

The CE Strategist – A learning tool to identify new circular business opportunities and adapt the business model

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Abstract

There is a broad consensus that new business models are a key factor for the transition to a Circular Economy (CE). The paper introduces the methodology of a learning tool, called CE Strategist, which provides guidance for the process of creating a CE-inspired Business Model. Developed within the European Erasmus+ project KATCH_e, the tool aims to help students and businesses alike, to identify circular business opportunities and further define them through an adapted version of the Business Model Canvas (BMC). The tool was being implemented as an openly accessible Webtool. Its methodology follows a four-step process: (1) Description of the current Business Model with a BMC template; (2) Evaluation of value capture opportunities along the whole product life cycle; (3) Selection of the most relevant CE strategies and Evaluation of best-practice examples; (4) Definition of a CE-inspired Business Model with a Business Model Canvas template highlighting potential influences. The innovation of the tool lies in its process design, which not only covers the analysis of CE potentials or the specification of the BM as the majority of existing tool, but provides guidance throughout the whole process of business model design which is the focus of this paper. It discusses, which CE business strategies can be distinguished, how their applicability can be evaluated and how they influence the different elements of a Business Model. The conclusions discuss the inherent limitations of the approach and how these were dealt with.

Keywords: Circular economy, Circular business strategies, Circular business models, Business Model Canvas, Tool

1. Introduction

This paper presents the methodology and the process design of the CE Strategist webtool. It was developed within the European Erasmus+ project KATCH_e, an acronym for “Knowledge Alliance on Product-Service Development towards Circular Economy and Sustainability and Higher Education”. The webtool is part of the educational resources developed and is accompanied by a theoretical module on business models. The aim of the webtool is to help the user identify business opportunities of the circular economy and provide guidance along the whole process of business model design. The tool targets product developers and designers from different manufacturing industries, both professionals and students. It is available online under the URL <https://tools.katche.eu/>.

The CE Strategist is part of a toolkit together with two other tools named CE Designer and CE Analyst. The CE Designer is a semi-quantitative Checklist Tool which aims to evaluate the design implications of different circularity strategies in the product and service development. The CE Analyst lets users quantitatively estimate the effects on the product carbon footprint when applying different CE strategies. The CE Strategist is designed on a basic framework that is also usable in all three tools and provide “bridges” and links to the other two webtools. Together the three tools provide a toolkit for CE helping users in design-, business and environmental assessment challenges.

2. Background and Methods

The tool methodology is the result of an extensive literature and practice review of existing tools, frameworks and business case studies. This research was guided by the following requirements the tool should fulfil:

Firstly, as a webtool for an online course, the tool is designed for individual users and not workshop-like settings. Therefore, the goal is to put forward a dynamic process framework throughout the whole business model design process, suitable for individual users, in contrast to merely providing a template for open innovation processes (such as the Business Model Canvas) where often additional “outside” guidance is needed.

Secondly, the tool should provide a useful addition to the concepts and frameworks already introduced in the theoretical module on business models also developed within the project. The use of the tool should be easy to use, provide a learning experience and expose the user to the fundamental idea of a circular economy and the business opportunities it provides.

The business model design process can be structured in three distinct iterative phases (Frankenberger et al. 2013): In the initiation phase the ecosystem is analysed, the needs of the players need to be understood and drivers for change are identified. The ideation phase is about generating new ideas and overcoming the current business logic. Finally, the integration phase is about the “translation” of ideas into the components of a business model.

This process is taken as a blueprint for the methodology, reviewing existing tools and derive requirements for the CE Strategist. An analysis of existing tools with a similar goal of inspiring CE-oriented business model innovation showed that there is a lack of guidance between the individual phases of business model design process - especially from the ideation phase to the integration phase. For example: The two webtools named CE toolkit (Evans and Bocken 2014) and Circular Pathfinder (van Dam et al. 2017) are quite similar in their scope and the target group they address. Both tools were designed as learning tools to quickly assess opportunities of the Circular Economy, from the viewpoint of manufacturers. The tools offer an evaluation of circular economy strategies such as repair, reuse, remanufacturing, products as services, etc. The results are useful to define aims both in terms of an adapted product design or a redefinition of the business model. However, the tools don't differentiate between these two use cases. Both tools focus on the ideation phase, but lack support as far as integrating the generated ideas in a business model.

