deboeck SUPÉRIEUR

Development of a Platform Business Model for Co-creation Ecosystems for Sustainable Furniture

Tobias Leiting, Andreas Külschbach, Volker Stich

In Journal of Innovation Economics & Management Volume 40, Issue 1, 2023, pages 81 to 107
Publishers De Boeck Supérieur

ISBN 9782807399525
DOI 10.3917/jie.pr1.0129

Article available online at
https://www.cairn-int.info/revue-of-innovation-economics-2023-1-page-81.htm

CAIRN.INFO
MATIÈRES À RÉFLEXION

Discovering the outline of this issue, following the journal by email, subscribing...
Click on this QR Code to access the page of this issue on Cairn.info.

Electronic distribution Cairn.info for De Boeck Supérieur.
Reproducing this article (including by photocopying) is only authorized in accordance with the general terms and conditions of use for the website, or with the general terms and conditions of the license held by your institution, where applicable. Any other reproduction, in full or in part, or storage in a database, in any form and by any means whatsoever is strictly prohibited without the prior written consent of the publisher, except where permitted under French law.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Development of a Platform Business Model for Co-creation Ecosystems for Sustainable Furniture[1]

Tobias LEITING
Institute for Industrial Management (FIR)
RWTH Aachen University, Germany
Tobias.Leiting@fir.rwth-aachen.de

Andreas KÜLSCHBACH
Institute for Industrial Management (FIR)
RWTH Aachen University, Germany
Andreas.kuelschbach@fir.rwth-aachen.de

Volker STICH
Institute for Industrial Management (FIR)
RWTH Aachen University, Germany
Volker.Stich@fir.rwth-aachen.de

ABSTRACT

Existing design platforms with multi-dimensional value chains currently have deficits in terms of their business models, resulting in insufficient attention to sustainability goals and individual requirements for products of these platforms. Co-creation approaches, such as the Do-It-Together (DIT) approach for furniture, involve customers and manufacturers as equal partners in the design and production process. This allows customers to have more influence on the sustainability and individualization of products. The existing literature addresses sustainability-oriented design principles for platform business models, but concrete platform business models for multidimensional DIT co-creation of furniture are still missing. Therefore, the objective of this paper is to develop a business model for a DIT co-creation platform for the furniture industry based on a four-step business model innovation framework. This method will then be applied to a specific project scenario to derive a

1. *Acknowledgment*: This research has received funding within the project INEDIT from the EU Horizon 2020 research and innovation program under Grant Agreement No. 869952.

DOI: 10.3917/jie.040.0081

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

project-specific DIT co-creation business model. This generates knowledge about the collaborative manufacture of sustainable and customized furniture and contributes to the cross-sectoral transfer of platform business models for the development of sustainable products.

KEYWORDS: Business Model Innovation, Co-Creation, Circular Economy, Furniture Design, Individualization

JEL CODES: L23, O31

Unsustainable patterns of production and consumption are driving the economy beyond natural planetary limits (Steffen *et al.*, 2015). Therefore, sustainable product creation approaches are needed. Sustainability encompasses not only a future-oriented approach to resources, but also interrelated social, economic, and ecological aspects (Rezaei, 2021). Research has argued that incremental improvements in products and processes are not sufficient for the required rapid transition to sustainability (Abdelkafi, Täuscher, 2016; Short *et al.*, 2014). Thus, companies need to explore ways to align their operations with long-term sustainability. Consequently, new business models for the sustainable design and production of products need to be implemented.

The example of the furniture industry shows that the shift in customer value requirements from products to usage has massive implications for design and production requirements. Customers demand access to products that are sustainable and tailored to their personal needs. More than 60% of European customers consider a design that meets their requirements to be the most important purchase criterion (Renda *et al.*, 2015). However, due to high competitiveness and great price pressure, furniture is currently mainly mass-produced and of low quality and value. As these products meet customer requirements only inadequately and quickly show signs of wear, they are often discarded after a short period of use (Dierig, 2018). In contrast, companies that focus on sustainability and quality are tailoring their furniture to the individual needs of customers. Due to the high level of individualization, the customer must be involved in the design process, similar to a Do-It-Yourself (DIY) approach. Because design and customization according to the classic DIY approach require substantial effort from these companies and thus lead to uneconomical production and expensive products (Dierig, 2018), customized furniture is not affordable for many customers. As a result, currently there is a lack of furniture that is sustainable and that meets individual customer requirements while remaining affordable for many customers. Since furniture items that are designed to meet the customers' requirements and wishes have a perfect fit and are rather expensive compared to low-quality mass-produced items, they are less likely to be replaced and thus

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

have a long lifetime. The DIY approach, therefore, reduces the waste of resources and respects the principle of sustainability more than conventional processes (Dupont *et al*., 2021).

Consequently, the industry must apply new, agile, and flexible design and production approaches to identify and address rapidly changing customer needs while simultaneously improving economic efficiency (Kohtala, Hyysalo, 2015; Pearce, 2014; Fox, 2013; Dupont, 2019). The co-creation approach offers the potential to capture the individual requirements of a large number of customers flexibly and cost-effectively and translate them into ideas and designs (Ihl, Piller, 2010; Dupont *et al*., 2021). In the furniture sector, co-creation creates an ecosystem that actively involves the customers in the design and production of the furniture (Geisler *et al*, 2021). In this context, the INEDIT H2020 research project has the ambition to transfer the traditional DIY approach into a *Do-It-Together* (DIT) approach that involves heterogeneous stakeholders in a co-creation process for furniture (INEDIT, 2021a). To efficiently implement the DIT approach in an industrial context, digital platforms and associated digital tools offer the potential to engage customers, identify their needs, and involve them at an early stage of the product development process (Ihl, Piller, 2010; Hirscher *et al*, 2018). The resulting cyber-physical-social space supports co-creative communities and facilitates a distributed value network for a collaborative economy (Gandia, Parmentier, 2020). To achieve holistic improvements in sustainability, the behavior of the individual stakeholders must be aligned to a holistic, sustainable circular economy, driven by business model innovation (Vence, Pereira, 2018). Therefore, this paper focuses on the design of business models for DIT co-creation and contributes to business model innovation in the circular economy for the furniture industry. For this purpose, the existing literature on business models will first be discussed in order to identify shortcomings in the realization of DIT co-creation approaches in practice. Subsequently, a four-step method for developing a DIT business model will be developed and implemented based on the INEDIT project scenario.

Existing Theories and Previous Work

Several design platforms for various products are already on the market. Most platforms that enable the co-creation of products and services are part of the so-called open-source movement (Bakker *et al*., 2018). Co-creation is the interactive creation of value by various stakeholders (Antikainen *et al*., 2015; Kirchherr *et al*., 2017). In this context, open-source platforms empower customers to participate in the co-creation of products and services (Evans

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

et al., 2007). This includes sharing individual needs, information, and knowledge, as well as providing opportunities for discussion and learning (Medema *et al.*, 2014). The term business model comprises the simplified, aggregated, and dynamically changing basic logic of all value-creating activities of an organization. It describes how marketable offerings are created, provided, and maintained with the help of value creation activities. In addition to value creation activities, strategy and stakeholder components are also considered to achieve the overall objective of generating and securing a competitive advantage (Wirtz, 2020). In this context, a sustainable business model is a business model that follows circular economy (CE) principles and includes elements that slow, narrow, or close the loop of resources so that resource inputs into the value creation processes are reduced and waste from the whole economy is minimized (Bocken, 2015; Geissdoerfer *et al.*, 2017). In recent years, CE has been promoted as an effective contributor to sustainable development, because it offers guiding principles to decouple resource use and environmental impacts from economic growth by preserving the value of products and materials for as long as possible (Ghisellini *et al.*, 2016; Geissdoerfer *et al.*, 2017).

