

PERCEPTIONS OF CIRCULAR BUSINESS MODELS IN SMES

Sebastian-Ion Ceptureanu^{1*}, Eduard-Gabriel Ceptureanu²
and Raphael Gert Denis Murswieck³

¹⁾²⁾³⁾ *The Bucharest University of Economic Studies, Romania*

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Abstract

Testing circular economy business models is crucial in understanding Circular Economy features across various industries. This paper analyses Circular Economy perceptions in Romanian SMEs by investigating entrepreneurs from PVC joinery industry. Using a multidimensional framework, ReSOLVE, as a conceptual model, and Lewandowski systematization, we measured 6 business actions and their relations with *Value creation*. The results of our survey can be described as mixed. Of the 6 business actions of ReSOLVE framework, for half of them (*Regenerate*, *Optimize* and *Exchange*) we can definitely conclude that these are correlated with Circular Economy in terms of Value Creation, while for a fourth there are variables significantly correlated without being able to conclude its overall contribution in terms of *Value creation*. Our empirical investigation contributes to literature development on Circular Economy research in SMEs and a step forward to shape future research initiatives.

Keywords: circular economy; ReSOLVE framework; value creation; spearman coefficient.

JEL Classification: Q53, Q57, C38.

Introduction

In the last decade Circular Economy (CE) has received increased attention among scholars as a way to overcome traditional production and consumption models relying on growth and intensive use of resources (Geissdoerfer et al., 2017) which are threatening the integrity of natural ecosystems (Ellen Mac Arthur Foundation, 2012; Su et al., 2013; Park and Chertow, 2014). Circular Economy is seen as an operationalization of sustainable development for businesses, also (Ghisellini et al., 2016; Murray et al., 2017). As such, it aims to (1) increase the efficiency for resource utilization, seeking to achieve a better balance between economy, environment and society (Ness, 2008); (2) provide an

* Corresponding author, **Sebastian-Ion Ceptureanu** – sebastian.ceptureanu@man.ase.ro

alternative to the current economic development model (Ness, 2008); (3) promotes an environmentally friendly use of resources (Ellen Mac Arthur Foundation, 2012).

However, as Circular Economy comes under increased scrutiny (Ellen Mac Arthur Foundation, 2012; Su et al., 2013; Naustdalslid, 2014), it is difficult to have a cohesive perspective (Ghisellini et al., 2016; Sauv e et al., 2016; Lewandowski, 2016; Lieder and Rashid, 2016; Murray et al., 2017; Geissdoerfer et al., 2017).

Circular Economy is seen as a new business model which may lead to sustainable development (Ness, 2008; Mathews and Tan, 2011; Naustdalslid, 2014). Sustainable development requires a balanced approach of several dimensions, technological, economic, environmental and social of economy, industry or individual industrial process as well as of the interactions among them (Ren et al., 2013).

Our study was performed in PVC joinery industry, a suitable industry to analyze circular business models (CBM) due to its mix of manufacturers or integrators of environmental hazardous PVC based products or by-products. During the last decades, polyvinyl chloride (PVC) has become a major input and raw material for various industries, for instance constructions (Thornton, 2002). Literature covering PVC effects is in majority skeptical on the positive effects of it, reporting important environmental and human health hazards determined by manufacture, use, and disposal of it or its by-products (Thornton, 2002; Cousins et al., 2014; Bruinen et al., 2015). These findings determined public authorities to acknowledge the risks of PVC products and by-products and restrict their use (Thornton, 2002; Ceptureanu E.G. et al., 2017a).

1. Literature review

In the literature, various conceptual frameworks of business models exist (Mahadevan, 2000; Frankenberger et al., 2013). However, most of them neglect Circular Economy principles and, as such, fail to be considered circular business models. Linder and Williander (2015) argue that a CBM enables value creation based on using the economic value embedded in products or services. Mentink argues that circular business models, although likely to focus on achieving sustainability objectives, do not prioritize fulfillment of social, environmental or ecological needs (Mentink, 2014). He argues that all business models are concomitantly linear and circular to some degree (Mentink, 2014) due to process optimization, product or service virtualization and use of resources from material loops, hence relying, even without being aware of, on Circular Economy principles.

