermosilla et al., 2010; OECD, 2012)—extensively in the literature: from stakeholder engagement (Bocken et al., 2013; He et al., 2017), long-term sustainability (based on the triple bottom line: Marcus et al., 2010; Elkington, 2013) to value creation, competition, business models (Adams et al., 2012; Boons & Lüdeke-Freund, 2013; Ghisetti & Rennings, 2014) and regulations of public and private governance (mostly affecting the corporate supply-side, He et al., 2017). But most of the reviews on eco-innovation have not decidedly pointed out the relationship between eco-innovation and new business model development as significative. The extant eco-literature do not give much importance to owners and stockholders demands for speed (time) and urgency (priority) in achieving economic returns for the actions and efforts of their companies. That means the most relevant eco-innovation papers and authors connect their constructs with the development of goods, services, processes and even organizations to improve corporate competitiveness, but disconnect eco-innovation from the ways a relevant portion of stakeholders demand organizations to create, deliver and capture new value, and thus preventing leaving value uncaptured (Yang et al., 2017). Moreover, the authors connecting sustainable innovation and business models (Evans et al., 2017; Bocken et al., 2014; Geissdoerfer et al., 2016, to name some examples of the most prolific) concentrate on theorizing and properly integrating those eco-innovated products, services, and processes with working business models to achieve a healthy triple bottom line (Elkington, 2013). But to the best of our knowledge, to date, there is nearly a vacuum in the literature if we would consider eco-innovation of business models as driven by valueholders' (or salient stakeholders: Peralta et al., 2018) economic needs, speed and urgency and not solely by the solutions to those environmental or social needs and pains.

This paper is a first approach at answering the following research question: How Lean Startup may help innovators create sustainable business models with speed and urgency, taking into

consideration an existential, relational principle of dependence (Marcus et al., 2010: 423). To answer this question, we built three case studies analyzing three firms and how Lean Startup is being used to effectively integrate sustainable goals and eco-innovation since the inception of these new business models. This is of importance since conventional business model innovation practices address sustainability late in their processes and always from a product perspective, which results in high failure rates (Geissdoerfer et al., 2016).

After this introduction, the next section provides the background and literature review. Section 3 presents the methodology we followed to build the case studies, presented in Section 4, on how different companies support their eco-innovation efforts by using Lean Startup sustainable principles. Section 5 presents a discussion shedding light on the grounds of Lean Startup as a business model eco-innovation method. We introduce each case to point out how this methodology can help new business models achieve economic growth with speed and prioritizing environmental and social outcomes. Lastly, in Section 6, we draw our conclusions and suggestions for future research.

2.2 Background and literature review

2.2.1 Eco-innovation of business models' literature

For matters of this chapter, we adhere to the definition of eco-innovation from Carrillo-Hermosilla et al. (2010) which stresses the idea of this type of innovations as "reducing the environmental impact caused by consumption and production activities." And building on that definition, we also adhere to the idea that eco-innovations "improve sustainability performance", expanding the traditional economic performance criteria to improve environmental and social metrics (OECD, 2012; Boons et al., 2013). In short, the different dimensions in the framework of Carrillo-Hermosilla et al. (2010) can be synthesized as follows (see Table 1.2): The design dimension covers aspects of technological change from an environmental perspective, the user dimension covers the specific demands for sustainability among (potential) users of the eco-innovation, the product-service dimension covers the firm's value proposition in the market targeting these user demands and facilitated by techno-environmental change, and the governance dimension describes involved stakeholders and their behavior within the value network. Eco-innovations involve a combination of characteristics belonging to these dimensions, which play a significant role in understanding their multi-faceted nature and diversity.

These and the rest of the definitions of eco-innovation[9] acknowledge that its challenges are complex, and that renovations of business models, or the creation of new ones should consider the dynamic relationships between business, society and nature. According to Marcus et al. (2010), this dynamism is best analyzed from an "embedded view" of the business, society, and nature metasystems, in what they call the B-S-N interface. This interface is a "[holarchical, or holistically hierarchical] analysis of how business, society and nature interrelate". Theirs is an aggregate view referring to the economic system (business), the global society (society) and the Earth's natural systems (nature), that allows them to posit the embedded view that nests businesses, within society, within nature, in a relational principle of dependence.[10]

The conceptual implications for sustainable business model innovation are proposed in Table 2.1, based upon the four-dimensional framework (design, user, product, governance) proposed by Carrillo-Hermosilla et al. (2010) and the B-S-N interface proposed by Marcus et al. (2010).

Eco-innovation attributes/dimensions	Intertwined (systemic) view[11]	Embedded (holistically hierarchical) view[12]
Design		
Component addition	Enhancing non-economic forms of value. Seems there could be an endless pursuit of alternatives, with multiple forms of value	Components are nested within larger systems. They are finite as the relationships between them. Relationships are dynamic
Sub-system change	Usually considered from a Business and Society (B&S) or	Business, society and nature are nested being nature the

[9] For recent reviews of the literature on eco-innovation see: Barbieri et al. (2016), they review the literature on environmental innovation (EI); Mazzanti et al. (2016), they provide a review of recent firm-level and plant-level surveys containing questions on environmental policies, innovation practices or performance; Del Río et al. (2016), they provide a critical review of the literature on the econometric analyses of firm-level determinants to eco-innovation

[10] This view contrasts with the disparate and the intertwined management perspectives of the B-S-N connection. The disparate view, based on conventional management theory and neoclassical economics, see nature and society separated and surrounding business. It usually disconnects the three systems

[11] The intertwined view integrates business, society and nature. Elkington (2013) and most of the specialists after him consider the three systems central and form the basis of sustainability models like the TBL

[12] The embedded principle orders the effects of the three metasystems, making businesses the most dependent (of the other two) for their survival. In short, and from an ordered systemic perspective (the embedded view), businesses are 'embedded' into society, first, and nature, second, and any of their activities and sustainability (long-term survival, Porrit 2006) will existentially depend on the latter. This is, apparently, a two-way avenue (Milbrath, 1989), although from a business model eco-innovation perspective we concentrate on the effects of society and nature into new business modelling

	Organization and the Natural Environment (ONE) interconnections, or "single process under analysis"	largest. Changes in businesses occur due to the other two, but the potential to adapt is not unlimited, and the nature of adaptations is also limited
System change	Interpenetrating systems aiming at weighting business, social and planet equally (as in the triple bottom line of Elkington, 2013). Creating value of any type is equally desirable (any value is equally desirable)	If the systems are nested (one is completely included in the next one), anything that undermines the larger systems weakens the foundation of the smaller, nested systems
User		
User development	Limited number of variables usually related to the value proposal. Relationship between variables is linear and static	Development is considered as widening people's choices, considering limitations and different sets of variables each time
User Acceptance	Stakeholder theory. Users/customers are treated collectively and very rarely individuals grouped are greater than their sum	Value hierarchy, with nature at its top then society then business. There is value in the three, but some elements are more valuable than others
Product		
Change in product service deliverable	To contribute and cooperate with society and nature	Need to address the value needed to comply with existential dependency
Change in product service process	To systematically integrate nature and society into business consciousness and activities. Development of resources and capabilities	Processes link activities, technologies and institutions and nature and societal well-being do not rely on one single-narrow process (e.g.

	that are environmentally and socially valuable for the firm and the market	dealing with just one institution). Innovation-growth relationship is not clear
Governance		
Government-level changes	Sustainability precedes simple economic outcomes. Corporations are the only human creations that can lead Anthropogenic Society to a sustainable world (Hart, 2005). Policies set regulatory and normative environments, and businesses influence opinion and shape public policies. Re-enlightment of the Anthropogenic Society (Andrew John Hoffman, Jennings, & Lefsrud, 2015)	Businesses cannot define full societal welfare (public goods) and can undermine societal sustainability. Society should supersede business development. Steady-state economics
Company-level changes	Successful integration of B&S or ONE to derive economic growth. Probably is B&S, through corporate social responsibility (CSR) and performance (CSP), the strategy that receives most of the attention. No particular ordering of value-creation activities or systems: Doing well (financially) by doing good (socially and environmentally)	One business is incapable of addressing the full range of human needs. Business limits are set by the society and environment they are nested in. Dynamism of the B-S-M interface is permanent in all directions (although from the effects of the larger into the smaller are prevalent)

Table 2.1. Implications of an intertwined view and an embedded view of business model eco-innovation along each of its dimensions (derived from Carrillo-Hermosilla et al., 2010; Marcus et al., 2010)

Eco-innovation and its relationship with business models have been subject of some studies (Adams et al., 2012; Boons & Lüdeke-Freund, 2013; Ghisetti & Rennings, 2014; OECD Directorate for Science & Technology And Industry, 2012; Schaltegger et al., 2012). And the result seems to be a preference for radical, systemic eco-innovations of business models as the means to promote and favor the transformation towards a greener economy. It is mostly fast or accelerated, and repeatable [greener] successes what eco-innovators and their promoters are aiming for. Since the OECD report (2012) describing the aspects of non-technological eco-innovation, particularly the eco-innovation of business models, a number of business model eco-innovation practices and elements have been described. We could summarize all of them in two basic, probably consecutive phases: (1) creation and (2) growth of the new sustainable business models.

As for the creation of new sustainable business models, several constructs are mentioned (our list is by no means complete, but may serve as a basis for reflection on the practical relevance of the components of business model eco-innovation strategies):

- Whether building business cases 'for' (voluntary), or 'of' (as a reaction to regulations) sustainability, companies and new business founders have for quite a while integrated the effects on the society and/or the natural environment in their regular innovation activities aiming at improved economic outcomes (Schaltegger et al., 2012). The effectiveness of that integration in terms of success, wealth or by any other metric is still best acknowledged on an individual, project-by-project basis
- Linear/non-linear creation processes. Business modelling, and its eco-innovation cousin is no different, is best depicted as a linear (causal), forecasted set of tasks which could be even be grouped in cycles (Geissdoerfer et al., 2017). But eco-innovating a business model (or several at the same time) seems to be most of the times far from linear and probably more continuously adjusted (effectual) until a tested solution is achieved (Frederiksen & Brem, 2017, figure 3, p 182)
- When thinking on eco-innovation as a way of creating/renovating business models, it is commonly accepted to think on 'a' (as in one) business model at a time. Probably that is seldom the case. Creating a sustainable business model requires the creation of several creation-delivery-capture value cycles. Probably one for each valueholder (as we

will explain later). Success will derive from the right fitting of each of those cycles by means of several business models (some of which could even be contradictory) with different layers, as in the triple-layered business model canvas (Joyce & Paquin, 2016), and shaped after any of the proposed sustainable archetypes (Bocken et al., 2014)

- The blocks, components or elements of the business models and how they are visually and conceptually organized are probably responsible for the extrem focus of the extant literature in the value proposal (Bocken et al., 2014; Boons & Lüdeke-Freund, 2013; Joyce & Paquin, 2016; Osterwalder & Pigneur, 2010). This dependence has biased the conceptualization of the business model concept to the point of it being a consequence of a decision on the customer and technical requirements expressed in the value proposal, which is even a wider concept (Blank & Dorf, 2012). But eco-innovation of a business model, particularly if it is to successfully and dynamically shape the business model (its layers and supporting sub-models), fast and urgently, probably needs to be studied and developed from a higher level, the business model itself (Bocken et al., 2014) . To say it differently, the 'value proposal' under discussion is the business model. This is the 'solution' to be developed, not only to the customers, but to all stakeholders and, primarily, to the valueholders

As for growth, once again, some constructs have been presented, much fewer than for the creation phase. Examples could be:

- Systemic (transformative) innovation refers to the transformations and changes that extend beyond the boundaries of a project or a firm that could help achieve longer term goals (OECD, 2012). Originally, the concept formed from the voices that spoke for the inclusion of social and cultural influences, producer-seller-consumer needs when designing new sustainable business models. And it is being accomplished by the consideration of key stakeholders (valueholders) as drivers of growth/failure of a new business model. Successful business models almost never grow autonomously these days (Bocken et al., 2014)
- Growth is seldom achieved by isolated business models. These are usually "temporary organizations", as Ries (2011) calls them, which means their growth is more times than not limited in both extension and time. Commonly, the original working business models are seeds for a next generation of business models, which can kill, support or change the originals. It is those combinations which aim for the long term and for sustainable growth

- Barriers to sustainable growth are also mentioned (Blank, 2015b; Boons & Lüdeke-Freund, 2013; Del Río et al., 2016). Both inside technical debt, organizational debt (listed as resources, capabilities and competences), institutionalized organizational memory, and external business environment, valueholder obstructions, hinder much of the success of any new sustainable business model ability to grow. Little is seen in the current literature about these effects
- Sustainable growth is achieved by means of integrating sustainable strategies, degrees of business model innovation and business case drivers (Schaltegger et al., 2012). Bocken et al. (2014) proved an alternative perspective on sustainable growth based on the value proposal, value creation and delivery and value capture (Richardson, 2008) to conceptualize different growth machines, or archetypes

Several authors describe the two referred phases and flood them with activities that traditionally focus on the enhancement of existing value propositions with new ideas (Carrillo-Hermosilla et al., 2010; Geissdoerfer & Jan Hultink, 2016). Moreover, it is our impression that listing, ordering and coherently mapping those activities into flows and end-to-end processes aiming at creation and growth of business models are not popular topics (He et al., 2017).

2.2.2 Lean Startup literature

Business model innovation perspective

Since its inception as a methodology to develop new business models (Ries, 2008), Lean Startup addressed two key ideas: (1) A new business model should not resemble or model the characteristics of incumbent businesses (Blank & Dorf, 2012); and (2) a new business model initial steps are plagued with uncertainties (Ries, 2008) which in most cases result in knowing nothing about the elements forming the business model, nor how those elements interrelate with each other. Both ideas are at the root of the Lean Startup theoretical model (Blank & Dorf, 2012; Eisenmann et al., 2011; Maurya, 2012; Ries, 2011), like its consideration of the fallacy that deeply affects innovators and entrepreneurs behaviors alike: they seem to believe true their initial hypotheses they build modeling established companies, and disregard the uncertainties and disconnections these seldom tested hypotheses are built with (Blank & Dorf, 2012).

With that in mind, Ries designed a new methodology called 'The Lean Startup Method' in 2011 (Dybå and Dingsøyr, 2008; Brown, 2008; Eisenmann, Ries and Dillard, 2011). Since then, and given its worldwide practice (X. Yang, Sun, & Zhao, 2018) as a method to develop new business models, some attempts have been made to establish the scholarly foundation of the methodology (Blank, 2013; Täuscher and Abdelkafi, 2016; Frederiksen and Brem, 2017;

Mansoori, 2017). But there are still some gaps that mostly relate to the complexity of the process of building a new business model if it is to become economically, socially and environmentally sustainable.

Concepts of Lean Startup favoring sustainability

Eisenmann and colleagues (2011), Ries (2011), Blank and Dorf (2012) and Maurya (2012) concentrated on describing how Lean Startup business model creation approach favors experimentation over planning, customer feedback and stakeholder data over intuition, and iterative design over traditional business planning (Rasmussen & Tanev, 2016). There are certainly differences with the conventional, product-centric business model creation practices (Eisenmann et al., 2011):

- Lean Startup approaches the creation of business models since the inception of the business idea, and not when the idea is rounded up and ready to be launched (marketed or commercialized).
- To realize the creation of a business model at such an early state of the development of the business idea, Lean Startup must adopt speed, urgency, flexibility (through a tactic called 'pivot'), and experimentation (through another two tactics called 'Minimum Viable Product', or MVP, and 'validated learning'). And those usually result in the development of several business models at the same time serving the same business vision, not just one (as in 'one-size fits all' business model).
- There has always been a concern among practitioners and scholars about how to form the founder's vision (purpose). Practical wisdom refers to a 'reality distortion field' as the grounds for the innovators' efforts, and the reason of their final success/failure (Steve Blank & Dorf, 2012). Lean Startup is about testing and reformulating that vision continually, based on market feedback (Eisenmann et al., 2011) and a relational strategy (see Relational Political Strategy, Luo and Zhao, 2013).

Conveniently, Lean Startup principles can be presented using the same framework we used in Table 2.1 to describe the two alternative views of the literature on the B-S-N interface. It also serves to identify how Lean Startup addresses this interface (see Table 2.2).

Eco-innovation attributes/dimensions	Intertwined (systemic) view, if applicable to Lean Startup	Embedded (holistically hierarchical) view, if applicable to Lean Startup
Design		

Component addition	We have not found evidences of this element in Lean Startup	Lean Startup treats the components of the business model holistically and hierarchically. It also acknowledges that there is limited time and resources and looks for the most efficient alternative using speed and urgency
Sub-system change	We have not found evidences of this element in Lean Startup	Lean Startup searches for changes outside the business /startup to understand their implications and opportunities for business success. This search has limits (skills, time, other resources) and calls for non-linear, multi-layer
System change	We have not found evidences of this element in Lean Startup	Offsetting the differentiation of types of innovations (incremental, continuous, radical), Lean Startup integrates the nested systems by firstly identifying how that integration happens, and then creating business models that can use that integration
User		
User development	We have not found evidences of this element in Lean Startup	Lean Startup departs from a limited number of variables (included in the vision of the new business model and presented in a business

		model canvas). But Customer Development quickly changes that vision by calling for feedback from every angle that provides information relevant for creating business models that solve user. Lean Startup recognizes that a valid set of variables at one time of development may not be valid later
User Acceptance	We have not found evidences of this element in Lean Startup	Lean Startup adheres to a hierarchical list of stakeholders. This list is not always complete (no need to) and the weight each stakeholder has on every step of the business model development varies. We developed the 'valueholder' based on this, later in this document
Product		
Change in product service deliverable	We have not found evidences of this element in Lean Startup	Lean Startup is very selective of the changes at this level. Only those needed to fulfil the requirements of the specific valueholders will be considered, in order to make the business model survive and grow

Change in product service process	We have not found evidences of this element in Lean Startup	Lean Startup processes are probably forming a network of activities (grouped under Customer Development and Agile Development), technologies (using the MVPs) and institutions (the new business models) that foster a multiplicity of new institutions or business models. The aim is to clarify a certain type of relationship between innovation and growth that is successful, as defined by founding team
Governance		
Government-level changes	Lean Startup probably supports a type of sustainability that considers the influences of society and nature, but its aim is to expand the limits imposed by the latter. First, it helps understand where those limits are, then tries to redefine them by discovering new associations of the B-S-N interface	We have not found evidences of this element in Lean Startup
Company-level changes	Lean Startup searches for communities, and individuals that can help understand what the relationships between the (1) problem and its solution might be; and (2)	We have not found evidences of this element in Lean Startup

	how that relationship can grow into a full business model. This search makes the process aim at B&S or ONE, probably delivering several business models at the same time, but each business model originally serves one or the other. Relevance in Lean Startup is given to economic progress (or pseudo-economic progress, as in measurable returns in the cases of NGOs or science spin-offs)	

Table 2.2. Description of Lean Startup eco-innovation methodology from an intertwined view and an embedded view, using the model of Table 2.1 (derived from Carrillo-Hermosilla et al., 2010; Marcus et al., 2010; Eisenmann et al., 2011; Ries, 2011; Blank & Dorf, 2012; Frederiksen & Brem, 2017)

Lean Startup addresses growth based on a very simple conceptual premise, very hard to see in practice. Growth, the measure Lean Startup uses for success, is based on how sustainable the new business model is. In other words, the business model will grow if it can create, deliver and capture value from its valueholders. As the business model is able to repeat and speed-up that cycle, growth would follow as a consequence—for different reasons, this growth is temporary and usually demands other complementary, supporting business models.

Valueholders

The 'valueholder' concept is our name for a reality we have witnessed in our research. It is based on the 'stakeholder' concept since Freeman (1984, updated by Freeman et al., 2004) by the Stakeholder Theory of the Corporation (Donaldson & Preston, 1995) and the Stakeholder View (SHV) of the firm (Mattingly et al., 2004). This latter recognizes that stakeholder relationships with the firm pose a "potentially sustainable source of competitive advantage" particularly relevant at creation of business models when there are few to none of those relationships. We then argue that a new business model pursuing sustainability needs to concentrate on establishing those stakeholder relationships, "raising the level of analysis [] to a broader

framework" that can help explain a new business model actions and results (Mattingly et al., 2004). Moreover, although the value of the firm was proposed to be measured by its ability to "create sustainable wealth for all the firm's stakeholders," (*ibid*) we have witnessed that there are some 'significant sociopolitical stakeholders' that matter more than the rest. And "firms will be more successful [] when they accurately identify and satisfy the requirements of key stakeholders" (ibid). Is SHV advocating for maximizing benefits for all stakeholders? The answer is probably yes, but we argue they should not be treated equally (nor they demand being treated equally), and definitely not at the same time (Mitchell et al., 1997). Hart and Sharma (2004) already pointed to a differentiation of stakeholders in powerful or 'salient', and smart mobs or 'fringe'. Even a new alternative for growth was proposed based on new business models that rightfully addressed the at-times chaotic and unpredictable social and environmental needs of 'fringe' stakeholders. Whether salient or fringe, not all stakeholders are equal, impact equally in the progression of a new business model, demand the same type of benefits or develop the same type of opposition, nor more importantly keep their influence along time. This dynamism and key influence of the stakeholders at each particular moment in the development of a business model is one of the defining characteristics of the valueholders. Conceptually, we find that the Theory of Stakeholder Identification and Salience (Mitchell et al., 1997), from the perspective of the firm, helps us describe them as they share the characteristics the Theory declares for stakeholders (Table 2.3 compares the concepts).

