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Sustainability-Related Strategic Evaluation of Business Models

Kristina Höse, Anika Süß * and Uwe Götze

Faculty of Economics and Business Administration, Chemnitz University of Technology, 09111 Chemnitz, Germany; kristina.hoese@wiwi.tu-chemnitz.de (K.H.); uwe.goetze@wiwi.tu-chemnitz.de (U.G.)
* Correspondence: anika.suess@wiwi.tu-chemnitz.de

Abstract: Recent developments, such as climate change, demographic change and resource scarcity, have forced companies to turn towards more sustainable resources, processes and products. Thus, their business models should be developed in a way that meets social, ecological and economic challenges. A vital part of this development process is the evaluation of business models against the background of sustainability targets during different phases of this process. This paper addresses the, thus far, largely neglected sustainability-related strategic evaluation in the earlier phases of business model development. Based on a sustainability-related canvas approach and concepts from strategic management theory, it suggests a method for sustainability-related strategic evaluation of business models as well as business model ideas and options. Therefore, a procedure for evaluation is presented and five main criteria are developed that should be taken into account: eligibility to create stakeholder's benefit, market attractiveness, heterogeneity/singularity, permanence and eligibility to generate sustainability-oriented value.

Keywords: business model evaluation; sustainability; strategic management sustainable business models

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1. Introduction

Global trends, such as climate change and resource scarcity, are forcing companies of all industries to rethink their business models towards sustainability [1]. However, the realization of new business models, especially those based on new technologies, is typically costly as well as accompanied by considerable risk—the probability of failure is often not close to zero [2]. Moreover, testing new business models on a prevalent trial-and-error basis might not be suited for sustainable business models [3], due to an avoidable waste of resources; by pursuing a business model idea without indications of success, resources are already drawn from and are possibly damaged. Therefore, a systematic and structured development of new business models in general and especially sustainable business models seems to be inevitable.

A vital part of such structured business model development processes is the evaluation of business model ideas and design options as well as complete business models. Evaluations help to prioritize promising business model ideas and design options [4], to reject not so promising ones, to direct development processes, to support decision making about the introduction of new business models and to convince investors of the potential of such models. Generally, evaluation approaches for business models can be roughly divided into two groups: detailed and strategic evaluations. A well-elaborated and detailed evaluation is typically only possible and justified (with regard to the necessary effort) towards the end of the business model development process, supporting the final decisions about business models and their implementation. A rougher "strategic evaluation" can and should be conducted in the earlier phases of such processes, fostering especially a systematic preselection of business model ideas and design options [5]. In the case of sustainability-oriented business models, which are the focus here, both types of evaluations

should include all three dimensions of sustainability. However, this paper deals with the strategic business model evaluation in early phases of development.

Regarding the sustainability-related evaluation of business model ideas, design options and whole business models, some methodologies for such evaluations do exist (e.g., [6,7]). For detailed evaluations, Cardeal et al. propose a detailed, sustainability-oriented business model evaluation, while focusing only on economic-oriented criteria during the strategic evaluation. However, they suggest elaborating the strategic evaluation in terms of sustainability [6]. This is the motivation of the current paper: it is intended to close the existing methodological gap by developing and presenting a comprehensive, well-structured and transparent strategic business model evaluation method that allows for generating significant statements about the potentials of business models and model ideas with regard to competition as well as sustainability. The method is based on different existing pillars: approaches to structure business models in general and especially with regard to sustainability, business model development processes, criteria for the single sustainability dimensions (economic, ecological, social), and criteria and evaluation approaches from strategic management theory (especially the market-based view and resource-based view). These pillars and the respective approaches are combined to build up the method for sustainability-related strategic business model evaluations. Our method should fulfil the following requirements: allow an assessment at *early stages of the business model development* process, be based on *strategic management* theory, assess the *whole business model*, *provide guidelines* for application and consider all *three dimensions of sustainability*.

2. Literature Review

2.1. Business Models, Their Development and Their Evaluation

Several authors have attempted to define the term *business model* [8–11] and several others reviewed the literature on these definitions [9,12]. With consideration of these comprehensive analyses, in this paper, a business model is understood as the logic of how a business creates value and delivers it to customers [13]. Furthermore, it incorporates different elements [14] or components as well as linkages between them [11]. Business model concepts are often visualized based on Osterwalder and Pigneur's business model canvas (BMC) [14] (or, as first seen, a business model ontology suggested by Osterwalder [15]), e.g., by Wirtz [16] and Schallmo [9]. The BMC originally built on four main areas or pillars—namely, product (value proposition), infrastructure management, customer interface and financial aspects—that have been further developed to the BMC [14,15] (see Figure 1). The nine business model elements in the BMC are customer segments, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partnerships and cost structure [14].