Konietzko *et al.* (2019) present three roles that are relevant for enabling a more sustainable and circular economy via online platforms. One is to reduce overcapacity and enable the resale of used products. Another role is to coordinate operators of product-service systems in complex service ecosystems. Third, online platforms play a role in fostering co-creation for different types of value-creation activities (Konietzko *et al.*, 2019). However, according to Antikainen and Valkokari (2016), there is a lack of frameworks to support business model innovation in companies in the context of a circular economy. Furthermore, the implications of adopting circular economy models and sustainability through value creation need to be understood for all stakeholders. When doing so, for example, the self-interests of stakeholders and sustainability efforts need to be balanced. Santa-Maria *et al.* (2021) also present the need for wider adoption of sustainable and circular business models for the transition to a sustainable future. In this regard, the challenges of securing a sustainable future must be met, and changes must be initiated at the core of the business model to address unsustainability at its source, rather than as an add-on to counteract negative business outcomes (Bocken *et al.* 2014; Vence, Pereira 2018; Witjes, Lozano, 2016).

Even though many existing co-creation platforms claim to generate economic benefits, they also seem to neglect sustainability (Frenken, Schor, 2017). Existing platforms currently show deficits in terms of business models, as they do not set effective sustainability goals for their products and do not

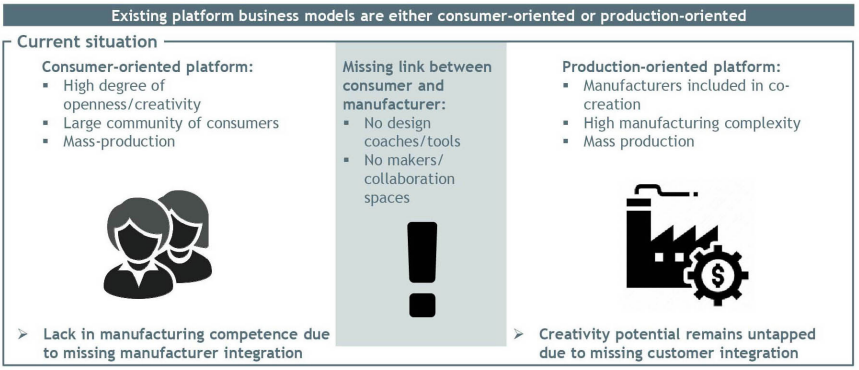
© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

offer sufficient opportunities to tailor complex products such as furniture to individual needs and complex products such as furniture cannot be tailored to individual needs (Hopener, 2019). One deficit of existing platforms is that their business models do not involve all stakeholder groups in the product design process right from the beginning. Therefore, there is a lack of linkage between the overarching sustainability objectives and the activities of the individual stakeholders. Another deficit is that existing platform business models only involve some, but not all relevant stakeholders (customers, designers, makers, and manufacturers) on the same level of the DIT value co-creation process. However, all stakeholders must get equally involved since they are all relevant for a successful and sustainable co-creation process (Hirscher *et al.*, 2018). Stakeholders are involved to varying degrees at different stages of the process, so interaction between all stakeholders is important. Platforms are well-suited to provide a space for this interaction (Gandia, Parmentier, 2020). For existing platforms, a distinction can be made between customer-centric and production-centric business models (Figure 1) (Rayna *et al.*, 2015). Customer-centric platform business models involve a large community of customers to capture their needs. They place the customers at the center of the value creation process and outsource essential value-adding activities to contractors (Reichwald, Piller, 2006). These platforms do not integrate the manufacturers into the design process, which results in a need for a low-complexity, mass-production manufacturing process, which in turn stands in the way of sustainability goals. In production-centered platforms, the producer is placed at the center of value creation, and the manufacturing complexity is usually higher than in customer-centered open innovation platforms (Bieger *et al.*, 2011).

Large series are produced and complex manufacturing processes are realized in order to produce the products quickly and cost-effectively. On these platforms, even complex products can be manufactured, but customers have limited options to participate in the creation process. In conclusion, increasing interaction and collaboration between all the stakeholders and providing a better-shared understanding of the local ecosystem, the DIT approach improves the integration of circular economy aspects into the business model (Kasmi *et al.*, 2022).

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Figure 1 **– Current business model approaches for design platforms (own Figure)**



To realize the potential of a platform that is both customer- and production-oriented, a multi-sided platform business model is required that focuses on both customers and manufacturers within the value chain (Rayna *et al.*, 2015). This requires a link between customers and manufacturers in the DIT co-creation process through stakeholders such as designers and makers. Furthermore, platform tools, collaboration spaces, and a defined co-creation process must be applied. The DIT co-creation business model must link all stakeholders of the value chain as equal partners. This leads to a new form of hybrid production that combines the scale and efficiency of high-volume manufacturing with the advantages of local small-batch production by enabling a confluence of ideas and technologies and the interconnection between digital and physical environments (Fox, 2013; Waldman Brown, 2016). It also integrates the customer as a direct participant in the value creation process, forming a circular business model as a driver for the circular economy (Vence, Pereira, 2018; Rayna *et al.*, 2015).

However, in the previously outlined literature, there is no comprehensive solution on how to align the furniture industry with the characteristics of a CE. Existing platforms currently have deficits in their business models, *i.e.*, the sustainability goals for the products of these platforms are not sufficiently considered, and complex products such as furniture cannot be adapted to individual needs. The changing requirements for platforms and business models in the context of sustainable development result in novel demands on research. Existing approaches for developing business models do not consider all relevant characteristics of the DIT co-creation process in the furniture industry. This paper aims to develop and apply a method for the innovation of a sustainable business model for a co-creation platform.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