Construct	Stakeholder	Valueholder
Definition	Any group or individual who can affect or is affected by the achievement of the organization's objectives (Freeman, 1984; Mitchell et al., 1997)	Any group, individual or situation that can affect or is affected by the development of the new business model, or any of its forming blocks
Power: "a relationship among social actors in which one social actor, A, can get another social actor, B, to do something that B would not have otherwise done"	Dynamic, perceived and dependent (on consciousness and will) Can produce coalitions and sub-coalitions Change foci of attention Disparate demands Control critical resources	Same basic characteristics plus: Temporal effect in most cases determining the phase the new business model is in So much power they can sink or up-bring to the stars a full-grown business model from

		one day to the next (much more, a forming business model) They affect value creation, value delivery, value capture, or any combination of the three They are usually the reason for decisive uncaptured value: (1) for not rightly considering them; or (2) too much focus on them leaves value on the table and produces organizational and technical debt
Legitimacy: "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, definitions"	Dynamic, perceived and dependent (on consciousness and will) May or may not correctly perceive the legitimacy of their claims The organization is an environmentally dependent coalition of divergent interests (legitimacies)	Same basic characteristics plus: Time and situation dependent Some valueholders can be legitimate to make claims more than once along the Customer Development process. Others just once
Urgency: "the degree to which stakeholder claims call for immediate attention"	Dynamic, perceived and dependent (on consciousness and will) Time sensitivity that can make delays in attending their claims unacceptable Criticality, or the importance of the claim for the stakeholder	Same basic characteristics plus: Immediateness, which makes true valueholder claims top priority Many do not express or even know about their time sensitivity, until it is too late

Salience: "the degree to which managers/founders give priority to competing stakeholder claims"	Relations with stakeholders and among themselves are multilateral and often coalitional, not bilateral and independent Allocation of resources is consistent with the most salient claims of stakeholder groups Managers' perception decide which stakeholders are salient Limited ability to attend all claims Constant changes in how they scan the environment and values which varies salience Some claims are contradictory, and managers handle those with several strategies leveraging the organization own power, legitimacy and urgency Erring is usually compensated by the stability of the organization. In extreme cases, the manager is replaced	Same basic characteristics plus: Time and situation dependent Founders' perception (not managers) is in place. That usually means it is an untrained perception (even in the case of experienced entrepreneurs) facing uncertainty In some cases (weak founders), managers' or investors' perception replaces that of founders, and force business-as-usual attention Usually claims come one at a time, one after the other. It is critical to develop agility, and never stop Erring means the end of the business model (only few times it means a reset)

Table 2.3. Comparison between stakeholders and valueholders, including how managers/founders perceive them (developed from Mitchell et al., 1997)

Being a subgroup of stakeholders (Mitchell et al., 1997), the new business model "creates, delivers, captures, and exchanges sustainable value and collaborates" (Geissdoerfer & Hultink, 2016) with the valueholders to achieve growth. It is when considering the impact (importance)

of each group of stakeholders, at each of these stages of the development of the new business model that the general stakeholder concept may become less important and only those stakeholders (the valueholders, see Exhibit 1) relevant to succeed at each stage should be considered. At each stage then, the corresponding valueholders probably force the evolution of the business model and following a referencing process (similar to a snowballing process, see Exhibit 2.1), the once valueholders will give room to the next set of valueholders initiating a new stage, usually with unique needs to address, different channels to be accessed, or different price tags, to name a few[13].

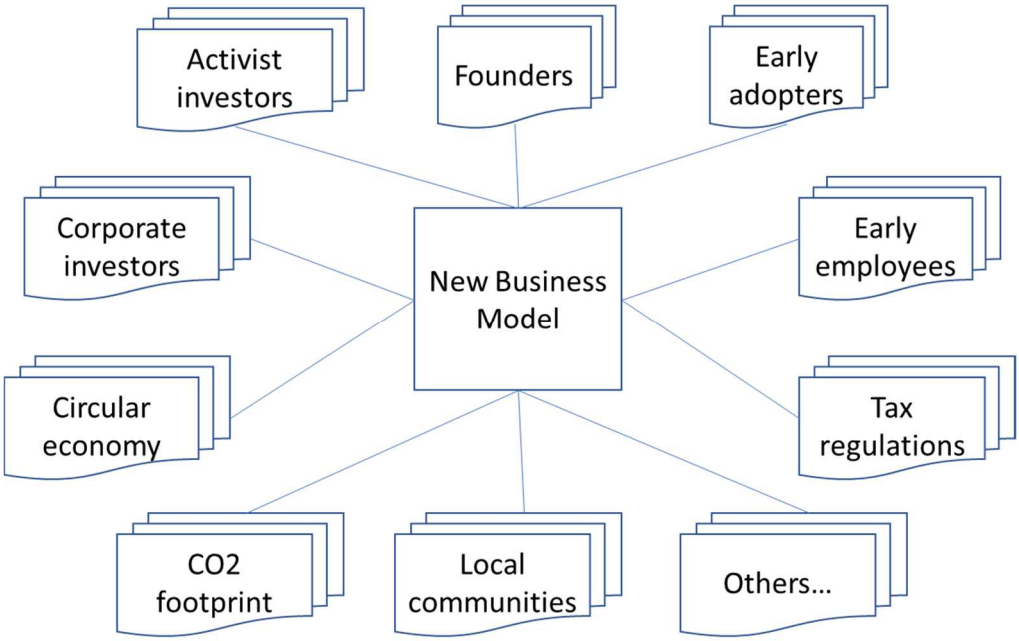


Exhibit 2.1. Representation of some of the valueholders (salient and fringe) a new venture faces during the Customer Discovery phases of the Lean Startup process (derived from Hart and Sharma, 2004; Blank and Dorf, 2012).Nothing really new if considered statically

[13] Exhibit 2.2 shows the same example of potential valueholders, but from a dynamic perspective, affecting the new business model as it progresses/recedes due to the influence of a particular group of valueholders (in many occasions the influence comes from just one individual, not a group). The repeated impact of the 'Founders' on the first and fourth moments of our exhibit is remarkable. This is to show that some valueholders appear, disappear and even mutate along the growth cycle of a new business model. They, quite possibly, are the true cause of the growth/recession of any business model

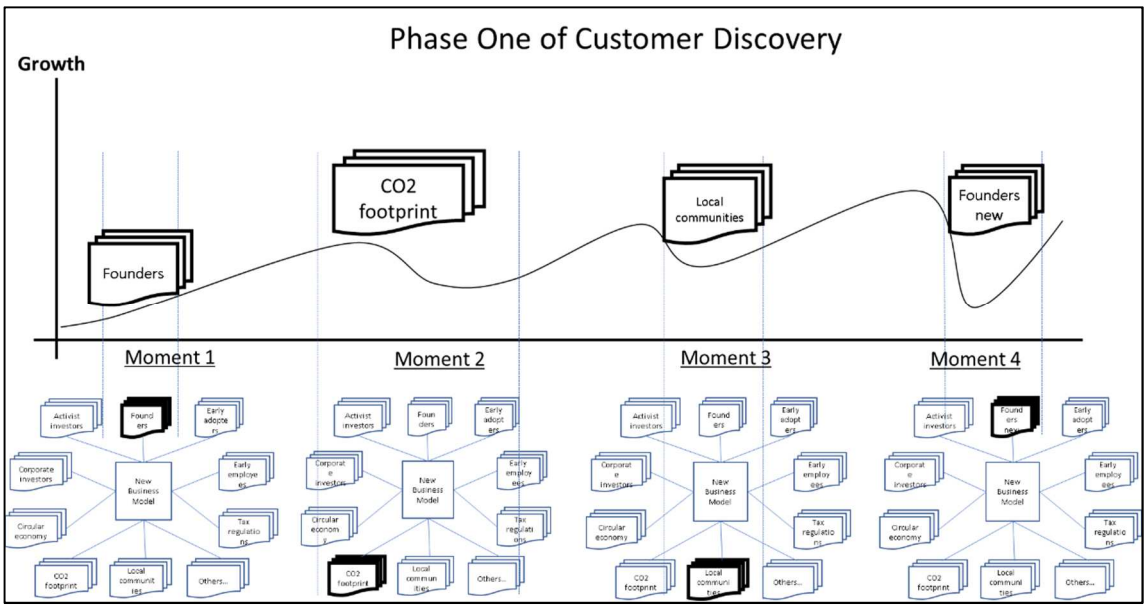


Exhibit 2.2. Dynamic effects of several valueholders in the growth cycle of a new business model along four instances of Phase 1 of Customer Discovery (Blank & Dorf, 2012). Each moment ends after the business model overcomes the support/impact of a particular valueholder (enlarged and bold in the exhibit). As one valueholder effect is present, usually the rest of the valueholders remain shadowed (do not vanish), and that is why they are represented in grey). This evolution depicted in this exhibit is a simplistic realization of the actual effects

2.3 Methodology

To answer our research question, we firstly searched WOS and ABI/Inform Proquest databases for peer-reviewed papers in English containing the words “Lean Startup” in their titles or abstracts, from 2012 to date. After an initial selection of 46 papers matching those criteria, we conducted a series of semi-structured interviews at the end of 2017 and beginning of 2018 with the heads and employees of 20 corporate innovation programs to detect how Lean Startup was being used to develop new business models in incumbent firms. Using the insights from the corporate interviews and the practitioner experiences of the coauthors of this document, we reviewed the 46 papers and selected those which were devoted to properly explaining Lean Startup methodology, its practice and showed connections between it and the eco-innovation concepts, reducing the number of papers to nine (see Table 2.4[14]). To complete the literature

[14] None of our selected nine papers on Lean Startup used the term “eco-innovation”, or “sustainable innovation”, but an in-depth analysis of each allowed us to extract the relationships between it and its implications for Lean Startup. These relationships are detailed in Table 2.1

references, we used backward and forward reference searching techniques (by reference and by author) complemented with references cited by our interviewees and five additional experts[15] in Lean Startup. In total, we gathered 13 references helping us describe Lean Startup as a sustainable business model innovation method. Table 2.4 also include these four additional references.

Author/s	Contribution to Lean Startup	Related eco-innovation concept
Blank, 2006	Customer development: customer discovery, customer validation, customer creation, company building Dynamic and iterative perspective to business model innovation BMs are developed	Generating economic value by quickly achieving sustainability objectives Deep understanding of stakeholder needs to induce behavioral change of individuals and organizations
Ries, 2011	Experimentation-pursuing innovation: innovation through repeated, validated experimentation Minimum viable products Validated learning: build, measure, learn cycle. Minimize uncertainty through learning Innovation accounting: a qualitative approach to measure growth Pivot/persevere	Urgently verifying whether business model (and value proposition) effectively delivers and captures intended value across the extended network of stakeholders Dimensions of eco-innovation require quantitative and qualitative metrics
Blank and Dorf, 2012	Dynamic and iterative process to develop BM call Customer Development Learning about early customers, and stakeholders	Generating shared value for a network of stakeholders Quick identification of sustainable problems and the business models that can tackle them down considering the affected stakeholders

[15] The list of experts is available from the authors upon request

	Testing these solutions quickly and urgently towards problem-solution fit Building business models that can sell repeatedly and grow Customer discovery: recurrently talking with users (and other relevant stakeholders), thinking about potential solutions and testing such solutions early on to iterate towards a problem-solution fit.	
Maurya, 2012	Adaptiveness and effectiveness of new startups in dealing with scarce resources in their go-to-market efforts Qualitative customer observation and interviewing techniques to assess problem to be solved and BM that solves the problem	Identification of stakeholders' interests by means of an orderly process (qualitative) Adaptive and fast process of BM creation to deal with limited resources and minimizing waste
Pease, 2014	Lean Startup measures trends through the leveraging of averages instead of variances Lean Startup looks at top line growth (revenue) rather than bottom line growth (net income) Lean Startup is based on value hypothesis: Tests whether a product delivers value to customers or markets as they use the product resulting in profitable sales and positive customer-use feedback Lean Startup is based on growth hypothesis: The growth hypothesis	Lean Startup controls for working links between economic metrics and their qualitative/quantitative driving causes, including customers, distributors and any other stakeholders

	tests how new customers discover a product or service. This results in high adoption rates, sales growth, and retention. It is confirmed through long-term, top line (revenue based) sales growth and distributor feedback	
Harms, Marinakis and Walsh, 2015	Lean Startup builds on 'disciplined entrepreneurship' (Sull 2004), 'hypothesis-driven entrepreneurship' (Eisenmann et al 2011), 'probe and learn' (Lynn et al 1996), and discovery- driven planning (McGrath and MacMillan 1995) Emphasis is not only on the 'need' and the 'solution', but also the 'network' component as a source of 'risky assumptions' that can make or break their venture.	Optimize the consumption of resources when starting up Needs and solutions of an array of networked stakeholders must be addressed (not only by the value proposal but by the BM)
Rasmussen and Tanev, 2015	Lean Startup may help develop new BM following a niche strategy Lean Startup BMs identify and segment customers in global market niches and skillfully serve highly specialized buyer needs New BM are quickly developed to cooperate with multi-national corporations by using their existing channels, net-works, and Internet infrastructure to rapidly receive substantial revenues and cash flow	Differentiation strategies focusing on unique designs and highly distinctive products which may be too small for the tastes of larger firms can help successful adaptation of multiple stakeholder interests Multi-national corporations may act as systems integrators or distributors of products and services of new born firms, providing opportunities for learning, technological infrastructure access, and evolutionary growth

Weissbrod and Bocken, 2016	Value creation in the context of time sensitivity. Urgency After-sales control of customers behavior Radical innovation of products and services: Innovation should go beyond eco-efficiency and sufficiency Corporate experimentation capability Personal values as motivator for business model innovation Broaden sustainability issues (social and technological)	Economic, social and environmental value creation driven by time and urgency Business model transformation from linear to circular Articulation of value creation on an ongoing basis Framing experimentation to sustainable development boundaries
Täuscher and Abdelkafi, 2016	Lean Startup as a method to design and accelerate sustainable growth, through self-reinforcing BMs Differentiation of sustaining growth from growth driven by one-time events Rapid growth is commonly associated with network effects (making the environment drive profitability) which means a constant effort to grow the customer base	Fast-growing enterprises make a disproportionate contribution to wealth creation and employment The ability to grow rapidly helps potential disruption of established industries, and the frequent emergence of new markets Large networks result in greater profit margins and reinforcing returns
Baldassarre et al., 2017	Value proposition design User-driven innovation Dynamic and iterative perspective to superior problem/solution fit	Sustainable value proposition that allows simultaneous value creation for multiple stakeholders, including customers, shareholders, suppliers and partners as well as the environment and society Expanding sustainable development efforts beyond technological

		advancements and production efficiency to concurrently pursuing behavioral change towards more sustainable consumption and interactions with products
Mansoori, 2017	Communication of customer and other stakeholder interactions Obtain first-hand feedback Understand customer needs and requirements Do not focus solely on one technology letting customers and stakeholders decide what to offer them Learning mindset, instead of selling to them Decisions are made on stakeholder interactions Focus on searching for a business model rather than executing a business plan: validation of hypotheses before developing anything Frequent changes due to single and double-loop learning	Interaction with and learning from stakeholders of different sorts to understand their needs and impact in the new BM
Frederiksen and Brem, 2017	User and customer involvement in BM and product development is significantly and positively related with, among others, financial performance Iterative approach to new product [business model] development Experimentation is a means to deal with uncertainty	Involvement of stakeholders on eco-innovation of BM The business model innovation parallel, non-sequential process improve final BM and elicit stakeholder consideration and reduces waste Long-term survival

	MVP lacks evidence for its efficacy: Lean Startup original conception does not deepen on its relationship with Design of Experiments field Lean Startup is heavily skewed to effectuation: Experimentation, minimum loss, extended social capital and flexibility are also supporting this idea	Creation of sustainable effects is a consequence of the means at hand (focus is on the selection of effects with those means, not the other way around)
Yang, Sun and Zhao, 2018	Search, which comprises the first two phases of Lean Startup, is part of the organizational learning process through which firms try to solve problems under conditions of environmental instability and ambiguity Entrepreneurs follow effectual logic to engage in search when in the initial phases of a new BM Contingencies are opportunities for novel creation and foster opportunity-motivated search	Organizations search their environment for new information for different reasons, e.g. to become better, to create new products, to identify new opportunities, to improve decision making, to develop a repeatable, scalable and sustainable BM Under effectual logic, entrepreneurs frame the future as a result of co-creation by different stakeholders. It increases the depth and breadth of search maximizing future options An effectuation mindset emphasizes strategic alliances and a pre-commitment by stakeholders rather than competitive analyses

Table 2.4. Contributions to Lean Startup methodology which show relatedness to eco-innovation concepts, from WOS and ABI/Inform databases

Similarly, we also conducted a review of the literature (using the same databases and filters) with the strings “business model innovation” AND “sustainable or sustainability”; “business model” AND “eco-innovation” in titles or abstracts, for the period 2014 to date. Out of the resulting 64 papers, 14 dealt with how business models are eco-innovated. They also provided us with a deep understanding of the concepts, relationships and key elements we needed to

frame the conceptual connection between Lean Startup and eco-innovation of business models. Based on our own experience and the contribution of three experts in sustainable business model innovation, we selected a group of representative papers that helped us present most of the critical elements of the current understanding of the relationship between eco-innovation and business modelling.

Once the framework for Lean Startup/Eco-innovation connection was set, we presented it to five academic and field experts, and with their comments we developed a script for supporting our semi-structured interviews on the use of Lean Startup by several startups (some of which were corporate startups). We then chose the case study method as the design model for our research, for its depth of investigation (Eisenhardt, 1989; Strauss & Corbin, 1990; Yin, 2009) in our current exploratory state of research.

2.4 Company case-studies

In this chapter, we have used three (instrumental) cases that allowed us (1) to show how Lean Startups sustainably evolved their business models with speed and urgency, and (2) how our framework answers our research question (from a qualitative perspective) and may help translate the concepts of Lean Startup and eco-innovation into practice, and vice versa. These case studies (listed in Table 2.5 were selected[16] from our field research database due to their special relevance presenting how Lean Startup is applied to eco-innovate business models (each case is summarized together with the criteria we followed for their selection).

[16] Criteria for case selection was elaborated using the precepts of Lean Startup as guiding lines, as defined by Blank and Dorf, 2010: Practices used for creating and growing business models, speed, urgency and validation of value proposal hypotheses

Criterion	Startup 1 - S1	Startup 2 – S2	Startup 3 – S3
Region	UAE	UAE	EU
Industry	Energy efficiency solutions	Strategic consulting	Cold production
Description	Six-year old startup based in UAE. The two cofounders (engineers) started this business when they identified a growing need and demand for energy saving services in the UAE and imported the business model from Europe.	One-year old strategy consulting company based in the UAE, with operations in the Middle East and Africa. Their focus is on innovation management. Its two founders (engineers) developed the business model bringing methodologies and practices from Silicon Valley.	Two-year old corporate startup, from the EU. They produce cold that is later distributed to several industrial customers. Following the corporation incubation program, it grew from, this startup has been developed by two employees (engineers) after winning the contest set up by their corporation to enhance the entrepreneurship spirit of the organization.
Practice used for creating their business models (Blank & Dorf, 2010)	They set the vision for S1 after the European original. Later they needed to redesign the first model through a series of interactions, pivots and	The two founders are experts in Lean Startup and have applied the method to grow the business model. Its original model has already suffered	Although the founders initially followed a conventional, linear method and produced a plan, it was quite evident from nearly day 0 that

	integration of new business models. Founders were not aware of Lean Startup but followed a very similar process.	several pivots and it is already being complemented by two new business models.	they were involving different stakeholders which made them discard plans and embrace a method similar to Lean Startup
Practice used for growing their business models (Blank & Dorf, 2010)	The startup grew bootstrapping their operations, self-financing only from clients, trying to secure a sound product/market fit and growth. In year three, they went into their first investment round and secured a very important investor who allowed S1 to grow faster and extend its core business to other products and services that complemented their original business model with other models.	Lean Startup (experimentation, customer discovery, business model canvas) techniques are what drive the growth of S2. Currently, they are struggling to find avenues for sustainable growth using a relentless process of validated learning with several stakeholders in a region where the founders had no prior network.	Its business model is being developed using a process based on customer inputs and needs, which have been researched and iterated extensively. Their initial business has pivoted more than 10 times in the first 12 months, departing from their original consumer orientation to their current B2B orientation. They are trying to evolve the latter without forgetting the consumer businesses (which will require longer cycles). Have already secured locations and production centers validating many of the assumptions of their first 2 business models.

Current Lean Startup/Customer Development stage (at time of writing) (Blank & Dorf, 2010)	Customer Discovery in the complementary products Customer Validation in their original model (consultancy)	Customer Discovery in all models	Customer Discovery in all models
Speed in searching for their business models (1-7, with 7 being the fastest) (adapted from Blank & Dorf, 2010)	5	3	7
Example of stated valueholders driving speed at Customer Discovery	Founder with no other income source than his startup's job	Entrenched competitor using unethical practices	Port authority willing to provide cold storage facilities to users of port
Urgency in the development of the value cycles (1-7, with 7 being the fastest) (adapted from Blank & Dorf, 2010)	6	3	6
Example of stated valueholders driving urgency at Customer Discovery	Construction contractor buyer not sold on energy saving solutions	Compliance process for new contractors of client corporations	Need for lowering costs of cold production of client companies Conflict of interests between startup's matrix and other incumbents

Value proposals built before/parallel to business models? (Blank & Dorf, 2010)	Although not their initial idea (they believed that their initial, imported value would drive the proper business model) it turned out they needed the business model first.	They are first willing to create sound value proposals and then business models would come.	From day 0 the goal is the creation of business models, leaving the value proposal as part (not critical) of them.
How Lean Startup-like method helps create sustainable business models with speed and urgency?	Lean Startup-like process followed by founders helped them concentrate on business model rather than a single value proposal. They benefited from importing a business model, not merely a solution. It was unintentional.	Lean Startup is helping founders test product/market fit and networks. Consulting is a difficult market for newcomers, and Lean Startup is helping these founders iterate with different models, sub-models and layers, in short sprints, minimizing waste and customers.	Lean Startup-like process made founders act very quickly, moving from one business model to the next, as this produced more effect and value. Past models are still being evolved, producing a bucket with several alternatives which Lean Startup can also help manage.

Table 2.5. Case study companies with a brief description of their projects and according to each selection criterion (derived from Blank & Dorf, 2010)

Our aim was to generate a first theoretical support for Lean Startup as a business model eco-innovation method and not to generalize our findings. We need to acknowledge though that one limitation of our research is using a small number of case studies (Eisenhardt, 1989).

2.4.1 Lean Startup, valueholders and the case-study companies

Lean Startup addresses valueholders by design, with speed and urgency (Blank, 2010) as the relevance of each valueholder group is temporary and limited. By means of its validated learning and departing from the initial hypotheses about the business model, Lean Startup quickly discovers different valueholder groups. Table 2.6 shows an example of the valueholders for our B2B startup Customer Discovery cycle: as validation progresses, both new valueholders and the evolution of the original produce the evolution of the initial business model design and the upsurge of other designs and differing business models.[17]

Customer Discovery pass #	Valueholder group
1st pass. Company internal competition	Corporation jury (formed of execs and external advisors)
2nd pass. Company incubation program	Corporation startup board (CEO and top execs) Startup founders
3rd pass. Customer discovery	First potential customers (ice producers for consumers) Partners of corporation affected by S3 operations
4th pass. Customer discovery	Second potential customers (cold storage logistic platforms)
5th pass. Supply chain links	Suppliers of infrastructures to transport cold to logistic platforms

Table 2.6. Summary of valueholders in company S3 of our case studies for the first instances of their new business model construction

[17] Additionally, our three cases might shed light on how valueholders speed-up, slow-down, or kill the companies challenges, actions or overall progress. Table 2.7 shows some examples. Out of the scope of our reflection is the stage in which the valueholders affected growth, or if the effect was positive or negative

	Startup 1 - S1	Startup 2 – S2	Startup 3 – S3
Example of stated valueholders driving speed at Customer Discovery	Founder with no other income source than his startup's job	Entrenched competitor using unethical practices	Port authority willing to provide cold storage facilities to users of port
Example of stated valueholders driving urgency at Customer Discovery	Construction contractor buyer not sold on energy saving solutions	Compliance process for new contractors of client corporations	Need for lowering costs of cold production of client companies Conflict of interests between startup's matrix and other incumbents

Table 2.7. Valueholders on each case-study company driving speed and urgency in their developments

2.5 Discussion

2.5.1 Lean Startup develops sustainable business models

The first step towards defining Lean Startup as a sustainable methodology to build business models (Geissdoerfer et al., 2016) is the identification of the characteristics that a methodology or a process has to have to qualify as a sustainable way to innovate a business model. From them:

"[We] define sustainable business model innovation as the analysis and planning of transformations to a more sustainable business model or from one sustainable business model to another. This comprises both the development of an entirely new business model and the transformation of an existing business model".