One important question relates to how business models can be developed in a structured and efficient way. Quite prominent and similar perceptions of the *business model development process* have been presented by Schallmo and Wirtz [4,16]. This process is pictured in Figure 2 and can be divided into six steps: development of business model ideas (1), feasibility analysis (2), prototyping (3), decision making (4), implementation (5) and monitoring and controlling (6) [4,16]. In step (1), different (innovative) business model ideas and their potential are identified using creativity techniques. After sounding out the potential, the basic characteristics of the possible business models are set. The results can be visualized, e.g., in rough drafts of different BMCs. Following this, the business model ideas are analyzed regarding their position in already established or new industries and their strategic direction, allowing a preselection of business model ideas to be pursued (2). Based on this analysis, in step (3), the aforementioned selected business model ideas are elaborated as prototypes of business models, resulting in detailed concepts. To decide on the most suitable business model among the alternatives, step (4) includes an evaluation of profitability. Finally, the chosen business model is implemented (5), monitored and controlled (6). After every step, feedback loops are possible, changing the already designed business model elements or referring to an exit strategy in case a low potential

of the business model ideas has been revealed based on the results of evaluations within the process.

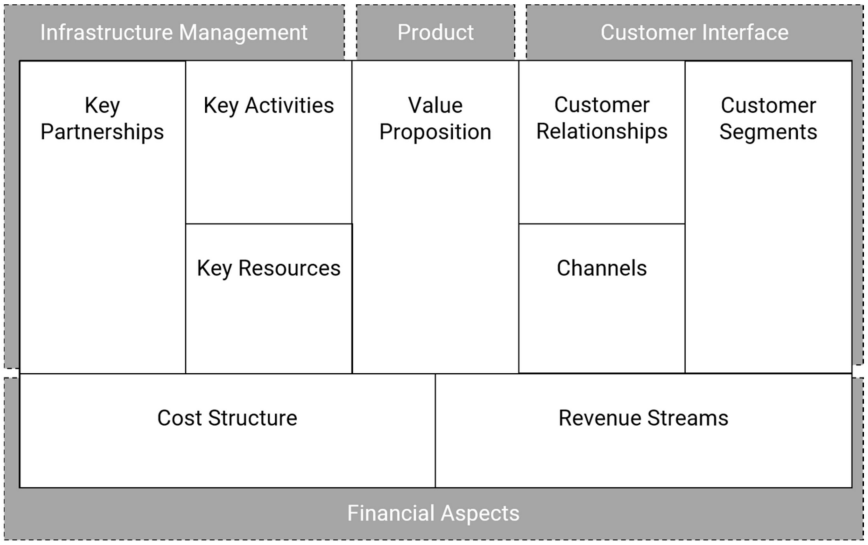

Figure 1. Business model canvas based on [14,15].