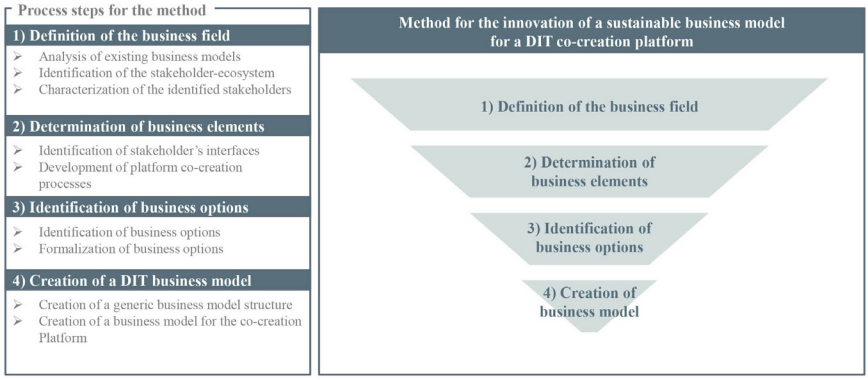
Methods

Hence, the research question for this paper is: *How to design a DIT business model for a co-creation platform for the design of sustainable furniture?* The INEDIT project scenario is used as a case study to demonstrate the design of such a business model for a specific application situation in the furniture industry. The aim of the INEDIT project is to create a platform for the co-creation of furniture that connects customers, designers, and manufacturers and thus creates more sustainability in the industry through a DIT approach. The INEDIT approach is applied in practice in 4 different use cases. The platform serves as a digital co-creation tool and touchpoint for integrating the stakeholders in one process. Preliminary work has been done in the project to design a DIT value creation process. Furthermore, a database of 61 interviews, conducted in the project to collect requirements from the relevant stakeholders of the INEDIT DIT co-creation ecosystem, was accessed (INEDIT, 2020). Additionally, this study analyzes and draws on the business models of 20 successful design platforms as a source for analogue business models for digital platforms (INEDIT, 2021b). On this basis and drawing on the business model innovation strategies outlined by Amit and Zott (2020), the business models were designed. In this respect, connecting the value creation processes of all stakeholders involved in co-creation is essential. To this end, first, the present method aims to develop interlinked business model elements for DIT co-creation. Subsequently, specific business model options are developed for the individual stakeholders based on the linked elements. These specific business model options for individual stakeholders can then be efficiently implemented in various industries. For a structured implementation and to provide clear orientation, this study follows four successive steps of business model innovation as outlined by Amit and Zott (2020): 1. Definition of the business field, 2. Determination of business elements, 3. Identification of business options, and 4. Creation of the business model (Figure 2).

In the first stage, the *definition of the business field*, requirements for the sustainable DIT platform business models are derived. This serves to determine the characteristics of the surrounding ecosystem, as well as the framework conditions and characteristics of the business model. For this, existing business model concepts of co-creation platforms are analyzed based on defined criteria for sustainable co-creation. On this basis, all relevant stakeholders for the DIT co-creation are represented and connected within a stakeholder map. For those stakeholders, an interview-based analysis is performed to understand the relationships between stakeholders, the effects of the system on the value generated for the stakeholders, and the impacts of the stakeholders input on the system.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Figure 2 **– Method for the innovation of business models for DIT co-creation (own figure, adapted from Amit, Zott 2020)**



In the second step, the *determination of the business elements*, interfaces and processes between stakeholders are identified and dependencies between the individual stakeholders in terms of value creation are identified. The objective is to define the characteristics of specific components within the business model and their interactions. Based on the value streams between stakeholders, the process for DIT co-creation on the platform is developed. This rough process is then narrowed down to the activity level of the stakeholders using swimlane diagrams.

In the third step, *identification of business options*, possible business options for DIT platform business are consolidated. This makes it possible to determine and define possible design states of the components of the business model. To this end, possible business model options are identified from the literature and narrowed down into relevant options by comparing them with successful platforms in practice. Subsequently, the formalized business options are visualized in a business option matrix. The matrix shows the business options between individual stakeholders and the costs and revenue flows of individual stakeholders.

In the final fourth step, the *creation of business models* is conducted. In this step, the described components of the business model are specified for the concrete platform and according to the requirements of this platform. Based on the business model canvas approach, a generic business model structure that consolidates all developed business model elements is developed. Based on this, the generic business model is finally specified and concretized.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Findings

In the following, the method for innovating business models in the DIT co-creation outlined above is applied to a product design process in the furniture industry. The results are based on the research carried out in the EU project INEDIT. The European dimension of the work brings several advantages: by working in a multidisciplinary consortium of partners across Europe, input and feedback from different cultures are incorporated into the research results.

Regarding the design process, the concrete application shows the change in the customer's role from a recipient of a product to a value co-creator, which has a massive impact on design and production requirements. As a result, business model options for all stakeholders of the DIT ecosystem and a business model concept for the platform can be developed. Based on this, a demonstrator will be developed, showing the practical application of the DIT co-creation approach in four specific use cases. The implication of the DIT co-creation approach for a circular economy can be demonstrated and evaluated on this basis. The results thus contribute to the establishment of the DIT co-creation approach within the furniture manufacturing industry as well as for other industries and products, thus realizing a more sustainable and customer-oriented value creation for furniture.

Definition of the Business Field

To define the business field, in a first step, an analysis of existing platforms is conducted. For this purpose, a screening of relevant co-creation platforms was carried out as part of the INEDIT project (INEDIT, 2020). The results of this analysis are used in the next step to identify the stakeholders involved in open innovation platforms for furniture. With the help of interviews with the identified stakeholders, the stakeholders are characterized. The outcome of this subchapter is an overview of stakeholders in combination with their goals and business fields. This stakeholder analysis aims to address the stakeholders' interests, expectations, and requirements from the beginning of the process.

Analysis of Literature and Possible Business Options

In a first step, an analysis of the literature and of existing platform business models is conducted. An overview of the application context and a basis for further business model innovation will be given. The platform analysis focuses on platforms that are either co-creation platforms in general or open

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

innovation platforms for the furniture industry. The platforms identified in the INEDIT research project will be evaluated based on specific criteria to assess their fit with the DIT co-creation use case in the furniture industry. The criteria defined for the evaluation of the platforms can be found in Table 1.

Table 1 – Criteria for the platform analysis

Evaluation Criteria	Definition	Low	Medium	High
Community size	Number of customers involved in the co-creation community	<10.000 users	10.000-50.000 Users	>50.000 users
Customer participation	Intensity and type of participation of the customers	Only product purchase	Customer feedback is incorporated	Participation in product development
Manufacturer participation	Intensity and type of participation of the manufacturers	Standardized product configuration	Partial individualization with manufacturer	High degree of customization
Product complexity	Value and complexity of the designed and manufactured products	Product consists of one part	Product consists of few, easily assembled parts	Product consists of many parts which special machines for assembly.
Sustainability	Consideration of economic, ecological, and social sustainability factors	No consideration given	Sustainability is equal in importance to other goals/ requirements	Sustainability is the overriding goals/ characteristic

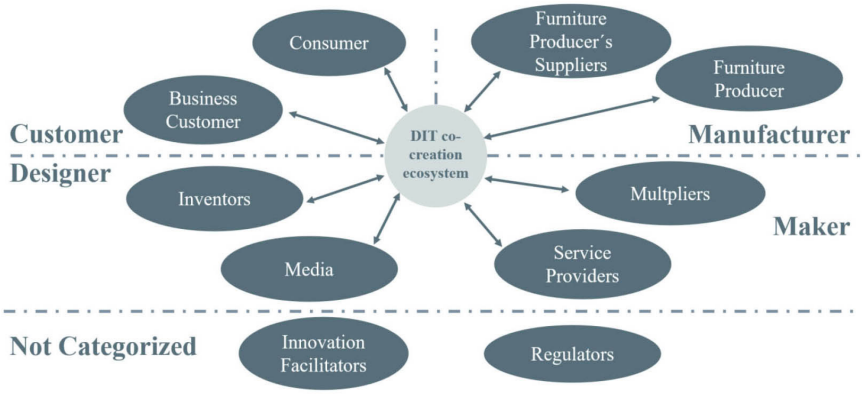
In total, the business models of 20 platforms were evaluated in an online screening and review. The suitability criteria for from Table 1 were used for evaluation. Platforms with a high degree of fit in all categories were chosen. Of these, the 4 platforms *Form.bar, Faberin, Handcrafted* and *Direct Create* show a potential fit for this application based on the criteria. However, none of these platforms fully meets all the selected criteria (INEDIT, 2021b). These platforms and their business models serve as a basis for the further development of the DIT co-creation business model.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Identification of Relevant Stakeholders

