Circular start-up development: the case of positive impact entrepreneurship in Poland

Boleslaw Rok and Monika Kulik

Abstract

Purpose – *The purpose of this paper is to explore how circular start-ups design and implement innovation into their business models to increase their positive impact.*

Design/methodology/approach – *This qualitative study is based on an exploratory multiple-case study involving six circular start-ups with positive impact in Poland. Data gathering took place via in-depth interviews with start-up founders.*

Findings – *The analysis demonstrates that three factors, which are strongly interconnected, can significantly influence the development of a circular start-up. The first is the purpose-led motivation for circularity as a solution, mostly concentrated on the environmental education of different market actors. The second factor is built on the aim to increase the positive impact by addressing the most pressing social and environmental problems. It determines the impact on society as well as on the environment and the extent to which its model can be scaled up. The third factor is driven by the understanding of the purpose of the innovation, concentrated on the business model innovation regarding circularity.*

Practical implications – *This paper demonstrates the benefits for diverse stakeholders and the importance of using circular business models in start-up development. Circularity can be perceived as a main part of the new approach to improve sustainability.*

Originality/value – *Circular start-ups represent a new phenomenon in the entrepreneurial market. While the structure and logic of the circular business model in start-ups are significantly unexplored in the management literature, this model is viewed as a crucial step in the direction of increasing the positive impact of start-ups. From a theoretical and practical perspective, it is important to understand the differences and similarities in this area within different markets.*

Keywords *Sustainability, Start-ups, Sustainable innovation, Circular economy, Positive impact*

Paper type *Research paper*

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1. Introduction

The concept of a circular economy has been created in response to the challenges related to the depletion of natural resources and increase in volumes of waste. It describes an economic system capable of regenerating itself in the life cycle of production and consumption, in which waste is subsequently used or reused as raw materials in the production process (Kirchherr *et al.*, 2017). From this perspective, the circular economy is based on a paradigm shift, as any waste can become raw material. The World Bank estimates that the circular economy offers an alternative that can yield up to $4.530tn in economic benefits by 2030, yet only 8.6% of the world is currently applying this circular system (The Circularity Gap Report, 2019).

Business plays a pivotal role in the transition to the circular economy (Lüdeke-Freund *et al.*, 2019; Urbinati *et al.*, 2017). A shift in business models is considered by a number of researchers to be the key factor enabling the transition from a linear to circular economy (Ellen MacArthur Foundation, 2015; Bocken *et al.*, 2013; Ghisellini *et al.*, 2016).

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However, it has been pointed out that such transition is easier for small- and medium-sized enterprises (SMEs) than for large companies established already in the market (Bocken *et al.*, 2013; Stewart and Niero, 2018). The available research indicates that start-ups are major actors in the circular economy innovation system (Bergset and Fichter, 2015; Hockerts and Wüstenhagen, 2010; Pruijsen, 2019; Rizos *et al.*, 2016). This type of business can serve as a motivator for other market players (Hoffrén and Apajalahti, 2009; Hansen *et al.*, 2002), particularly in the case of radical innovation (Henry *et al.*, 2020; Hockerts and Wüstenhagen, 2010), and can positively contribute to the development of the technological innovation system in the circular economy. Hence, analysis of the factors which can support circular innovation and the emergence of start-ups involved in this process is essential.

We use these insights within our explanatory qualitative case research, presenting how practitioners in Poland have developed circular-oriented start-ups. Our findings show the crucial role of strong personal motivation to achieve circular value. This is especially valuable in the initial period of building a start-up position in the market. The biggest challenge in the periods that follow is focusing on developing and assessing the collaborative and system-oriented business models in the process of transition (Brown *et al.*, 2020) and determining how to integrate ecosystem perspectives into circular-oriented innovation (Konietzko *et al.*, 2020).

Our study takes a step towards a better understanding of the role of entrepreneurs' personal motivation in transition into the sustainable circular economy and circular enterprises as an important part of this new economy. It can provide additional insight into business models of circular start-ups. We believe there is a gap in the existing literature with reference to the identification of potential drivers for innovative solutions in sustainable entrepreneurship. There is also a gap in analysing the specific enablers of sustainability approach in small enterprises (Amankwah-Amoah *et al.*, 2018; Lüdeke-Freund, 2019).

We would like to fill the gap by integrating these concepts with the previous findings from selected case studies. The purpose of this paper is twofold: firstly, to explore the factors which motivate circular start-up founders in their path towards sustainability, and secondly, to identify and explain the components of the circular business model innovation. We discuss how start-up founders use the concept of circular economy and how it affects the business models of their enterprises. In our opinion, start-up design is based on both economic and ecological values and is driven by entrepreneurs' personal motivation to maximise their positive impact and build sustainable value. These motivations could be the key to the emergence of circular business model innovation. By presenting actual business models developed and adopted by sustainable entrepreneurs, we add to the current knowledge on circular start-ups.

This paper is organised as follows. Firstly, based on the literature review, we outline the concept of sustainability in business, focusing on small- to medium-sized companies, particularly start-ups. We take a closer look at the process of combining economic, social and environmental goals during firm development, and we analyse attitudes towards sustainable innovation, especially with respect to business models. We focus specifically on circular innovation, as it seems to provide a response to one of the greatest challenges we face now. Then, we present our research design and sample characteristics. Next, using qualitative research tools, we analyse six cases of circular start-ups in Poland. Finally, we present our empirical findings and discuss the motivation of sustainable start-up founders and the change factors driving the development of circular start-ups and analyse the transition processes that the surveyed entrepreneurs undergo. Conclusions and limitations are provided in the last part of this paper.

2. Conceptual background

In the academic literature, the concept of corporate sustainability includes the company's tangible contribution to the achievement of societal goals, environmental protection, social

justice and economic development through its main business operations (Hahn *et al.*, 2017). In this paper, sustainability was defined as the balanced integration of economic performance, social inclusiveness and environmental resilience, which offers a benefit to current and future generations (Geissdoerfer *et al.*, 2017).