On the other hand, the Business Model Canvas (Osterwalder and Pigneur 2013), provides a helpful template to organise, analyse and innovate business models by defining nine distinct elements (see Figure 1). Assigning the BMC to the BM design process, it is a useful tool both for the initiation phase and even more for integrating the pieces of a business model.

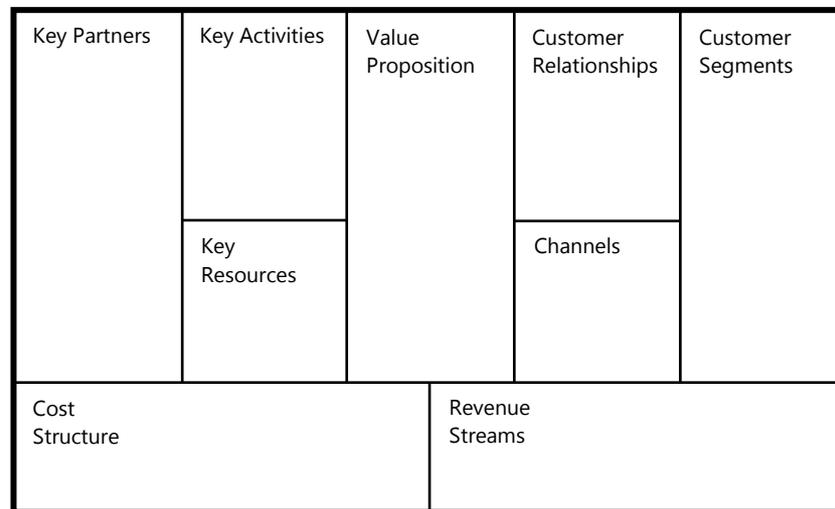


Figure 1. The Business Model Canvas (Osterwalder and Pigneur 2013)

In the sustainable business model innovation literature, there is a broad critique of the “profit-first world view” the BMC implies (Upward 2013). Value to be captured within a business model is mainly conceived as being created for customers only. As a result, critical aspects of sustainable business models such as environmental impacts, finite resources, social considerations or other affected stakeholders than customers are externalised (Upward and Jones 2015). As a consequence, many alternative frameworks for innovating business models sustainably have been introduced in recent years. The method generally has been, adding additional elements, questions or layers to the traditional BMC: The Sustainable Business Model Canvas (www.case-ka.eu) introduces two additional fields below named eco-social costs and eco-social benefits. As the name suggests, the Triple layered Business Model Canvas (Joyce and Paquin 2016) adds two additional layers concerned with social stakeholders and the environmental life cycle on top of the economic BMC framework. The flourishing Business Canvas expands the BMC framework to a total of 16 fields, to integrate social and environmental aspects (Hoveskog et al. 2018).

However, the appeal of the BMC is quite strong, especially because of its simplicity, resulting in wide spread adoption and name recognition of the concept also outside the business community. Furthermore, many additional elements and layers can also be integrated in the traditional BMC structure, if value is perceived not only in economic terms but also includes environmental and social concerns. As value is at the centre of the definition of the definition of a business model, a “re-definition” of the term has repercussions on all business model elements.

The idea of the CE Strategist is therefore to highlight the opportunities of a CE (similarly to the mentioned Circular Pathfinder and CE toolkit) while translating their implications to the structure of the BMC. Figure 2

shows an overview of the steps the user follows and links them to the business model design process: The user starts by describing the current business model (Step 1), then evaluates which opportunities fit best within the applied context (Step 2), subsequently selects the best fitting strategies (Step 3) and finally defines an (adapted) circular business model with the help of an adapted BMC version which highlights essential influences of the chosen strategies.