Moreover, a new sustainable business model "reflects cultural, structural, firm-level, and systems-level attributes" arising from the characteristics (structural and cultural) and balance of

economic, environmental, and social attributes (Stubbs & Cocklin, 2008).[18] Also, Bocken and colleagues (2014) conceptualized sustainable business models as archetypes ("representative of underlying mechanisms of transformation […] creating new value, or significantly reducing negative impacts on the environment and society").[19]

[18] See Table 2.8 for a comparison of our business cases characteristics with those presented by Stubbs and Cocklin (2008)

[19] We tried to match our case studies with those archetypes, to understand if the new business models produced by Lean Startup fit into any of them. Table 2.9 reflects this comparison

	Startup 1 - S1	Startup 2 – S2	Startup 3 – S3
Structural attributes			
Economic	Generate economic returns by selling energy-saving solutions/consultancy services	Lobbying industries in their area, building networks (Luo & Zhao, 2013) around sustainable innovation (at process and business model levels)	Returns based on several sources, mainly by reusing waste that has a close-to-zero cost
Environmental	Most of the current business models offset (amending harm made to the environment) or advocate for sustainable solutions for clients	Thus far, S2 is approaching environment building stakeholder networks, which are rather disconnected. They do not seem to have a clear policy or strategy linking environmental goals. Probably too early to see which environmental influencers are really meaningful for business success	Limiting, reducing or even eliminating waste by reutilizing all of it is helping S3 offset, and restore the environment, and even aim for close loops systems from day 0 of the startup. Not looked for original, these attributes are spontaneously emerging by the use of Lean Startup-like method to build their business model
Social	Importing an efficient model from abroad helps UAE benefit from it	Major uptake is the effort S2 is making in spreading sustainable	This is the result of a social initiative of a large corporation. Socially it is

	without the high costs of development. That eases the adoption and speeds up reaching social benefits in terms of jobs and culture in the country	innovation methods in the UAE. Education of relevant decision-makers, mid-management and practitioners may also be meaningful for startups in the early stages, particularly in services industries. Problems arise with value capture of those efforts if time is long	serving interests both to the internal and external stakeholders of S3, but also to the social environment of its corporation
Multidimensional	Startups of a certain maturity and traction share the need for investors. S1 helps showing that after showing success with product/market fit, growth is dependent on valueholders (rounds of funding), and speed is dependent on market size (particularly if following a niche strategy)	S2 history is too short. Different from S1 they are struggling to get the models right. Most of what they do impact/gets impacted multidimensionally, with no clear separation of the effects, at the time of this writing	This is a clear case of demand-driven model, meaning they started off as an idea looking for a solution but pretty soon changed to address the market
Cultural attributes			
Economic	Founders and investors are committed to lower environmental	Not yet clearly cut. As with new startups they need to find a proper	S3 serves, from day 0, economic goals to serve both the founders and

	impact as well as for financial reasons. Their new business models reflect that trait	way to capture economic value that helps them survive. On paper, their commitment involves social and environmental outputs	the parent corporation. Founders quitted their jobs, and corporation is looking into long term goals outside their traditional business
Environmental	Founders and investors share their passion for the environment and for clean resources. The fueled that passion in the land of oil, and seems they are profiting from it	No clear cut, as the startup is still making up most of their business models. Still, they selected an industrial niche, and most of the proposals we have researched show commitment to the preservation of nature	They look into reusing waste and pollutants of water. Also, they are reducing energy consumption drastically. Environment protection is the seed for their company
Social	They benefited from international standards, but this is part of their success. They learnt, and taught others, about the positives of energy-saving solutions	Principal part of S2 strategy. Education and spreading the word of innovation as differential for success of incumbents. Repeated relationship between education and value capture for S2 is what remains to be fully validated	S3 is a model for promoting innovation/entrepreneurship culture in its parent company, where the CEO and board are aiming at leveraging that culture among organization to boost long-term results and survival
Multidimensional	Starting to look into mid-term results	Their sales cycles are pretty long. But that affects viability. They are trying	Strategic integration with parent corporation

		to fit regular long-term sources with immediate alternatives, to secure survival	

Table 2.8. Characteristics of business models of case study startups being developed with Lean Startup (developed from Stubbs & Cocklin, 2008)

	Startup 1 - S1	Startup 2 – S2	Startup 3 – S3
Type of sustainable archetype	First model was 'Substitute with renewables and natural processes' This couples today with 'Maximize material productivity and energy efficiency Definition' A new 'Adopt a stewardship role' is being developed with their third business model.	Business model is still iterating among 'Deliver functionality, rather than ownership', 'Adopt a stewardship role', and conventional non-sustainable types	First business model is a 'Create value from 'waste' type Second is more of a 'Maximize material productivity and energy efficiency' type Third business model is 'Develop scale-up solutions' type

Table 2.9. Fit of case-study companies with the sustainable archetypes. We have conceptually compared the archetypes with the most relevant business models of each of our research companies (developed from Bocken et al*.,* 2014)

2.5.2 Lean Startup drives sustainable challenges and activities in new business models

A second step to qualify Lean Startup as a method for eco-innovating business models (Geissdoerfer et al., 2016) requires identifying how it sets up the strategic relationship between the new business model activities and its triple bottom-line objectives (Schaltegger et al, 2012; Carrillo-Hermosilla et al, 2010 and Geissdoerfer et al, 2017). Lean Startup is originally lacking this connection explicitly, and to accommodate the multilinear process[20] that Lean Startup follows to innovate business models, we organized its tasks and goals by Activities and Challenges.[21] Table 2.10 shows our proposal for a framework that can turn Customer Development (and Lean Startup) original design into an explicit business model eco-innovation process and Table 2.11 shows an example with our case-study companies.

Stage of Customer Development ▸	Customer Discovery	Customer Validation	Customer Creation	Company Building
Challenges				
Activities				

Table 2.10. Proposal for new business model development using Customer Development original design (developed from Blank, 2006; Geissdoerfer, Savaget and Evans, 2016)

[20] This process is called Customer Development (Blank, 2006) and it has become the center-piece of the Lean Startup method (Ries, 2011; Blank, 2013)

[21] As it is important to sort out the problems the new business faces when trying to address the needs, interests or jobs-to-be-done (Ulwick, 2016) of its valueholders, also it is important to do it at the right time. This dynamism of Lean Startup helps to drive the actions and activities and their priorities at each development stage

	Startup 1 - S1	Startup 2 – S2	Startup 3 – S3
Customer Discovery			
Phase one: state your business model hypotheses	Importing the model from EU, S1 most critical challenges were related to market size and growth hypotheses	S2 needed to put down many business model hypotheses, as the market is saturated with big consultancies and entrenched competitors. Product/market is a major challenge	Immediately got its product/market fit hypos validated. Current main challenge is setting the right production and distribution hypotheses for its business models
Phase two: "get out of the building" to test problem	The two founders have been involved in the testing of the business model hypotheses since inception. Getting them act together was a challenge	Founders are fully committed to do exploration and validation of problems. Biggest challenge is their bias based on past and early experiences	Problem was validated by founders in the first weeks. How to manage success and not die from it was the challenge
Phase two: "get out of the building" to test product solution	New solutions / new stakeholders are a consequence of a demand-driven type of evolution they are following. Which to keep is the challenge	Since this a service company the challenge is the adaptability of services. Still to be validated: sales repeatability of solutions	Founders are validating several solutions at the same time, prioritizing them, and initially concentrating on those that show more commitment from

			stakeholders, not necessarily the most profit-generating solutions.
Phase four: verify the business model, and Pivot or Proceed	Two business models passed this phase. Validation of sales and growth models were what lied ahead	Currently pivoting the main model towards companies with less requirements for agreeing with proposals. This is a major challenge from Lean Startup method: disregard failing business models	They are validating the production hypotheses (activities, resources, costs). Need for speed

Table 2.11. Challenges of our case-study companies when pursuing triple bottom line goals, organized by phases of Customer Discovery. Customer Discovery is the first stage of Lean Startup/Customer Development model (developed from Blank & Dorf, 2012; Schaltegger et al., 2012; Geissdoerfer et al., 2017)

2.5.3 Lean Startup also fully covers the dimensions of eco-innovation challenges

In our third step, we grouped the goals and trade-offs that formed the sustainable Challenges or "internal and external factors influencing the innovation process", of each Lean Startup phase using the eco-innovation dimensions of Carrillo-Hermosilla et al (2010).[22] Table 2.12Table 2.12 organizes the eco-challenges a lean startup faces.[23]

Eco-innovation aspects	Eco-innovation dimensions	Potential amount of Eco-challenges (EC) in Customer Discovery grouped by eco-innovation dimension
Design		
	Component addition	Some EC that are mostly related to the product/market fit and MVP development
	Sub-system change	Some EC that are mostly related to the first hypotheses of any of the blocks of the business model
	System change	Few EC that are mostly related mostly to the hypotheses about the founding team, funding and compliance with regulations/norms
User		

[22] In line with Christensen (1997), OECD (2012), Bocken et al. (2014), or Schaltegger et al. (2012) typologies of innovation, Carrillo-Hermosilla and colleagues (2010) developed their own typology, departing from "the nature of produced technological change". But as they, or Schaltegger et al. (2012) acknowledge, technical or process eco-innovations are just two perspectives of sustainable innovation. In this document we extended the eco-innovation dimensions framework, complementing it with those eco-innovations that are business-model centered, or that change/create new business models, as Lean Startup is mainly focused on them

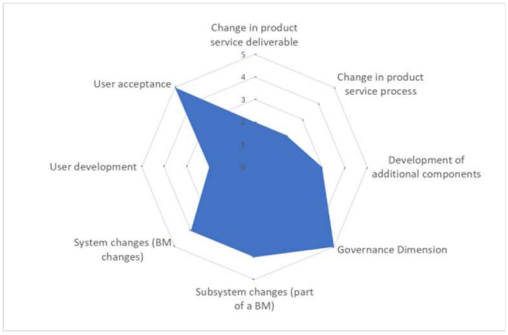
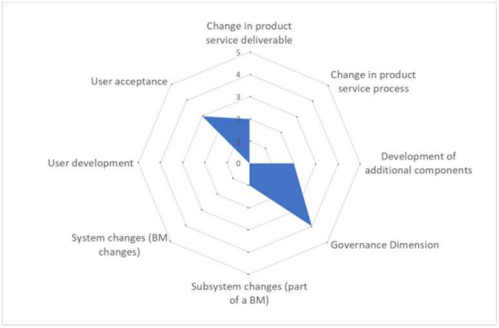
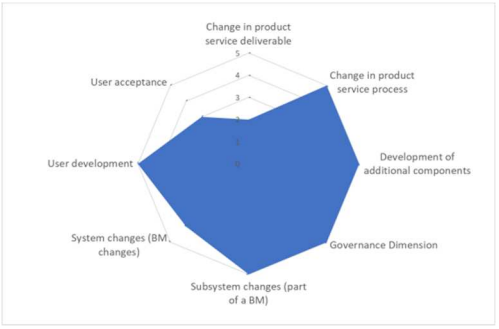
[23] This example is only for Customer Discovery (the first stage of the Customer Development process). For each eco-dimension, we have identified a number of potential eco-challenges ('many', 'some' or 'few') to be addressed by innovators at each Customer Discovery phases. Further research can advance in describing which are the specific eco-challenges per stage/phase. This exercise needs to be repeated with the rest of the Customer Development stages (Customer Validation, Customer Creation and Company Development)

	User development	Many EC mostly to know the user needs and jobs to be done, particularly if speaking about early adopters
	User Acceptance	Many EC at the end of this stage, critical to address repeatability of sales
Product/service		
	Change in product service deliverable	Some EC that are mostly related to building first get-keep-grow cycles in the "Customer relationships" block
	Change in product service process	Some EC related to integrating agility/cascade production in the "Activities" block Some EC related to control for technical and organizational debts (Steve Blank, 2015b)
Governance		
	Government-level changes	Few EC but critical to address sustainability (direct and fringe stakeholders and valueholders) (Hart & Sharma, 2004) Many legal challenges
	Company-level changes	Few EC related to organization building and founding team consolidation

Table 2.12. Challenges in the Customer Discovery stage of a lean startup grouped following the dimensions of eco-innovation (developed from Carrillo-Hermosilla et al., 2010; Blank & Dorf, 2012)

Using our case-study companies we have measured their progress through the Customer Development stages and found noticeable differences in the challenges they address when developing their business models. This could represent actual differences in their evolutionary stage, but we are prone to believe this represent different effectiveness towards solving the challenges posed by their related valueholders. If this were the case, S3 would be the most

efficient (measured by growth and speed) and S1 the most limited. Table 2.13 shows to what extent each of our cases fulfill the conceptual dimensions to eco-innovate business models.[24]

Case	Business model/Comments
Startup 1 – S1	Energy savings for construction
	This model marks low in several dimensions, mostly from its "imported" condition. They truly change deliverables, processes and components, but in the client companies. As a successful new business model, it does not need to adapt those. 'User development' is also low as the UAE users are slow and fixed to their traditional practices
Startup 2 – S2	Sustainable strategic consulting
	S2 picture at time of writing shows low marks in most of the dimensions, as it is showing constant change of this business model. The radar, though, could be used not only as an alarm system of potential pitfalls, but also as a forecasting tool to address new pivots of the business model. Governance dimension high grade could be reflecting the clarity of founders about their own business model
Startup 3 – S3	Industrial cold production
	'User acceptance' is low due to the on-going process of S3 to understand needs of potential user companies. They do not have clearly stated which these may be. As newly born, this dimension may always be low (like in other cases), as they are not fully ready to measure perception changes with

[24] We used the eco-innovation dashboards of Carrillo-Hermosilla et al (2010). We should note that the current dimensions' definitions seem to be particularly relevant for established companies. We have found some difficulties when using the dashboards for startups or newly formed / developing business models, which could lead to further revisions of this sound framework and visual tools

	new clients. Still some portion of the new perception can be detected with comparisons with competition

Table 2.13. Dashboards for the eco-innovation dimensions for our case-study companies at Customer Discovery stage. Only one business model per case is considered (developed from Carrillo-Hermosilla et al., 2010; Blank & Dorf, 2012)

2.6 Conclusions

With this chapter, we have initially filled the gap in the extant literature about the capacity of Lean Startup to serve as practice to innovate business models into sustainable business models. Lean Startup is frequently understood as an alternative way to the conventional business model innovation, maybe faster, more focused and based on quasi-scientific validation of the new business underpinnings. But to this date, Lean Startup has not been treated as an alternative practice to eco-innovate business models.

Setting up an evaluation process of three steps, we have evolved Lean Startup original design into a practice that firstly connects sustainable Challenges and Activities, secondly sorts them across its stages and thirdly addresses all the dimensions of eco-innovation.

Drawing theoretical conclusions from only three case studies is certainly risky (Lawrence, 2002). Nevertheless, using three lean startups from the UAE and the EU, we have presented some evidences of how the founders of those companies and are using Lean Startup to address the eco-challenges they face. Using Lean Startup, they are particularly efficient at detecting and integrating the demands, interests and needs of environmental and social valueholders, producing economic returns that help them grow according to their founders' expectations. Also, Lean Startup-like methodologies seem to help our startups search for relevant valueholders, prioritize them, and accordingly choose the eco-challenges that can drive their growth. These are relentless learning cycles, where older Challenges are replaced by new ones.

We believe we have contributed to the existing literature on business models' eco-innovation by presenting the first evidences on how Lean Startup could be used to address sustainable business model innovation.

Next step towards confirming this promising field should be the confirmation of our preliminary validation of the methodology. A further step should list the eco-challenges and activities and check if Lean Startup fully addresses them (as our evidences seems to confirm). Also, more case studies are needed to show the soundness of our proposed toolbox (Table 2.6-Table 2.11) to

gauge the connection between Lean Startup and eco-innovation. Finally, there is need of quantitative evidences that help understand how valueholders really impact the challenges definition of business models developed with Lean Startup.

3 Chapter 3. Sustainable Business Model Innovation And Acceptance Of Its Practices Among Spanish Entrepreneurs[25]

3.1 Introduction

New business modelling, or innovation of business models, is being a fruitful field for research (Wirtz et al., 2016). However, scholarly studies on practices for business modelling are not that common (He et al., 2017). And to the best of our knowledge, research on the motivations and factors driving the acceptance of those business modelling practices by eco-entrepreneurs is in its very early infancy (Exhibit 3.1 shows a summary of our approach to this research topic, as will be further explained below). To fill this gap, we firstly acknowledge the dynamic perspective of the development of business models (Cavalcante et al., 2011). Additionally, this perspective also argues the need for innovation of business models is recognized and acted upon by individuals (and maybe after a critical mass or success, by collectivities. Cavalcante et at, 2011: 1329).

[25] The Journal of Corporate Social Responsibility and Environmental Management (IF: 4.918) has published this chapter as a paper in the Special Issue on Sustainable Innovation: Processes, Strategies, and Outcomes of. See Peralta et al., 2019

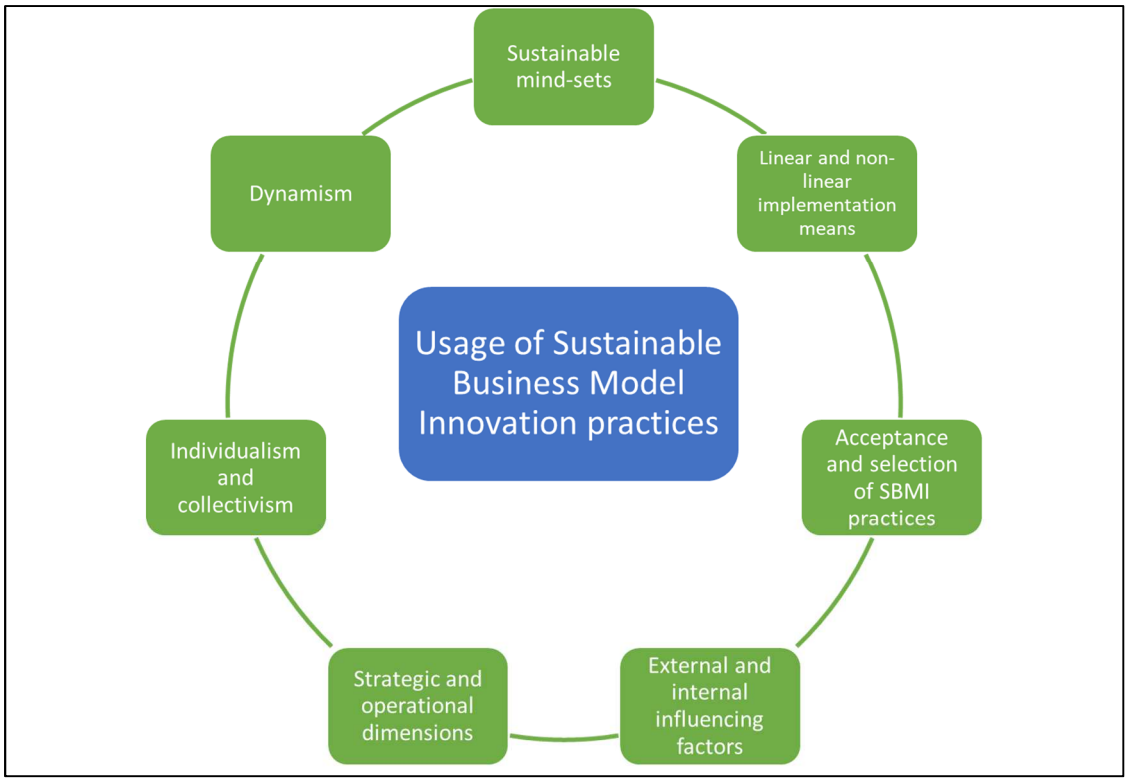


Exhibit 3.1. Summary of concepts included in our research on usage of sustainable business model innovation practices

Out of the different entrepreneurial mindsets, the one advocating for more sustainable and environmentally friendly business models is relevant for a broadening base of researchers. As a research line, these mindset studies have recently started and mostly concentrate on external factors (Hussain et al., 2018; Pipatprapa et al., 2017) which configure the current definition of eco-innovation. But already there have been calls (Song & Yu 2018: 136) for research on internal (organizational and individual) factors that explore how individual abilities help connect business model eco-innovation strategy with successful eco-innovation (Kiefer et al., 2018). Thus, secondly, this chapter complements main-stream studies on external collective factors, investigating their balance with the business model internal collective and individual factors, and how they play a role in the selection of practices for successful eco-innovation.

Thirdly, sustainable business model innovation[26] strategy and the dimensions of its implementation (Kiefer et al., 2017) seem crucial for established and new firms in terms of surviving, outperforming the competition or aiming at effects lasting longer than product or

[26] Carrillo-Hermosilla and colleagues (2010) listed many definitions of the term eco-innovation. In this chapter, we take on that definition that focuses in the eco-innovation of business models, rather than products or services, in what other authors call sustainable business model innovation (see Geissdoerfer, Vladimirova, & Evans, 2018: 406)

process innovations (Wirtz et al., 2016). And research and practice might be pointing to believe that alternatives to design and roll out any sustainable business model innovation strategy into practice seem to follow either a linear sequence (Boons & Lüdeke-Freund, 2013) or a non-linear development (Blank, 2013; York & Danes, 2014). And this polarization is giving way to a rising debate among scholars which is being enriched by its different perspectives (see for example, Hansen et al., 2018; Kiefer et al, 2018; Lüdeke-Freund et al, 2018; Tiemann et al., 2018). The debate currently concentrates on the practices and tools for sustainable business model innovation development or implementation. But we ask, how entrepreneurs decide between a linear or a non-linear sustainable business model innovation process? And which factors affect this entrepreneurs' selection of design and implementation practices to use for sustainable business model innovation? Our answers to these research questions aim to shed light on one of the potential causes of the success of a sustainable new business model (sustainable business model): the reasons why entrepreneurs choose certain practices for sustainable business model innovation development before others. We theorize these motives (internal and external) drive the selection and use of sustainable business model innovation practices, and this usage might lead to overperformance and success of new sustainable business models. Also, different key stakeholders involved in the development of sustainable business model innovation (mentors, government agencies, incubators or investors) might use our answers to better tailor their support programs, balancing those factors and causes.