Corporate sustainability in business strategies and processes has recently become a promising way to cope with the global challenges formulated in the United Nations Sustainable Development Goals (SDGs) under the label of "sustainable strategic management" or "sustainability innovation strategy" (Rego *et al.*, 2017; Hargreaves, 2019).

An important question remains regarding whether sustainability can entail the need to modify or even significantly alter a corporate business strategy or a business model. The corporate sustainability concept clearly represents an innovative change in an attempt to optimise the value for all stakeholders, that is, to create integrated value (Logan, 2017). Although companies that implement sustainability have various ways of formulating their business goals, they frequently refer to stakeholder value (Freeman, 1994), shared value (Porter and Kramer, 2011), sustainable value (Freudenreich *et al.*, 2019) or regenerative value (Howard *et al.*, 2019). Sometimes these firms use several SDGs as the purpose and foundation of their strategy.

Diverse attitudes regarding the integration of sustainability into the corporate strategy have been widely discussed (Engert *et al.*, 2016; Oertwig *et al.*, 2017). In practice, however, the corporate world seems to see no genuine possibility of rethinking strategic management to ensure a sustainable future for their organisations and society at large (Sharma and Jaiswal, 2018). A new phase of sustainability management is needed because sustainable business is reaching the limits of what it can accomplish in its present form (Hoffman, 2018). As previously stated, there is a significant disconnect between sustainable business on an organisational level and sustainability development on a global level or between business activity and the global state of the environment and society (Dyllick and Muff, 2016).

Looking for a new perspective on sustainable development, a number of researchers have turned their attention to SMEs (Cohen and Winn, 2007; Lans *et al.*, 2014; Shepherd and Patzelt, 2011). SMEs are considered the backbone of the European Union (EU) economy, representing 99% of all businesses and providing two-thirds of the total private sector employment in the EU (European Commission, 2017). Entrepreneurship is perceived not only as a source of achieving different economic goals, but also as a means to address persistent sustainability challenges (Shepherd and Patzelt, 2011).

The concept of sustainable entrepreneurship has emerged as an overlapping research and practice area between sustainable development and entrepreneurship and has been defined as the recognition, development and exploitation by individuals of opportunities to bring into existence future goods and services with economic, social and ecological gains (Cohen and Winn, 2007). Sustainable entrepreneurship has the potential to create radical change, not merely incremental, by combining activities and processes that lead to the development of profitable opportunities, while contributing to sustainable development (Lans *et al.*, 2014).

Sustainable entrepreneurship can be described as an innovative, market-oriented and personality-driven form of creating economic, societal and/or ecological value by means of breakthrough environmentally or socially beneficial market or institutional innovations (Schaltegger and Wagner, 2011). While the sustainable entrepreneurship literature draws attention to smaller enterprises, the bulk of the research on environmentally and socially responsible practices has focused on larger companies that have operated in the market for years (Blundel *et al.*, 2013; Hamann *et al.*, 2017). Therefore, to advance the discourse on sustainable entrepreneurship, we seek to explore attitudes of innovative start-ups to sustainability. We define a start-up as a temporary organisation which seeks to apply a repeatable, scalable and innovative business model (Blank, 2013). What distinguishes them from other enterprises are their goals (intentions), which are more ambitious and expansive,

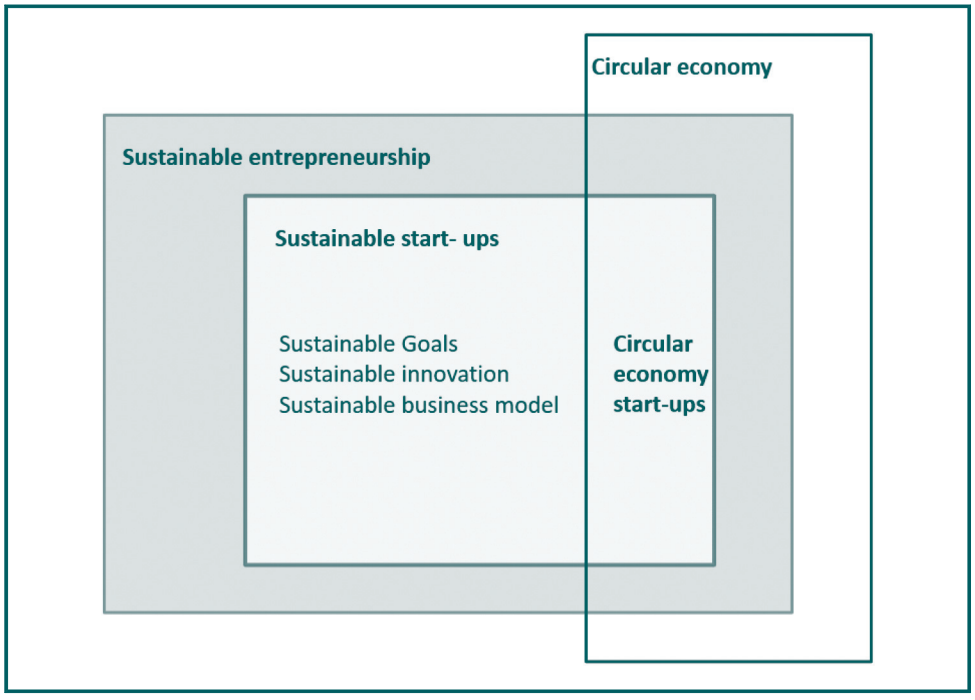
and their function, as they typically search for a business model and structure, which at an advanced stage means funds obtained from investors (Skala, 2019) (Figure 1).

Start-ups, which are new market entrants founded by entrepreneurs with a technological drive and a focus on radical change from the start, are often based on innovations, including sustainability-oriented innovations. They play a crucial role in a community by fostering a greater level of sustainability through their positive impact (Horn and Brem, 2013). They are referred to as sustainability-oriented innovations, sustainable innovations, eco-innovations or green innovations (Klewitz and Hansen, 2014; Geradts and Bocken, 2019; Hogevold *et al.*, 2014). The academic literature defines sustainable innovation as the introduction or adaptation of a product, process, organisation or system which provides a positive social, environmental and economic impact (Rauter *et al.*, 2017). Geradts and Bocken (2019) have proposed that sustainability-oriented innovation includes "everything from the development of new or improved products or services to the creation of new processes and business models that brings benefits to the environment or the society at large".