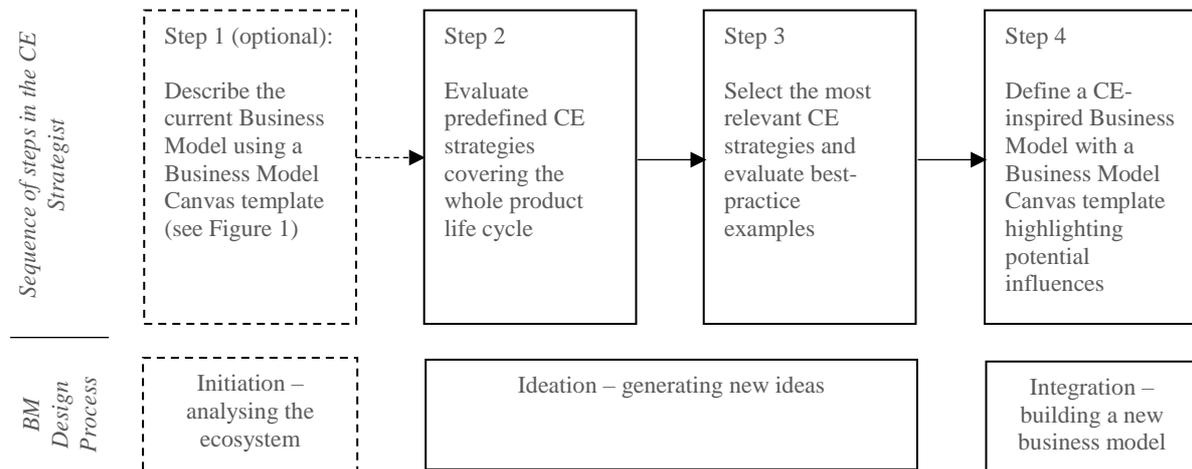


Figure 2. Structure of the CE Strategist with the corresponding steps of the business model design process according to (Frankenberger et al. 2013)

The methodological goal of the tool is to link the sustainability-view with the ideal of a circular economy at its centre with the business view of creating a financially viable business model. This goal results in the following research questions, which are covered in the following section:

- Which CE Business strategies can be distinguished?
- How can the potential of the CE business strategies be evaluated?
- How do the CE Business Strategies influence the individual elements of a BM?

3. Results

Which CE Business strategies can be distinguished?

The term circular economy is far from being sharply defined. It means different things to different people and institutions (Kirchherr et al. 2017), which is why a definition for the KATCH_e materials was necessary. There, Circular Economy is defined as a system that is restorative and regenerative by intention and design, which supports ecosystem functioning and human well-being with the aim of accomplishing sustainable development.

The definition builds on the widespread definition by the Ellen MacArthur Foundation (Ellen MacArthur Foundation et al. 2015) and unites it with the concept of sustainable development. By that definition the circular

economy can be understood as a model which emphasizes efficient resource flows, but does not exclude other areas of sustainability such as good working conditions. Resource flows can be optimised by narrowing, slowing and closing resource flows (Jørgensen et al. 2018).

In relation to Business Models this also means that Circular Business Models are a subset of Sustainable Business Models (Geissdoerfer et al. 2018). This is reflected in the categorization of Sustainable Business Model Archetypes (Bocken et al. 2014) where examples and archetypes of CE-related business models represent only a fraction of the different variants. To summarize, circular business models are conceptualised as a subtype of sustainable business models which emphasize the efficient use of resources by narrowing, closing and slowing resource flows.

To help in the process of designing a more circular BM, the tool provides a set of predefined CE business strategies. Strategies are understood as a long-term plan of action designed to achieve a goal – in this case with the goal of a circular economy. This is in contrast to business models, which are a concrete and individual manifestation of strategies. This also implies that business models might also build on a number of different strategies.

To enable a more efficient resource use, it is necessary to put the product life cycle in the centre of the idea finding process. The framework of the Value hill communicates this mindset well (Achterberg et al. 2016), and not only highlights opportunities along the life cycle but also shows how the “inner cycles” of a Circular economy provide a potentially higher value capture. By doing so, the framework merges the logic of business strategies with the goal of resource efficiency.

The concept differentiates between business strategies in the pre-use phase (Uphill), where value is continually added, the use phase (Tophill), where value is maintained for as long as possible, and the post-use phase (Downhill), where the value of products, components or materials is retained (Achterberg et al. 2016). This orientation along the product life cycle ensures that the strategies shown provide a complete picture of possible strategy options from the viewpoint of manufacturers.

The CE strategies are also characterised by a change of profit incentives. E.g., use-oriented-services such as pay-per-use systems incentivise the provider to make use of an asset for as long as possible and therefore encourage resource conservation and efficiency by design. This is in contrast to more “linear” business strategies based on product turnover, which often incentivise short product lifetimes and built-in obsolescence.

Table 1 shows an overview of the eleven CE business strategies used in the CE Strategist. The table also shows how these relate to the frameworks of the Value Hill (Achterberg et al. 2016) and the Sustainable Business Model Archetypes (Bocken et al. 2014). Furthermore, the table highlights how resource flows (Jørgensen et al. 2018) are influenced through the strategy and what potential new profit sources are uncaptured (Moreno et al. 2016).