Such analyses of the underlying factors motivating the usage of one method or practice are not rare in business research (Venkatesh, et al., 2003, 2012; Lima & Baudier, 2017). They not only consider external and collective factors, but also internal and individual variables. Along this line, Venkatesh and colleagues (2003) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT) scales explaining a user's behavior from her intention to use a technology, tool, or practice by putting up a summarized model of psychological and sociological theories (Venkatesh et al., 2003: 427-437). Like the original UTAUT, the rationale behind our framework is: a sustainable business model innovation practice, together with other internal and external factors, generate a cognitive and emotional reaction in the entrepreneur that results in the actual use of that method or practice, in an endless, self-reinforcing cycle (Venkatesh et al., 2003: 427). Using UTAUT scales, we aim to answer our research questions building eleven factors[27] (endogenous constructs) affecting the entrepreneur's use of different practices or

[27] The eleven constructs are: Intention to use, performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price/cost and habit (Venkatesh et al., 2012: 158) and speed, funding and security

methods to innovate business models to achieve economic, social and environmental goals. Complementarily, we order these factors according to the strength of their relationship with their determinants. Finally, our research helps to identify which stakeholders seem relevant and influence that entrepreneurial behavior.

The rest of the chapter is organized in a literature review, describing the main sustainable business model innovation literature as well as our revision of the UTAUT original constructs and the new mechanisms. Then we cover the methodology we used for the formation of the constructs, which we discuss later stating the implications of our findings. Finally, we set future research directions.

3.2 Literature background

3.2.1 Methods to eco-innovate business models

Although the literature on sustainable business model innovation is vividly expanding, there is a certain divergence of conceptualizations and lack of commonalities in its many references. For purposes of this chapter, we have reviewed the extant literature on sustainable business model innovation technologies, practices and methods, and extracted the conceptual implications that helped us identify the behavioral and external constructs of an entrepreneur's acceptance of practices and methods to define and implement ventures aiming at triple bottom line goals. In this chapter, we interchangeably use eco-innovation and sustainable innovation (Boons & Lüdeke-Freund, 2013: 11).

We agree with Carrillo-Hermosilla and colleagues (2010) that eco-innovation aims to "reduce the environmental impact caused by consumption and production activities". But we also argue that this specific goal should extend beyond technical and process innovation to include the development of new sustainable business models which, for instance, is identified as a basis to "diffuse large scaled environmental technology systems" (Kanda, Sakao, & Hjelm, 2016).[28] It is on this SMB eco-innovation concept that we concentrate on in this chapter. Not only due to its potential to expand the traditional economic performance criteria to include environmental and social metrics (OECD, 2012; Boons et al., 2013; Bergset & Fichter, 2015: 124), but more importantly, because it can consider the dynamic relationships between business, society and nature (Marcus et al. (2010).

[28] For Kanda and colleagues (2016) these new sustainable business models should include six non-technical components (market, finance, resources, activities, partnership and ownership) which complement the technical elements for sustainable development

Despite differences on the purposes driving entrepreneurs (Bergset & Fichter, 2015), sustainable entrepreneurs' main concern seems precisely the successful performance (along the triple bottom line: Stubbs & Cocklin, 2008) and competitiveness of their sustainable business models. sustainable business models performance and competitiveness is then measured by the value they provide to conventional stakeholders (shareholders, customers), but also to the environment (internal and external to the business model), and society (internal and external individuals and groups to the firm's organization) (Bocken et al, 2013). More specifically, a sustainable business model's performance and competitiveness could depend over time on specific salient stakeholders and lead users, that we denominate as valueholders (Peralta et al., 2018).

In the context of the broader sustainable business model innovation concept, there also seem to be a clear sustainability vision: when companies and start-up firms build business models 'for' (voluntary), or 'of' (as a reaction to regulations) sustainability, they also integrate in them the effects of the society and/or the natural environment. They reinforce their regular innovation activities aiming at improved economics (Schaltegger et al., 2012).

But it is in the how that concern and vision get implemented where things apparently get confused. The two methodologies or sets of practices mostly used by entrepreneurs to implement new sustainable business models, namely the New Product Development(NPD process) and Lean Startup (see Table 3.1), are well described in their respective stages, challenges, activities and tools (Blank & Dorf, 2012; Geissdoerfer et al., 2016). But beyond certain commonalities, like experimentation and learning from experience (Wirtz et al., 2016: 15), confusion builds up when they refer to, for example, learning from mistakes, failures and tests (Wirtz et al., 2016)[29].

The *product development process* (Blank, 2009)

[29] Most probably, this confusion has made the literature on how to develop a sustainable business model concentrate on stating the elements (inter-organizational networks, societal systems, stakeholders, value proposition, supply chain, customer interface, tools or financial models: Boons & Lüdeke-Freund, 2013: 13, Stubbs & Cocklin, 2008) needed for designing and implementing sustainable business models. Few authors describe the methods and practices (Martin Geissdoerfer et al., 2016; Henriksen et al., 2012; Tiemann et al., 2018) that entrepreneurs can use to overcome the 'design-implementation gap' (Geissdoerfer, et al., 2017) and accomplish their sustainable business model business goals. In this chapter we reference the New Product Development (NPD) or conventional stage-gate process and the Lean Startup (Steve Blank, 2013; Eisenmann et al., 2011) as theoretical methods or practices suitable for sustainable business model innovation and to bridge the design-implementation gap (Weissbrod & Bocken, 2016). See Table 3.1. sustainable business model innovation practices applicable for sustainable innovation

With this term Blank referred to the traditional, stage-gate, incremental way of executing a sustainable business model innovation strategy (called also new product development, NPD: York, Jonathan L; Danes, 2014)). In this case, the activities (technologies: Harms, Marinakis, & Walsh, 2015: 5) aiming at developing new business models for sustainable value traditionally follow a process similar to this: Idea, concept design, development, launch, post-sale.
Lean startup or Lean Innovation
Lean Startup is seldom considered a sustainable business model innovation methodology although since its inception (Ries, 2011) it integrated new business modelling with the consideration of all stakeholders to develop sustainable, growing business models (Eisenmann et al., 2011). Considering it as a business model eco-innovation method (Peralta et al., 2018), it combines Blank's (2006) customer development process, agile software experimentation (Dybå and Dingsøyr, 2008, Brown, 2008), and business model design (Osterwalder, 2004). Lean Startup approaches the creation of business models considering all the relevant stakeholders since the inception of the idea, and not as one of the final steps of the development of that business idea.
Using neither the NPD, nor Lean Startup processes
Although not specifically described anywhere to the best of our knowledge, many entrepreneurs, due to lack of knowledge, tools, time or out of a need for simplification, prefer to "fly without instruments", as one of our expert entrepreneurs put it.

Table 3.1. sustainable business model innovation practices applicable for sustainable innovation

Our overall research context is then one of individuals and firms looking for practices and methodologies to develop and implement sustainable strategies (Song & Yu, 2018). In this context, environmental and social factors inhibit or support economic performance of firms and startups, probably in dynamic cycles, and externally and internally affect their structures, development, and their sustainable strategies. Research on those factors address the organizational capabilities for eco-innovation (Kiefer et al., 2018) and their relationship with competitive advantages or financial performance (Song & Yu, 2018: 136) or with the tools needed to cope with those factors (Tiemann et al., 2018). Ours is a chapter willing to satisfy a growing demand for research beyond these organizational capabilities focusing on individual skills, abilities and traits. We contribute to clarify how entrepreneurs can successfully develop competitive sustainable business models (Stubbs & Cocklin, 2008) from the factors that affect the entrepreneur´s individual behavior.

The design and implementation of sustainable business models by eco-entrepreneurs are guided by their acceptance of those sustainable business model innovation tools, practices and complex methods, similarly to what Lima & Baudier (2017) described. Our behavioral approach to design and implementing an innovative sustainable business model analyzes the individual

traits influencing that acceptance using the Unified Theory of Acceptance and Use of Technology (UTAUT: Venkatesh et al., 2003).

3.2.2 UTAUT in the context of business model eco-innovation practices

The UTAUT and UTAUT2 models are two widely accepted syntheses of information technology (computer technology) acceptance for users and consumers (Venkatesh et al., 2012). We have selected this framework as it has been developed out of a review and synthesis of eight prominent models explaining the users' acceptance of technology[30] and given its stronger explanatory power. Originally, these two models addressed the theoretical relationship between technology use[31] and the mechanisms that drive this use (what the authors called 'behavioral intention').

To extend the validity of these models, as well as expanding them to other expressions of technology (beyond IT), Venkatesh and his colleagues demanded "careful theoretical consideration to the context being studied" to advance and complement with new constructs the "scope and generalizability of UTAUT" (Venkatesh et al., 2012: 160). More specifically, Venkatesh et al., 2012: 158) demanded (1) identifying new constructs and (2) altering the original relationships in UTAUT[32].

The original constructs included in the UTAUT model were: Performance Expectancy (PE); Effort Expectancy (EE); Social Influence (SI); Facilitating Conditions (FC); Hedonic Motivation (HM); Behavioral Intention (BI); Habit (HT); Usage (US).[33]

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[30] The UTAUT framework outperforms the earlier theoretical models with an adjusted R2 of 69 percent, exceeding the adjusted R2 (40 percent) of the list of earlier prominent theoretical models that UTAUT is based on (see Venkatesh et al., 2003:Table 1 for the list of models included)

[31] Technology is here understood in the classical concept of "the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment." (Enciclopaedia Britannica, November 2018). Alternatively: "1a. the practical application of knowledge especially in a particular area; 1b: a capability given by the practical application of knowledge; 2.: a manner of accomplishing a task especially using technical processes, methods, or knowledge; 3.: the specialized aspects of a particular field of endeavor" (Merrian Webster, November 2018). Consequently, although 'technology' is often regarded as apps or hardware, it is also including practices, methods, skills, or knowledge, used to accomplish any objective

[32] Venkatesh and colleagues included a third requirement ("introducing new relationships") to extend the validity of the original model into other fields. This chapter is an introduction of the factors intervening in the next UTAUT-sustainable business model innovation, and we concentrate on the first two requirements which specifically relate to them. A later chapter will also address the third requirement to describe and validate the acceptance of sustainable business model innovation practices full-scale model

[33] See the Appendix for a full description of the UTAUT original constructs and its adaptation to our UTAUT-sustainable business model innovation model

3.2.3 The UTAUT-sustainable business model innovation new constructs

By (1) adding new constructs, and (2) altering the original relationships in UTAUT Venkatesh and his colleagues extended their original model into UTAUT2 (Venkatesh et al., 2012: 158). Similarly, we have tailored further the UTAUT framework to our experienced entrepreneurs' population. We have expanded those constructs (1) identifying three new key conceptual constructs (speed, funding and security), and (2) altered some of the original relationships, hypothesizing new influences between the constructs and their determinants, in line with our sustainable context.

Speed (SP) [34]

Speed is defined as "fast, fearless decision-making, cycle time, speed and tempo" (Steve Blank & Dorf, 2012). This new construct into the UTAUT model does not captures extrinsic determinants (market velocity, technology changes, regulations updates) as they might be better addressed by other constructs (FC and SI). It is best described as a collection of intrinsic predictors: adaptation and improvisation (together with execution) (Duxbury, 2014: 22), commitment ("passion and drive": Jain, 2011; Manohar & Pandit, 2013), tempo (Blank & Dorf, 2012) and timely knowledge creation for decision making (Nonaka et al., 2000: 14). This construct might help to cope with situations of no-references, time-scarcity, and complex developments, where multiple and simoultaneous paths require different degrees of attention. For some authors, tt is the velocity (or the lack of it) in testing core business facts that is associated to failure of new businesses (Bertels et al., 2015; Nonaka et al., 2000).

Funding (FU)

Funding is defined as the need for money to start and scale any venture, whether it is for product development or any other "liquidity events" (Blank, 2016). This is formed out of three constructs: financial strategic management (Karadag, 2015; López et al., 2012), competitiveness and control (López et al., 2012) and growth/scaling (Picken, 2017; Powell & Bitner, 1992). It is academically well grounded that survival and performance of startups and new business models is tied to the presence of financial management (Karadag, 2015) which affects the founders' ability to earn credibility and legitimacy, but also to building a supportive culture, and have everyone involved in addressing risk and uncertainty (Picken, 2017).

[34] In the Appendix, we have listed the new constructs (Speed, Funding and Security) and their related indicators that form our extended measurement model for sustainable business model innovation practices acceptance. Our updates of the original UTAUT and UTAUT2 constructs are available from the authors upon request

Funding of a new sustainable business model might also be related to higher competitiveness (López et al., 2012: 94), and tools and metrics to control it. Being competitive and in control of the new venture usually means an alignment of financial and overall strategies, which usually is reflected in higher funding and easier exits (therefore, better chances to grow to further investment rounds).

Repetition and scalability are also predictors of our funding construct, as they are signs of successful development of an effective new business model and organization (Powell & Bitner, 1992). When it exists, this growth ability of new sustainable business models might complement and expand their credibility and positively affect their funding.

Security (SE)

Security is defined here as the probabilistic prediction of economic uncertainty that affects decision making of individuals (Makridakis et al, 2010). We see it as intrinsic to the individual. Our construct is best described by these predictors: knowledge creation (Nonaka et al., 2000), revision of goals and actions (type of mindset: Sarasvathy, 2001; Ye, 2016) and heuristics (Ye, 2016: 404). Knowledge is created by the spiral interactions between explicit and tacit knowledges (Ye, 2016: 7-9) and affect how individuals predict their future and, therefore their security (usually expressed economically).

The cyclical building of knowledge departs from a revision of losses, failed alliances and contingencies (or opportunities). It leads to a revision of goals and actions that defines how an individual faces the future and uncertainty (predicting them or controlling them), which differentiates a managerial mindset from a more entrepreneurial one (Sarasvathy, 2001; Ye, 2016). Managers, whose judgements are based on probability and advocate for planning and probabilistic predictions of uncertainty (Makridakis et al., 2010: 87), and entrepreneurs, that aim at controlling uncertainty, minimizing the need for prediction, are subject to rationality coupled with intuition. The differences are in that they use different heuristics (Ye, 2016: 404) or use the same heuristics differently. These available heuristics for sustainable business model innovation are the two different approaches to sustainable business model modelling we described earlier, which help decision makers to cope with uncertainty and gain security (for them, their developments and teams).

3.2.4 UTAUT-sustainable business model innovation: factor hypotheses

Since our chapter's expected contribution to the extant sustainable business model innovation modelling discussion is the identification of the factors (endogenous constructs) that might affect the entrepreneur's use of one method to innovate sustainable business models, we

proposed the following hypotheses describing how the already described constructs are linked to the sustainable entrepreneurial environment.

Our departure point to explain which factors influenced the acceptance of the selected sustainable business model innovation practices should then include the width of behavioral, experiential, and diverse sources that we have proposed with our factors. Moreover, as we have described those sources, they must be dynamic (time-related), external (reflected mostly on our PE, FC, FU, SI, CO, US constructs) and also internal (mostly covered by our EE, HM, SP, HT, SE, BI). Therefore, we hypothesize:

H1. Entrepreneurs' acceptance of methods to develop their new sustainable business models depend on dynamic external factors (i.e., PE, FC, FU, SI, CO, US) and dynamic internal factors (i.e., EE, HM, SP, HT, SE, BI) to them.

Given the sustainable entrepreneurial context, sustainable business model founders receive notorious influences from several sources. Conventional wisdom and scholarly work usually cite lack of skills (Karadag, 2015), covered by our Facilitating Conditions construct; need for easy implementation (Blank & Dorf, 2012; Drexler et al., 2010; Eisenmann et al., 2011) covered by our Effort Expectancy construct; specific financial challenges (Bergset & Fichter, 2015) covered by our Funding construct; and the satisfaction to improve/comply with others prior to their self-interest (Spence et al., 2008), covered by our Hedonic Motivation construct. Therefore, we hypothesize:

H2. EE, FC, FU, and HM show the strongest relationships with their determinants (i.e., are the most soundly built factors) in the context of sustainable business model creation.

One key issue when addressing sustainable business model innovation studies is the relationship of the new business models with their stakeholders and how this evolves over time. In line with Hart & Sharma (2004), Mitchell et al. (1997) and Von Hippel (1986), we argue that stakeholders should not be considered equally, and their impact towards sustainability if far from homogeneous. It is actual valueholders and their diverse timings the ones that drive the development or failure of the new ventures (see Peralta et al., 2018). This research does not focus on identifying such characteristics, time impact or any other relevant evidences contributing to the valueholder concept, but since our Social Influence definition includes the relationship of entrepreneurs with a broad set of stakeholders, we hypothesize:

H3. Current customers, potential customers, investors, other founders and incubators/accelerators are the groups of stakeholders that drive Social Influence in the context of entrepreneurial eco-innovation.

3.3 Methodology

3.3.1 Measurement

We performed our exploratory factor analysis using the PLS-SEM algorithm and bootstrapping (see Lohmöller, 1989, for a mathematical presentation of the path modeling variant of PLS) included in Smart-PLS 3.0 software. We decided to use PLS due to its power "to simultaneously examine relationships among measured variables and latent variables" (Hair, Jr. et al., 2014) and "its robustness in the face of data noise and missing data" (Garson, 2016).[35]

[35] In general, PLS-SEM shows a higher statistical power than covariance-based SEM and is more suitable for exploratory purposes (Hair, Jr. et al., 2014: 79) and early stage theoretical development (Garson, 2016: 9). This is not to say that PLS-SEM is bias-free, as the multi-linear combination of indicators and constructs produces overestimations of their loadings and weights. This "PLS-SEM bias" has a limited relevance when the model complexity is reduced, and sample size is high (Hair, Jr. et al., 2014: 79). Both requirements are agreed to be met with the 10 times rule (10 times the largest number of formative indicators used to measure a single construct). In our research, our sample size fulfilled the rule as it should mean a minimum of 200 cases (Social Innovation has 20 theoretical indicators)

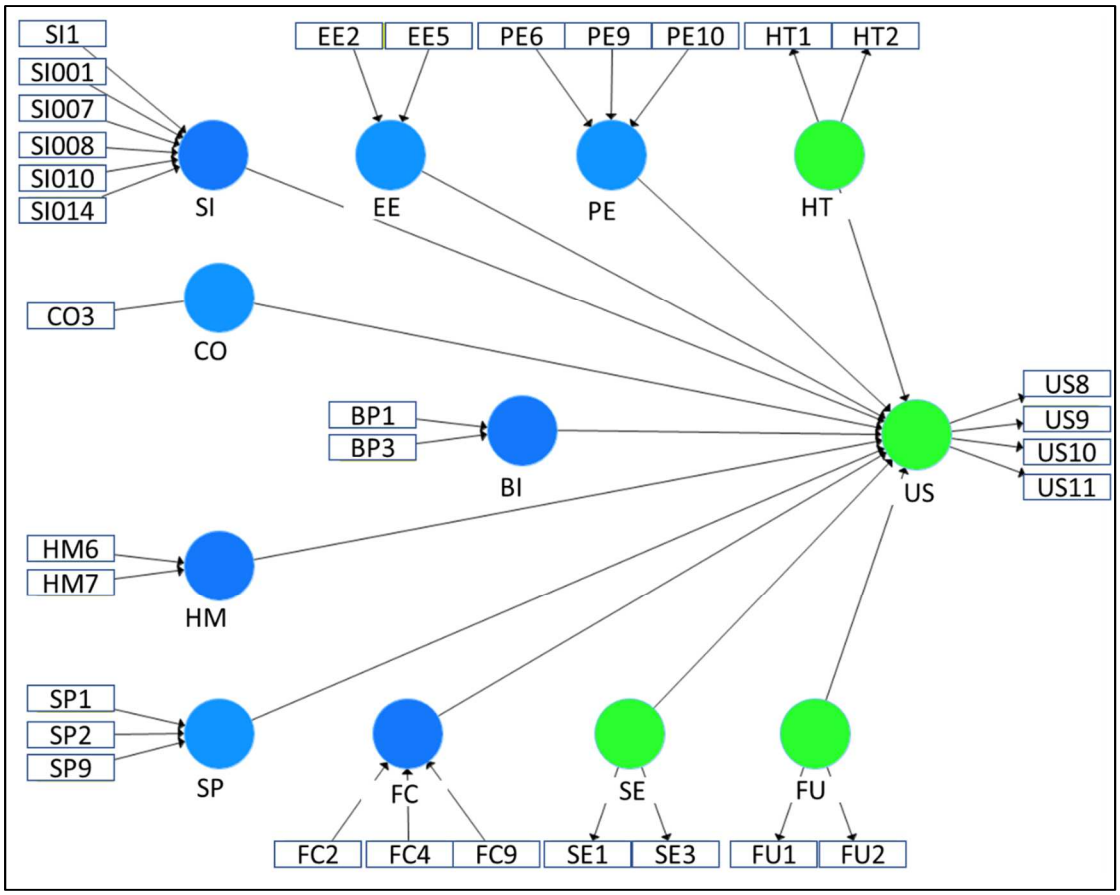

Exhibit 3.2. Measurement model of UTAUT-sustainable business model innovation. Formative (blue) and reflective (green) constructs and their meaningful measures. Arrows pointing to Usage (US) show potential connections in a complete model

Note:[36] PE: Performance Expectancy; EE: Effort Expectancy; SI: Social Influence; FC: Facilitating Conditions; HM: Hedonic Motivation; BI: Behavioral Intention; HT: Habit; SP: Speed; FU: Funding; SE: Security; US: Usage

3.3.2 The questionnaire

To collect our data, we developed a questionnaire to be distributed and administered online. To prevent potential biases common in entrepreneurial studies analyzing entrepreneurs' competencies (Tehseen et al., 2017) and their impact in business outcomes (growth, success, TBL), we opted to follow the recommendations of Tehseen and colleagues (2017) and chose some of their procedural controls as we shared the entrepreneurial context and technique of analysis. As for procedural remedies and to reduce ambiguity and complexity of item

[36] For the sake of clarity, we have not listed all the formative and reflective indicators (the complete measurement model), but they are available from the authors upon request

formulations, we tested the initial versions of the questions with nine experts[37], and versions of the draft questionnaire were sent out in two waves to a sample population of 998 entrepreneurs. These tests helped us to limit the time spent in each section, and as suggested (*ibid*: 146-147), we also included different formats of response (e.g., randomly presenting the items, or introducing supplementary binary items) for some of the constructs (particularly the dependent variable). We changed the general positive style of the questions to negative in items PE10 (opposing PE6) and SP2 (opposing SP1). Additionally, we protected the anonymity of respondents (which they knew prior to starting the questionnaire with specific messages included in its instructions) which complemented our control for critical biases (e.g., common method variance).

3.3.3 Participants and collection of data

Our survey was administered online and in Spanish to a population of 4,038 experienced Spanish entrepreneurs.[38] All of them were identified by their profiles in social networks using a country-wide random search logic followed by a personal message of the lead author informing of the research project and asking for their voluntary participation. From a procedure perspective, participants were prevented from repeated participation.

As a geographical location, Spain was selected for this study due to the wide variety of initiatives (private and public, domestic and international) that make Spanish entrepreneurs being exposed to nearly the full variety of structures and modes of entrepreneurship, across all regions. Also, Spain and its economic agents (entrepreneurs included) are highly influenced by national and international eco-innovation drivers. For example, there are modest domestic sources for and investments in eco-innovation (Peñasco et al., 2017) but European green policies and cooperation with other international agents positively and significantly influence the awareness and diffusion of eco-innovation among entrepreneurs (*ibid*). Although much remain to be made from public and private agents, Spanish entrepreneurs seem to show a high awareness of environmental and social formal and informal requirements and needs as it is reflected in our majority of participants declaring goals beyond financial and economic metrics (Table 3.1).