Basically, innovations can take the form of various traditional innovations that contribute to sustainability improvements (particularly process innovations) or the introduction of a new product, which can be considered as a means of generating greater sustainability (Provasnek *et al.*, 2017). In contrast, business model innovation does not necessarily involve discovering a new product or service; instead, it uses new ways to create and deliver the existing product or service and new ways to capture value from them. Business model innovation has attracted considerable attention in the literature and industry recently, and it is increasingly suggested that such innovation is a key to future business development, increasing the market value of the enterprise (Zott *et al.*, 2011; Peralta *et al.*, 2019; Baldassarre *et al.*, 2017).

Business model innovation is emerging as a potential mechanism to integrate sustainability into business, whether such a process occurs in small, middle or large companies (Jolink and Niesten, 2015; Schaltegger *et al.*, 2016). Nevertheless, the dominant approach to

Figure 1 Intersection of different concepts



innovation continues to focus on the development and implementation of technological innovations, the elements of the change process management and the possibility to align a company's capabilities with the market expectations. Social challenges and the impact of innovation on improving the quality of the natural environment are not typically analysed in this context. Yet, an increase in the level of innovation remains a key challenge not only in terms of the competitiveness of the economy, but also in terms of addressing the major challenges facing the society, formulated as the SDG framework.

An important sustainability issue discussed in both the scientific literature (Geissdoerfer *et al.*, 2017; Merli *et al.*, 2018) and the practice of economic life (EC, 2019), with reference to SDGs, is circularity. Characterised by emphasis on closing the loop, resource efficiency and access to ownership, the circular economy is thought to help reduce consumption and use of resources while incentivizing both the production and consumption of more durable products (Aluchna and Rok, 2019). Examination of the relationship between circular economy and sustainable development reveals that the circular economy is as a condition for sustainability (Geissdoerfer *et al.*, 2017). As such, it is viewed by activists, the start-up community and other major players as a disruptor of the currently unsustainable practices of overconsumption of less durable goods driving our existing economies (Botsman and Rogers, 2010).

The biggest promise of the circular economy is the economic growth decoupled from the use of resources. It is considered a necessity in light of the declining resources and is also viewed as one of the most influential concepts in sustainability management, expected to add to the transformation towards the resource-efficient and low-emission economy (European Commission, 2017). Circularity can be understood as the production and consumption of goods through closed-loop material flows that internalise environmental externalities linked to virgin resource extraction and waste generation.

The concept of a circular economy rests on three principles:

1. to preserve and enhance natural capital;
2. to optimise yields from resources in use; and
3. to make the system more effective by removing negative externalities (Taranic *et al.*, 2016; Aluchna and Rok, 2019; Blomsma and Brennan, 2017).

Overall, this concept advocates the reorientation of the industrial model towards a system (McDonough and Braungart, 2002) that is self-sustainable and based on renewable energy, minimises the use and generation of toxic substances and reduces waste by implementing this measure into the design process. A circular economy business model can be defined as the rationale for how an organisation (or network of organisations) creates, delivers and captures value in a manner that is restorative and regenerative by design and which aims to keep products, components and materials at their highest utility and value at all times (Lewandowski, 2016). In practice, full circularity can also be the most expected step towards sustainability for SMEs (Rizos *et al.*, 2016; Zamfir *et al.*, 2017).

The success of an enterprise in transition to a circular business model depends on how well this process is supported by a specific mindset of the founder; local or regional networking with other start-ups and supporting multipliers to enhance information sharing and awareness raising; potential to develop and assess collaborative and system-oriented business approach; and the benefits of being recognised as a "sustainable" start-up by customers and business partners (Rizos *et al.*, 2016; Brown *et al.*, 2020).

The existing literature on ecological and sustainable entrepreneurship appears to lack an exploration of the actual circular business models developed by sustainable entrepreneurs. Several studies have focused on defining concepts (Schaltegger and Wagner, 2011; Shepherd and Patzelt, 2011), understanding the opportunities and challenges related to sustainable entrepreneurship (Jiang *et al.*, 2018; Pacheco *et al.*, 2010; York and

Venkataraman, 2010) or comparing different entities (Hockerts and Wüstenhagen, 2010; Schaltegger *et al.*, 2016). Also, a number of strategic issues have been discussed, particularly the sustainable entrepreneurship process (Belz and Binder, 2017) and the institutional processes which support it (Pinkse and Groot, 2015) or the role of perceived barriers (Hoogendoorn *et al.*, 2019). Furthermore, the taxonomy of circular economy business models based on the traditional R-framework (Blomsma and Brennan, 2017; Sihvonen and Ritola, 2015; Reike *et al.*, 2018) or other criteria (Henry *et al.*, 2020; Urbinati *et al.*, 2017; Ünal and Shao, 2019) has been studied. In addition, the skill sets and motivations of sustainable entrepreneurs have been analysed recently (Haldar, 2019).

We strive to contribute to the literature by analysing circular business model innovations adopted by start-ups in the process of transition to the logic of circularity (Bocken *et al.*, 2013; Linder and Williander, 2017; Henry *et al.*, 2020). Using a qualitative, multiple case study approach, we look at the driving force behind the development and innovation of circular start-ups. In the subsequent section of this paper, we present and discuss how selected start-ups in Poland adopt this new approach and how this process affects their business models and their path towards sustainability. Business model redesign based on circularity could be a key to radical improvement in the process of creating sustainable value, building stakeholder capital through inclusiveness and fostering resource efficiency to address social and environmental challenges as a purpose-led activity, while focusing on improving positive impact by scaling up at the same time.