Others argue that CBMs closely follow the main approaches of Circular Economy:

- *Focused on environment.* Various scholars argue that a new industrial paradigm transforms the current model, basically a linear one, into a more integrated and complex ecosystem, which seeks to embed circularity as its processes' results serve as raw materials for other processes (Braungart et al., 2007; McDonough and Braungart, 2013; McDonough et al., 2003). McDonough and Braungart (2013) developed a framework based on two loops, comprising technic and biologic based cycles, where resources are to be preserved for long term, with negligible quality degradation. This later materializes in cradle to cradle design as a certification program for businesses (Ellen MacArthur Foundation, 2013). Abu-Ghunmi et al. (2016) argue that an environmentally friendly activity has to be simultaneously economically viable and profitable while Lieder and Rashid (2016) put a strong focus on environmental issues (both as impact and resource scarcity).

- *Focused on the efficient use of resources.* The pillar of this approach is that fundamental redesign of industrial flows, which focuses on eco-effectiveness rather than on eco-efficiency (McDonough and Braungart, 2013; Boons and Lüdeke-Freund, 2013).

- *Focused on 3R (recycling, reuse and reduction).* Sauv   et al. (2016) consider Circular Economy as a system emphasizing reuse and recycling as substitutes for raw materials, while George et al. (2015) place recycling at the center of a macroeconomic model for circular economies. To enable the flows of resources, some scholars give a key role to sustainable supply chain management (Lacy and Rutqvist, 2015). Other scholars promote the adoption of green Supply Chain Management practices (Genovese et al., 2015) or militate for a complete redesign of the Supply Chain Management to meet the Circular Economy challenges (Lacy and Rutqvist, 2015).

- *Focused on society*, encompassing several trends: (a) *societal*. Naustdalslid (2014) linked policy and technology and argue that stakeholder involvement and societal participation are crucial in Circular Economy successful implementation while Webster (2013) elaborates on the fundamental role of education; (b) *behavioral*. Tukker (2015) discussed the diffusion of product services, Ghisellini et al. (2016) researched collaborative consumption models while van Weelden et al. (2016) analyzed acceptance of refurbished products; (c) *policy*. Several scholars (Genovese et al., 2015) analyzed the role of policy in successful circular economies by analyzing challenges in terms of technology and public participation and their role as facilitators while Esposito et al. (2017) discussed fiscal and regulatory frameworks within specific industries.

Wirtz (2011) proposed an integrated business model consisting of three main components: (a) *strategic*, comprising items like strategy, resources and network; (b) *customer and market*, comprising items like customer, market offer and revenue model; (c) *value creation*, comprising production of goods and services, procurement and financial model. Laubscher and Marinelli (2014) identified several critical components for the integration of the Circular Economy principles with business: (1) *Sales model*; (2) *Product design/material composition*, (3) *IT/data management*; (4) *Supply loops*; (5) *Strategic sourcing for own operations*; (6) *HR/incentives*.

ReSOLVE framework (Ellen MacArthur Foundation, 2012; 2013; 2015a; 2015b) incorporates three principles of the Circular Economy (preserve, optimize and foster) and their translation into six business actions: *Regenerate, Share, Optimize, Loop, Virtualize, and Exchange*.

The six business actions are (Ellen MacArthur Foundation, 2012; Lewandowski, 2016):

- *Regenerate*, which focuses on the shift in business activities from traditional sources of energy or raw materials to renewable energy and new materials. According to this business action, biological cycles circulate flows of energy and materials and convert organic waste into sources of energy and raw material for other chains (Lewandowski, 2016). Hence, it aims to regenerate ecosystems' health. In Lewandowski systematization, *Regenerate* comprises *Energy recovery, Circular supplies, Efficient buildings, Sustainable product locations and Material leasing* (Lewandowski, 2016).