[37] The list of experts is available from the authors upon request

[38] Each participant was identified using “entrepreneur”, “founder”, “founding partner” and their Spanish translations out of a total population of 84,709 (at March 31, 2018), and publicly declaring two-year+ experience developing new business models (each was individually cross-checked with available data on their past and current entrepreneurial projects), currently holding positions either as heads or co-founders of their businesses and being based in Spain (both their businesses and them)

We had 234 cases (25 cases were missing the last part of the questionnaire, which we filled using each item's sample median[39]) with 41 women, and ages ranging from 19 to 73 (221 cases were between 26 and 65). 140 individuals declared pursuing social and/or environmental goals, in addition to economic objectives, and these represented our subset of sustainable entrepreneurs. Taking this subset, we executed PLS-MGA and parametric tests to identify relevant differences by observed groups, but we did not find any statistical significance among our "triple bottom line" entrepreneurs and the rest.

[39] Out of the 600+ started surveys we have collected and due to the exploratory nature of this study, we decided not to drop these 25 cases as they included raw responses for all our determinant items and were only missing the last part of our questionnaire, which mostly included some voluntary respondent identification data and the explicit controls for common method variance (CMV). Our analyses of statistical significance of the effects of this inclusion in this CMV control is not meaningful, and it adds robustness to the rest of our analyses (i.e., internal consistency)

Industry	Secondary	Bachelor	Graduate/ Master	PhD.	Other	
Agriculture, Manufacturing		**3**				**11**
ECON		3	2			5
TBL		5	1			6
Arts, Entertainment, Media		**4**	**3**		**1**	**21**
ECON		4	5			9
TBL		1	10		1	12
Business Services	**1**	**26**	**33**	**5**		**65**
ECON	1	14	14	2		31
TBL		12	19	3		34
Consumer Services	**2**	**7**	**7**		**2**	**18**
ECON	1	1	4			6
TBL	1	6	3		2	12
Education		**2**	**12**	**2**		**16**
ECON		2	5			7
TBL			7	2		9
Engineering, Energy, Utilies			**3**			**5**
ECON		1	1			2
TBL			3			3
Fashion		**3**	**2**	**1**		**6**
ECON		2		1		3
TBL		1	2			3
Finance & Insurance	**1**	**5**	**5**	**1**		**12**
ECON		3	2	1		6
TBL	1	2	3			6
Government,NGOs		**1**				**2**
ECON		2				1
TBL			1			1
Health Services		**1**	**9**	**1**		**11**
ECON			2			2
TBL		1	7	1		9
IT	**1**	**10**	**19**	**3**	**1**	**34**
ECON		4	3			7
TBL	1	6	16	3	1	27
Lodging, restaurants, food		**4**	**3**			**14**
ECON		4	2			6
TBL	1	4	3			8
Retail Sector		**6**	**6**	**2**		**14**
ECON		2	3	1		6
TBL		4	3	1		8
Transportation		**1**	**3**			**4**
ECON		1	1			2
TBL			2			2
ECON	**2**	**43**	**44**	**5**		**94**
TBL	**4**	**42**	**80**	**10**	**4**	**140**
	6	**85**	**124**	**15**	**4**	**234**

Table 3.2. Distribution of sample participants by industry, declared new business model objectives and education

Note. ECON: only economic goals; TBL: triple bottom line goals

3.4 Results and discussion

To obtain our results, we followed the recommended path weighting method in the PLS algorithm of Lohmöller (Garson, 2016: 38) performing 5,000 iterations. Table 3.3 and Table 3.4 present the measurement results.

	Loading	Mean	SD	VIF	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
[FU1] <- Funding	0,544***	0,546	0,049	2,134	0,843	0,844	0,927	0,864
[FU2] <- Funding	0,531***	0,530	0,052	2,134				
[SE1] <- Security	0,407***	0,398	0,071	1,981	0,826	0,977	0,916	0,845
[SE3] <- Security	0,671***	0,677	0,070	1,981				
[HT1] <- Habit	0,506***	0,505	0,028	1,555	0,748	0,766	0,887	0,797
[HT2] <- Habit	0,612***	0,614	0,033	1,555				
[US10] <- Usage	0,277***	0,277	0,014	2,115	0,885	0,890	0,921	0,745
[US11] <- Usage	0,310***	0,310	0,016	**5,191**				
[US8] <- Usage	0,302***	0,302	0,015	5,000				
[US9] <- Usage	0,268***	0,268	0,014	2,183				

Table 3.3. PLS-SEM loadings, descriptives, reliability, validity figures and VIF coefficients of reflective constructs

Notes:

1. HT: Habit; SP: Speed; FU: Funding; SE: Security; US: Usage.
2. *p < 0.05; **p < 0.01; ***p < 0.001

Reflective constructs and their measurements loadings were assessed for reliability and validity using mixed methods. Path loadings were above .80. P-values were also signficant in all cases at the .001 level. Moreover, convergent validity through composite reliability (all values > .80), or Cronbach's alfas (over .70) reflect good scales and high convergent validity. Finally, AVE values show good convergent and divergent validity values over .50.

	Weight	Mean	SD	VIF
[EE2] -> Effort Expectancy	0,178*	0,180	0,073	1,120
[EE5] -> Effort Expectancy	0,927***	0,923	0,040	1,120
[CO3] -> Cost	1***	1,000	0,000	
[HM6] -> Hedonic Motivation	0,803***	0,801	0,065	1,512
[HM7] -> Hedonic Motivation	0,290***	0,290	0,082	1,512
[BI1] -> Behavioral Intention	0,802***	0,801	0,051	1,482
[BI3] -> Behavioral Intention	0,295***	0,295	0,066	1,482
[PE6] -> Performance Expectancy	0,530***	0,524	0,136	1,832
[PE9] -> Performance Expectancy	0,485***	0,476	0,134	1,805
[PE10] -> Performance Expectancy	0,294**	0,297	0,112	1,020
[SP1] -> Speed	0,612***	0,601	0,098	1,024
[SP2] -> Speed	0,459***	0,457	0,110	1,014
[SP9] -> Speed	0,542***	0,537	0,086	1,010
[FC2] -> Facilitating conditions	0,523***	0,513	0,113	1,341
[FC4] -> Facilitating conditions	0,361**	0,361	0,132	1,378
[FC9] -> Facilitating conditions	0,507***	0,497	0,122	1,048
[SI1] -> Social Influence	0,487***	0,475	0,136	1,035
[SI001] -> Social Influence	0,380*	0,329	0,163	1,690
[SI007] -> Social Influence	-0,317*	-0,289	0,169	1,773
[SI008] -> Social Influence	0,324*	0,285	0,155	1,600
[SI010] -> Social Influence	0,268*	0,234	0,146	1,894
[SI014] -> Social Influence	0,342*	0,297	0,151	1,661

Table 3.4. PLS-SEM weights, descriptives, reliability and multicollinearity VIF coefficients of formative constructs

Notes:

1. PE: Performance Expectancy; EE: Effort Expectancy; SI: Social Influence; FC: Facilitating Conditions; HM: Hedonic Motivation; BI: Behavioral Intention.
2. *p < 0.05; **p < 0.01; ***p < 0.001
3. Rest of measures of these constructs were dropped due to p-value higher than 0.1, and therefore deemed non-significant.

Table 3.4 shows path loadings for formative components that were significant at p-values <.05. The rest of the indicators with paths weights falling below that threadshold were subject to deeper analysis to assess their representativeness. As an example, Social Influence, our construct with the largest number of indicators (20) was further analyzed when indicators SI001-SI0017, SI009-SI0013, and SI0015-SI0019 showed very low path weights and p-values > .10. In this case, all those indicators were dropped to keep the factor reliable (we kept those indicators which were significant at p< .10). Also, noticeable is the Cost composite. Originally consisting of two indicators, we dropped CO1 as it was insignificant (p=.679) with very low weight.

Reflective constructs show certain collinearity, which is normal in these models, not being a meaningful issue (Garson, 2016: 72). Our formative indicators show no overlapping, even at the VIF 2.5 stringent cutoff value.

Our H1 hypothesis was fully supported, as all our factors and components were rightly addressed by at least one measurement. Most look very strong in terms of relevance (p-values of .01 or lower). This might suggest that both external and internal factors are influencing the acceptance of sustainable business model innovation practices among entrepreneurs. Further investigations are needed to identify the relative importance of these factors and their evolution along time.

As for our H2 hypothesis, it is partially confirmed. Effort Expectancy and Hedonic Motivation are among the ones with higher loadings. Facilitating Conditions and Funding are not as strong as others like Speed. This might mean that entrepreneurs favor those sustainable business model innovation practices that seem easier to implement (Mansoori, 2017; X. Yang et al., 2018) and allow them to feel they are fulfilling their dreams (Frederiksen & Brem, 2017; Picken, 2017). But they do not seem to regard FC or the search for external funding as strongly as other variables, which might be the consequence of a lack of trust in the entrepreneurial education and support

they find in Spain, public or private. Further research might test the relationship of these variables with Usage and can confirm these initial conclusions. One composite emerging with a lot of strength is Behavioral Intention, which is particularly relevant in our research on usage of methods to develop sustainable business models, as it is devised as a moderator of our exogenous variables and Usage.

Regarding our H3 hypothesis about which stakeholders are more salient, or significant in terms of influencing the entrepreneurs' usage of methods to sustainable business model innovation, the results are mixed, and the hypothesis is partially supported. Out of the hypothesized groups, potential customers (SI001) and investors (SI008) appear as meaningful drivers (Rasmussen & Tanev, 2016). Left out are current customers, and incubators. The groups that also appear to be meaningful for deciding on which eco-innovation methods to use are employees of the current sustainable business model innovation project (SI010), and teachers/instructors (SI014) (Mansoori, 2017). National/regional government (SI008) is significant too, but our sample of entrepreneurs apparently showed a lack of understanding or detailed references about these entities in the tools they use for sustainable business model innovation (this issue has been approached also by Unterkalmsteiner et al., 2016).

Our BI and US constructs theorized that the entrepreneurs use three alternatives for sustainable business model innovation (the conventional NPD, Lean Startup and 'no method at all'). This was in accordance with antecedents from academia and practice (Blank & Dorf, 2012; Boons & Lüdeke-Freund, 2013; Eisenmann et al., 2011; Geissdoerfer et al., 2016). Our results showed that entrepreneurs use the three practices as they serve the purpose of helping them develop their sustainable business models. Further research, though, should establish the model that explains how this usage behavior is formed and if there are any differences among the usage of the three methods (Euchner, 2016; McGrath, 2010; Zalewska-Kurek et al., 2016).

PE was theorized as the construct that captures the economic motivation of an entrepreneur to build a sustainable business model using one particular method. Our results show that, being significant, other constructs more in line with the eco-innovation precepts (Bergset & Fichter, 2015; Schaltegger et al., 2012; Stubbs & Cocklin, 2008) like Social Influence or Funding show similar strength. This may indicate that entrepreneurs balance economic achievements with other outcomes, but further research would be needed to understand if performance along the triple bottom line has any real impact in the preferred use of a sustainable business model innovation method.

EE, or the perceived complexity of a practice, is pointed out as one major driver of the use of any sustainable business model innovation practice to develop sustainable business models (Blank & Dorf, 2012; Picken, 2017; Schaltegger et al., 2012; Wirtz et al., 2016). This might suggest that the practices we have presented to the entrepreneurs are clear to understand and master and are actionable, without much difference. And this is an important driver for any initiative favoring new sustainable businesses should build on these methods. Whether using one or the others is leading each new project to success and in which conditions they are used remain as a potential extension of our research.

SI was theorized in our chapter to address the influence of the different stakeholders in the entrepreneur. Our approach to this factor left the entrepreneurs free to choose whom among different stakeholders could be more salient or relevant (Hart & Sharma, 2004; Mitchell et al., 1997; Von Hippel, 1986), by in their treatment in their preferred strategic and implementation tools. Our significative salient groups (potential customers (SI001), investors (SI008), employees of the current sustainable business model innovation project (SI010), teachers/instructors (SI014) and national/regional government (SI007)) are certainly shocking: entrepreneurs concentrate on potential customers as their businesses need more “new fuel” and they look for it in new customers rather than in current clients. They also look for investors as additional sources of funds and which might drive adaptations of entrepreneurial support to address this community needs. They also concentrate on early employees, as it is probably a major source of both benefits and drawbacks for a young business. The relevant presence of instructors and the government seem to point out to the support they receive from them, which might indicate a stronger role of both types of agents in the construction of new businesses (Mansoori, 2017). It is also meaningful that other stakeholders (e.g., users, influences, family, or suppliers) do not show enough relevance in our sample, which might be due to the way data was collected, but beyond its meaning, this construct results support our theory of the different effects of stakeholders in the design and, more importantly, in the implementation and review of any eco-innovation strategy. Further research should deepen in this analysis, and the identification of valueholders (Peralta et al., 2018), as particular groups affecting the successful development of sustainable business models.

Our theory behind the FC construct was related to the support entrepreneurs find to advance and master the sustainable business model innovation method chosen. But it also covers the compatibility of their preferred practice with other tools. Only the Minimum Viable Product, a concept originally associated with Agile Development (Blank & Dorf, 2012; Dybå & Dingsøyr, 2008) shows as significant. Moreover, this construct’s results, coupled with the negative loading

of the National/regional Government in SI might mean that entrepreneurs find the public training programs specially designed for them supportive, but that they do not know how to integrate national and regional government impact in their developments (Unterkalmsteiner et al., 2016).

The enjoyment and learning of using a sustainable business model innovation practice, which we theorized in HM is another of the major drivers to use a modelling method. Entrepreneurs turn to teachers and instructors and to the easiness and enjoyment of using a practice to value and use it. This might suggest that they use tools that are easy and enjoyable, and that have a pleasant support, independent of the results they can reach with them. If this were the case, certainly our results may contribute to the design of training and education programs on eco-innovation of business models.

CO addressed the observable costs of implementing a sustainable business model. Only one significant measure formed this construct, suggesting that entrepreneurs use their sustainable business model innovation practice if it facilitates cost control: in other words, the method chosen is needed to be able to control costs. The sustainable business model innovation methods described here do not include specific, but very general, controlling tools. Further research should address this connection between the sustainable business model innovation method and its cost-controlling use. Moreover, this new line of research could also address the control of unobservable, social and greener costs.

HT helps us understand the real impact of the method in the lives of entrepreneurs. Basically, if the chosen sustainable business model innovation method is believed to drive their efforts towards their vision. Our results show a positive and significant relationship of this Habit with their agenda and commitment, and this might be another important characteristic of any preferred practice: it must clearly state an agenda that produces habits towards success.

SP is the construct we use for addressing one of the major tenets of Lean Startup, Agile Development and the latest developments of the NPD process (Blank & Dorf, 2012; Geissdoerfer et al., 2016) which is the ability of entrepreneurs to be swift. We theorized that using a method for creating new sustainable business models could slow their developments. Based on our results, we know that the sustainable business model innovation methods do not seem to slow the pace of creation of sustainable business model and they are related as accelerators of that pace.

Our second extension of the UTAUT and UTAUT2 models is related to the role of a particular stakeholder group (Blank, 2016), the investors, who are also one of the few relevant for

sustainable entrepreneurs. In this case, with the FU construct, we theorized that this group is relevant because it is addressed in their planning tools and drives stages of development of sustainable start-ups. Our results confirm that Spanish entrepreneurs focus on investors before other stakeholders as drivers of their businesses progress It opens a new line of research to deepen on which specific elements of the sustainable business model innovation practices are deemed important for investors at each stage and how the sustainable business model innovation practice is then adapted to from the original formats to address those investor needs.

SE was our last addition to tailor our behavioral framework to the sustainable business model innovation context. It theorized the need of entrepreneurs to seek a secured source of personal income to live comfortably and help others (their employees) secure their jobs. Our results confirm that employees are a major driver of the behavior of an entrepreneur: they are one of the few referenced groups in their planning tools and the reason might lie in the effort entrepreneurs make to ensure their security, above others.

3.5 Conclusions

Our chapter provides empirical support to the factors we theorized are influencing the acceptance of entrepreneurs of sustainable business model innovation practices to design and implement their sustainable business models. We have identified, described and empirically supported behavioral structures (composites and factors) that influence the usage of any of the sustainable business model innovation methods or practices commonly available for business modelling. Based on extant behavioral models of acceptance of technology and business practices, we have developed a strong framework of eleven factors, combining academically grounded concepts (Intention, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Costs/Price, Habit) and three new constructs (Speed, Funding, Security), derived from the relevant literature on sustainable business model innovation.

Second, these factors are constructed using external and internal influences and include collective and individual determinants. In doing so, we have contributed to advance the research on the individuals' relevance when creating sustainable business models. Our stronger constructs, built with those considerations in mind, Effort Expectancy (i.e., the easiness of use, or "actionability", of the sustainable business model innovation method) and Hedonic Motivation (i.e., the enjoyment and learning the sustainable business model innovation method produces) partially support our second hypothesis. These two constructs and Behavioral Intention, which also shows unexpected strength, shed light on which could be the relevant

constructs to be taken into account when entrepreneurs select a sustainable business model innovation practice. As a first approach to knowing what drives the entrepreneurial use of sustainable business model innovation practices, our chapter provides support to the underexplored field of implementation practices of eco-innovation at the strategic, operational and tactical levels. This is particularly relevant when starting up a firm, as the entrepreneurial team faces uncertainty when implementing their plans in any of those three levels. Having a sound sustainable business model innovation strategy is deemed as a required component for success (Amit & Zott, 2012; Baldassarre et al., 2017; Boons & Lüdeke-Freund, 2013; Evans et al., 2017; Klewitz & Hansen, 2014) and we argue that knowing which factors drive the acceptance of a design and implementation method can additionally strengthen any strategy development, most particularly eco-innovation strategies. This might be relevant for entrepreneurs, incubators, accelerators, mentors and academic institutions devoted to teaching entrepreneurship, as they present concrete areas needing special attention. For example, making one particular sustainable business model innovation practice more actionable than other lures entrepreneurs to it, independent of its perceived efficacy. And the same happens with those practices that are more enjoyable, whether they are properly fitted for successful sustainable business model development. Our findings complement those of Kanda and colleagues (2018), suggesting a clear bias of the roles they identified of support agents towards balancing all constructs in their activities with entrepreneurs. This might mean that an incubator should probably build on the actionability and enjoyment of a particular sustainable business model innovation practice to introduce other relevant aspects like Security, easier access to Funding, Speed and the rest of our eleven constructs and rightly balance them in their incubated projects.

Finally, we also contribute to the current sustainable business modelling and stakeholder discussions by identifying groups of valueholders that may be more salient or more influential for seasoned entrepreneurs.

Limitations and future research

The main limitation of the current research is its static, frozen-picture-like view of the elements or structures (constructs) that influence the entrepreneurs' use of one sustainable business model innovation practice. These change with time, experience and failure (Blank, 2010; Eisenmann et al., 2011). But our exploratory research, being one of the first of its kind, is short in fully addressing 'time', 'learning', and 'valueholder' effects. This might be a novel and

promising line of research, starting from our factors and investigating their evolution at each stage of the sustainable business models' development towards growth and success.

Another limitation is the localization of our sample. Future research on the acceptance of sustainable business model innovation practices following the path we just opened could provide a wider perspective of this research, including samples from other countries and adding other characteristics (i.e., corporate vs. non-corporate entrepreneurs, Western vs. Asian countries, eco-countries vs. non-eco-countries).

A final concern is the relationship of the factors and the actual usage of a sustainable business model innovation practice. Due to space limitations, we were not able to present here these relationships in a model that fits those elements into a sound sustainable business model innovation practice acceptance theoretical model. Furthering into that line, strengthening the current relationships of the factors and uncovering new relationships among the factors are two wide and needed new research fields.

4 Chapter 4. Experimenting with Business Model Eco-Innovation: Modelling The Entrepreneur's Decision On Which Practice To Use To Create Sustainable Businesses[40]

4.1 Introduction

Research on how entrepreneurs make decisions regarding their development of new sustainable business models (sustainable business models) is still infant. We believe that this decision-making process (Ye, 2016) has among its earliest steps the entrepreneur's acceptance of the practice s/he would use and experiment with to build a sustainable business model. Experimentation, learning and retaining strategic flexibility (Andries, et al., 2013) seem to be among the top innovation capabilities to succeed with certain types of innovation-driven activities (Bocken, et al., 2018). But it is only through the use of one innovation practice or another (including the absence of a "formal" practice in a sort of effectual learning; Sarasvathy, 2001) that experimentation is enabled and deployed (Rissanen & Sainio, 2016).

By explaining how the entrepreneur's acceptance of such a practice is influenced by external and internal factors, this chapter contributes to the extensive field of business model innovation (Wirtz, et al., 2016) and the novel business model experimentation for sustainability field (Antikainen & Bocken, 2016; Weissbrod & Bocken, 2016) addressing the following gaps. First, the connection of new business models with sustainability concepts and the means and practices to activate that connection is what we call 'sustainable business modelling'. The actual development of sustainable business models (sustainable business models) is still undergoing deep investigations (see a recent example in Tiemann, et al., 2018). We have not found an abundant body of literature identifying the building parts of sustainable business models and the actual process of putting them together through business model experimentation for sustainable success (see a recent example in Bocken & Antikainen, 2018). An unfortunate consequence of this novelty is that concepts like tools, testing methods, priorities and even sustainable business model development practices get often confused with each other and this confusion may be having us stuck in how to proceed further. Academics devote much time to explain such tools and seldomly describe how tools, challenges or activities fuse into methods

[40] This chapter has been submitted to the Special Issue on Business Experimentation for Sustainability of the Journal of Cleaner Production (IF: 6.352) and is currently under review

and practices, how these drive tests and other experimentation actions to produce successful sustainable business models. Second, we have the impression of an ever-compounding complexity, saturation of concepts and over-abundance of indications to potential influences about how to start and develop a new sustainable business model. We believe there is a distinguishable call for simplification and in-depth analyses to identify what really matters to successfully grow a new sustainable business model and to successfully enact sustainable business model innovation in different contexts. Third, although we still may be at an exploratory stage regarding sustainable business model innovation and sustainable business models, some researchers have already advocated for a dynamic perspective to study these developments (Weissbrod & Bocken, 2016; Cavalcante et al., 2011). And not only 'time' is relevant from this perspective. Also, the 'individual' (vs. 'mass' or 'collectivity') is needing attention (Cavalcante et al., 2011: 1329) as it is the individual behaviors that foster innovation (Felin and Foss, 2005; Crossan and Apaydin, 2010). 'Time' and 'individual behaviors' are missing in most current sustainable business model innovation analyses. And four, we miss deeper research on the balance between external and internal factors (stakeholders) dynamically enabling or obstructing sustainable business model innovation (Bocken et al., 2018). If we all acknowledge a broad definition of stakeholders as key to develop sustainable business models, we cannot forget the influences of externalities in testing and construction of organizations and individual behaviors, and vice-versa. And we know these influences are not equally weighted and timed (coordinated), but we lack a good understanding on valueholders[41] at various times of the sustainable business model innovation development.