Based on an initial analysis as part of the INEDIT project, key stakeholders within the DIT co-creation ecosystem were identified (INEDIT, 2020). In total, 10 different stakeholders can be identified. They can be divided into the four categories of customers, designers, makers, and manufacturers. A customer is a person or group who pays to consume the furniture or services that are provided by a designer, maker, or manufacturer. Consumers and business customers belong to the customer category. A designer is a trained professional who designs the product and its properties. Designers are inventors. Furthermore, the media can be added to this group as a source of inspiration for designers. The makers are representatives of providers of technology-based open-source hardware and knowledge for the DIY culture and, in the INEDIT context, for the DIT approach. Thus, service providers and multipliers represent the makers. Manufacturers are stakeholders that produce the furniture by converting raw materials into furniture by labour and machines. Representatives of this category are the furniture producers and their suppliers (INEDIT, 2022). Regulators and innovation facilitators are "Not Categorized", as they cannot be assigned to any of the four categories of customers, designers, makers, or manufacturers. All stakeholders in the DIT co-creation of furniture are structured within a stakeholder map (Figure 3) as follows:

Figure 3 **– Stakeholder map of the DIT co-creation ecosystem for furniture (own figure)**



Characterization of the Identified Stakeholders

Stakeholder interviews are used to obtain further information about the stakeholders and thus to further characterize them. 61 semi-structured in-depth interviews with representatives from all stakeholder categories were

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

conducted within the INEDIT project (INEDIT, 2020). Due to the different requirement profiles, the questionnaire for the customers differed from that for all other stakeholder groups. The interviewees cover all stakeholder roles, including business customers, furniture producers, furniture producer's suppliers, service providers, and other stakeholders other than the customers. The interviews were used to capture the objectives and requirements of the individual stakeholders concerning DIT co-creation. The weighting of the requirements by individual stakeholders and the frequency with which a requirement is mentioned were important in this respect. Fulfilment of these requirements by the DIT co-creation platform represents a value proposition for these stakeholders. The value categories were created by drawing on the existing literature (Osterwalder *et al.*, 2010). The open answers from the semi-structured interview were analyzed and then assigned to the respective categories. The value propositions were then derived depending on the relevance of the statements from the interviews. The value propositions of the platform, in turn, were derived from the objectives of the DIT approach. The general expectation of all stakeholders is that the platform can be used to develop more sustainable products, provide a co-creation ecosystem, and achieve higher customer satisfaction by offering products that better meet the individual needs of customers (Figure 4). The customer's goals are to obtain sustainable and customized furniture while maintaining a high level of product transparency, as well as to improve on product ideas. Customers seek recognition or reward for the contribution of creative ideas – they want to be recognized as the originators of ideas or as co-designers of the product. The designers' goals are to develop designs based on customer needs, evaluate product ideas, and provide feedback. These findings correspond with the literature, which considers the ability to customize (Borga *et al.*, 2009; Klahn *et al.*, 2014) and to address sustainability requirements (Papadopolus *et al.*, 2014; Wan *et al.*, 2018; Xu *et al.*, 2020) as key success factors for the furniture industry. The DIT co-creation platform enables designers to offer services such as designing products, offering design training to clients, or advising customers for a charge. Furthermore, the platform offers access to design tools and a direct connection to potential clients. The objectives of the makers are the production of prototypes and small series or to offer consulting services from a production perspective. Makers want to establish a business by offering services such as prototyping, process improvement consulting, and product optimization. For this purpose, the platform offers access to co-creation tools and potential clients. For manufacturers, the platform enables access to existing furniture product designs that has a high value for customers. Furthermore, the platform offers direct customer and market access for manufacturers.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Figure 4 – Value proposition for the stakeholders of the DIT co-creation business model (own figure)

Determination of Business Elements

The platform enables the exchange of value between the individual stakeholders and supports the process of furniture design and production. In this subchapter, the stakeholders are connected by determining the value and information flow and the point of contact between the stakeholders. To this end, a value matrix for the stakeholders is derived. Based on this, the processes and activities on the platforms are developed for all stakeholders. The value matrix will be validated after the implementation of the demonstrator in the four use cases within the INEDIT project.

Identification of Stakeholders' Interfaces

The value propositions achieved by individual platform stakeholders are highly dependent on the activities of other stakeholders. There is a multi-dimensional exchange of values between all stakeholders involved in the platform. An efficient exchange of these values is enabled by the processes on the platform. The platform is at the center and relates to all four other stakeholders. As multi-sided co-creation between the stakeholders is desired, value exchange takes place directly and informally as well as indirectly and formally via the platform. Based on this, each relevant contact and value flow between the respective stakeholders is considered. For this purpose, a value exchange matrix depending on the characterization of the stakeholders is developed (Figure 5). The matrix is based on findings from the 61 semi-structured interviews. The potential connections between all stakeholders can be identified and formalized through value exchange activities.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

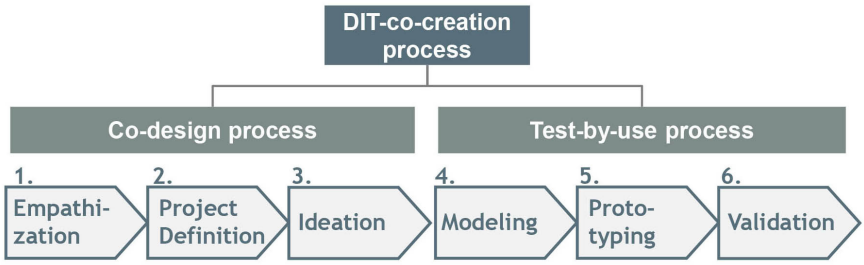
Figure 5 – Value exchange matrix for stakeholders of the DIT co-creation business model (own figure)

Provide value to	Customers	Designers	Makers	Manufacturers
Customers	▪ Feedback on ideas and products ▪ Ideas for improvements	▪ Sharing needs and ideas for design ▪ Client	▪ Sharing needs and ideas for prototyping ▪ Client	▪ Market potential for product designs ▪ Consumer
Designers	▪ Transfer of requirements and ideas into designs ▪ Design training	▪ Exchange of tools, ideas and best practices	▪ Creation of a design suitable for production	▪ Exchange of tools, ideas and best practices
Makers	▪ Creation of prototypes from designs ▪ Training in manufacturing	▪ Design feedback from prototyping perspective	▪ Exchange of tools, ideas and best practices	▪ Exchange of ideas regarding production
Manufacturers	▪ Selling customized products	▪ Design feedback from a manufacturing perspective	▪ Prototype feedback from manufacturing perspective	▪ Exchange of tools, ideas and best practices

Presentation of Platform Co-creation Processes

After the previous step of establishing potential connections between the stakeholders, this step presents the individual stakeholder processes to understand the relationships between the value provided and the action needed to deliver that value. The co-creation design process was developed within the INEDIT project, thus the following work will focus on integrating this process as a basis into the business models. Firstly, the general co-creation process is presented, which is then used as a basis for modeling swimlane diagrams. The co-creation processes are derived from design thinking approaches (Doorley *et al.*, 2018). The swim lane diagrams comprise all events, actions, decisions, and tools needed for the platform and all respective stakeholders in a compact visualization. The co-creation process can be divided into two parts: co-design and testing by use. Both parts can be divided into 3 subprocesses. In sum, the stakeholders complete the following six process steps: 1. the empathizing process, 2. the project definition process, 3. the ideation process, 4. the modeling process, 5. the prototyping process, and 6. the validation process (INEDIT, 2021a) (Figure 6).