- *Share* aims at maximizing use of products or services by mutual sharing among customers or users. Company's customers are increasingly aware and willing to share company's products or services while, simultaneously, ownership loses importance both for product manufacturers or services providers, on one hand, and their customers, on the other

hand. Products are designed to last longer, companies increasingly focus on reusing their products and extending their life cycle through maintenance or repair (Lewandowski, 2016). Reusing products is encouraged if they are technically fit to be used. In Lewandowski systematization, *Share* comprises *Maintenance and repair, Collaborative consumption, Product lease, Availability, Performance, Product attachment and trust, Use of own device, Incentivized return and reuse of products, Upgrading, Hybridization* and *Gap-exploitation* (Lewandowski, 2016).

- *Optimize* aims to increase efficiency of production and elimination of waste in the manufacturing process and in the supply chain (Lewandowski, 2016). Companies are encouraged to use digital manufacturing technologies to the detriment of traditional technologies, to reduce waste in production systems and supply chains (Ellen MacArthur Foundation, 2015a). In Lewandowski systematization, *Optimize* comprises *Asset management, Produce on demand, Waste reduction* and *Outsourcing* (Lewandowski, 2016).

- *Loop* uses biological and technical cycles. Biological cycles can recapture the value of organic waste, while technical cycles can restore the value of post-consumption products and packaging through repair, reuse, remanufacturing, and recycling activities (Lewandowski, 2016). *Loop* basically seeks to keep materials in closed loops (Lewandowski, 2016). Collaboration and coordination in supply chains are essential to close the loop and convert waste into useful resources (Ellen MacArthur Foundation, 2015a). In Lewandowski systematization, *Loop* comprises *Remanufacture, Recycling, Upcycling* and *Circular supplier* variables (Lewandowski, 2016).

- *Virtualize* actions emphasize delivery of utility virtually and not physically. As such, companies using it replace more and more their physical products with virtual and dematerialized products or services, enhancing customers' satisfaction (Spring and Araujo, 2017). In Lewandowski systematization, *Virtualize* comprises only one variable, *Dematerialized services* (Lewandowski, 2016).

- *Exchange* actions seek to introduce non-renewable materials or new technologies, replacing traditional, more obsolete ones (Lewandowski, 2016), to generate new products and services (Ellen MacArthur Foundation, 2015b). The aim is to replace obsolete, usually non-renewable products, into more advanced and renewable ones, determining a reduction of consumption (Despeisse et al., 2017). In Lewandowski systematization, *Exchange* comprises again only one variable, *New technology* (Lewandowski, 2016).

The six business actions are presented in table no. 1.

Table no. 1: Conceptual framework of variables

Business action	Variables	Description
Regenerate	Energy recovery	The business use conversion of non-recyclable waste materials into energy .
	Circular supplies	The business use of renewable energy .
	Efficient buildings	Localization of business activities in efficient buildings.
	Sustainable product locations	Localization of business activities in sustainable manufacturing locations.
	Material leasing	The business sells their products/services functions, hence minimizing the environmental impact.

Business action	Variables	Description
Share	Maintenance and repair	Product/service maintenance and repair extend product life cycle.
	Collaborative consumption	Product or service enable collaborative consumption.
	Product lease	The company provides privileged use of a product or a service. The user is not the owner of that specific product or service.
	Availability	Product or service is available for the customer for a determined duration.
	Performance	The revenue is generated based on the solution or result achieved.
	Return and reuse of products	The business allows customers to return used products for a pre-established value.
	Upgrading	The business replaces components of its products with better quality ones.
	Attachment and trust	The business products or services are trusted.
	Use of own device	The business allows or facilitate customers to use their own devices to get access to products or services.
	Hybridization	The company's business model relies on a durable product based on short-lived consumables.
	Gap-exploitation	Exploit lifetime value gaps in company's products or services.
Optimize	Asset management	The business internally collects, reuses and resales its used products.
	Produce on demand	The business is producing only when its products or services are demanded, with zero stocks.
	Waste reduction	The business focuses on waste reduction, both in the production process and before.
	Outsourcing	The business efficiently uses resources through outsourcing.
Loop	Remanufacture	Restore products or products' components to required quality.
	Recycling	Recover resources out of disposed products or by-products.
	Upcycling	Materials are reused and their value is upgraded.
	Circular supplier	Use supplies from material loops, bio based- or fully recyclable.
Virtualize	Dematerialized services	Shift from physical to virtual for company's products, services or processes.
Exchange	New technology	Use new manufacturing technologies.