It is at the intersection of the decision to build a sustainable business model, the use of sustainable business model innovation practices and how these practices help to manage the dynamism of sustainable business model innovation where we place our research. Specifically, our research question is: How factors/constructs deemed as relevant in the acceptance of sustainable business model innovation practices influence the innovators' decision to use those practices to build a new sustainable business model? The answer to this research question is relevant due to: (1) its description of the multiple factors, mostly intangible, affecting the actual use of a sustainable business model innovation practice as the main driver of the experimentation and building processes of a sustainable business model; (2) its explanation of

[41] We have defined valueholders as 'salient stakeholders' (Crane & Ruebottom, 2011; Hart & Sharma, 2004; Mitchell et al., 1997)they are connected with their influence and the time they enact that influence, critically affecting the success of a new sustainable business model (see Peralta et al., 2018, for an extended description)

the yet unclear interaction of these factors with each other; (3) its contribution with a model that clarifies which factors determine the decision to use a sustainable business model innovation practice.

The rest of this chapter firstly presents a review of relevant sustainable business model innovation literature and addresses de gap of measuring the acceptance of a sustainable business model innovation practice. We then elaborate on our empirical methodology and the results of our research, which help us conclude with a discussion on the soundness of our model to explain what drives entrepreneurs' use of a sustainable business model innovation practice. We also describe potential implications of our findings.

4.2 Literature

4.2.1 Development of sustainable business models and experimentation in the literature

The conceptual connection of new business models and sustainability underpinnings (see Bocken, et al., 2016 or Lüdeke-Freund, et al., 2018) revolve around the idea of a business model value proposition, that becomes the seed for sustainable benefits. But this, in our opinion, under-researched bond between a business model's value proposition and sustainable concepts extends to the rest of the so-called building blocks or elements of a business model (Osterwalder & Pigneur, 2010). These gaps are particularly relevant at sustainable business modelling, i.e. the actual development of sustainable business models, which is still undergoing further investigations (Tiemann, et al, 2018). Therefore, concepts like tools, methods, practices get often confused with each other and this confusion may be preventing further advancement in this domain. For instance, Chang and his colleagues (2012) described how incumbents approached a successful combination of product and market (based on Lynn et al., 1996 in Chang et al., 2012) through a process of probing, experimenting, and repeated learning with new ideas, new R&D, and manufacturing/marketing tools. At about the same time, Blank and Dorf (2012) insisted on how startup firms and challengers must concentrate their discovery and validation efforts to test and experiment with different hypotheses referring to the BMC blocks and their interconnections (Andries et al., 2013, later described a similar "simultaneous experimentation" process). To this day, academics in the sustainable business model innovation field have devoted much effort into explaining toolboxes for sustainable business model innovation. But we still need research explaining how sustainable business model innovation tools, challenges and activities might combine into comprehensive experimentation methods and validation practices. These methods and practices are what we call sustainable business model innovation

practices and connect a business idea with a working sustainable business model (or sustainable business models) through a series of experimentation and testing stages.

To the best of our knowledge, studies proposing and deepening on sustainable business model innovation practices, like Geissdoerfer, et al. (2016), Peralta, et al (2018), Weissbrod & Bocken (2016) or in a more general vein (Andries et al., 2013) are rare. Call it a 'journey' (Roome & Louche, 2016; Wicki & Hansen, 2016), a 'pattern' (Lüdeke-Freund et al., 2018) or a 'path' (Steve Blank & Dorf, 2012), sustainable business models seem to be the result of either of two experimentation alternatives or sustainable business model innovation practices (largely coinciding with the two approaches described by organizational learning theory: Andries et al. 2013): A stage-gate, linear process like the New Product Development (NPD: York & Danes, 2014; Cooper, 2000)[42] and a non-linear process like Lean Startup (Blank & Dorf, 2012; Eisenmann, et al., 2011; McGrath, 2010)[43]. The decision to use of either process of "business model development" (Roome & Louche, 2016:6) through experimentation seems neither random (Andries et al., 2013: 305) nor simple given the amount of concepts influencing that decision (see Exhibit 4.1: top part).

[42] NPD or the conventional sustainable business model innovation process is mostly based on Lynn et al (1996) description of probing and repeated learning within an established firm. This experimentation ability relates and adapts with each NPD stage (ideas, R&D, manufacturing, marketing and commercialization) and today it has adopted tactics like Design Thinking or Agile development to some extent (Cooper, 2014). This ability in NPD follows in most stages a natural-science experimentation approach (Weissbrod, 2019) with characteristics of a "focused commitment" approach

[43] Experiments and validation tests are cyclical in Lean Startup. Its Customer Development experimentation process is designed to test business model hypotheses following a non-linear process (Ries, 2011; Täuscher & Abdelkafi, 2016), very much like any epistemic falsification in science (as it is described in Weissbrod, 2019)

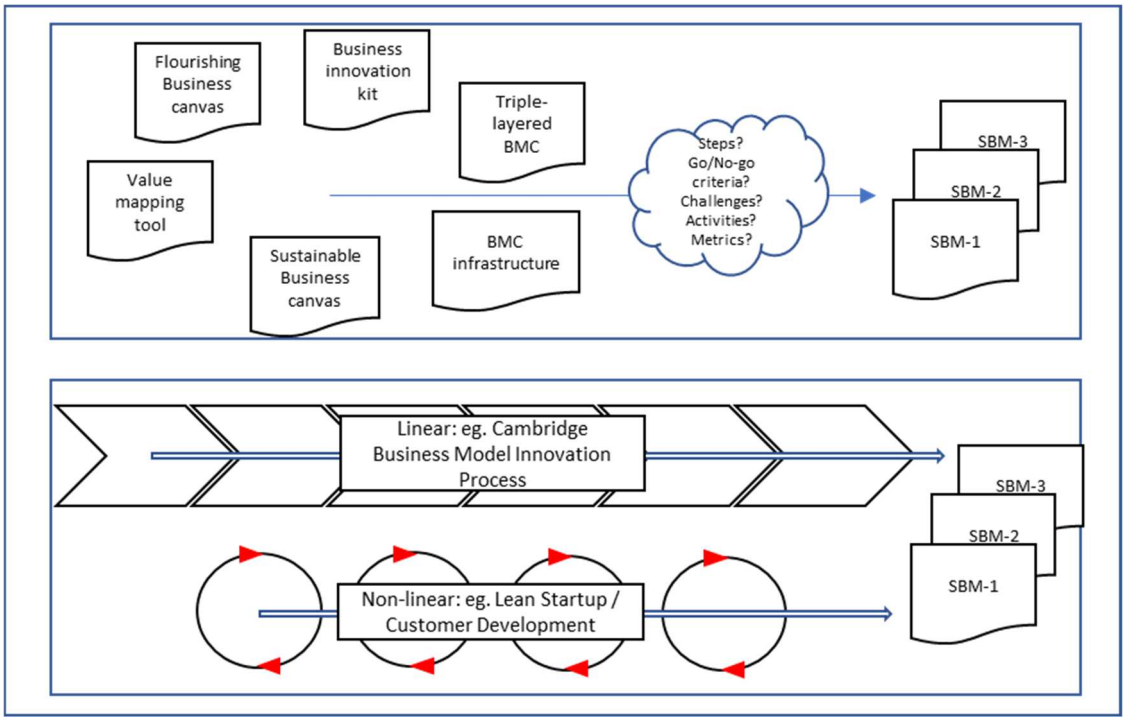

Exhibit 4.1. A comparison between views of tools for sustainable business model innovation testing: A scattered view (based on Tiemann et al., 2018: top), and a more integrated, practice-like perspective (based on Blank & Dorf, 2012; Geissdoerfer, et al., 2016; Andries, et al., 2013: bottom)

Having covered our proposal for (1) ordering the academic efforts to effectively uncover (2) what enacts the development of successful, competitive sustainable business models next we address (3) how to measure that development.[44]

4.2.2 Measuring the development of sustainable business models

We know that a linear NPD process can address our #(1) purpose, although its compromise with sustainability might be limited if cluttered with conventional, established-business measurements (as Blank and Dorf, 2012, or Muller, et al., 2005, denunciated). As for the #(2) purpose, a multilinear method like Lean Startup/Customer Development seems better equipped to dynamically and simultaneously deal with multiple valueholders (Blank, 2013; Eisenmann et al., 2011; Peralta et al., 2018). This method's innovation metrics also help with our #(3) goal and

[44] This is along rationales like Blank and Dorf's (2012) that also warn us because what matters in a new sustainable business model is different from an established business model and therefore: "startup metrics are different from those in existing companies"(Ibid).

facilitates the alignment of actions with goals (Muller, et al., 2005) by limiting the number of metrics to track.[45]

Regarding the development of sustainable business models using linear or non-linear experimentation processes and their measurements, we still are at an exploratory stage. But we believe that dynamic analyses of the use of these sustainable business model innovation practices is already needed (much in line with Cavalcante et al., 2011). 'Time' seems relevant ('time sensitivity' in Weissbrod & Bocken, 2016), but we have not yet seen how linear and non-linear sustainable business model innovation practices become affected by it, particularly in the shorter run. Moreover, the 'individual' (abilities, knowledge, emotions) perspective is requiring attention (Cavalcante et al., 2011: 1329) as it is this individual's (the innovator) behaviors that produce innovation (Felin & Foss, 2005; Crossan & Apaydin, 2010) and bias both experimentation and interpretation of experiments.

Mitchell, et al. (1997) seem a good starting stance for those analyses. But since them, we are missing contributions describing the dynamic balance (Exhibit 4.2) of external and internal salient stakeholders enacting and obstructing sustainable business model innovation at each moment or stage. In our review, we have not found many references to the influences of externalities affecting sustainable business model innovation practices, and vice-versaSee Kieffer et al., 2018 for one of the few. And neither have we found references to how experiments should measure the changes in weight (salience) of these stakeholders and their influences, or how those weights change over time (whether they are coordinated or not). Nevertheless, salient stage-related stakeholders, or 'valueholders' (Peralta et al., 2018), gain great relevance for sustainable business model innovation success when connecting the stakeholders, time and organizational and individual influences. Exhibit 4.2 shows how the valueholders might regulate the sustainable business model development and tests over time. Their impact originates new business models to address their needs, which in turn affect individually and organizationally the original sustainable business model.

[45] The rationale of a reduced set of metrics to drive a complex organization is extensively discussed in the literature. Lean Startup advocates make use of that rationale for new business models. They nest relevant leading and lagging indicators to drive the modelling of a new sustainable business model similarly to antecedents like the Balance Scorecard (Kaplan & Norton, 1992), Activity Based Costing (R. Cooper & Kaplan, 1988) or the House of Quality (Hauser & Clausing, 1988)

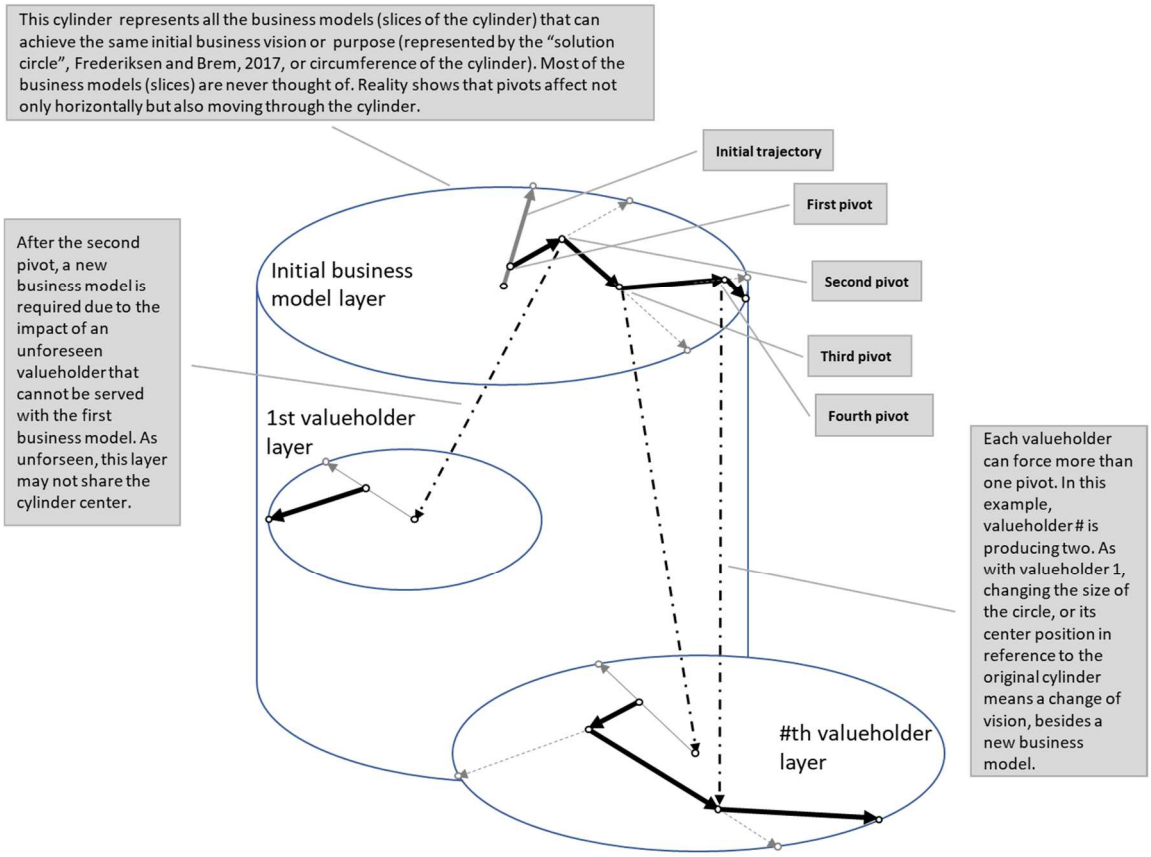

Exhibit 4.2. Valueholders, stages of sustainable business model development and individual and organizational adaptations (pivots). Developed from Frederiksen and Brem (2017)

It is the intersection of the decision to build a sustainable business model using sustainable business model innovation practices, the application of sustainable business model innovation practices to experiment with, measure and manage the dynamism of new sustainable business model development that has led us to build the UTAUT-sustainable business model innovation framework.[46] The next section presents this framework that aims to integrate the effects of valueholders, their time-related salience and other conditions that form the decisions of early-stage innovators when building new sustainable business models.

4.2.3 Sustainable experimentation practices and the UTAUT-sustainable business model innovation framework

The UTAUT-sustainable business model innovation framework helps study the acceptance and use of sustainable business model innovation practices by founders of sustainable business

[46] Our framework is based on the widely referenced Unified Theory of Acceptance and Use of Technology (UTAUT: Venkatesh et al., 2003, 2012) to model how innovators accept and decide to use sustainable business model innovation practices (Peralta et al., 2019)

models and eco-entrepreneurs.[47] The first step in its development is the identification of the constructs driving that acceptance and use. In an effort to clarify how these decisions are taken, we used a summary of psychology, sociology and motivation theories (see Venkatesh et al., 2003 and Venkatesh et al., 2012). Then, we designed twelve constructs explaining the influences and sizes of external and internal effects, as well as collective and individual behavioral traits influencing what sustainable business model innovation practice to use. Table 4.1 presents a summary of these constructs, that were built after the identification of what really matters for eco-entrepreneurs in the first stages of their sustainable business models' development.

UTAUT-sustainable business model innovation Construct	Description
Behavioral intention (BI)	This is the founder's intention to use a particular method (practice or technology) to experiment and develop a sustainable business model
Usage (US)	This is the dependent variable measuring the actual use of a sustainable business model innovation practice
Performance expectancy (PE)	This is the degree to which an individual believes that using a sustainable business model innovation practice will help him or her to build a successful sustainable business model
Effort expectancy (EE)	This is the easiness of use of a particular sustainable business model innovation practice or method
Social influence (SI)	This is the degree to which an individual perceives that important others believe s/he should use a certain sustainable business model innovation practice
Facilitating conditions (FC)	This is the degree to which an individual believes that an organizational and technical infrastructure exists to support his or her use of a certain sustainable business model innovation practice
Hedonic motivation (HM)	This is the fun or pleasure derived from using a sustainable business model innovation practice

[47] The identification or validation of the sustainable business model innovation practices for the actual development of successful sustainable business models can be found in Peralta et al. (2018), Geissdoerfer et al. (2016) or Weissbrod & Bocken (2016) and their ongoing research

Costs/price (CO)	This refers to the costs of the experiments to develop a sustainable business model, and include collaboration costs of the founding team and rest of costs needed to succeed in each stage of the chosen sustainable business model innovation practice
Habit (HT)	This is viewed as prior behavior and it is measured as the extent to which an individual believes the behavior to be automatic
Speed (SP)[48]	This is defined as fast decision-making, cycle time, speed and tempo
Funding (FU) [10]	This construct reflects the need for money to start and scale any venture, whether it is for product development or any other "liquidity events" (Blank, 2016)
Security (SE) [10]	This relates to the probabilistic prediction of economic uncertainty that affects decision making of individuals

Table 4.1. Summary of UTAUT-sustainable business model innovation constructs (adapted from Venkatesh et al., 2003 and Venkatesh et al., 2012)

Venkatesh and his colleagues (2012) suggested that to fully leverage a theoretical framework like UTAUT-sustainable business model innovation to the proposed context of new sustainable business model development these twelve constructs should be complemented with the identification of the relationships among them. In a first step, we identified the quality of the relationships between each construct and their respective loadings or weights, as we introduced not only conventional reflective constructs but also novel formative constructs.

Table 4.2 and

Table 4.3 summarize our findings.

[48] Speed, Funding and Security allowed us to expand and tailor the original UTAUT models to our eco-entrepreneurial context. See Peralta et al., 2019, for a full description of each variable

	Loading	Mean	SD	VIF	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
[FU1] <- Funding	0,931***	0,931	0,020	2,134	0,843	0,844	0,927	0,864
[FU2] <- Funding	0,928***	0,927	0,018	2,134				
[HT1] <- Habit	0,871***	0,870	0,026	1,555	0,748	0,766	0,887	0,797
[HT2] <- Habit	0,914***	0,914	0,013	1,555				
[SE1] <- Security	0,879***	0,874	0,042	1,981	0,826	0,977	0,916	0,845
[SE3] <- Security	0,957***	0,959	0,013	1,981				
[US10] <- Usage	0,820***	0,818	0,033	2,115	0,885	0,890	0,921	0,745
[US11] <- Usage	0,906***	0,905	0,017	**5,191**				
[US8] <- Usage	0,897***	0,896	0,021	5,000				
[US9] <- Usage	0,825***	0,823	0,035	2,183				

Table 4.2. PLS-SEM loadings, descriptives, reliability, validity figures and VIF coefficients of reflective constructs (Peralta et al., 2019)[49]

Notes:

3. *p < 0.05; **p < 0.01; ***p < 0.001

	Weight	Mean	SD	VIF
[EE2] -> Effort Expectancy	0,179*	0,180	0,073	1,120
[EE5] -> Effort Expectancy	0,927***	0,923	0,040	1,120
[CO3] -> Cost	1***	1,000	0,000	
[HM6] -> Hedonic Motivation	0,803***	0,801	0,065	1,512
[HM7] -> Hedonic Motivation	0,290**	0,290	0,082	1,512
[BI1] -> Behavioral Intention	0,802***	0,801	0,051	1,482
[BI3] -> Behavioral Intention	0,295***	0,295	0,066	1,482
[PE6] -> Performance Expectancy	0,530***	0,524	0,136	1,832
[PE9] -> Performance Expectancy	0,485***	0,476	0,134	1,805
[PE10] -> Performance Expectancy	0,294**	0,297	0,112	1,020
[SP1] -> Speed	0,612***	0,601	0,098	1,024
[SP2] -> Speed	0,459***	0,457	0,110	1,014
[SP9] -> Speed	0,542***	0,537	0,086	1,010
[FC2] -> Facilitating conditions	0,523***	0,513	0,113	1,341
[FC4] -> Facilitating conditions	0,360**	0,361	0,132	1,378
[FC9] -> Facilitating conditions	0,507***	0,497	0,122	1,048
[SI1] -> Social Influence	0,487***	0,475	0,136	1,035
[SI008] -> Social Influence	0,324*	0,285	0,155	1,149
[SI014] -> Social Influence	0,342*	0,297	0,151	1,118

Table 4.3. PLS-SEM weights, descriptives, reliability and multicollinearity VIF coefficients of formative constructs[50]

Notes:

4. *p < 0.05; **p < 0.01; ***p < 0.001

[49] Item descriptions for each construct are available from the authors upon request
[50] Items for each construct are available from the authors upon request

5. Rest of measures of these constructs were dropped due to p-value higher than 0.1, and therefore deemed non-significant.

A second step to properly build the UTAUT-sustainable business model innovation framework is the formulation of the relationships of the constructs driving the actual usage of a particular sustainable business model innovation practice, which we present in section 4.2.4.

4.2.4 UTAUT-sustainable business model innovation: model hypotheses

Our chapter sits at the intersection of the decision to use sustainable business model innovation practices, the application of these sustainable business model innovation practices and metrics and how these practices help to manage the experimentation dynamism of sustainable business model development. Specifically, our research question is: How factors/constructs deemed as relevant in the acceptance of sustainable business model innovation practices influence the innovators' decision to use those practices to build a new sustainable business model?

Indirect effects hypotheses

The answer to this research question demands a first set of hypotheses related to the effect of our multiple factors or constructs on the actual use of a sustainable business model innovation experimentation practice. Similar research like Venkatesh and colleagues (2008, 2012) or Lima and Baudier (2017) presented examples of the interactions of our predictor variables and the output variable. And these interactions were in those cases found to be affected indirectly by Age, Gender, Experience and Voluntariness. Adapting these authors' propositions to our sustainable business model innovation research, we have developed the following set of hypotheses

H1a: Age, gender and experience will moderate the effect of Facilitating Conditions on Behavioral Intention. As such, the effect will be stronger on younger women with less entrepreneurial experience in the early stages of using a sustainable business model innovation practice.

H1b: Age, gender, and experience will moderate the effect of Hedonic Motivation on Behavioral Intention. As such, the effect will be stronger among older men in the early stages of using a sustainable business model innovation practice.

H1c: Age and gender will moderate the effect of Cost on Behavioral Intention. As such, the effect will be stronger among women, particularly young women.

H1d: Age, gender, and experience will moderate the effect of Habit on Behavioral Intention. As such, the effect will be stronger for older men with high levels of experience with the sustainable business model innovation practice.

H1e: Age, gender, and experience will moderate the effect of Habit on sustainable business model innovation practice Use. As such, the effect will be stronger for older men with high levels of experience with a sustainable business model innovation practice.

H1f: Experience will moderate the effect of Behavioral Intention on Use. As such, the effect will be stronger for founders and eco-entrepreneurs with less experience.

H1g: Experience will moderate the effect of Speed on Behavioral intention. As such, the effect will be stronger for founders with more experience.