Figure 6 – DIT co-creation process (own figure, adapted from INEDIT, 2021a)



© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Each step consists of further sub-steps. The following describes the "Empathization" process in more detail. The "Empathization" process is used to identify and understand the needs of the customers. In the "Project Definition" process, data collected on a requirement is interpreted and the scope of a project is clarified and defined. In the "Ideation" process, ideas and solutions to this requirement are discussed, elaborated, and communicated. In the "Modeling" process, a solution is developed in the form of a formal model. The "Prototyping" process transforms a model into a physical product. In the "Validation" process, the physical product is validated concerning the requirements and needs of the customer and prepared for industrial production. The identified stakeholder interrelations and the stakeholder journey analysis are now added to the stakeholder matrix. Each individual process is then transferred to a process swimlane. Figure 7 shows the swimlane diagram for the empathization process. This visualization allows representing both the platform activities and the individual activities of the stakeholders in a formalized way (INEDIT, 2021a).

Identification of Business Options

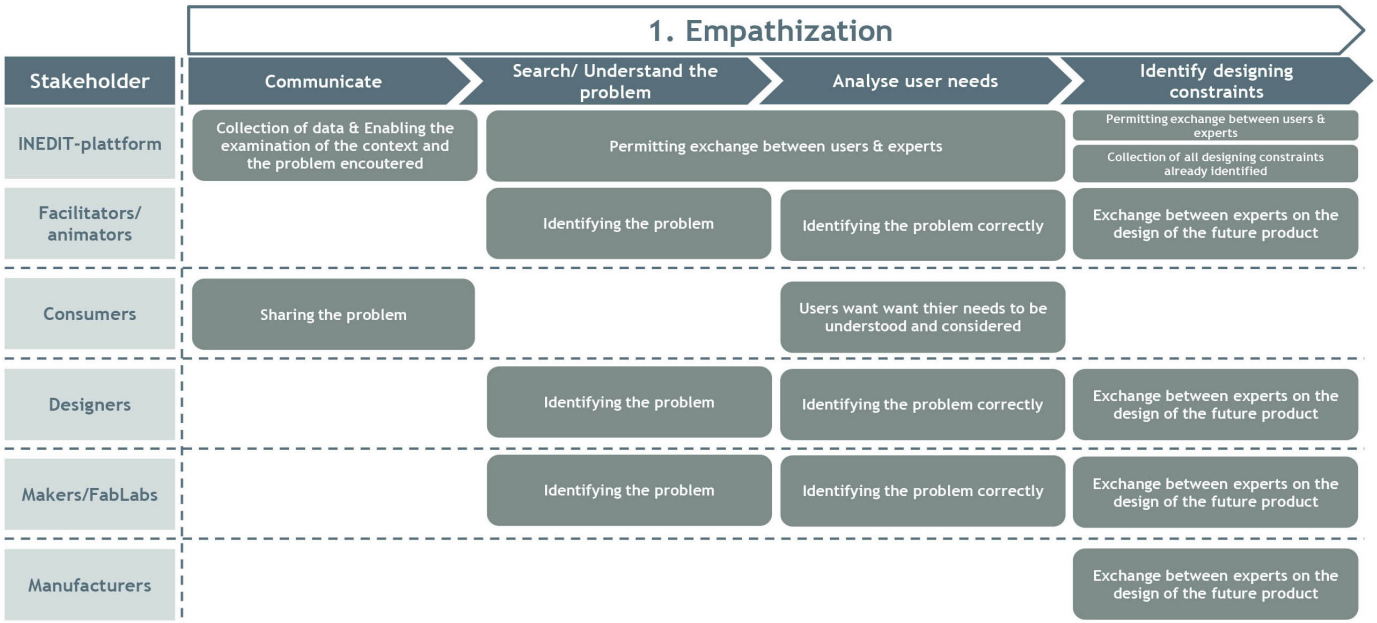
The objective of the third step is to identify business options for all stakeholders and the platform based on the previous results. In order to achieve this objective, suitable revenue options for the identified value propositions are determined from the literature and merged with the existing platform business models in the industry. These options are then applied to the stakeholders in the DIT co-creation process with a business option matrix.

Identification of Business Options

To promote co-creation activities, incentives must be created for the stakeholders of the process through business options. Various business options are possible and feasible as drivers for the value exchanges within the DIT co-creation process. According to Gassmann *et al.*, stakeholders can generally engage in over 55 potential business options with each other (Gassmann *et al.*, 2013). In total, nine of these possible business options were derived from existing platform business models in the industry (Table 2). Each business option links two interacting stakeholders. The provision of a service to another stakeholder results in a revenue stream, and the purchase of a service from another stakeholder results in a cost stream.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Figure 7 - Process swimlane diagram of the empathizing process (own figure, adapted from INEDIT 2021a)



© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Table 2 – **Possible business options for DIT co-creation**

Business option	Definition
Free	Free voluntary contribution/access without compensation
Freemium	Free access to basic services and payment for premium services
Sale of products	Sale of products in a direct transaction
Sale of services	Offer of services for a time- or project-based fee
License	Offer of rights of use for a single payment
Pay-per-use	Fee depending on utilization
Subscription/ Membership	Continuous access to services in return for a regular payment
Affiliation	Sharing of added value depending on the success
Transaction commission	A commission dependent on the volume of a transaction

Formalization of Business Options

In the following, these identified business options are transferred to the individual actors in the DIT co-creation process. For this purpose, a business option matrix is developed including all stakeholders (Figure 8). This includes, on the one hand, the primary business option between two stakeholders and, on the other hand, the main revenues and costs of the individual stakeholders. This structure aims to keep the business options as simple and transparent as possible, creating high incentives for co-creation for all stakeholders in the ecosystem as well as a balanced relationship between revenue and costs for each stakeholder. Therefore, customers are given free access to the platform. Furthermore, the idea and feedback exchange between individual stakeholders is free of cost as the value in return is not quantifiable. The designers, makers, and manufacturers must contribute a subscription fee to gain access to the platform. The subscription option is established in practice as a simple and transparent model for platform stakeholders with commercial objectives in using the platform. The revenue stream to the platform allows compensating the costs of operating the platform. In return, the designer and the maker receive access to the platform and can sell their services to the customers. This model reflects the effort in time and resources to provide the services in the best possible way, creating transparency and simplicity. Products are offered to customers by manufacturers through direct sales. Provided with efficient access to developed designs and to the market, they must pay a transaction commission in addition to the subscription fee, which is based on the transaction volume. This platform business model ecosystem creates an incentive for all stakeholders involved in open innovation to participate in co-creation. At the same time, the platform can sustain itself through revenues from product sales and subscription fees.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