Table 1. Overview of CE Business Strategies used in the CE Strategist.

Value Hill ¹	Business Strategy	Definition	Resource Flow ²	SBM Archetypes ³	Profit Sources ⁴
Uphill	Circular Sourcing	Using resources as production inputs that are renewable, recoverable, bio-based and/or comparatively resource conservative. (Achterberg et al. 2016) The strategy summarizes innovation approaches which focus on material choices such as Cradle to Cradle, Localisation, Biomimicry, Green Chemistry, etc.	Narrowing Closing	2, 3	a, b
	Maximising Production Efficiency	Describes a number of manufacturing principles that focus both on maximising the material and energy efficiency in the production process, such as Industrial Symbiosis, Low Carbon Manufacturing, Additive Manufacturing, On Demand Production, Dematerialisation, renewable energy, etc. (Bocken et al. 2014)	Narrowing Closing	1, 3	a
	Circular Design	Make use of product design strategies that are actively considering end of use strategies, such as repair, upgradability, modularity, repurposing, closed loop recycling, etc. (Achterberg et al. 2016)	Slowing, Closing	2	c
	Long Life Design	Focusing on delivering long-lasting and energy-efficient products the customers are attached to. Products are often comparatively expensive when acquired. Durability and Sustainability is a major part of the company's communication. (Bocken et al. 2016)	Slowing	6	c
Tophill	Life Extension	Selling consumables, spare parts, and add-ons which support the longevity of products and/or providing repair & maintenance services. (Achterberg et al. 2016)	Slowing	6	d
	Product-oriented Services	Products are sold to consumers with extra services aiming to prolong the use phase of the product. Examples include extended warranties, service contracts, supply of consumables, take-back agreement, consultancy, etc. (Tukker 2004)	Slowing	4	d
	Use-oriented Services	The ownership of the product remains with the service provider. It is made available in a different form and is sometimes shared by a number of users. Examples include: leasing and renting (single user), sharing (sequential use by different users) and pooling (simultaneous use by various users). (Tukker 2004)	Slowing Closing	4	d, e
	Result -oriented Services	Clients and providers agree on a specific result and not necessarily a pre-determined product. All resources used to deliver the result are becoming cost factors for the provider, creating a financial incentive to use them as efficiently as possible. (Tukker 2004)	Slowing Closing	4	d, e
Downhill	Reuse	Providing used products to new customers.	Slowing	2	f
	Remanufacturing / Refurbishment	Restoration of a used product to a condition as good as new. (BS 8001:2017)	Slowing	2	f
	Material Recapture/ Recycling	Recapturing materials and components and/or transforming waste into new materials substituting the use of virgin materials.	Closing	2	a, b

¹(Achterberg et al. 2016)
²according to the framework of narrowing, slowing and closing resource flows (Jørgensen et al. 2018)
³Sustainable Business Model Archetypes (Bocken et al. 2014): (1) Maximise material and energy efficiency, (2) Create value from waste, (3) Substitute with renewables and natural processes, (4) Deliver functionality rather than ownership, (5) Adopt a stewardship role, (6) Encourage sufficiency, (7) Repurpose for society/ environment, (8) Develop scale up solution
⁴Adapted from (Moreno et al. 2016): (a) from material and energy efficiency, (b) from recovering resources from products/materials, (c) from selling long-life time products or increased functionality, (d) from consumable/ spare part/ service sales, (e) from increasing the utilization rate by shared access/ ownership/ performance provision, (f) from providing used/ refurbished/ remanufactured/ upgraded units

How can the potential of the CE business strategies be evaluated?

Having a set of predefined CE business strategies, the next step is about finding out which ones fit best for a specific purpose (see Figure 2). There are a number of methods from existing tools with a similar objective. E.g. the Ecodesign PILOT (Wimmer and Züst 2001) suggests product improvement strategies based on the most relevant life cycle stage from the raw material extraction to the disposal of the product. The already mentioned Circular Pathfinder (van Dam et al., 2017) takes a top-down approach based on the resource hierarchy, considering the potentials of “inner CE cycles” with a high resource efficiency impact first. The tool starts evaluating options to narrow the resource flow, then looks at options to slow resource flows starting such as long life strategies and finally analyses options to close resource flows. The CE Toolkit (Evans and Bocken 2014) mostly looks at the product characteristics and derives potential improvement measures from there.