H1h: Experience will moderate the effect of Funding on Behavioral intention. As such, the effect will be stronger for founders with more experience.

H1i: Experience will moderate the effect of Security on Behavioral Intention. As such, the effect will be stronger for founders with less experience.

H1j: Age, gender, experience and voluntariness will moderate the effect of Social Influence on Behavioral Intention. As such, the effect will be stronger for older women in corporate settings in their early stages of experience.

Sustainable moderator-related hypotheses

Our UTAUT-sustainable business model innovation model also explores other potential indirect effects and relationships influencing the connection of the independent variables with the dependent variable. This includes the Type of sustainable business model innovation practice (business-plan based, or Lean-Startup based) and their declared TBL focus. Our hypotheses related to these potential moderators are

H2a: Type and Focus will moderate the effect of Facilitating Conditions on Behavioral Intention. As such, the effect will be stronger on founders using Lean Startup and focusing on TBL objectives.

H2b: Focus will moderate the effect of Hedonic Motivation on Behavioral Intention. As such, the effect will be stronger among founders looking for TBL goals.

H2c: Type and Focus will moderate the effect of Cost on Behavioral Intention. As such, the effect will be stronger among founders using BPs for TBL goals.

H2d: Type will moderate the effect of Habit on Behavioral Intention. As such, the effect will be stronger for BP experienced users.

H2e: Type will moderate the effect of Habit on sustainable business model innovation practice Use. As such, the effect will be stronger for Lean Startup users.

H2f: Type and Focus will moderate the effect of Behavioral Intention on Use. As such, the effect will be stronger for founders using BPs aiming for economic goals.

H2g: Type will moderate the effect of Speed on Behavioral intention. As such, the effect will be stronger for founders using Lean Startup.

H2h: Type will moderate the effect of Funding on Behavioral intention. As such, the effect will be stronger for Lean Startup advocates.

H2i: Type and Focus will moderate the effect of Security on Behavioral Intention. As such, the effect will be stronger for BP users with a stronger focus on economic goals.

4.3 Methodology

Following earlier similar studies like Venkatesh et al. (2012) or Peralta et al (2019), we decided to further explore our sample of Spanish senior entrepreneurs, validating our structural model (Exhibit 4.3).

4.3.1 Measurement

We used the scales of our exploratory components ("weighted composites": Garson, 2016: 30) analysis in Peralta and colleagues (2019). All the structural variables were measured using a five-point Likert scale. Gender and Voluntariness were coded as dummies. Age was measured in years. Experience was measured in number of projects fulfilled. Type of sustainable business model innovation practice was binary coded.[51] Triple Bottom Line focus was also binary coded (only-economic goals, or TBL goals). We had eight formative structural composites described in Table 4.3. Our study is using behavior-anchored scales which, according to Sharma et al. (2009), Venkatesh et al. (2012) or Tehseen et al. (2017), could be subject to significant Common Method Variance (CMV). This CMV may arise because our respondents self-report on personality traits, perceptions or behaviors. To control for CMV, we designed a mixed methods strategy (Tehseen

[51] The list of practices presented included five common practices which were later coded as business-plan based (linear or focused commitment approach) or Lean-Startup based (non-linear or simultaneous experimentation approach)

et al., 2017: 146-147): First, we followed application of the Measured Latent Marker Variable Approach (*Ibid*[52]); second, we included different formats of response (e.g., randomly presenting the items, or introducing supplementary binary items) for some of the constructs (particularly the endogenous variables); third, we changed the general positive style of the questions to negative in some items (e.g., PE10 vs.PE6);[53] and fourth, we protected the anonymity of respondents. We found no significant impact of CMV in our sample.

Our questionnaire was created in English, then translated into Spanish and was validated for language issues and content with nine experts.[54] Two versions of the draft questionnaire were then sent out in consecutive waves, in September 2017 (with a four-week difference) to a sample population of 998 entrepreneurs. These tests validated our scales and helped us rework the layout and language of the questionnaire to limit the time spent in each section, the expected response rate and the commitment of both the entrepreneurs and the organizers of those communities to our research.[55]

For the analysis of our structural model, we continued using the PLS-SEM algorithm and bootstrapping (see Lohmöller, 1989) included in Smart-PLS 3.0 software.

[52] Following Chin and colleagues suggestions, we used the seven-item Fisher & Fick's social desirability scale(1993), for the English version of the questionnaire, and used the translation to Spanish of Gutierrez et al. (2016), for the Spanish version. We then applied the two proposed approaches: construct level correction (CLC) and item level correction (ILC). The results of these tests are available from the authors upon request

[53] In Annex I we have included the list of measures and latent variables of our extended UTAUT-sustainable business model innovation model

[54] The list of experts is available from the authors upon request.

[55] A description of the full process is is available from the authors upon request

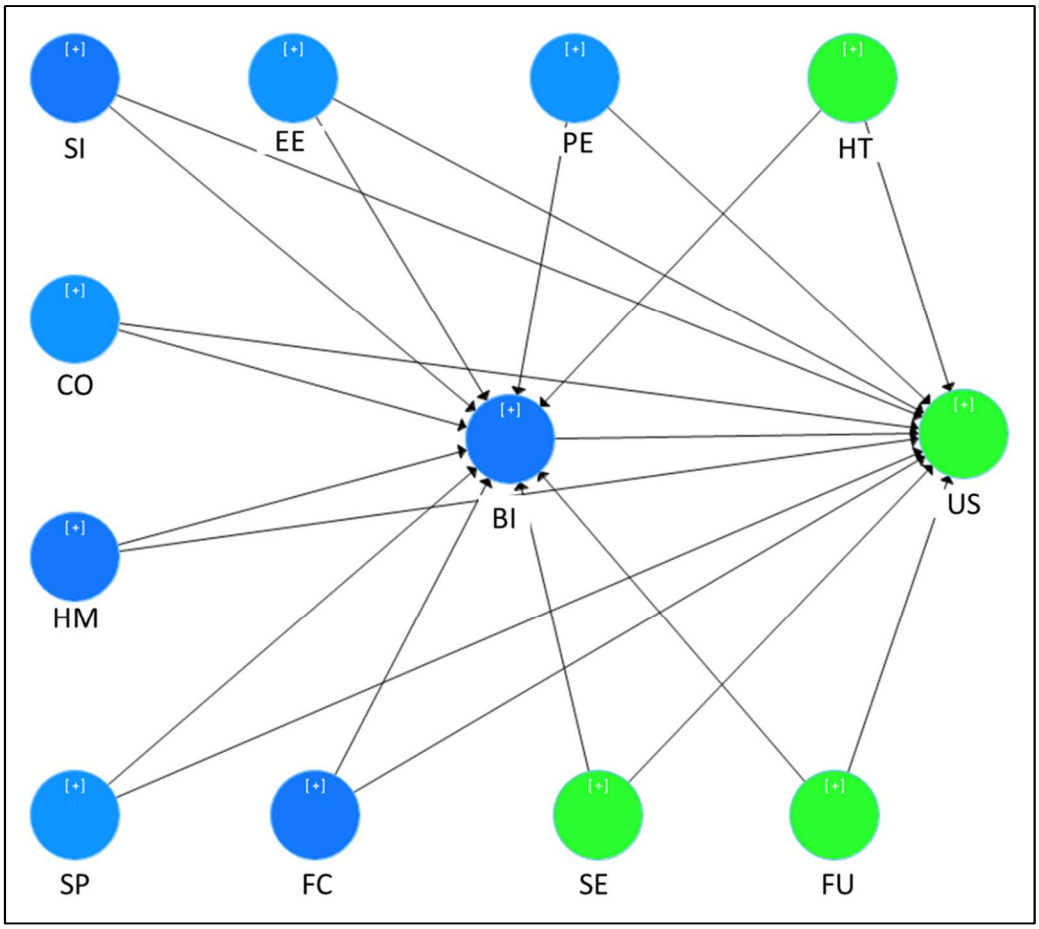

Exhibit 4.3. Structural (inner) model of UTAUT-sustainable business model innovation. There are ten exogenous constructs (PE, EE, SI, FC, HM, CO, HT, SP, FU, and SE) and two endogenous constructs (BI and US). Blue constructs are formative and green constructs are reflective

Note: PE: Performance Expectancy; EE: Effort Expectancy; SI: Social Influence; FC: Facilitating Conditions; HM: Hedonic Motivation; BI: Behavioral Intention; HT: Habit; SP: Speed; FU: Funding; SE: Security; US: Usage.[56]

4.3.2 Data collection

Our online survey was administered online in January and February 2018 and in Spanish to a population of 4,038 experienced Spanish entrepreneurs (two-year+ experience developing new business models). All of them were based in Spain and publicly declared their positions either as heads of their startups or as co-founders.

[56] For the sake of clarity, we have not listed all the formative and reflective indicators (the complete measurement model), but they are available from the authors upon request

Spain was selected for this study mainly because it is an emergent country in terms of entrepreneurship and the wide variety of initiatives (private and public, domestic and international) that make Spanish entrepreneurs being exposed to nearly the full diversity of structures and modes of entrepreneurship, across all regions. Also, Spain and its economic agents (entrepreneurs included) are highly influenced by national and international eco-innovation drivers. For example, there are modest domestic sources for and investments in eco-innovation (Peñasco et al., 2017) but European green policies and cooperation with other international agents positively and significantly influence the awareness and diffusion of eco-innovation among entrepreneurs (*ibid*). Although much remain to be made from public and private agents, Spanish entrepreneurs seem to show a high awareness of environmental and social formal and informal requirements and needs as it is reflected in our majority of participants declaring goals beyond financial and economic metrics.[57]

We had 234 cases[58] with 41 women, and ages ranging from 19 to 73 (221 between 26 and 65). TBL goals were declared by the largest group (140). Table 4.4 shows the distribution by industry of our sample. We found no evidence of demographic differences, or any statistically significant difference between eco-entrepreneurs (those declaring TBL goals) and entrepreneurs pursuing only-economic goals. [59]

[57] Complementarily, there are research-economy reasons. This research is self-sustained by its corresponding author who is based in Spain

[58] 25 cases were missing the last part of the questionnaire, which mostly includes the Social Desirability questions to control for CMV and a final thank-you and follow-up note. We filled missing data using each item's sample median

[59] Our heterogeneity tests included PLS-MGA and parametric tests

Industry	*Secondary*	*Bachelor*	*Graduate/ Master*	*PhD.*	*Other*	
Agriculture, Manufacturing		**3**				**11**
ECON		3	2			5
TBL		5	1			6
Arts, Entertainment, Media		**4**	**3**		**1**	**21**
ECON		4	5			9
TBL		1	10		1	12
Education		**2**	**12**	**2**		**16**
ECON		2	5			7
TBL			7	2		9
Engineering, Energy, Utilities			**3**			**5**
ECON		1	1			2
TBL			3			3
Fashion, Retail	**0**	**9**	**8**	**3**	**0**	**20**
ECON		4	3	2		9
TBL		5	5	1		11
Government,NGOs		**1**	**1**			**2**
ECON		1				1
TBL			1			1
Health		**1**	**9**	**1**		**11**
ECON			2			2
TBL		1	7	1		9
IT	**1**	**10**	**19**	**3**	**1**	**34**
ECON		4	3			7
TBL	1	6	16	3	1	27
Services	**5**	**47**	**53**	**6**	**2**	**113**
ECON	2	23	23	3		51
TBL	3	24	30	3	2	62
ECON	**2**	**43**	**44**	**5**		**94**
TBL	**4**	**42**	**80**	**10**	**4**	**140**
	6	**85**	**124**	**15**	**4**	**234**

Table 4.4. Distribution of sample participants by industry and education

Note. ECON: only economic goals; TBL: triple bottom line goals

4.4 Results

Following Sarsted and colleagues guidelines (2017: Fig. 3), we present our results for our model, starting with a summary of our measurement model assessment and continuing assessing the structural model.

4.4.1 Measurement model assessment

For this research, we decided to be very strict on the indicators we accepted for each of our factors, favoring significance over load as long as the final joint result of the model was satisfactory. This may mean weaker reflective indicators (see Table 4.2), but with stronger

statistical power: all our selected indicators show strong consistency reliability values,[60] convergent validity values[61] and discriminant validity values.[62]

Formative constructs (Table 4.3) show slightly weaker path weights than comparable studies in other fields. Being ours the first study of its kind, we decided not to drop any significant low-scoring indicators (there are voices for this decision: Garson, 2014; Sardsted and colleagues, 2017, but also against it: Hair et al., 2014) as they contribute enriching the model's content validity. As in the earlier reflective constructs analysis, these formative constructs are showing strong power, evaluated by their convergent validity, lack of collinearity[63] and statistical significance[64] and relevance.[65]

4.4.2 Structural model assessment

After assessing the fair quality of our UTAUT-sustainable business model innovation measurement model, we checked for collinearity issues in our constructs (see Table 4.5)[66], calculated the path coefficients relevance (Table 4.5 & Table 4.6) and computed the predictive (variance-based) power of the model with an R^2 of .60 (moderate: Sarstedt et al. 2017) for Behavioral Intention and of .73 for Usage (moderatge to substantial: *ibid*). We finalize this assessment with the f-square effect size measures or R-square change effects (Garson, 2016; Sarstedt, et al., 2014) (Table 4.5).

[60] Jöreskog's composite reliability levels are considered "satisfactory to good" for all constructs (.70 and .95: Hair et al. 2017b, p. 112). Cronbach's alfa and reliability coefficient rho-A values are also within those thresholds

[61] Average Variance Extracted (AVE) values show that all constructs are explaining more than 50% (.50) of the variance of their respective items

[62] Henseler et al.'s (2015) hetero- trait-monotrait (HTMT) ratio of correlations show strong values below the threshold .90. The correlation matrix is available from the authors upon request

[63] VIF values are below the 5-threshold

[64] See Sarstedt, et al., 2017: 19 for the rule of thumb we have followed

[65] Path coefficients are standardized and, therefore, show their comparable relevance in shaping each construct (Garson, 2014:79; Sarstedt et al., 2017:20)

[66] VIF values of inner constructs show no collinearity, even with a stringent 4 cut-off value

	Path coefficients	F-squared	VIF
Behavioral Intention -> Usage	0.354***	0.190*(^^)	2,470
Cost -> Behavioral Intention	0.066	0.007	1,650
Cost -> Usage	0.046	0.005	1,661
Effort Expectancy -> Behavioral Intention	0.318***	0.116*(^^)	2,159
Effort Expectancy -> Usage	0.213***	0.070(^^)	2,408
Facilitating conditions -> Behavioral Intention	0.108	0.018	1,648
Facilitating conditions -> Usage	0.097*	0.021(^)	1,677
Funding -> Behavioral Intention	0.068	0.006	1,800
Funding -> Usage	-0.094*	0.018	1,811
Habit -> Behavioral Intention	0.077	0.009	1,725
Habit -> Usage	-0.033	0.002	1,740
Hedonic Motivation -> Behavioral Intention	0.244**	0.068(^^)	2,176
Hedonic Motivation -> Usage	0.343***	0.190*(^^)	2,323
Performance Expectancy -> Behavioral Intention	0.116	0.015	2,202
Performance Expectancy -> Usage	-0,05	0.004	2,235
Security -> Behavioral Intention	-0,037	0.002	1,382
Security -> Usage	0.030	0.002	1,385
Social Influence -> Behavioral Intention	0.020	0.029(^)	1,482
Social Influence -> Usage	0.048	0.006	1,483
Speed -> Behavioral Intention	0.028	0.001	2,629
Speed -> Usage	0.039	0.002	2,631

Table 4.5. Path coefficients, effect size and collinearity values of the inner model constructs

Notes:

1. *p < 0.05; **p < 0.01; ***p < 0.001
2. (^) $f^2 > 0.02$ (small effect); (^^)$f^2 > 0.15$ (medium effect); (Cohen, 1988 in Hair, Jr., et al., 2014 and in Sarstedt, et al., 2017)

	Total Indirect Effects
Cost -> Behavioral Intention -> Usage	0,023
Effort Expectancy -> Behavioral Intention -> Usage	0,112***
Facilitating conditions -> Behavioral Intention -> Usage	0,038
Funding -> Behavioral Intention -> Usage	0,024
Habit -> Behavioral Intention -> Usage	0,027
Hedonic Motivation -> Behavioral Intention -> Usage	0,086**
Performance Expectancy -> Behavioral Intention -> Usage	0,041
Security -> Behavioral Intention -> Usage	-0,013
Social Influence -> Behavioral Intention -> Usage	0,007
Speed -> Behavioral Intention -> Usage	0,01

Table 4.6. Indirect effects show mediation of BI is small and limited to EE, HM and FC

Notes: *p < 0.05; **p < 0.01; ***p < 0.001

Our assessment ends with the evaluation of heterogeneity (Hair, Jr. et al., 2014). Since our study is exploratory, we hypothesized differences among groups in our population related to their goals (only economic vs. TBL), gender, age, experience, voluntariness or type of sustainable business model innovation practice used. None of these variables reflected significant differences in our model's power or paths[67]. An example of our Multi-Group Analysis for our only-economic vs. TBL entrepreneurs is found in Table 4.7. We then performed unobserved heterogeneity tests with a similar result[68], rejecting the hypothesis of results distortion due to observed or un-observed heterogeneity.

	Path Coefficients-differences (only economic vs. TBL)
Behavioral Intention -> Usage	0,021
Cost -> Usage	0,043
Effort Expectancy -> Usage	0,327
Facilitating conditions -> Usage	0,030
Funding -> Usage	0,136
Habit -> Usage	0,101
Hedonic Motivation -> Usage	0,049
Performance Expectancy -> Usage	0,24*
Security -> Usage	0,048
Social Influence -> Usage	0,20*
Speed -> Usage	0,062

Table 4.7. Example of PLS-MGA analysis of the path differences between hypothesized groups (economic vs. TBL oriented entrepreneurs)

4.5 Discussion of results

Our chapter provides a sound framework to analyze the individual entrepreneur's use of sustainable business model innovation practices, or experimentation practices to sustainably innovate business models. This is an under-researched field on an important phenomenon, and

[67] We assessed observed heterogeneity hypotheses using PLS-MGA (non-parametric multi-group analysis), parametric MGA test and Welch-Satterthwait Test (Garson, 2016; Hair, Jr. et al., 2014)
[68] We assessed un-observed heterogeneity using FIMIX and POS (prediction-oriented segmentation) (Garson, 2016; Hair, Jr. et al., 2014)

we have been able to extract and analyze a group of constructs that together seem to drive the usage of those testing practices explaining up to 73% of its R^2.

The entrepreneurial field is a mixture of organizational and non-organizational contexts (Venkatesh et al., 2012), even for solo-entrepreneurs. Therefore, we decided to address our research considering the eight behavioral theories/models of technology use of the UTAUT framework. Thus, we put together a comprehensive selection of the critical factors stated as predictors of the behavioral intention to use a certain sustainable business model innovation practice and the use of a sustainable business model innovation practice. Out of all of these critical factors, a very limited number of drivers made a significant contribution to the sound predictive power of our model.

The meaningful predictors of the behavioral intention (acceptance) of a particular sustainable business model innovation practice over another is EE[69] with no meaningful mediating/moderating effects. Based on the size of our path coefficients, EE is the strongest determinant of the acceptance of a certain sustainable business model innovation practice. Having a clear path to follow set by that particular practice, the easiness to enact (actionability) experiments and tests in that practice, and the promise of mastering it in a short time are the drivers behind EE and the leading indicators of the entrepreneur's acceptance of such practice. HM is the second factor driving acceptance of a sustainable business model innovation practice, although its effect size is small and non-significant. Still this HM construct may play a meaningful role, as we will see now.

The strength of our model to predict the usage of a certain practice is driven by the medium sized effects of BI and HM[70]. Furthermore, there are significant mediation or indirect effects of BI in the cases of EE (strong), HM and FC (weak in both cases). Therefore, according to our study, the use of a practice to test and think critically about a new business, take executive decisions, spark creativity and span collaboration with the founding team, is mostly dependent on the acceptance of that practice. Secondary, relevant and mediated by its acceptance (BI), a certain practice and its experiments and tests are chosen if it is perceived to help learn about the sustainable business model. Also, the experiments and tests to understand the sustainable business model must be fun (learning and fun combine in HM).

[69] HM shows a significant path weight but a non-significant size effect on BI
[70] EE and FC also produce some effects, but their sizes are small and non-significant

If BI, EE and HM are the constructs driving acceptance and usage of the specific set of experiments and tests we have called a sustainable business model innovation practice, then they could be blended together, for example, in sustainable business model innovation education. Programs can be streamlined, to clarify the business modelling teaching towards experimentation, actionability, and quick feedback to provide understanding and hedonic rewards (i.e., fun) while creating sustainable business models. According to this, linear practices may be more suitable for these outcomes, and advocates of non-linear practices probably need to work easier and more rewarding ways of teaching their sustainable business model innovation methods. On a separate note, it is important to note that the intentions to use a practice is on its experimental process, not on its outcome. Because, strikingly, the outcome is not meaningful for experienced entrepreneurs.

Regarding FU, this has a significant negative weight but with a small and non-meaningful effect which was unpredicted in our literature review. It may be pointing out the discrepancy of sustainable business model innovation practices to build new ventures and their use to capture investor funding. From our findings, the use of a sustainable business model innovation practice helps to get funded or succeed at a funding round. But then that practice maybe jeopardizing the collaboration with investors to critically think and take decisions about the business, hindering team-building and creativity with them. In our opinion, this result points to further refinement of sustainable business model innovation paths and toolboxes to include investor tools and tactics in their definitions. Given that we have detected a significant effect of investors as a salient stakeholder group (Peralta et al, 2019), we propose further investigations of this dynamic relationship along different new businesses readiness levels.

Contrary to earlier literature (Lima & Baudier, 2017; Venkatesh et al., 2012), in our entrepreneurial sustainable business model innovation context, all mediator and moderator variables seem to have no significant effects, whether in the strength of the relationship between exogenous and endogenous variables, or in the heterogeneity of the sample.

4.6 Conclusions

This chapter provides empirical support to the research of the intersection of the decision to build a sustainable business model, the application of sustainable business model innovation practices and how these practices help to manage the experimental process of sustainable business model development. It answers the research question: How factors/constructs deemed as relevant in the acceptance of sustainable business model innovation practices influence the innovators' decision to use those practices to build a new sustainable business

model? with a predictive empirical model. This UTAUT-sustainable business model innovation model (1) describes the multiple factors, mostly intangible, potentially influencing the entrepreneur's decision to use a sustainable business model innovation practice; (2) explains the interaction of these factors with each other; and (3) identifies which factors determine the entrepreneurial decision to use a sustainable business model innovation practice for experimenting and testing a sustainable business model.

Factors like activities, tools, methods, practices get often confused with each other. For instance, academics and practitioners devote much effort to explain toolboxes for sustainable business model innovation (e.g., Tiemann, et al., 2018) but little is explained of how tools and activities are blended and used into comprehensive methods and practices to experiment and probe a sustainable business model (much less, multiple, parallel sustainable business models, as in Andries et al., 2013). To the best of our knowledge, sustainable business models seem to be the result of either of two experiment-driving alternatives: A stage-gate, linear process like the one presented by the New Product Development practice (NPD: York et al., 2014) or a non-linear process similar to what the Lean Startup practice (Blank & Dorf, 2012; McGrath, 2010) advocates for.