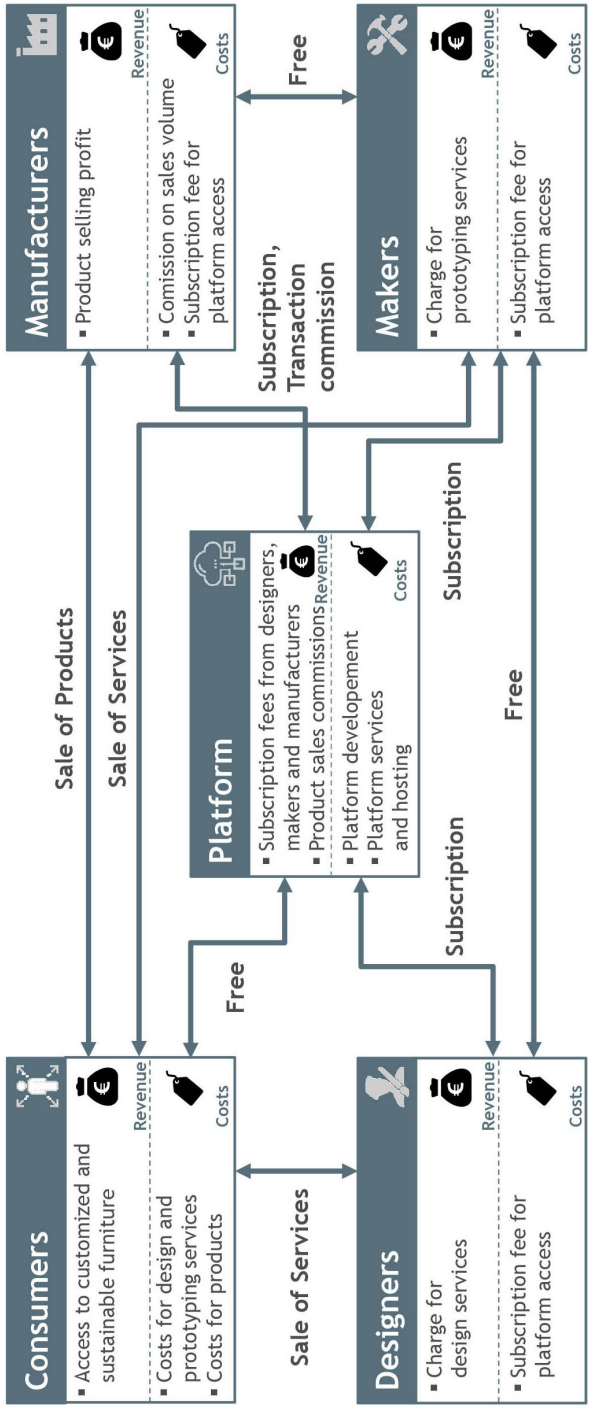


Figure 8 – Business option matrix for the DIT co-creation (own figure)

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Creation of DIT Business Models

In the three previous steps of the present approach, the stakeholders of the DIT co-creation ecosystem were linked to each other. The next step aims to derive a specific business model based on the previously linked business model elements, merging the interests of customers, designers, makers, and manufacturers. For this purpose, first, a generic business model structure is created that consolidates the developed elements of the business models. This structure is subsequently used to design the concrete business model for the platform.

Creation of a Business Model for the Co-Creation Platform

Osterwalder's Business Model Canvas approach provides a basis for the structure of the business model (Osterwalder *et al.*, 2010). In this approach, a business model is created with the help of a canvas made up of nine fields (Figure 9). This structure can be filled with the developed content of the DIT co-creation business model. The customer segments of the business models consist of people with individual requirements and needs for furniture. For each business model, the "Key Partners" field represents the stakeholder map derived in the first step of the present approach. The value propositions of the individual stakeholders can be extracted from the value creation map defined. Key activities and key resources reflect the activities of the stakeholders and the platform within the co-creation process to create the value proposition, which was created in the second step. The customer relationships and the channels represent the activities of the respective stakeholders in the co-creation process in relation to the customers. The two fields of cost structure and revenue streams correspond to the contents of the business option matrix developed in the third step.

In the final step of this approach, the business model for the co-creation platform is specified. For this purpose, the business model is structured based on the generic business model structure. To this end, the previously defined business model characteristics that are relevant for the respective stakeholder type are summarized and transferred to the business canvas structure. This procedure creates an interlinked business model, considering the requirements of each stakeholder type of the DIT co-creation ecosystem (see Figure 9).

Discussion

The method is designed for the development of business models for co-creation ecosystems in DIT value creation processes by combining the

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

Figure 9 – A business model canvas for the DIT co-creation platform for furniture (own figure)

Business model of the platform for the DIT co-creation

Key Partners
- Customers
- Designers
- Makers
- Manufacturers

Key Activities
- Co-design (e.g. design contests)
- Test by use (e.g. Usage data creation)

Key Resources
- Collaboration interfaces/tools
- Sustainability KPI

Value Propositions
- Improving sustainability
- Creation of a co-creation ecosystem
- Improving customer satisfaction

Customer Relationships
- Co-design process (e.g. Customer feedback on ideas)
- Community management

Channels
- Platform (e.g. portal, forums)
- Co-design process activities

Customer Segments
- Individual orders from custmer
- Orders from customer community
- Production for the market

Cost Structure
- Platform developement
- Platform services and hosting
- Marketing

Revenue Streams
- Subscription fees of designers, makers and manufacturers
- Product sales comission from manufacturers

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

interests of heterogeneous stakeholders. This novel approach the basis for the DIT ecosystem of the co-creation platform in the INEDIT project developed to design individualized furniture in a sustainable way. Important characteristics of t co-creation within this DIT ecosystem are multidimensional interactions between heterogeneous stakeholders like customers, designers, makers, and manufacturers. This enables a hybrid digital-physical interaction between global and local production for a generation of value creation towards the circular economy. These stakeholders must collaborate as equals in the value chain of furniture creation through a platform business model. This paper presents a four-step business model innovation method for the development of sustainable platform business model concepts, taking the framework conditions of the DIT ecosystem into account.

A business model for a CE needs to master the difficult balancing act of addressing the three conflicting goals of environmental, economic, and social sustainability. An important key aspect for achieving this is the creation of a co-creation value network of different stakeholders (Konietzko *et al.*, 2019). For the co-creation development of complex products such as furniture, the activities of different stakeholders must be brought together. To this end, the interests of the individual stakeholders must be harmonized with the overall sustainability-oriented goals of the platform using the mechanisms of the business model. Existing business models do not sufficiently consider the interaction of individual stakeholders with each other (Hirscher *et al.*, 2018). The method developed in this paper focuses on the interaction of the individual stakeholders within the value creation processes of the platform. The primary objective is to harmonize the interests and activities of all stakeholders. On the one hand, this enables sustainability objectives to be transferred to individual stakeholders in a targeted manner. On the other hand, the pursuit of the stakeholders' self-interests leads to higher incentives for co-creation. This strengthens the role of the customer, who evolves from a passive buyer to an active co-creator (Vence, Pereira, 2018). Customers have greater influence and transparency on the sustainability of the created products. They can participate in decisions on how to make their products more sustainable and they are willing to pay higher prices for production because they participate in such decisions. Thus, sustainability does not have to result from regulations or restrictions on furniture development – it may pay off economically (Abdelkafi, Täuscher, 2016).

Currently, the resulting business model has a high level of abstraction. To apply the results in practice, the business model must be further detailed. For this, the core activities, processes, and revenue mechanisms must be further concretized based on practical use cases. Here, the four use cases of the

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

INEDIT project serve as a suitable basis. The use cases are created and examined within the INEDIT research project. The analysis of the business model for each use case is part of the research project. In the following application, the elements of the business model must be assessed and iteratively further developed. In particular, the impact of co-creation activities on sustainability needs to be assessed through the application of the business model. This requires an objective evaluation for the sustainability of the co-created product, which can be performed, for example, with the help of sustainability-oriented KPIs (Abdelkafi, Täuscher, 2016).