The evaluation used for the CE Strategist builds on the analyses of 100+ documented CE practices assigned to the eleven CE strategies, mostly from the construction and furniture sector. The research question was: What are the unifying product and market characteristics that qualify it for a certain strategy?

Relating the question with the framework of the BMC, the analysis looked both at characteristics of the backend (Key Partners, Key Activities and Key Resources) and the frontend (Customer Relationships, Customer Segments, Channels) of successful CE-oriented Business Models. The backend side is associated with the product side of a Business Model, while the frontend customer-facing side of the Business Model on the other hand is also described as the market side (see Figure 1). Similar to the CE toolkit, the evaluation is based on preferable product characteristics (such as material composition, longevity, modularity, production methods, etc.) but additionally looks at supportive market characteristics (such as customer demands, requirements, life time and investment costs, etc.). The result is shown in Table 2, where each strategy was assigned between one and six evaluation criteria. The user is asked to evaluate the accuracy of the statements with a four-point scale of false, mostly false, mostly true and true. The table also shows how the answer influences the evaluation. The (+) means that a positive response influences the applicability of the assigned strategy positively and vice versa. E.g. if the criterion “customers mainly seek the functionality of a product” is true for the examined product system, it results in a positive feedback for the strategy “result-oriented services”.

The varying number of evaluation criteria per strategy shows that the allocation of explicit and unambiguous criteria for each strategy is challenging. Some strategies allow for more clearly definable characteristics than others. E.g. The strategy “Circular Sourcing” is easily evaluated by analysing the material components of the current product system. On the other hand, finding unifying characteristics which favour the strategy “Product-oriented services” is harder due to the many different types of business models that build on this generic strategy. This resulted in only one generic criterion.

As the tool targets a wide range of different sectors, some criteria might not be applicable for the analysis of a specific product-system. In that case the tool offers to exclude individual criteria, by choosing not relevant.

Table 2. Overview of evaluation criteria related to the CE Business Strategies.

CE Business Strategy	Influence +/- ¹	Evaluation Criteria
Circular Sourcing	-	Materials are mostly renewable and non-hazardous.
	-	Materials come from local sources, resulting in low transportation emissions.
	-	Materials are sourced under fair working conditions.
	-	A high rate of recyclates is used and the product itself is recyclable.
	-	The materials are highly eco-efficient, having few environmental impacts.
	-	The materials are easily separable. (avoidance of composites and coatings)
Maximising Production Efficiency	+	The manufacturing stage is highly energy and resource intensive.
	+	The production requires significant warehouse capacities.
	+	The energy needed - power and heat - in the production process stems mostly from non-renewable sources.
	+	The production process results in a number of unused waste streams (heat, waste materials, water, etc.).
Circular Design	-	Product parts with a short life time are easily accessible and separable.
	-	Products are easy to disassemble (with standard tools, in a short time, supported by a modularised design).
	-	Product failures are easy to identify and its design anticipates the most likely failures.
	+	Technical Obsolescence (e.g. due to short innovation cycles), if relevant at all, only relates to parts of the product.
Long Life Design	+	Technical product innovation cycles are relatively long.
	-	The product is timeless and/or customizable in its design.
	-	Users are attached to the product (due to its performance, aesthetics, experience, etc.).
	+	The use phase of the product is relevant in terms of its power consumption or use of consumables.
	+	Customers are willing to pay more for a eco-efficient, long-lifetime product.
Life Extension	+	The product is characterised by parts with different lifetimes and/or requires consumables.
	+	The use time of the product is shorter than its potential lifetime.
	+	Reasons for product failures are similar.
Product-oriented Services	+	Customers often hesitate to acquire the product due to uncertainties in its performance.
Use-oriented Services	+	Customers don't need to own the product, but are interested in its functionality
	+	High purchase prices act as barrier for more customers.
	+	The average product use time is shorter than its lifetime.
	+	There is an incentive to take the products back after the use phase.
Result -oriented Services	+	Customers mainly seek a certain functionality, the product is of minor concern (e.g. mobility instead of car ownership)
	+	Products often underperform in their use phase in relation to their potential (e.g. due to limited user expertise)
	+	Products are characterised by high investment (purchase prices) and/or operational costs.
	+	Customer requirements are highly individual.
Reuse	+	Products are often still functional at the end of their use time.
	+	There is a high customer demand for used products (e.g. due to lower prices).
Remanufacturing / Refurbishment	+	Products are discarded because parts of it are faulty / technologically obsolete / look worn / are out of fashion.
	+	Professional product-specific expertise (such as knowledge, skills, equipment) is needed to reintroduce products into the market.
Material Recapture	+	High material costs are associated with the production of the product.
	+	Large amounts of discarded material are available as potential a secondary source.