We have researched on the acceptance and use of each of those practices. And thus, we now know that Spanish entrepreneurs are led by the process rather than its output. Then, their acceptance, or intention to use, is mostly driven by practices that show them a clear actionable path, fostering step-wise testing and learning. They also look to master the practice in a short time. The actual use of a sustainable business model innovation practice to think critically about a new business, make executive decisions and to spark creativity and team collaboration is driven by that acceptance, and with nearly equal strength by the enjoyment produced by the knowledge and learning the entrepreneurs gain over its endeavor and the fun and pleasure of creation.

Consequences of our research may affect our interpretation of the initial steps of the entrepreneurial sustainable business model testing process. First, we now have a tool to help us understand how eco-entrepreneurs and venture founders decide how to start building their venture. After deciding on an idea or vision comes the *how* to achieve that vision. This is a complex process guided by the method or practice they choose to plan and realize their vision through different types of experiments, trials and tests (Andries et al., 2013; Weissbrod, 2019; Antikainen & Bocken, 2016). The practice filters and distorts how they see reality, and the decision to use one of the available practices is commonly situated very early in the process of

sustainable business model innovation. We do not yet know the effect of each sustainable business model innovation practice in the final success of a new venture, but after our research we have a model that soundly predicts how the factors involved affect the election of such practice. Second, we believe these insights are of importance for scholars, as they can now focus on ordering current tools and even creating improved experimenting alternatives knowing that entrepreneurs look, for example, for a clearer sustainable business model innovation process rather than some vague output of that process; they choose mastery in a short time over performance; or visual design tools like the BMC over costs. But our findings also affect their sustainable business modelling teaching as they probably need to integrate fun in the actual learning of either practice, and a much clearer view of cause-effect relationships in sustainable business model innovation. Finally, for practitioners, the implications seem also several. No stakeholder (whether salient or not) is really considered relevant, and neither are factors like costs, speed, or performance. Business model innovation corporate or public-supported programs might also need to figure out how to reshape their programs to offer clearer paths, and improved facilitating conditions for entrepreneurs if they want their methodologies and practices to be used as real alternatives to the current ones.

Limitations and future research

We acknowledge that the main limitation of our research is its yet static analysis of the constructs influencing the acceptance and use of sustainable business model innovation practices by entrepreneurs. PLS-SEM seldomly captures the dynamism of sustainable business model creation. New analysis methodologies of our constructs involving 'time', the 'learning', and the 'valueholder' effects can better help understand entrepreneurs as individuals and their limitations/accelerators for success.

Another limitation is the localization of our sample. Future research on the acceptance of sustainable business model innovation could include samples from other countries or regions, adapting our constructs and controlling for other heterogeneity factors (i.e., corporate vs. non-corporate entrepreneurs, Western vs. Asian countries, eco- vs. non-eco countries, ready-to-invest vs. non-ready-to-invest ventures).

5 Chapter 5. Conclusions

Our Society's successful entrepreneurs and innovators have hacked, and continue to do so, the environmental system to their benefit, and have created and perpetuated organizations, ways and practices (Hoffman & Jennings, 2018) that are contributing to the environmental degradation of our Anthropocene era. But we believe the innovation of business models, far from being the problem, might be the strongest solution to mend the wrongs we are living today if we are able to focus them on "creating sustainability" (Ehrenfeld, 2009 in Hoffman & Jennings, 2018).

Our main contribution with this dissertation sits at the intersection of sustainability and business model innovation, presenting the most relevant elements current business model eco-innovation (sustainable business model innovation) practices should identify to include them in the development of new sustainable business models (sustainable business models). Additionally, we have studied a novel way of developing new business models like Lean Startup from a sustainable perspective. From our conceptual and qualitative research, we can conclude that this practice might be apt for this type of business innovation.

Using Lean Startup-like methodologies could help business model innovators search for the relevant valueholders (Peralta, et al., 2018), learn from them, and accordingly choose the right challenges to begin the business modelling process. Once selected, Lean Startup would guide the innovators through relentless learning cycles, where older challenges are replaced by new ones, keeping the connection between planet, social and economic outcomes. Organizing these challenges using the eco-innovation dimensions of Carrillo-Hermosilla, and colleagues (2010), we could effectively see to which extent each new business model addressed the sustainable challenges imposed by its valueholders, and how that translated into its ability for capturing sustainable value.

We believe we have contributed to the existing literature on sustainable business model innovation by presenting the first evidences on how Lean Startup might be used to develop new sustainable value, starting at the challenges' selection. We have also presented Lean Startup as an alternative to find ways of addressing sources of value uncaptured which can help speed up a new business model's growth.

The Lean Startup concepts and evidences presented in Chapter 2 fill the gap in the literature about the capacity of Lean Startup to serve as practice to innovate business models into

sustainable business models. They complement the extant knowledge of sustainable business model innovation describing how entrepreneurs and corporations search for their new business opportunities and how Lean Startup is enacted, intentionally or not, in that search. Lean Startup is frequently understood as just an alternative to the conventional way of innovating business models. Blank (2013) and others (Eisenmann et al., 2011; Weissbrod, 2019; York & Danes, 2014) have correctly grounded Lean Startup as a faster, more focused and less waste-producing methodology to build new businesses. But to this date, Lean Startup has not been treated as an alternative method to produce new sustainable business models. And our conceptual, qualitative and quantitative approaches seem to confirm its suitability and usage for sustainable business model innovation.

Conceptually, we set up an evaluation process of three steps. They helped us evolve Lean Startup original design into a practice that (1) connected sustainable Challenges and Activities; (2) sorted them across its stages; and (3) addressed all the dimensions of eco-innovation (Carrillo-Hermosilla, et al., 2010). This is in line with the evaluation of other sustainable business model innovation practices (see Bocken et al., 2014; Geissdoerfer et al., 2016), complemented with the framework developed by the eco-innovation dimensions.

Qualitatively, and studying three lean startups from UAE and the EU,[71] we presented evidences of how the founders of those companies are using Lean Startup to address the eco-challenges they face. They are particularly efficient at detecting and integrating the demands, interests and needs of environmental and social valueholders, producing economic returns that help them grow according to their founders' expectations. Also, Lean Startup-like methodologies seem to help our studied startups search for relevant valueholders, prioritize them, and accordingly choose the eco-challenges that can drive their growth. These are relentless learning cycles, where older challenges keep being replaced by new ones, continuously, in the growth phases these startups are in.

Quantitively, in Chapter 3, we provide empirical support to the factors we theorized are influencing the acceptance of entrepreneurs of sustainable business model innovation practices to design and implement their sustainable business models. We have identified, described and empirically supported behavioral structures (composites and factors) that influence the usage of any of the sustainable business model innovation methods or practices commonly available

[71] Although drawing theoretical conclusions from only three case studies is certainly risky (Lawrence, 2002), we nevertheless believe to have contributed to the existing literature on business models' eco-innovation by presenting the first evidences on how Lean Startup could be used to address BMEI

for business modelling. Based on extant behavioral models of acceptance of technology and business practices, we have developed a strong framework of eleven factors, combining academically grounded concepts (Intention, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Costs/Price, Habit) and three new constructs (Speed, Funding, Security), derived from the relevant literature on sustainable business model innovation.

Second, these factors are constructed using external and internal influences and include collective and individual determinants. In doing so, we have contributed to advance the research on the individuals' relevance when creating sustainable business models. Our stronger constructs, built with those considerations in mind, Effort Expectancy (i.e., the easiness of use, or "actionability", of the sustainable business model innovation method) and Hedonic Motivation (i.e., the enjoyment and learning the sustainable business model innovation method produces) partially support our second hypothesis. These two constructs and Behavioral Intention, which also shows unexpected strength, shed light on which could be the relevant constructs to be taken into account when entrepreneurs select a sustainable business model innovation practice. As a first approach to knowing what drives the entrepreneurial use of sustainable business model innovation practices, our chapter provides support to the underexplored field of implementation practices of eco-innovation at the strategic, operational and tactical levels. This is particularly relevant when starting up a firm, as the entrepreneurial team faces uncertainty when implementing their plans in any of those three levels. Having a sound sustainable business model innovation strategy is deemed as a required component for success (Amit & Zott, 2012; Baldassarre et al., 2017; Boons & Lüdeke-Freund, 2013; Evans et al., 2017; Klewitz & Hansen, 2014) and we argue that knowing which factors drive the acceptance of a design and implementation method can additionally strengthen any strategy development, most particularly eco-innovation strategies.

In Chapter 4, we give empirical support to the research of the intersection of the decision to build a sustainable business model, the application of sustainable business model innovation practices and how these practices help to manage the experimental process of sustainable business model development. It answers the research question: How factors/constructs deemed as relevant in the acceptance of sustainable business model innovation practices influence the innovators' decision to use those practices to build a new sustainable business model? with a predictive empirical model. This UTAUT-sustainable business model innovation model (1) describes the multiple factors, mostly intangible, potentially influencing the entrepreneur's decision to use a sustainable business model innovation practice; (2) explains

the interaction of these factors with each other; and (3) identifies which factors determine the entrepreneurial decision to use a sustainable business model innovation practice for experimenting and testing a sustainable business model.

Factors like activities, tools, methods, practices get often confused with each other. For instance, academics and practitioners devote much effort to explain toolboxes for sustainable business model innovation (e.g., Tiemann, et al., 2018) but little is explained of how tools and activities are blended and used into comprehensive methods and practices to experiment and probe a sustainable business model (much less, multiple, parallel sustainable business models, as in Andries et al., 2013). To the best of our knowledge, sustainable business models seem to be the result of either of two experiment-driving alternatives: A stage-gate, linear process like the one presented by the New Product Development practice (NPD: York et al., 2014) or a non-linear process similar to what the Lean Startup practice (Blank & Dorf, 2012; McGrath, 2010) advocates for.

We have researched on the acceptance and use of each of those practices. And thus, we now know that Spanish entrepreneurs are led by the process rather than its output. Then, their acceptance, or intention to use, is mostly driven by practices that show them a clear actionable path, fostering step-wise testing and learning. They also look to master the practice in a short time. The actual use of a sustainable business model innovation practice to think critically about a new business, make executive decisions and to spark creativity and team collaboration is driven by that acceptance, and with nearly equal strength by the enjoyment produced by the knowledge and learning the entrepreneurs gain over its endeavor and the fun and pleasure of creation.

Regarding Lean Startup and its use as a valid sustainable business model innovation practice for practitioners, we have presented some qualitative evidences of how the founders of our case-study companies are using Lean Startup to address the eco-challenges they face. Using Lean Startup, they are particularly efficient at detecting and integrating the demands, interests and needs of environmental and social valueholders, producing economic returns that help them grow according to their founders' expectations. Also, Lean Startup-like methodologies seem to help our startups search for relevant valueholders, prioritize them, and accordingly choose the eco-challenges that can drive their growth. These are relentless learning cycles, where older Challenges are replaced by new ones.

Consequences of our quantitative research may affect academics and practitioners' interpretation of the initial steps of the entrepreneurial sustainable business model testing

process. First, we now have a tool to help us understand how eco-entrepreneurs and venture founders decide how to start building their venture. After deciding on an idea or vision comes the *how* to achieve that vision. This is a complex process guided by the method or practice they choose to plan and realize their vision through different types of experiments, trials and tests (Andries et al., 2013; Weissbrod, 2019; Antikainen & Bocken, 2016). The practice filters and distorts how they see reality, and the decision to use one of the available practices is commonly situated very early in the process of sustainable business model innovation. We do not yet know the effect of each sustainable business model innovation practice in the final success of a new venture, but after our research we have a model that soundly predicts how the factors involved affect the election of such practice. Second, we believe these insights are of importance for scholars, as they can now focus on ordering current tools and even creating improved experimenting alternatives knowing that entrepreneurs look, for example, for a clearer sustainable business model innovation process rather than some vague output of that process; they choose mastery in a short time over performance; or visual design tools like the BMC over costs. But our findings also affect their sustainable business modelling teaching as they probably need to integrate fun in the actual learning of either practice, and a much clearer view of cause-effect relationships in sustainable business model innovation.

Finally, for practitioners, there are other meaningful implications. No stakeholder (whether salient or not) is really considered relevant, and neither are factors like costs, speed, or performance. Business model innovation corporate or public-supported programs might also need to figure out how to reshape their programs to offer clearer paths, and improved facilitating conditions for entrepreneurs if they want their methodologies and practices to be used as real alternatives to the current ones. This might also be relevant for entrepreneurs, incubators, accelerators, mentors and academic institutions devoted to teaching entrepreneurship, as our findings present concrete areas needing special attention. For example, making one particular sustainable business model innovation practice more actionable than other lures entrepreneurs to it, independent of its perceived efficacy. And the same happens with those practices that are more enjoyable, whether they are properly fitted for successful sustainable business model development. Our findings complement those of Kanda and colleagues (2018), suggesting a clear bias of the roles they identified of support agents towards balancing all constructs in their activities with entrepreneurs. This might mean that an incubator should probably build on the actionability and enjoyment of a particular sustainable business model innovation practice to introduce other relevant aspects like Security, easier

access to Funding, Speed and the rest of our Chapters 4 and 5 eleven constructs and rightly balance them in their incubated projects.

Finally, we also contribute to the current sustainable business modelling and stakeholder discussions by identifying groups of valueholders that may be more salient or more influential for seasoned entrepreneurs.

Limitations and future research

From Chapter 2, we believe the next step towards confirming this promising field should be the confirmation of our preliminary validation of Lean Startup. A further step should list the eco-challenges and activities and check if Lean Startup fully addresses them (as our evidences seem to confirm). Also, more case studies are needed to show the soundness of our proposed Lean Startup toolbox (Table 2.6-Table 2.11 to gauge the connection between Lean Startup and eco-innovation. This might lead to a quantitative exploration and confirmation of the relevance of Lean Startup as a sustainable business model innovation practice, able to produce balanced returns according to the Triple Bottom Line.

The main limitation of our quantitative research is its static, frozen-picture-like view of the elements or structures (constructs) that influence the entrepreneurs' use of one sustainable business model innovation practice. These change with time, experience and failure (Blank, 2010; Eisenmann et al., 2011). But our exploratory research, being one of the first of its kind, is short in fully addressing 'time', 'learning', and 'valueholder' effects. This might be a novel and promising line of research, starting from our factors and investigating their evolution at each stage of the sustainable business models' development towards growth and success. This dynamic perspective, considering all those effects, will probably be one of the first attempts at predicting the outcomes of new sustainable business models. Most necessarily, a broader model with items capturing the observed and unobserved effects will produce the needed algorithms to achieve that goal.

Another limitation is the localization of our sample. Future research on the acceptance of sustainable business model innovation could include samples from other countries or regions, adapting our constructs and controlling for other heterogeneity factors (i.e., corporate vs. non-corporate entrepreneurs, Western vs. Asian countries, eco- vs. non-eco countries, ready-to-invest vs. non-ready-to-invest ventures). We have already started progressing towards this cross-country research, which will bear its first results before the end of 2019.

Although we have confirmed the strength of the influences of up to twenty stakeholder groups in sustainable business model innovation practitioners, there is need of further quantitative evidences that help understand how valueholders really impact the challenges definition of business models developed with Lean Startup and the rest of sustainable business model innovation practices.

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7 Appendix

7.1 UTAUT original constructs, in the context of sustainable business model innovation

Following is a review of how the original UTAUT concepts [72] are addressed in the context of sustainable business model innovation for entrepreneurial initiatives.

7.1.1 Behavioral intention (BI) and Usage (US)

Following the original contribution of the UTAUT model in terms of the relationship between an individual's intention to use a method or technology and the dependent final usage (Venkatesh et al., 2003: 427), our contribution is to explain how a founder's intention to use a particular method (practice or technology) to develop a sustainable business model drives her actual use of that method.

The methodological options to use for developing new sustainable ventures that we have considered in our research are NPD, Lean Startup and 'neither NPD nor Lean Startup' (see Table 1).

7.1.2 Performance expectancy (PE)

"Performance expectancy (PE) is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003: 447). In our context, the five constructs summarized under performance expectancy in the original UTAUT ((ibid: 447): perceived usefulness (triple bottom line goals), extrinsic motivation (e.g., building business models 'for' or 'of' sustainability) , job-fit (e.g. individual-skills based jobs), relative advantage (e.g., improved economics thanks to reduced environmental and social costs), and outcome expectations (e.g., "reduce the environmental impact caused by consumption and production activities") are referring to the entrepreneur's expectations to successfully eco-innovate a business model.

[72] The scales and indexes for the constructs derived from UTAUT (i.e., Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Behavioral Intention and Usage) were adapted from Venkatesh et al. (2003). The scales for the constructs derived from UTAUT2 (i.e., Hedonic Motivation, Costs and Habit) were adapted from Venkatesh et al. (2012). The Speed scale was drawn from Steve Blank & Dorf (2012), the scale for Funding was derived from Picken (2017) and the scale for Security was adapted from Sarasvathy (2001). All items were measured with a five-point Likert scale, anchors being "strongly disagree" and "strongly agree." Social Influence anchors for the SI9_SI0XX items were "No detail" and "Very detailed."

7.1.3 Effort expectancy (EE)

"Effort expectancy is defined as the degree of ease associated with the use of the system" (Venkatesh et al., 2003: 450). This construct is formed of three determinants: "perceived ease of use, complexity, and ease of use" (ibid: 450). In the context of sustainable business model innovation, sustainable business model innovation processes and practices help clarify a complex and often ambiguous design-implementation gap (Martin Geissdoerfer et al., 2016). We theorize that their improved view of that gap may be one of the reasons behind their acceptance by eco-entrepreneurs.

The Effort Expectancy construct captures then the feeling and experience of seasoned entrepreneurs about sustainable business model innovation complexity, for both linear and multilinear methods. The NPD process adopts a linear design and implementation based on its causal and managerial approach (Makridakis et al., 2010; Sarasvathy, 2001). Problems may arise if the cumulative knowledge gained during its initial phases does not fit with the market or with the valueholders that should eventually support the sustainable business model growth. Lean Startup multilinear implementation combines causality with effectuality (Frederiksen & Brem, 2017; Sarasvathy, 2001), and its implementation is cyclical and adaptive, with continuous pivots, iterations and development of ephemeral support business models: Bajwa, Wang, Nguyen Duc, & Abrahamsson, 2017; McGrath, 2010) as the new business model integrates the needs and support of valueholders, which seldomly is a linear, straight process.

7.1.4 Social influence (SI)

"Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al., 2003: 451). In this case, the three constructs representing Social Influence in UTAUT are "subjective norm, social factors, and image" (ibid: 451). Given the sustainable entrepreneurial context of our research, we have included those constructs as part of the selection criteria we have used to identify a list of nineteen stakeholder groups, with potential to influence the entrepreneur's behavior. To make up this list, we have integrated the work of Steve Blank and Dorf (2012), Hart and Sharma (2004), Peralta and colleagues (2018) and Von Hippel (1986), together with other grey sources and the experience of the authors.

From a sustainable business model innovation perspective, this Social Influence construct seems to reflect more intensely than the rest of our factors the dynamism of sustainable entrepreneurism. More specifically, stakeholders, and the influence they have over a new venture, are dynamic and temporal. And the valueholder concept captures that dynamism and

erratic, sometimes unforeseen, influence on the performance and growth of sustainable business models. Out of our stakeholders list, and considering the static and geographically local nature of our current research, SI can shed some light on the conceptual work of Steve Blank & Dorf (2012), Hart & Sharma (2004), Mitchell, Wood, & Agle (1997) and Von Hippel (1986), detecting who the significant stakeholders (valueholders) are, if any, for our sample of entrepreneurs.

7.1.5 Facilitating conditions (FC)

"Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (Venkatesh et al., 2003: 453). Three determinants build facilitating conditions: "perceived behavioral control, facilitating conditions, and compatibility" (ibid: 453).

7.1.6 Hedonic motivation (HM)

"Hedonic motivation is defined as the fun or pleasure derived from using a technology" (Venkatesh et al., 2012: 161). This construct relates to the "perceived enjoyment" of the entrepreneur in using a method or technology to ease her development of a new sustainable venture. And complements the earlier (extrinsic) constructs from motivation theory as it is an intrinsic construct.

7.1.7 Costs/price (CO)

Following the concerns expressed by Venkatesh and colleagues (2012: 161), entrepreneurs, particularly those included in our research, bear the cost and economic burden of the sustainable business model innovation process, whether because they are the first investors or because they need to seek for the initial funds to start the process (Karadag, 2015). This search for funds along the stages of development of the new business model is to become a constant, as the new venture develops its sustainable business model(s) (Blank, 2014). And this driver certainly affects the individual's intention and behavior of the method to use. The theoretical constructs affecting costs are the pricing of the applications to effectively use each method or tool, the costs associated to collaboration of the founding team using the same sustainable business model innovation method and the costs associated to fulfilling the requirements of each method's stages.

7.1.8 Habit (HT)

"Habit is viewed as prior behavior; and second, habit is measured as the extent to which an individual believes the behavior to be automatic" (Venkatesh et al., 2012: 161). To this extent,

prior experiences are a predictor of habit as they form beliefs and influence behavior. In our context, habit is also a perceptual construct, intrinsic to the individual.

7.2 Survey items per UTAUT-SBMI construct

Construct/survey items UTAUT-SBMI
Speed (SP)
Using your sustainable business model innovation method as part of your entrepreneurial project is allowing you... SP1. to get things done faster SP2. to cycle around things and be slower SP9. helped you get funded quicker

Construct/survey items UTAUT-SBMI
Funding (FU)
Regarding money / funding of your current project, your sustainable business model innovation method… FU1. made easier for external / corporate investors to fund your project FU2. has helped you succeed in one or more rounds

Construct/survey items UTAUT-SBMI
Security (SE)
Your sustainable business model innovation method… SE1. helped you earn enough money to live comfortably SE3. helped you build a sure job for you and your employees

Construct/survey items UTAUT-SBMI
Social influence (SI)
Why did you decide to use the sustainable business model innovation method in your current project? SI1. others around you were using it
SI9. Please, for each of the following stakeholders, describe the amount of detail in your current planning too... SI9_SI001 Potential customers SI9_SI002 Current customers

SI9_SI003 Potential users
SI9_SI004 Current users
SI9_SI005 Customer influencers
SI9_SI006 Local government/city council
SI9_SI007 National or regional government/public institutions
SI9_SI008 Investors
SI9_SI009 Other founders of your team
SI9_SI010 Employees of your current project
SI9_SI011 Relatives (family)
SI9_SI012 Friends
SI9_SI013 Mentors
SI9_SI014 Teachers/instructors
SI9_SI015 Other fellow entrepreneurs
SI9_SI016 Incubator/accelerator supervisors
SI9_SI017 Boss/company managers
SI9_SI018 Suppliers
SI9_SI019 Supply-chain strongest link