Moreover, application of the present method requires substantial effort so far. For this reason, concrete principles and measures for the development of co-creation business models could be derived from this approach. Thus, blueprints for the individual development steps are possible, enabling to transfer of these principles to further co-creation platforms with less effort. Through further research, the mechanisms and components of platform business models should be investigated to understand the influence on the co-creation and sustainability of the product and the value creation activities. This insight could contribute towards making platform business models more sustainable.

The present method was developed and applied to the development of sustainable business models for the use case of a DIT co-creation platform. However, it is conceivable to apply the method in other use case scenarios for the development of sustainable business models. The method is especially suited for situations where multiple stakeholders with heterogeneous target systems collaborate within a common value creation process. Accordingly, the method should also be validated in other application scenarios and, if successfully transferable, a generalization of the approach is possible to design sustainable business models for co-creation value creation activities. Accordingly, the method should be validated in further application scenarios and, if successfully applicable, transferred into a general approach for the design of sustainable business models for co-creation value creation activities.

Conclusion

There is currently no available offer of furniture that is sustainable, tailored to individual customer needs, and at the same time affordable for many customers. To address this situation, we have developed a novel DIT co-creation process. Customers and manufacturers are brought together on a digital platform – as equal partners and supported by designers and makers in a co-creation process. Until now, the business models of existing platforms

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

focus either on the customer side or on the production side. There is a lack of multi-sided business models that equally involve all stakeholders in the value chain to implement DIT co-creation in practice. Therefore, our research ambition was to develop and apply a method for innovating sustainable business models for DIT co-creation processes.

This paper presents a four-step method to innovate sustainable DIT business models for co-creation processes. With the help of this method, a platform business model was developed for the DIT co-creation process of the INEDIT project. First, the method focuses on linking the business model elements of the individual stakeholders and on structuring and shaping the dependencies between the individual stakeholders. Based on the process steps for connecting all business model elements of the respective stakeholders of the DIT co-creation ecosystem, a formalized business model is derived for the INEDIT co-creation platform using the business model canvas approach. This can be also used as a basis for the implementation of DIT co-creation in other multi-sided furniture platforms. The research presented here offers a novel method for the innovation of a business model for co-creation ecosystems and illustrates the application of the method for the INEDIT project scenario for DIT co-creation in the furniture industry.

By applying the derived principles for designing platform business models in other application scenarios, the DIT co-creation process can be established in various industries. Small and medium-sized enterprises can benefit greatly from this approach, as it increases the economic viability of producing lucrative and customized products on a small-series, manufacture-on-demand basis. New products are jointly designed and developed by different actors in an optimized value creation process combining 'global design' with 'local production'. Furthermore, the co-creation process and the transparency of the sustainability over the product are innovative drivers of the circular economy. The application of the innovated business models within the INEDIT project is an important element in achieving multi-sided platforms for sustainable furniture. In follow-up of INEDIT, the innovated business model will be concretized and transferred into implementation concepts for a multi-sided furniture platform. Within a prototypical market launch phase, the business model will be iteratively adapted based on market experience.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

REFERENCES

ABDELKAFI, N., TÄUSCHER, K. (2016), Business Models for Sustainability from a System Dynamics Perspective, *Organization & Environment*, 29, 74-96.

AMIT, R., ZOTT, C. (2020), *Business Model Innovation Strategy: Transformational Concepts and Tools for Entrepreneurial Leaders*, Hoboken USA, Wiley.

ANTIKAINEN, M., LAMMI, M. M., HARRI, P., RÜPPEL, T., VALOKARI, K. (2015), Towards Circular Economy Business Models: Consumer Acceptance of Novel Services, *International Society for Professional Innovation Management*, 6-9.

ANTIKAINEN, M., VALKOKARI, K. (2016), A Framework for Sustainable Circular Business Model Innovation, *Technology Innovation Management Review*, 6(7), 5-12.

BAKKER, C., BALKENENDE, R., POPPELAARS, F. (2018), Design for Product Integrity in a Circular Economy, in *Designing for the Circular Economy*, London, Routledge (Taylor & Francis Group).

BIEGER, T., ZU KNYPHAUSEN-AUFSESS, D., KRYS, C. (2011), *Innovative Geschäftsmodelle. Konzeptionelle Grundlagen, Gestaltungsfelder und unternehmerische Praxis*, Berlin, Springer-Verlag.

BOCKEN, N. M. P. (2015), Sustainable Venture Capital: Catalyst for Sustainable Start-up Success?, *Journal of Cleaner Production*, 108, 647-58.

BOCKEN, N. M. P., SHORT, S. W., RANA, P., EVANS, S. (2014), A Literature and Practice Review to Develop Sustainable Business Model Archetypes, *Journal of Cleaner Production*, 65, 42-55.

BORGA, F., CITTERIO, A., NOCI, G. PIZZURNO, E. (2009), Sustainability Report in Small Enterprises: Case Studies in Italian Furniture Companies, *Business Strategy and the Environment*, 18(3), 162-176.

DIERIG, C. (2018), *Darum Müssen Die Deutschen Mit Billigen Möbeln Leben,* Welt online, online available at https://www.welt.de/wirtschaft/article172440322/Warum-die-Deutschen-jetzt-mit-billigen-Moebeln-leben.html

DOORLEY, S., HOLCOMB, S., KLEBAHAN, P., SEGOVIA, K., UTLEY, J. (2018), *Design Thinking Bootleg, d.school at Stanford University*, https://dschool.stanford.edu/resources/design-thinking-bootleg

DUPONT, L. (2019), Agile Innovation: Creating Value in Uncertain Environments, *Journal of Innovation Economics & Management*, 28(1), 1-5.

DUPONT, L., KASMI, F., PEARCE, J., ORTT, R. (2021), *"Do-it-Together": Towards the Factories of the Future*, in Ramos, J., Bauwens, M., Ede, S., Given Wong, J., Cosmo-local reader, Futures Lab, 52-59.

EVANS, S., PARTIDÁRIO, P. J., LAMBERT, J. (2007), Industrialization as a Key Element of Sustainable Product-Service Solutions, *International Journal of Production Research*, 45(18-19), 4225-4246.

FRENKEN, K., SCHOR, J. (2017), Putting the Sharing Economy into Perspective, *Environmental Innovation and Societal Transitions*, 23, 3-10.

FOX, S. (2013), Paradigm Shift: Do-it-yourself (DIY) Invention and Production of Physical Goods for Use or Sale, *Journal of Manufacturing Technology Management*, 24(2), 218-234.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

GANDIA, R., PARMENTIER, G. (2020), Managing Open Innovation through Digital Boundary Control: The Case of Multi-Sided Platforms in the Collaborative Economy, *Journal of Innovation Economics & Management*, 32(2), 159-180.

GASSMANN, O., FRANKENBERGER, K., CSIK, M. (2013), *The St. Gallen Business Model Navigator*, London, Pearson Education Limited.

GEISLER, L., HERZBERG, N., MUNDT, N. (2021), *Co-Creation bei komplexen Consumer Products*, online available at https://tud.qucosa.de/api/qucosa%3A75910/attachment/ATT-0/

GEISSDOERFER, M., SAVAGET, P., BOCKEN, N. M. P., ERIK JAN HULTINK, E. J. (2017), The Circular Economy: A New Sustainability Paradigm?, *Journal of Cleaner Production*, 143, 757-768.