¹evaluation with a four-point scale between false (-), mostly false, mostly true, true (+); +/- describes the answer which generates a high potential of the corresponding strategy; individual criteria can also be excluded by choosing "not relevant"

How do the CE Business Strategies influence the individual elements of a BM?

To achieve the goal of providing guidance in the process of integrating the pieces of business model (see Figure 2, Step 3 to Step 4) the tool is based on the following premise: CE business strategies are understood as patterns that produce similar outcomes on the level of the business model. This doesn't mean that every business model, that applies e.g. the strategy "Life Extension" looks the same, but that there are certain elements that are essential to address when following it. For example, applying the Life Extension strategy, will result in recurring Customer Relationships and require the provision of (repair) services as a Key Activity, among others.

This categorisation of essential business model elements that make a circular business model distinctive and unique was put forward by Smith-Gillespie (2017). The CE Strategist builds on these essential elements. New elements were added where necessary based on the business model characteristics of the best-practice examples that also served as the foundation for the evaluation criteria defined for Step 2. Tables 3 and 4 show the essential elements to consider when defining a new business model.

Among others, the tool also shows specific design strategies references as new Key Activities that are fundamental for the business strategy. This not only allows users to recognize a certain design strategy as one of the components of a new business model - for some strategies this relation is more fundamental than for others. In case of the two strategies "Long Life" and "Circular Design", as the name suggests, design is the key idea of its Value Proposition. In others, such as "Maximising Production Efficiency" product design plays a minor role. Still, every strategy necessitates a certain design approach. To evaluate and improve the product design, the CE Strategist links to the CE Designer - see also the contribution about the CE Designer tool in the ERSCP 2019 proceedings. The idea is that the basic evaluation of the applicability of CE strategies can both be used for business model- and product design considerations.

Table 3. Essential elements of the CE Business Strategies, adapted from (Smith-Gillespie 2017)

BMC Elements CE Business Strategies	Value Proposition	Customer Relationships	Channels	Customer Segments	Key Activities	Key Resources	Key Partners	Revenue Streams	Cost Structure
Circular Sourcing	SU			NC	D5, D7		CM	WV	MC
Maximising Production Efficiency	SU			VC	D7, D8			WV	MC
Circular Design	LC, SU			NC	D2			PR	
Long Life Design	LC, SU	PA		NC	D1			PR	
Life Extension	LC, SU	RR		NC	D2, SP		CU	SR	LC
Product-oriented Services	LC	RR	RC	NC	D3, SP		CU	BR	LC
Use-oriented Services	LC, AC	LR	RC	NC	D4, SP	UA	CU	PS	LC, FC, TC
Result-oriented Services	LC, PF	LR	RC	NC	D4, SP	UA	CU	PS	LC, FC, TC
Reuse	LC, SU		RC, RS	NC	D1	PA	RL, CU	PR, WV	PI, TC
Remanufacturing / Refurbishment	LC, SU	RR	RC, RS	NC	D7	PA	RL, CU	PR, WV	PI, TC
Material Recapture / Recycling	LC, SU			NC, VC	D5	MR	RL, CU	WV	PI

Table 4. Explanation of the Essential Elements of CE Business Strategies, adapted from (Smith-Gillespie 2017).