Source: Adapted from Lewandowski, 2016

ReSOLVE is one framework that manages to address Circular Economy business models across a wide array of industries, in this sense being suitable to be used for SMEs. The framework is more complex than others in terms of variables defined, since there are 26 variables considered.

As a dependent variable we used *Value Creation*. Various ways are presented in literature in which circular business models create value. In our research we used 5 descriptors, namely: *Generate competitive advantage, Generate additional revenues, Generate*

constant long-term revenues, Determine improved resource management and Lead to beneficial partnerships, based on literature review.

- *Generate competitive advantage.* Achieving a competitive advantage is a driving force for *Value creation* and is seen as an incentive to adopt a CBM (Aragon-Correa et al., 2008). Various scholars provide examples of circular business actions aimed at gaining competitive advantage, such as the use of clean production technologies (Zeng et al., 2010), green supply chain (Ramus and Steger, 2000) or new way to assess cost of production (Sharma, 2000).
- *Generate additional revenues.* Adopting Circular Economy principles can lead to additional revenues through processes like recycle, or reuse (Park et al., 2010) or waste sales (DSGC, 2015).
- *Generate constant long-term revenues.* According to Circular Economy principles, there is a shift in customer behavior, with an increased number of customers (both individual customers and business as well) willing to accept and use products or services they do not own by purchasing. This implies long-term relationships between them and the manufacturers of products or service providers, which will generate for the latter constant long-term revenues (DSGC, 2015).
- *Determine improved resource management.* A business using Circular Economy principles improve its capacity to reuse, reclaim and recycle resources, determining resource associated costs cuts (Park et al., 2010).
- *Lead to beneficial partnerships.* Circular Economy changes the way logistics is done, with value chains reversing and, as a result, this brings increased trust among strategic partnerships of the value chain. In addition, SMEs could fill in the gaps as an intermediary within the chain (DSGC, 2015).

2. Materials and methods

The SMEs involved in our empirical research were selected from SMEs operating in PVC joinery industry. Previous studies on the industry (Ceptureanu E.G. et al., 2017a) concluded that in Romania there are 70 companies exclusively specialized on PVC based joinery (out of 619 operating in the industry), while other 55 companies are specialized in providing PVC assemblies. Therefore, the initial statistical population for our study comprised 125 companies. At the same time, due to the aim of our study, all companies involved had to be small and medium sized enterprises (SMEs). In their classification, we considered the European Union recommendation 2003/361. This further reduced the statistical population from 120 to 112 companies (table no. 2). Two more criteria were used in our study: geographical distribution of surveyed SMEs, since we planned to cover all Romania’s development regions, and availability to participate. Questionnaires were administered to 72 SMEs, who returned 49 valid ones (a 68% response rate).

Table no. 2: Sample structure

Criterion	Description	No. of SMEs investigated	Percentage
Development Region	South-East	6	12.24%
	South	4	8.16%
	South-West	1	2.04%
	West	10	20.41%
	Bucharest–Ilfov	15	30.61%

Criterion	Description	No. of SMEs investigated	Percentage
	North-East	3	6.12%
	North-West	1	2.04%
	Center	9	18.37%
SMEs size (no. employees)	Micro (<10)	16	32.65%
	Small (10–49)	19	38.78%
	Medium (50–249)	14	28.57%
SME' age (years)	< 5 years old	12	24.49%
	5–10 years old	17	34.69%
	10–15 years old	12	24.49%
	> 15 years old	8	16.33%

Since the authors have had previous experience in setting up and implementing model testing (Ceptureanu E.G. et al., 2017b; Ceptureanu S.I. et al., 2017), they validate the questionnaire using face-to-face open interviews with 5 entrepreneurs. The interviews were conducted in early October 2017 and lasted on average half an hour. The purpose of interviewing the entrepreneurs was to identify potential problems in the way questions were formulated and to make sure that the questionnaire was properly designed. Based on the interviews, we made small adjustments to the questionnaire and distributed it to the respondents via email.

- *Independent variables.* Each independent variable was transformed in a statement, measured in a 5-items Likert scale, with 1 Strong dissent to 5 Strong assent (table no. 3).