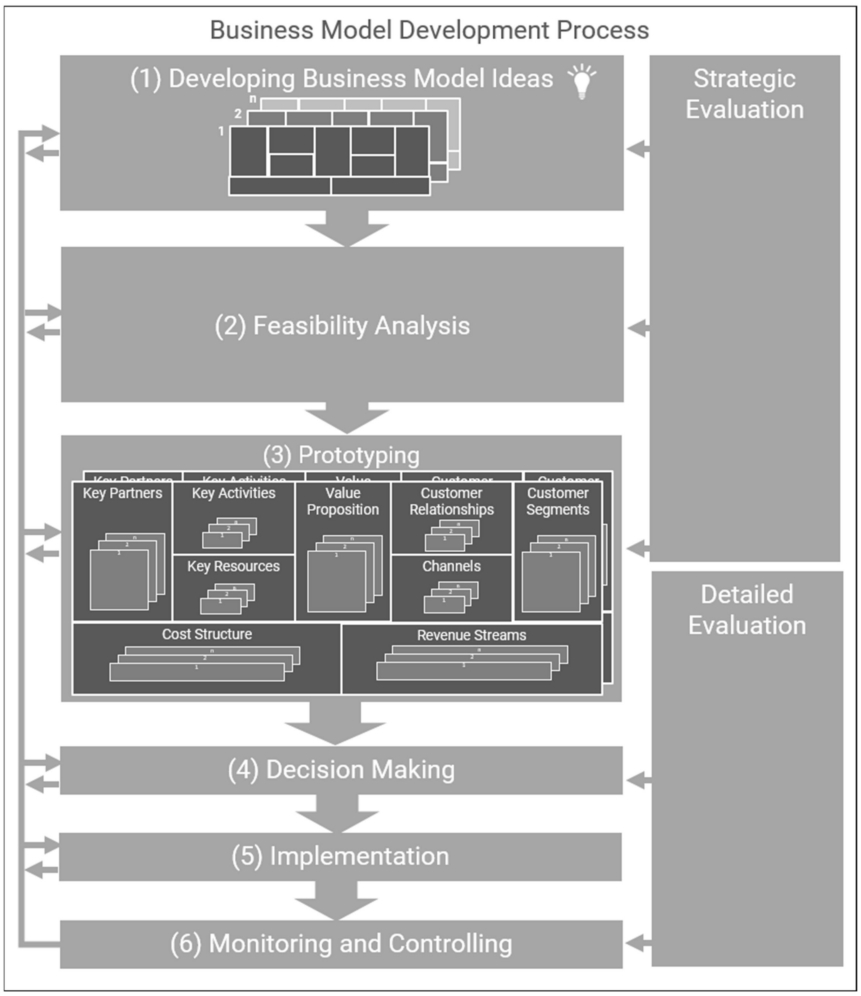

Figure 2. Business model development process based on [14,16].

In the literature, the presented business development process is linked to multiple steps of the *evaluation process* at two different levels of detail, as indicated by small arrows on the right side of Figure 2. The first rough evaluation is performed in step (1), where different business model ideas are weighed against each other [16], e.g., by using a list of criteria [4]. Another (explicit) evaluation is conducted within step (2), as the feasibility of the business model concepts is analyzed. This analysis can comprise the market, the industrial sector, the competitors and the environment, e.g., by using Porter's "Five Forces" [17], amongst others, and the environment [16]. In addition, step (3) comprises an evaluation of the developed prototypes [4], which can be conducted, e.g., by using a SWOT-Analysis [14]. Step (4) contains a more detailed profitability evaluation, e.g., by calculating a precise business plan for every alternative [16]. After implementing the chosen business model, it is assessed whether the goals regarding value proposition, customer needs and profitability are achieved [16]. On the one hand, this list shows that evaluations are suggested in every step of the development process, and on the other hand, the variety of criteria, approaches and instruments becomes clear. Beyond that, there are some evaluation methods suggested in the literature not linked to specific phases of the business model development process, as categorized by Tesch and Brillinger's literature review [18]. At the same time, they clearly emphasize there are still research gaps regarding the evaluation methodologies.

Strategic evaluations are highly relevant in the early phases of business model development; they are fundamental for setting the main characteristics of the business model as strategic decisions have to be made and not every element is thought out yet. One approach that seems suitable has been developed by Rehme et al., who suggested a strategic evaluation of business models based on criteria derived from the resource-based view [5]. This enables a structured analysis of business models. However, this evaluation approach is economic-oriented, without focusing on ecological and social aspects as well. Additionally, the approach refers especially to resources as the core of the resource-based view. The market perspective, which is a very important part of business models, especially regarding the customer segments, is not focused on, as there are no criteria for it. Therefore, this approach does not meet all of the requirements we determined above, but is a promising basis for further developments. Consequently, these two aspects are discussed in Section 3.

2.2. Sustainable Business Models, Their Development and Their Evaluation

The topic of corporate sustainability is becoming increasingly important, especially in corporate practice [7]. Nevertheless, the importance of sustainability depends on corporate objectives and the strategy from which the business model is derived. One well-structured systematization has been presented by Steger, who considers three different levels of integrating ecological goals into the corporate goals system [19], which can be extended to the social dimension of sustainability as well (see Figure 3).

Thus, the first level, *sustainability as a constraint*, aims at economic profit and limiting activities towards ecological and social sustainability to an unavoidable minimum due to legal restrictions. The second level, *sustainability as a chance*, embraces the possibility of reaching higher economic profit by exceeding the minimum level of ecological and social activities, e.g., by corporate image improvement. Lastly, the level *sustainability as a corporate goal* assures acceptance of social and ecological responsibility, apart from the achievement of economic value. At this level, goals can be weighted differently, up to a dominance of social or ecological goals similar to non-profit organizations (NPOs). In this paper, the second and third targets of conception are followed, otherwise (level one) the term "sustainable business model" or "business model towards sustainability" [20] would not be appropriate.