BM Element	Essential elements of CE Business Strategies		
Value Proposition	LC	Lower Lifetime Costs – through longer uptime of the product, lower operating costs, higher eco-efficiency, providing secondary use cases, etc.	
	PF	Performance – enhancing the performance by focusing on the desired result (providing light instead of bulbs, mobility instead of selling cars, etc.)	
	AC	Access – improving through use-oriented service on the product availability, flexibility, range of choices, etc.	
	SU	Sustainability – providing an environmental or social benefit valued by customers and other stakeholders	
Customer Relationship	PA	Product Attachment – Customers are attached to the product due to its high efficiency, premium branding, etc.	
	RR	Recurring Relationship – through upgrades, add-ons, maintenance and repair services, etc.	
	LR	Long-Term Relationship – through contracts, leasing, services, subscriptions, etc.	
Channels	RC	Return Channel – offering a method to collect products after the use phase	
	RS	Re-Sale Channel – offering a secondary use channel, often distinct from the primary channel	
Customer Segments	NC	New Customer Segments – quality-conscious, green, cost-conscious customers	
	VC	Vertical Customers - new customer segments outside the current value chain or industry (Industrial Symbiosis, recipients of waste materials, etc.)	
Key Activities	D1	Design of Long-Life Products	These design strategies can be evaluated with the CE Designer tool
	D2	Design for Product-Life Extension	
	D3	Design of Product-oriented Services	
	D4	Design or use-or result-oriented Services	
	D5	Design for Recycling	
	D6	Design for Remanufacturing	
	D7	Design for Material Sustainability	
	D8	Design for Energy Sustainability	
Key Resources	SP	Service Provision – supporting the longevity of products, through support, maintenance, repair, etc.	
	UA	Use-Phase Asset Management – track, manage and service products during the use phase	
	PA	Post Use-Phase Asset Management –storing, remanufacturing, refurbishing and reselling products after the use phase	
Key Partners	MR	Material Recovery – Equipment, plants and staff for material recovery processes	
	CM	Circular Material Supplier – Recycling facilities, Waste management, collection systems, reprocessing facilities,	
	RL	Reverse logistics – product, component or material recovery provided by a third party	
Revenue Streams	CU	Customer – becomes a partner by initiating new valuable company processes through takeback, repair, remanufacturing, etc	
	PR	Product Sale Revenues – additional or changing product sale revenues	
	BR	Bundled Product Service Sale Revenues – from the sale of customer owned bundles with extended warranties, guarantees, takeback agreements, etc.	
	PS	Product Service Revenues – from providing access to products while retaining ownership	
	SR	Service Revenues – from the provision of services such as selling consumables, maintenance and repair services	
Cost Structure	WV	Waste as Value – revenues from waste avoidance	
	LC	Labour Costs – for providing labour-intensive services	
	MC	Manufacturing Costs – due to changing materials, sources, quantities, energy needs, etc.	
	FC	Financing Costs – Insurance Costs, leasing costs, upfront investment costs, etc	
	TC	Logistics and Transport Costs – service provision, transports, asset tracking, etc.	
	PI	Product Return Incentive – Mechanisms such as deposits or credits are enforced to incentivise takeback schemes	

The methodology also allows for the combination of a multitude of strategies. This idea of a mutual dependency of the different strategies is also stressed in the Value Hill framework (Achterberg et al. 2016). E.g., a Business Model that builds on the delivery of a use-oriented service aims to intensify the use of a product due to new profit incentives. This shift of incentives and as products are not changing ownership during the use phase might furthermore encourage downhill strategies, such as “Remanufacturing / Refurbishment”.

In these cases, the BMC template combines the corresponding elements, while excluding duplicates. Figure 3 shows how such a template for Step 4 looks in the tool. The essential elements are shown as editable elements in the tool. Furthermore, items from Step 1- the definition of the current business model – can be imported and of course, new elements can be added. This means that the influences arranged within the BMC-structure are supposed to provide the starting point for the definition of a CE-oriented business model.