3. Research design

The sample presented in this paper was selected purposefully. Firstly, we decided to concentrate on the most innovative sectors in sustainable entrepreneurship in Poland, including ethical fashion and design, sustainable lifestyle, zero waste products, upcycling, food sharing, renewable energy, green housing and urban mining. Our second decision was consistent with our research objective that enterprises should be established in Poland with a clear orientation for scaling up their positive impact. Thirdly, business activities carried out by the start-ups under analysis in our study included integrating profitability with issues related to environmental protection, societal development or other social concerns, as certain initiatives in this area tend to focus on a single goal, such as social inclusion, with no direct environmental component or ambition to scale up the initiative. The final selection criterion was reference to the concept of circular economy.

We used case studies of start-ups based in Poland. In this context, we observe that, because of the relatively low level of innovation in Poland (Zastempowski and Glabiszewski, 2020) and the general attitude of Poles regarding issues related to circular economy (Koszewska, 2019), Poland might exhibit greater barriers to positive-impact start-ups from a business perspective. Nevertheless, owing to the international range of operations of the start-ups selected for our study, the sample is relevant not only within a local context. These start-ups also operate outside Poland, often offering their services and solutions to customers worldwide, and the problems they are trying to solve seem universal.

In the initial step, we conducted a systematic search for start-ups in accordance with the aforementioned criteria and the study requirements. To a certain extent, we used an existing database created mainly from the lists of participants, nominees and winners of different local, national or regional incubators, award schemes, contests, accelerators and SDG hackathons. Consequently, our initial report, "Positive Impact Start-ups in Poland" was prepared with a database of 360 start-ups to facilitate positive impact (Rok, 2019). In the second step, out of the whole sample, we selected a group of 131 start-ups which represented strong environmental motivation, operating in the field of organic food, fashion, construction, lifestyle and education. The next step was to select those organisations which, apart from being pro-environmental, referred directly to the concept of a circular economy, featuring long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing

and recycling practices. Within the sample, 45 such start-ups were identified. Then, based on the firms' website content, those entities concentrated not only on product or service innovation, but also on business model innovation, were highlighted.

Finally, six start-ups that had demonstrated business model innovation based on a circular economy were selected and invited to our study: Bioelektra, Deko Eko, EcoBean, Rec.On, Syntoil and WoshWosh. The group included start-ups operating in different sectors, but from the perspective of this paper, the sectors in which businesses implemented different circular business models included resource recovery, re-making, co-product recovery, re-use, circular sourcing and re-condition (Lewandowski, 2016; Lüdeke-Freund, 2019); these sectors proved most suitable for our study. The start-ups operated at different levels of development: from the early development stage to those offering products on the market or even beginning to benefit from economies of scale.

We conducted qualitative multiple case study analysis. Various tools were used to gather data, particularly semi-structured interviews and analysis of corporate documents, video materials and media interviews with the start-up founders. The interviews were conducted either face-to-face or online and were either written or filmed. A total of nine persons were interviewed. Each interview consisted of three main parts:

1. general information about founders, the start-up and its business model;
2. description of the start-up life cycle; and
3. information related to business model innovation.

Parts 1 and 2 involved open-ended questions concerning development stages and current status and plans, whereas part 3 involved direct questions about products and innovation. The interview data were triangulated using the secondary data to improve accuracy and completeness. QDA Miner Lite was used for data coding. Below, we present brief descriptions of the six start-ups studied.

4. Research sample characteristics

Bioelektra aims to recycle and recover up to 96% of the municipal solid waste stream. It has designed a highly innovative, environmentally friendly, zero-emission, socially responsible and economically attractive technology for mechanical heat treatment of waste. Clean secondary raw materials are separated, while the isolated organic fraction can be used as a fertilizer, soil improver or admixture with construction materials. Bioelektra's customers are typically municipalities responsible for the waste management system, while waste fractions are received mostly by recyclers. The company operates one solid waste processing plant in Poland and offers its technology to municipalities worldwide.

Deko Eko supports companies and organisations in creating ecological and ethical solutions in a circular economy through its upcycling platform. The company co-operates with eco-designers who process selected waste materials, thus maximizing their value. This provides aesthetic and functional consumer products made entirely of waste generated by large companies. Through online "smart matching", the company effectively combines the needs of a specific customer company and its waste materials with innovative solutions from individual designers and upcycling social entrepreneurs. In addition, Deko Eko offers its business customers comprehensive brand upcycling, a process which involves the analysis of waste generated by the company and the development of proposals for waste management and processing. In addition to Poland, the company has a branch in The Netherlands.

EcoBean, together with the Warsaw University of Technology, has developed an innovative technology to produce briquettes from coffee waste. Coffee briquettes, a renewable energy

source, are more efficient and cheaper to produce than their wood counterparts. Used coffee grounds are picked up from coffee-serving points, such as cafes, establishments in the hospitality industry, petrol stations and office parks. The company operates a small manufacturing site with the monthly capacity to process 20 tons of used coffee grounds supplied by a network of partners. Large-scale sales of coffee briquettes have not been launched yet, and the company's products are provided as samples for prospective customers to try.

Rec.On offers modern, hand-made, eco-friendly products made mostly from recycled automotive parts, recycled furniture and other materials which others consider garbage. It significantly reduces the volume of raw materials used in production. Each product is marked with a unique serial number, and the manufacturing process involves Ghanaian artisans, thus also supporting a social goal. Packaging used for shipping is made from biodegradable materials. The company operates in Poland and Spain, while offering its products in its online store to customers worldwide.

Syntoil is a clean-tech start-up which offers the technology to transform rubber waste into valuable commercial products. This process can significantly reduce the emissions of harmful gases and dust from tyre burning or processing in the traditional batch pyrolysis process. From used tyres, Syntoil produces rubber granules, which are subsequently processed into products such as solids, i.e. carbonizate (soot and oils), and a gas fuel comparable to propane. The solids are then re-used in the production of rubber, while the gas is burnt to produce electricity. Syntoil's products are supplied to the rubber industry. A single Syntoil installation can process up to 6,000 tons of used tyres annually.