Table no. 3: Measurement scale for independent variables

Variables	Statement in our survey
Business action 1. Regenerate	
Energy recovery	My business uses conversion of non-recyclable waste as part of its activities
Circular supplies	My business uses renewable energy in at least one of its processes
Efficient buildings	My business is located in an efficient building
Sustainable product locations	My business is located in at least one sustainable product location
Material leasing	My business sells the functions of our PVC based products, so the environmental impact is reduced
Business action 2. Share	
Maintenance and repair	In my business, we extend our products life cycle by maintenance and repair
Collaborative consumption	My business enables shared use, access, or ownership of product between B2C or B2B
Product lease	We have in our commercial offer the chance to exclusively use a product/service without actually buying it
Availability	In my business, the product or service is available for the customer for a determined duration
Performance	In my business, the revenue is generated according to the delivered solution
Return and reuse of products	Our customers are allowed to return used products for a pre-established value.
Upgrade	In my business we can replace modules or parts of our products with better quality ones

Variables	Statement in our survey
Attachment and trust	We are dedicated to create products/services that are liked or trusted
Use of own device	We enable customers to use their own devices to get access to our products/services
Hybridization	In my business we consider that a durable product includes short-lived consumables
Gap-exploitation	My business seeks to capitalize on “lifetime value gaps” or leftover value
Business action 3. Optimize	
Asset management	In my business we use at least one of the following asset management procedures: internal collection, reuse, refurbish and resale of used products
Produce on demand	In my business we are manufacturing mainly on demand
Waste reduction	In my business, waste reduction in both production process and before are important
Product-Service System: Outsourcing	For my business, a more efficient use of resources through outsourcing is important
Business action 4. Loop	
Remanufacture	In my business we are focused on remanufacturing or product transformation by restoring a product or its components to improved quality
Recycling	My business is dedicated to recover resources by recycling disposed products or by-products
Upcycling	In my business materials are reused and their value is upgraded
Circular supplier	My business use supplies from material loops, raw materials and by-products
Business action 5. Virtualize	
Dematerialized services	In my business we are gradually shifting from physical to virtual for at least one of our processes
Business action 6. Exchange	
New technology	My business uses new technology for manufacturing

• *Dependent variable. Value Creation*, was measured by 5 statements on a 5 points Likert scale (table no. 4).

Table no. 4: Dependent variable

Result	Variables	Statement in our survey
Value Creation	Generate competitive advantage	Adopting a circular BM positively influences the competitive advantage of my business
	Generate additional revenues	Adopting a circular BM positively generates additional revenue streams for my business
	Generate constant long-term revenues	Adopting a circular BM positively provides steady long-term revenue streams for my business
	Determine improved resource management	Adopting a circular BM positively improves the internal resource management of my business
	Lead to beneficial partnerships	Adopting a circular BM positively determines beneficial partnerships for my business

Source: Adapted from Lewandowski, 2016

Survey questions and scale validation are presented in table no. 5.

Table no. 5: Survey questions and scale validation

Business action 1. Regenerate (Cronbach’s $\alpha = 0.842$)	Factor Loadings
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Energy recovery	0.837
Circular supplies	0.809
Efficient buildings	0.722
Sustainable product locations	0.793
Material leasing	0.889
Business action 2. Share (Cronbach's $\alpha = 0.749$)	Factor Loadings
Maintenance and repair	0.769
Collaborative consumption	0.809
Product lease	0.756
Availability	0.869
Performance	0.709
Return and reuse of products	0.726
Upgrade	0.888
Attachment and trust	0.963
Use of own device	0.532
Hybrid model	0.722
Gap-exploitation	0.822
Business action 3. Optimize (Cronbach's $\alpha = 0.893$)	Factor Loadings
Asset management	0.942
Produce on demand	0.869
Waste reduction	0.809
Outsourcing	0.856
Business action 4. Loop (Cronbach's $\alpha = 0.816$)	Factor Loadings
Remanufacture	0.746
Recycling	0.806
Upcycling	0.912
Circular supplier	0.851
Business action 5. Virtualize (Cronbach's $\alpha = 0.716$)	Factor Loadings
Dematerialized services	0.716
Business action 6. Exchange (Cronbach's $\alpha = 0.812$)	Factor Loadings
New technology	0.812