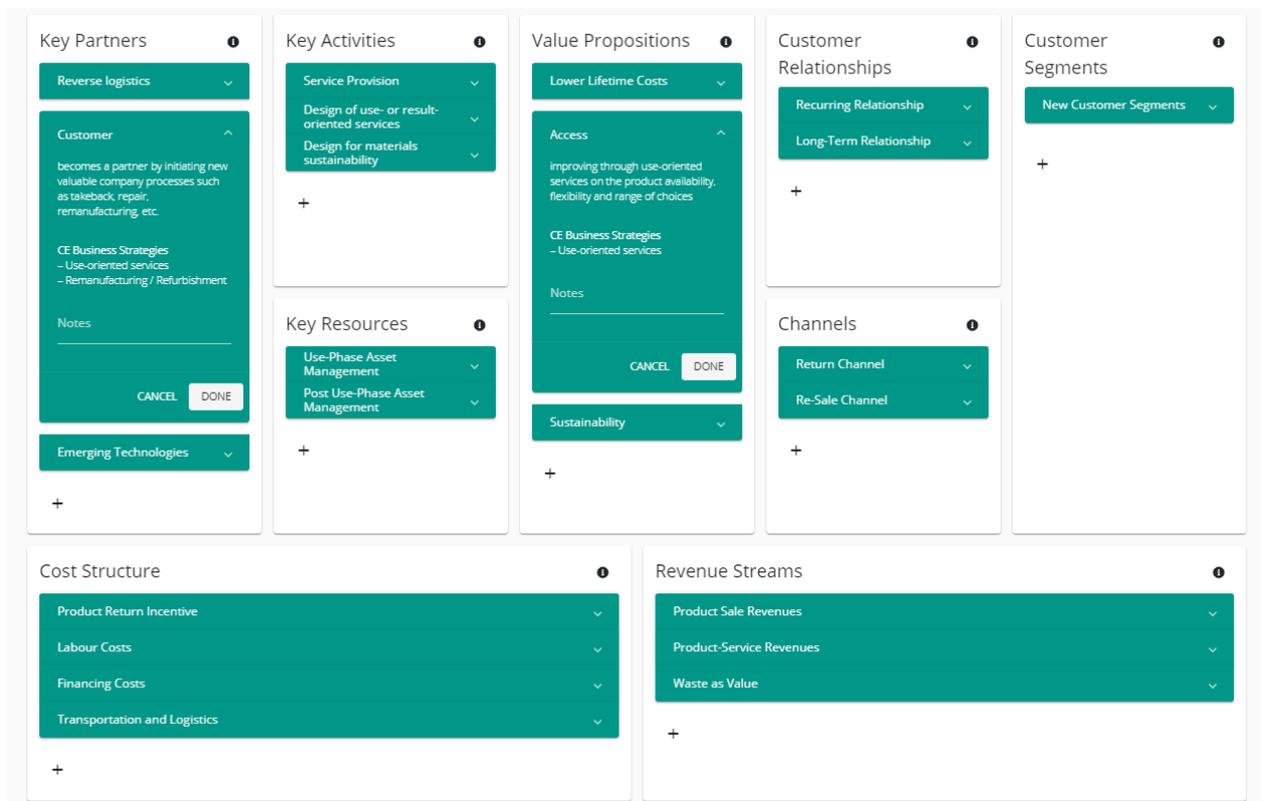


Figure 3. Screenshot from the CE Strategist with the essential elements related to the strategies Remanufacturing and Use-oriented-Services; Business Model Canvas from (Osterwalder and Pigneur 2013)

4. Conclusions

The goal of the CE Strategist tools' methodology is to provide guidance in the process of CE-oriented business model Innovation. As many existing tools only evaluate the CE potentials of a specific product, the main innovation of the CE Strategist lies in the translation of CE potentials from the ideation phase to specific requirements to consider in the integration phase of the business model design process. This approach also results in some limitations regarding the applicability of the tool, which are discussed in this section.

First and foremost, the tools premise of providing guidance, results in the necessity of predefined paths and outcomes. The tool builds on a semi-quantitative evaluation method with predefined strategies, best-practice examples and influences. Therefore, by design, this might result in a narrowing of perceived possibilities. However, this is always a fundamental issue when developing such tools - also supposedly neutral and generically applicable tools such as the BMC are criticized, as discussed in the beginning, for its narrow focus on financial value, resulting in unsustainable business models. The goal for the CE Strategist was therefore to be as transparent as possible about the tools functioning and logic. For one, this is done with the comprehensible evaluation scheme in Step 2, which links each strategy with a number of corresponding questions. Secondly, in Step 4 the tool shows the influences as editable items in the BMC template while also referencing the origin strategy of each item. Both measures assure that the results are comprehensible.

To highlight certain influences on different elements of a business model requires a specific perspective and a number of presumptions. The tool looks at the potentials of a CE from the perspective of manufacturers. This perspective allows to assume a fundamental structure of the Business model. For example, it assumes that the business model builds on revenues from the sale of products or services, it assumes that Product Design is one of the Key Activities, that Key Resources includes physical resources being transformed while Key Partners represent the supply chain. In other words, a certain archetype of the front- and backend of the business model must be presumed in order to highlight influences of a business model redesign. One of the limitations is therefore this narrowing of the target group, which directly results from the aim of covering the whole design process. Still, as the CE represents an idea building on system innovation instead of end of pipe solutions, manufacturers are key to fulfil its promises.

The tool is currently in the process of being tested broadly by different stakeholders (universities and companies) in the four countries of the KATCH_e project partners (Austria, Spain, Portugal and Denmark). Feedback is continuously gathered and the tool is adapted accordingly. Together with the other two webtools developed within the project - the CE Designer and the CE Analyst – the final versions will be available online under the URL tools.katche.eu in December 2019.

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