WoshWosh is a modern shoemaker that also performs footwear renovation, cleaning and personalisation services. Since July 2015, the company has refurbished over 30,000 pairs of shoes in Poland. In addition, the company offers work shoes to business customers. It has created a new occupation in the labour market: shoe renovator, thus refreshing and promoting the vanishing trade of a shoemaker. Furthermore, the company collects shoes for homeless people and single mothers and holds social campaigns for children and animals in need. WoshWosh raises public awareness related to excessive footwear consumption. The company has workshops and a network of partner shoemaker shops and pick-up points all over Poland.

The start-up characteristics are outlined in Table 1 below.

Table 1 Basic characteristics of start-ups examined in the study

Category	*Bioelektra*	*Deko Eko*	*EcoBean*	*Rec.On*	*Syntoil*	*WoshWosh*
Sector	Waste management	Zero waste consumer products	Renewable energy sources	Interior eco-design	Rubber industry	Fashion/shoe repair
Form of activity	Recycling plant/ready-to-use equipment	Online collaborative platform	Production plant	Craft workshop	Equipment manufacturer	Craft workshop network
Main circular values	Recover Recycle	Rethink Upcycle	Re-use Recycle	Re-use Repurpose	Rethink Reduce	Repair Refurbish
Business model	Resource recovery	Re-make	Co-product recovery	Re-use	Circular sourcing	Re-condition
Target group	Local governments	Corporate partners	Individual and business clients	Individual clients	Industrial clients	Individual clients
Stage of development	Growth	Early	Prototype	Early	Early	Growth

5. Findings

Our study implies that the development of circular start-ups is somewhat driven by the personal characteristics of their founders. Start-up founders emphasise their personal motivation and purpose-led attitudes towards entrepreneurship, mostly related to the values they cherish, particularly preservation of the natural environment, climate protection and orientation to zero-waste and closed-loop systems.

Our data indicate that the actions aimed at developing a start-up are initiated by the recognition of an environmental problem which the potential sustainable entrepreneurs have met or experienced in their private or professional lives. Occasionally, a single experience triggers further actions. For the founder of Syntoil, it was seeing tyres which could not be disposed of in a traditional landfill. For an EcoBean engineer, the impulse came from hearing a story during a meeting about how much used coffee grounds were produced and thrown away every day. In the case of Bioelektra, a young engineer who, having observed difficulties with waste segregation, committed himself to develop a solution to this problem. The founder of WoshWosh had the desire to have her favourite pair of shoes renovated, whereas Deko Eko's owner took an exotic trip, during which she saw how some materials commonly considered to be waste could be used:

> Travelling around Cambodia, I came across some souvenirs that were made from cement sacks from a local cement plant. Whole villages lived on this kind of work. I was intrigued by the idea that something could be done through upcycling regular trash and I decided to explore this market in Poland. (Deko Eko)

At times, a recurring event rather than a single experience inspires start-up ideas, like in the case of Rec.On's owner, who used to see automotive parts which were no longer needed in his car workshop every day. Such an occurrence triggers a process of thinking of how to address the problem:

> In my previous workplace I often dealt with automotive parts that were sent to a smelter for melting. I saw beautiful shapes, and that's how I conceived the idea to practice applied arts with environmental protection in mind. (Rec.On)

Furthermore, start-up founders have a sense of impact and empowerment, which is based on their conviction that the existing environmental problems could and should be solved and that *they* can do something about it. This impulse is followed by a drive to change, recognizing an existing solution to the given problem or identifying that there is no solution and searching for a new solution, which can be transformed into a business opportunity.

The founders of Deko Eko and WoshWosh left their corporate positions to take a risk and start their own businesses. Rec.On is run by an entrepreneur who shifted his business from a car workshop to an artist's studio, continuing to use the same automotive parts. Syntoil combines professional technological experience with business, while Bioelektra is a symbiosis of engineering and investing with a vision. EcoBean is an example of a company founded by the former or current university faculty. As one of its founders said:

> We met because I was a person collaborating a lot with universities, including the Warsaw University of Technology. I had an ability to solve various problems by identifying or developing the relevant technologies and finding people to put it into practice. A friend of mine was looking for an idea to make use of coffee waste. And that's how it all started.

Starting their own business required great courage and faith that it would succeed. As the chief executive officer (CEO) of Syntoil said in her interview:

> In our human nature, the schemes are so strong that it is very hard to break them. As for me, I simply do not have this tag in my head, and my mind lacks that part which fears change.

Determination to develop one's own business remains high despite adversities and obstacles when pursuing the achievement of the initial vision. Deko Eko reported that its initial idea for a business-to-consumer platform failed to meet expectations, because the market was not ready for such products. Hence, it underwent a shift in focus to a different target group: companies. Only upon kick-starting this segment, they returned to residential customers. WoshWosh faced a major crisis at an initial stage resulting from excessive orders which they could not handle. This led to a change in their business model and management methods. For Bioelektra, the changing and ambiguous waste management regulations in Poland are a major barrier. Therefore, the company is determined to explore foreign markets. EcoBean faces similar problems with waste regulations. Having identified the problem with recycled waste management, Syntoil changed its business model to prepare customised products for end users. The innovation which had been the original idea for business can evolve under the influence of adverse external conditions and development barriers, leading to a change in the entire business model of a start-up.

The analysis of the interviews and the collected materials indicates that the studied start-ups refer to the concept of sustainability in their general message, while the elements of circular economy or its selected components appear in their business as circular values. Similarly, few mission statements include the term "sustainable" (Syntoil) or make reference to both environmental and social values (EcoBean and Rec.On), whereas all mission statements have some environmental element in the form of a general statement about ecology (WoshWosh) or the environment (Rec.On and EcoBean) or reference a specific circular economy process (recycling and upcycling in the case of Bioelektra and Deko Eko, respectively).