3. Results

To establish the presence and strength of relationships among study variables, we calculated Spearman correlation coefficients between each variable for each of the 6 factors of ReSOLVE framework and dependent variable, *Value Creation*. Rho is the Spearman correlation coefficient, showing the association between a factor and *Value Creation*; μ is the arithmetic mean rating (on the 1-5 scale); p is the p-value; a low p value indicates a low likelihood that no association exists between the factor and the dependent variable (table no. 6).

Table no. 6: Correlations between ReSOLVE variables and *Value Creation*

	Spearman rho	p value	μ	Std. dev.
Business action 1. Regenerate				

	Spearman rho	p value	μ	Std. dev.
Energy recovery	0.78	<0.001	3.16	0.6
Circular supplies	0.73	<0.001	2.78	0.7
Efficient buildings	0.47	0.3	1.98	1.9
Sustainable product locations	0.78	0.4	2.15	1.7
Material leasing	0.74	<0.001	2.84	0.7
Business action 2. Share				
Maintenance and repair	0.81	<0.001	2.87	0.6
Collaborative consumption	0.70	<0.001	2.76	0.8
Product lease	0.10	0.5	2.08	1.5
Availability	0.20	0.2	1.96	1.3
Performance	0.39	0.1	2.36	1.4
Return and reuse of products	0.15	0.4	1.17	1.3
Upgrade	0.58	<0.001	3.24	0.7
Attachment and trust	0.73	<0.001	2.92	0.8
Use of own device	0.30	0.3	1.67	1.4
Hybrid model	0.78	0.4	1.52	1.4
Gap-exploitation	0.07	0.5	1.12	0.5
Business action 3. Optimize				
Asset management	0.63	<0.001	2.84	0.4
Produce on demand	0.86	<0.001	3.42	0.5
Waste reduction	0.74	<0.001	2.93	0.6
Outsourcing	0.22	0.3	1.82	1.0
Business action 4. Loop				
Remanufacture	0.48	0.05	1.58	1.3
Recycling	0.73	<0.001	2.47	0.6
Upcycling	0.42	0.22	1.14	1.0
Circular supplier	0.38	0.2	1.92	1.0
Business action 5. Virtualize				
Dematerialized services	0.3	0.5	1.74	1.1
Business action 6. Exchange				
New technology	0.72	<0.001	2.82	0.7

Considering *Regenerate* business action, its role on *Value creation*, 3 out of 5 variables considered - *Energy recovery*, *Circular supplies* and *Material leasing* - were significant. Companies operating in PVC joinery industry seem interested in conversion of non-recyclable waste into heat, electricity, fuel as part of their activities, in using renewable energy in at least one of their processes and, to some extent, to sell the functions of their products and attempt to reduce use of hazardous materials in production. However, the surveyed entrepreneurs did not seem to consider the location of their business or the use of efficient (smart) buildings as important for *Value Creation*. Overall, the surveyed entrepreneurs focus to some extent on the shift from traditional sources of energy or raw materials to renewable energy and new materials, on organic waste transformation into

sources of energy and raw material for other chains. As a consequence, they aim to regenerate ecosystems' health through their business activities.

In term of *Share* business action, 4 out of 11 variables considered - *Maintenance and repair*, *Collaborative consumption*, *Upgrade* and *Attachment and trust* are significant in relation with *Value Creation*. The surveyed entrepreneurs consider important to extend their products life cycle through maintenance and repair, are willing to enable shared use, access, or ownership of the product with their customers or other companies, are willing to replace modules or parts of their products with better quality ones and, as a result, wish to create products that will be trusted by the customers. We concluded that the Romanian entrepreneurs' focus on customers leads to increased awareness and willingness to share their products or services while, simultaneously, ownership becomes less important for them in the context of *Value Creation*.