GHISELLINI, P., CIALANI, C., ULGIATI, S. (2016), A Review on Circular Economy: The Expected Transition to a Balanced Interplay of Environmental and Economic Systems, *Journal of Cleaner Production*, 114, 11-32.

HOPENER, G. A. (2019), *Hoepner-Marketing-Lexikon*, FH Aachen, Aachen, online available at https://www.wirtschaftswiki.fh-achen.de/index.php?title=Plattformbasiertes_Gesch%C3%A4ftsmodell.

HIRSCHER, A.-L., NIINIMÄKI, K., JOYNER ARMSTRONG, C. (2018), Social Manufacturing in the Fashion Sector: New Value Creation Through Alternative Design Strategies?, *Journal of Cleaner Production*, 172, 4544-4554.

IHL, C., PILLER, F. T. (2010), Von Kundenorientiertung zu Customer Co-Creation im Innovationsprozess, *Marketing Review St. Gallen*, 27(4), 8-13.

INEDIT (2020), *D2.1 - Specification of the DIT Stakeholders Needs and Expectations*, INEDIT Project Report, online assessable at https://www.inedit-project.eu/deliverables/

INEDIT (2021a), *D2.2 - Design of the DIT Approach and XD Framework*, INEDIT Project Report, online assessable at https://www.inedit-project.eu/deliverables/

INEDIT (2021b), *D5.1 – Design of the Comprehensive DIT Business Model*, INEDIT Project Report, online assessable at https://www.inedit-project.eu/deliverables/

INEDIT (2022), *INEDIT Glossary*, online assessable at https://www.inedit-project.eu/glossary/

KASMI, F., OSORIO, F., DUPONT, L., MARCHE, B., CAMARGO, M. (2022), Innovation Spaces as Drivers of Eco-innovations Supporting the Circular Economy: A Systematic Literature Review, *Journal of Innovation Economics & Management*, https://doi.org/10.3917/jie.pr1.0113

KIRCHHERR, J., REIKE, D., HEKKERT, M. (2017), Conceptualizing the Circular Economy: An Analysis of 114 Definitions, *Resources, Conservation & Recycling*, 127, 221-232.

KLAHN, C., LEUTENECKER, B., BEBOLDT, M. (2014), Design for Additive Manufacturing – Supporting the Substitution of Components in Series Products, *Procedia CIRP 21*, 138-143.

KOHTALA, C., HYYSALO, S. (2015), Anticipated Environmental Sustainability of Personal Fabrication, *Journal of Cleaner Production*, 99, 333-344.

KONIETZKO, J., BOCKEN, N. M. P., HULTINK, E. J. (2019), Online Platforms and the Circular Economy, *Innovation for Sustainability*, Cham, Springer, 435-450.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

MEDEMA, W., WALS, A., ADAMOWSKI, J. (2014), Multi-Loop Social Learning for Sustainable Land and Water Governance: Towards a Research Agenda on the Potential of Virtual Learning Platforms, *NJAS – Wageningen Journal of Life Sciences*, 69, 23-38.

OSTERWALDER, A., PIGNEUR, Y., WEGBERG, J. (2010), *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, New Jersey, John Wiley & Sons.

PAPADOPOLUS, I., TRIGKAS, M., KARAGOUNI, G., PAPADOPOULOU, A., MORAITI, V., TRIPOLITSIOTI, A., PLATOGIANNI, E. (2014), Value Creation Based on IT Marketing: An Exploratory Study for Developing Strategic Partnerships in the Greek Wood and Furniture Sectors, *International Journal of Technology Marketing*, 10(4), 345-361.

PEARCE, J. M. (2014), *Open-Source Lab How to Build Your Own Hardware and Reduce Research Costs*, online available at https://www.elsevier.com/books/open-source-lab/pearce/978-0-12-410462-4

REICHWALD, R., PILLER, F. T (2006), Interaktive Wertschöpfung. Open Innovation, Individualisieurng und neue Formen der Arbeitsteilung, *Betriebswirtschaftlicher Verlag Dr. Th. Gabler, Wiesbaden*.

RENDA, A., PELKMANS, J., SCHREFLER, L., LUCHETTA, G., SIMONELLI, F., MUSTILLI, F., WIECZORKIEWICZ, J., BUSSE, M. (2015), The EU Furniture Market Situation and a Possible Furniture Products Initiative, *Centre for European Policy Studies (CEPS)*, *Brussels*.

REZAEI, J. (2021), *Strategic Decision Making for Sustainable Management of Industrial Networks*, Cham, Springer Nature Switzerland.

SANTA-MARIA, T., VERMEULEN, W. J. V., BAUMGARTNER, R. J. (2021), Framing and Assessing the Emergent Field of Business Model Innovation for the Circular Economy: A Combined Literature Review and Multiple Case Study Approach, *Sustainable Production and Consumption*, 26, 872-891.

SHORT, S., BOCKEN, N., BARLOW, C. Y., CHERTOW, M. (2014), From Refining Sugar to Growing Tomatoes: Industrial Ecology and Business Model Evolution, *Journal of Industrial Ecology*, 18, 603-618.

STEFFEN, W., RICHARDSON, K., ROCKSTRÖM, J., CORNELL, S. E., FETZER, I., BENNETT, E. M., BIGGS, R., CARPENTER, S. R., DE VRIES, W., DE WIT, C. A., FOLKE, C., GERTEN, D., HEINKE, H., MACE, G.M., PERSSON, L. M., RAMANATHAN, V., REYERS, B., SÖRLIN, S. (2015), Planetary Boundaries: Guiding Human Development on a Changing Planet, *Science*, 80, 347.

RAYNA, T., STRIUKOVA, L., DARLINGTON, J. (2015), Co-creation and User Innovation: The Role of Online 3D Printing Platforms, *Journal of Engineering and Technology Management*, 37, 90-102.

VENCE, X., PEREIRA, Á. (2018), Eco-innovation and Circular Business Models as Drivers for Circular Economy, *Contaduría y Administración Especial Innovación*, 64(1), 1-19.

WIRTZ, B. W. (2020), *Business Model Management: Design–Instrumente–Erfolgsfaktoren von Geschäftsmodellen*, Cham, Springer Nature Switzerland.

WALDMAN BROWN, A. (2016), *Exploring the Maker-Industrial Revolution: Will the Future of Production be Local?*, online available at https://brie.berkeley.edu/sites/default/files/brie-working-paper-2016-7.pdf.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)

WAN, M., ZHANG, Y., YE, W. (2018), Consumer Willingness-to-Pay a Price Premium for Eco-Friendly Children's Furniture in Shanghai and Shenzhen, *Forest Products Journal*, 68(3), 317-327.

WITJES, S., LOZANO, R. (2016), Towards a More Circular Economy: Proposing a Framework Linking Sustainable Public Procurement and Sustainable Business Models, *Conservation and Recycling*, 112, 37-44.

XU, X., WANG, S., YU, Y. (2020), Consumer's Intention to Purchase Green Furniture: Do Health Consciousness and Environmental Awareness Matter?, *Science of the Total Environment*, 704, https://doi.org/10.1016/j.scitotenv.2019.135275.

© De Boeck Supérieur | Téléchargé le 23/05/2023 sur www.cairn.info (IP: 77.89.51.194)