Sustainable development as a general idea close to the company's perception of its role in the environment appeared also in interviews and statements, while in the business model descriptions, this idea is made more specific by reference to the selected circular economy processes. As one of our interviewees stated:

> "Let's take care of the planet" or "Let's stop generating mountains of waste" remain empty slogans, as nobody realizes the scale of it and that mankind is on a path to self-destruction. The other side of the coin is related to business, as our underlying assumption was to process all this waste. (Syntoil)

Interestingly, the concept of sustainability is obvious to these founders, and they do not feel the need to talk about it:

> My, or rather our, assumption is that companies which fail to adapt to the sustainable development goals and which decline to base their production on sustainable resources will collapse in the 21st century. We are living this conviction, which we kind of adopted a long time ago. (Syntoil)

Although the interviewed start-up founders discuss the environmental and waste management solutions most, they also notice the societal aspect of their activities, trying to be socially sensitive as well. WoshWosh carries out campaigns to collect shoes for the homeless, supports failing shoemaker's shops and seeks to renew this craft in Poland. Bioelektra emphasises good working conditions in its plant, which it considers a unique action in that market. Rec.On co-operates with a Ghanaian craftsman. Also, Deko Eko employs local artisans from poorer regions. Social inclusion is complementary to their main operations and supplements their business model, the core of which is circularity.

The start-up founders analysed in our study clearly communicate the role played by their companies. All start-ups highlight their positive environmental impact, referring directly to the principles of circular economy as a whole or its selected stages. They emphasise their low- or zero-waste policy by re-conditioning (WoshWosh), recycling (Bioelektra, EcoBean and Syntoil) or upcycling (Deko Eko and Rec.On). Furthermore, all of the start-ups share a

sense of positive indirect impact on the natural environment by protecting natural resources and altering business processes or consumer habits towards greater sustainability. The CEO of Syntoil observed:

> Combustion of fossil fuels generates huge carbon dioxide emissions: almost 6 tons of CO_2 per ton of soot. In the second stage of our venture, the entire CO_2 will be redirected to production, so we can become fully carbon-neutral. This brings about societal consequences: cleaner air, conservation of fossil fuels and raising people's awareness of where it all comes from.

These start-up founders also see their positive role in building a responsible supply chain. This process involves the education of business partners and suppliers on the one hand and residential and business customers on the other. Deko Eko holds upcycling workshops for its residential and corporate customers. WoshWosh educates its partners within a network of shoemaker's shops and laundries. EcoBean demonstrates for its customers how its environmental footprint is reduced through the use of coffee waste.

The start-ups increase their impact by scaling up their business activity through expanding their product portfolio, replicating technology, expanding to foreign markets and reaching new customers, but also searching for innovation or expanding the scope of activities of the organisation and its founders into new areas. The Rec.On founders are establishing an upcycling village in Spain. EcoBean is developing another innovation related to coffee waste processing into a polymer and Bioelektra is searching for new methods to use their waste fractions. They also notice their pioneering role in the Polish market, emphasising that they have contributed to the transition towards sustainability. As the founder of Deko Eko put it:

> It may be argued that, in the beginning, we were a trendsetter in the Polish market. At that time, other companies did not understand the concept of upcycling. We had a positive impact on the whole business sector.

Furthermore, these founders mentioned a drive towards business innovation. This motivation is based on an innovative idea which aims to solve, or at least considerably mitigate, an environmental crisis. Entrepreneurs emphasise that their solutions are unique and their ideas should be deemed innovative and pioneering, which they consider added value. EcoBean developed an innovative process to manufacture briquettes from coffee waste. WoshWosh is the first shoe renovation company. Bioelektra and Syntoil stress the innovativeness of their municipal waste processing method and tyre processing technology, respectively.

Innovation is not limited to products and services but also involves the organisation of processes or the business model as a whole. An ecological product or service remains at the core of a business model of each start-up. It is also delivered in an eco-friendly manner. This may involve packaging and distribution channels (Rec.On, Deko Eko, WoshWosh and EcoBean) or technological installations which are placed close to waste-generation sites to reduce costs and emissions related to transport (Bioelektra). The CEO of Syntoil described innovation in his company in the following manner:

> We have one product innovation, and there is also a technology and process innovation. The third important element is that our process is not only circular, that is, we redirect our products for re-use, but also zero-waste, that is, any waste which might be generated by us is sold back to the industry to be used once again.

The founder of Deko Eko observed:

> Overall, our business model is innovative because it is based on our B2B2C platform. We have the database and the know-how related to upcycling, and we are constantly scaling up new ideas. What I mean is the innovativeness of the products offered on our platform and various methods of upcycling. In fact, "brand upcycling" is our philosophy of action.

Such an innovative approach can frequently evoke some external misunderstanding or difficulties with business development or communication. Therefore, these companies attempt to use the language of profits and results in their business communication; they use circular economy terms only in mature markets or with customers who implement sustainability strategies themselves. As a Syntoil representative described it, "The language is what connects us worldwide and divides us in Poland." Therefore, all the start-ups presented in this paper are entering or planning to enter markets outside Poland that are more pro-environmental with their products. In the process, they expect their technology not to lose any of its innovativeness in the process. As a Bioelektra's representative noted:

> We face no technological competition whatsoever either in Poland or globally. There are some companies with similar technologies, but they are less effective. Sometimes we say we are like Tesla, and when we are invited to attend some event, I always say, "For me, it's like delivering a speech at a conference of Diesel engineers." We have nothing common to talk about. We have such a different attitude and starting point, that we are a completely different animal. We do not compare ourselves with other technologies, because we do it quite differently, with a different attitude and in a different manner.

Consequently, environmental education along the value chain of business partners, suppliers and customers remains a major component of a business model of each of the innovation start-ups. Apart from economic benefits, their business offers mention additional elements related to environmental impact reduction. The situation is slightly different in the case of the start-ups which involve an artistic component and operate in the upcycling segment, namely, Deko Eko and Rec.On. In their communication with residential customers, they place more emphasis on circular economy values, as these are often shared by those buying products from companies for which ecological and aesthetic aspects are equally important.