Optimize was, in our study, the most relevant business action for surveyed entrepreneurs. For 3 out of 4 variables considered we found correlations with the dependent variable: *Asset management*, *Produce on demand* and *Waste reduction*. SMEs operating in PVC joinery Industry use internal processes like collecting, reusing, refurbishing and resale of used products but, at the same time, are focused on manufacturing: they manufacture their products mainly when there is demand for them. Waste reduction in both production process and before are important for entrepreneurs, too. Overall, the surveyed entrepreneurs aim to increase efficiency in production and reduce waste in the manufacturing process and in the supply chain, optimizing their business actions. In this context, *Value Creation* for customers is generated by short supply chains and the possibility of production on demand.

In terms of business action 4. *Loop*, the respondents linked Value creation with *Recycling*, while *Remanufacture*, *Upcycling* or *Circular supplier* were not relevant. So, PVC joinery industry SMEs are dedicated to recycling to recover resources, but that is pretty much all. As such, the surveyed entrepreneurs are not especially keen on keeping materials in closed loops, and as a result collaboration and coordination in supply chains are not essential in *Value Creation* by Romanian entrepreneurs.

For the last 2 business actions, *Virtualize* and *Exchange*, the results were mixed. While each comprises only one variable, according to Lewandowski systematization, there was a positive correlation only in the case of *Exchange*, while *Virtualize* was not significant. Surveyed Romanian entrepreneurs are not keen to shift their focus on virtual and dematerialized products or services, maintaining their traditional commercial practices without enhancing customers' satisfaction. However, they seek to introduce non-renewable materials or new technologies, replacing traditional, more obsolete ones, to generate new products and services or to replace obsolete, usually non-renewable products, determining improved resources efficiency.

Overall, the results of our survey can be at best described as mixed. Of the 6 business actions of ReSOLVE framework, for half of them (*Regenerate*, *Optimize* and *Exchange*) we can definitely conclude that they are correlated with Circular Economy, while for a fourth (*Share*) there are variables significantly correlated without being able to conclude its overall contribution in terms of *Value creation*.

Conclusions

Addressing such a topic like circular business models and frameworks is not an easy endeavor since these are poorly represented and explained in the literature. Most of the studies are non-analytical and focused on specific types of CBM, their specificity and context. In our opinion, most of the business actions specific to CBMs are covered by ReSOLVE framework, hence our choice for it. Although existing frameworks can be used in connection with Circular Economy, most of them fail to explain how the Circular Economy principles are linked to each business action. Hence, there is a need for a comprehensive testing of conceptual frameworks for CBMs to adequately assess their viability. This paper is analyzing a circular business model from the perspective of entrepreneurs and their perceptions.

In this paper, we explored how Romanian entrepreneurs from PVC joinery industry relate themselves to Circular Economy through a very specific outcome, *Value creation*, a common result of circular business models. We used a well-known Circular economy framework, ReSOLVE, and Lewandowski systematization of the business actions of the framework. In our study, the entrepreneurs' perception was hypothesized and analyzed in connection with the dependent variable, Value Creation. In so doing, we particularly aimed at displaying the entrepreneurs' attitude towards the whole circularly designed loop of their business.

For this purpose, we submitted a structured questionnaire to a representative sample of Romanian entrepreneurs operating in PVC joinery industry. The PVC based industries, and joinery industry is not an exception, endanger the natural environment and their role in a smooth transition toward Circular Economy may be important. We also develop a particular interest for this industry by analyzing, for instance, sustainable opportunities recognition (Ceptureanu S.I. et al., 2017).

To understand in which ways the entrepreneurs' perceptions on Circular Economy are shaped by CBMs, we first reviewed the literature to identify different dimensions resulting from various conceptual frameworks. The result was our decision to use ReSOLVE framework as a model, with its six dimensions of Circular Economy.

Our study may assist entrepreneurs in assessing and choosing the most suitable circular business model or set of business actions for their business; however, further examination is needed due to its limitations. The most significant one is its focus on PVC joinery industry without including SMEs from other industries, limiting as such its conclusions to that specific industry. Other limitations regard possible misunderstandings by surveyed entrepreneurs of some of the concepts of ReSolve framework and the sensitiveness of its dimensions to company size, age, lifecycle stage or SMEs diversification. Finally, the small sample is another limitation.

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