6. Discussion

6.1 Personal experience

The collected data suggests that the direct experience of entrepreneurs is crucial in recognising a specific problem as a starting point for development of a positive impact start-up, which is consistent with the extant literature and empirical studies on social entrepreneurship (Robinson, 2006; Shaw and Carter, 2007). This finding may be linked to the concept of avenues of knowledge (Shane, 2000) based on the information and knowledge acquired during formal education, and avenues of experience (Corner and Ho, 2010), which reflect life and professional experience. Both knowledge and experience increase one's ability to recognise market opportunities (Ardichvili *et al.*, 2003; Patzelt and Shepherd, 2011), and recognition of opportunities is generally considered an important element of entrepreneurship (Gaglio and Katz, 2001).

6.2 Scale-up potential

In contrast to the observations made by some researchers (Perrini *et al.*, 2010; Sunny and Shu, 2019), who pointed out to the locality of the problems addressed by social enterprises, the challenges addressed by circular start-ups are universal in nature because they reflect global phenomena related to waste management. EcoBean uses coffee grounds, Syntoil deals with used tyres, Bioelektra processes municipal waste, Rec.On transforms automotive parts, WoshWosh renovates shoes and Deko Eko operates a universal platform for upcycling services. The solutions they offer are not locally specific and can be duplicated elsewhere.

6.3 Empowerment

Another factor driving the development of start-ups is a sense of impact and empowerment among entrepreneurs, which comprises a sense of control, i.e. a feeling that positive and negative outcomes depend on what we do in our lives; a sense of self-efficacy, i.e. a belief

that we can achieve the intended goals; and a sense of freedom, i.e. a conviction that we choose from among the available life opportunities ourselves (Henao-Zapata and Peiró, 2018). The generalised sense of empowerment, which is closely linked to a positive assessment of one's competences (abilities, skills, knowledge, etc.) raises the attractiveness of the goals set by an individual, increases energy and persistence in actions and makes an individual more resistant to stress (Bandura, 1977).

6.4 Sustainable orientation

The start-up founders we studied can be classified as visionary types of green entrepreneurs, as identified by Walley and Taylor (2005), who pursue a sustainable orientation. Ecopreneurs perceive the protection of the natural environment as an important end in itself rather than merely a component of the economic goal (Affolderbach and Krueger, 2017). Environmental issues form the core of the start-up concept, whereas social aspects tend to be complementary.

The main driver for sustainable entrepreneurs is their willingness or intention to balance and combine their desires to change the world and earn money into a desire to contribute to solving societal and environmental problems through a pursuit of business opportunities. Their ultimate goal is sustainability, while their enterprise with its business model is merely a tool to this end. Regardless of the differences in the weight attributed to particular objectives, all of the presented case studies have those three pillars in common. The emergence of each circular start-up is triggered by the occurrence of a combination of economic and environmental goals. The third dimension, social, is integrated as a complementary goal, typically at a later stage. Furthermore, the social component is driven not by external pressure or conditions but rather the inner motivation of sustainable entrepreneurs to scale up their positive impact. Similar conclusions were reached by Belz and Binder (2017), who analysed the subsequent stages of development of sustainable enterprises.

6.5 Path towards circularity

The enterprises examined generally relate to the concept of sustainability. However, this term appears merely as a general idea which sets the direction for changes but is irrelevant for them on an operational level. As indicated by one of Syntoil founders, "this is an empty slogan", and the goals of an organisation need to be transformed into a circular business project. In this context, the term "circular" appears to be more meaningful in practise than the term "sustainable", because it describes a means to achieve a certain level of sustainability (Geissdoerfer *et al.*, 2017), whereas the concept of sustainable development often concentrates on creating the economic, environmental and social value, while failing to identify specific ways to achieve it (Lüdeke-Freund, 2019). References to the circular model are narrowed down and focus on solving the problems related to excessive waste generation or the depletion of natural resources (Henry *et al.*, 2020). Circularity involves some additional terms with the "re-" prefix, such as rethink, repurpose and regenerate, which become moral values that set the direction of business operations and affect the sustainable lifestyle of the founders.

6.6 Positive impact

Another result of this study is the observation of the shift from the company's perspective and value creation to positive impact maximisation, which represents the stakeholders' perspective. Sustainable value proposition should indicate the benefits and costs to other groups of stakeholders and specifically the society and the natural environment. Therefore, sustainability is not only something to act on, comply with or engage in, but also a major source for change (Dean and McMullen, 2007). Start-ups use environmental opportunities

not merely to maximise profits, which would require traditional value creation, but also to build economic, environmental and social value by integrating these aspects into their business activity (Schaltegger *et al.*, 2016).

Furthermore, they attempt to scale up their positive impact linearly by altering the individual components of the value chain: ecological packaging of products (Rec.On, Deko Eko and WoshWosh), use of eco-friendly technologies in service provision (WoshWosh) or production (Bioelektra, EcoBean and Syntoil) or other business processes modification towards zero waste. Non-linear expansion of positive impact is also affected by activities in the social sphere, such as education (Deko Eko and WoshWosh), social commitment (Rec.On, Deko Eko and WoshWosh) or outreach to employees (Bioelektra).

6.7 Circular innovation

Clear orientation on circular business model innovation is a major element shared by the start-ups covered by this study. This category of innovation is founded on re-thinking of the value proposition, or a product or service offered by a company to its stakeholders. From the strategic perspective, this type of business model innovation should provide a competitive advantage by creating greater value for customers and contribute to sustainability at the level of both the company and society at large. The ability to implement innovation, either incremental or disruptive, at the business model level represents the necessary business capability (Adams *et al.*, 2016).

Circular-oriented innovation is a form of business model innovation aimed at sustainability and circularity on the level of processes and products. By implementing such innovations, circular start-up founders frequently address the limitations of the existing markets (EcoBean, Syntoil and WashWash), regulatory framework (Bioelektra) or environmental awareness (Deco Eko and Rec.On). Sustainable entrepreneurs introduce circular innovations that transform market imperfections into business opportunities, replace unsustainable forms of production and consumption and create value for a broad range of stakeholders (Foss and Saebi, 2016; Massa and Tucci, 2014; Schaltegger *et al.*, 2016), while trying to conceptualise and implement new business models (Lüdeke-Freund *et al.*, 2019; Pieroni *et al.*, 2019). Circular model innovations aim to develop a model by incorporating more specific principles of closing the loop and contributing to a regenerative economy (Diaz Lopez *et al.*, 2019; Geissdoerfer *et al.*, 2017; Linder and Williander, 2017). Particularly in the case of new ventures like start-ups, broadening the perspective in the process of delivering value contributes to several major changes, especially at the business model level. Business model innovation seeks to extend the positive impact delivery to all stakeholders (Schaltegger *et al.*, 2016).

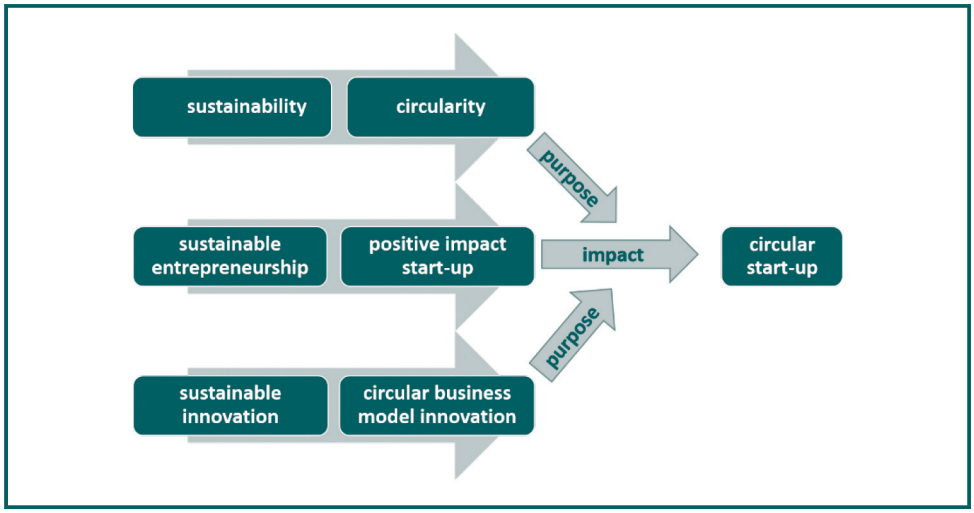
In conclusion, circular start-up business models are driven by three types of transition: from sustainability to circularity; from a sustainable entrepreneurship towards positive impact start-ups; and from sustainable innovation to circular business model innovation. Circular start-ups are special entities that use all three transition processes. The main drivers for circular start-ups are connected to purpose-led motivation as well as a sense of impact and empowerment among their founders. This is summarised in the graph (Figure 2).

7. Conclusions and limitations

Transformation towards a circular economy requires new business models as well as entrepreneurs who will develop and implement them. Hence, there is a need for studies which could help entrepreneurs better understand the value created and distributed in the circular economy transformation process.

Our study aimed to identify the change drivers among start-up founders as well as circularity-oriented business models innovation. Based on the data collected, we can conclude that the development of circular start-ups is driven by their founders' motivation to achieve integrated

Figure 2 Circular start-up model



economic and environmental objectives and to maximise their positive impact. Sustainable innovation projects in circular start-ups originate from the internal passion of their founders. It seems that entrepreneurs involved in a circular economy are further ahead in terms of innovation for sustainability, thus adopting a breakthrough approach to management of their ventures and the social, economic and environmental impact of the goods and services they provide.

We noticed that the business model of circular start-ups is based on three types of transformation: from sustainable development to circular; from sustainable entrepreneurship to start-ups with positive impact; and from sustainable innovation to innovation in a circular business model. In addition, the motivation of start-up founders, which goes beyond commercial profit towards exerting a positive impact on the environment, is also of great importance.

Circular business model innovation appears to be a key to delivering sustainable solutions. However, the implementation of circularity principles at the enterprise level remains at an initial stage for several reasons. Firstly, such innovative solutions are not widespread, and the knowledge of business model re-design is low. Secondly, the awareness of the relevant economic potential and environmental benefits appears to be higher in large corporations, while the interest in and understanding of this operationalisation of sustainability generally fails to be recognised by small companies. Thirdly, efforts aimed at sustainable development are either fragmented or concentrated on one pillar of sustainability and address separate issues rather than covering the whole value chain (Rizos *et al.*, 2016).

Our research adds to the literature on entrepreneurship, sustainability and business model innovation, providing a better understanding of the conditions for the development and operation of circular start-ups through the analysis of the actual business activity pursued by entrepreneurs. The present study can serve as a valuable complement to the quantitative research on circular start-ups (Henry *et al.*, 2020), offering a better explanation of their business models. These case studies may contribute to knowledge of sustainable enterprises and thus inspire and enable more systematic research on circular start-ups. A qualitative analysis of circular start-ups in Poland can also inspire researchers from other geographic regions to test the described model and analyse the strength of the sustainable motivation of the founders. It would be interesting to study the barriers for start-up founders who build their businesses based on the principles of a circular economy and analysis of success factors. Identification of the typical characteristics of the start-ups which have

achieved high circularity can lead to formulating practical conclusions and recommendations for prospective founders of circular start-ups. Our findings might be also relevant to decision-makers and investment funds intending to support the innovative start-ups in the context of SDG-related initiatives.

Our findings concerning the drivers of the development of circular start-ups are not supported by any representative and comparable indices, which may be considered a serious limitation to this study. Our research covered start-ups based in Poland while operating on international markets as well. Therefore, a comparable analysis of different regions might be considered in further research, particularly with respect to institutional or legal barriers to circular start-up development. Therefore, an in-depth qualitative analysis of the existing challenges and proper measures for both circular start-ups and circular innovations is necessary. In our study, we indicate the barriers to start-up development as specified by those who developed circular business innovations. Understanding such barriers might help accelerator programme operators and investors eliminate the limitations faced by enterprises willing to transform their businesses to achieve circularity and should inspire further research.

Note: The interviewees consented to the disclosure of data, such as the position or function in the organisation that allows their identification.

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