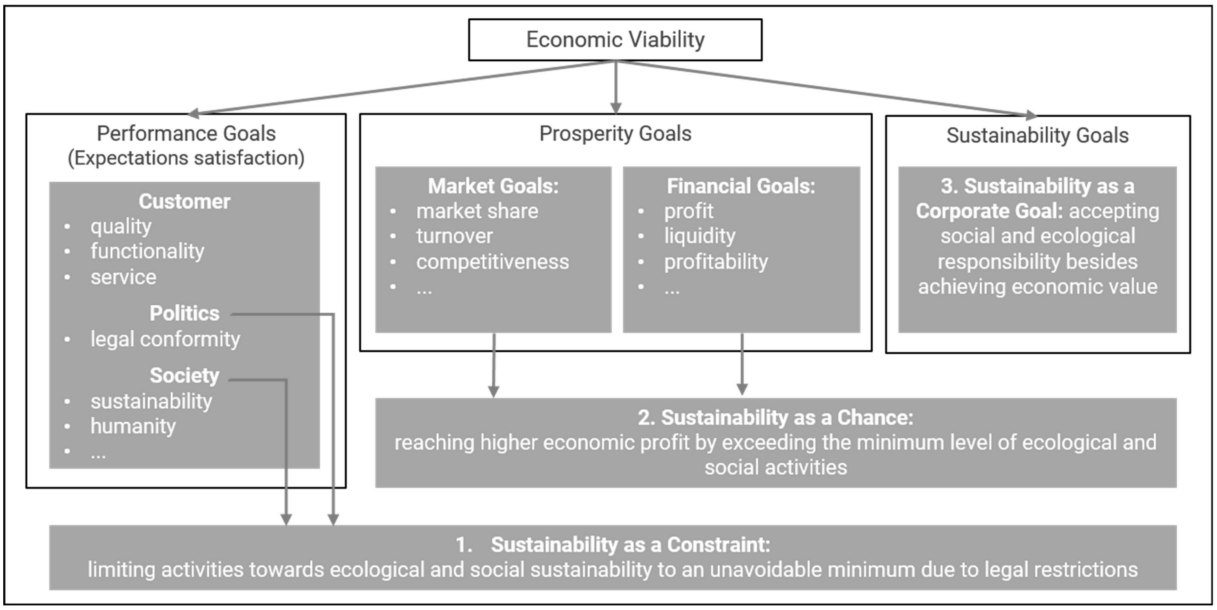

Figure 3. Corporate goals system and sustainability levels based on [19].

To contribute to corporate sustainability (levels two and three), an advancement of the foremost economic-oriented conventional business model development is inevitable [12]. A *sustainable business model* achieves economic viability through providing ecological and social benefits (level two) [7], or it creates value for the company, its customers and other stakeholders while saving, or at least not damaging, social and ecological resources (level three) [21]. In this regard, other forms of value beyond economic value are created, and furthermore, a broader range of stakeholders is considered [22]. A special type of sustainable business model is the circular business model, providing solutions for the circular economy. Circular business models aim at improving sustainability by minimizing the resource inputs into the organizational system, and the waste and emission coming out of it by closing resource loops, with that, transitioning from a linear into a circular flow [23].

The main question these definitions raise is how business models can be developed such that economic viability is pursued along with or through ecological and social aims. This, again, is followed by the question of how the sustainability of a business model can be evaluated and how potential for improvements can thus be identified. Therefore, a brief overview on existing business model development and evaluation concepts in the context of sustainability is given.

For *developing sustainable business models*, Bocken et al. [24] provide different archetypes, e.g., *creating value from waste* or *substituting with renewables*, to draw inspiration from when developing new business models. More specific, Kleef and Ropes investigate how to build circular business models for small- and medium-sized enterprises in the waste management industry [25]. Another way of considering sustainability in business models was proposed by Boons and Lüdeke-Freund [26]. They identified incentives for sustainable development in four of the generic (e.g., Osterwalder's) business model elements: the *value proposition* balances social, ecological and economic needs in the interests of stakeholders beyond economic value. The *supply chain* is based on accepting responsibility for activities along the supply chain and not shifting social and ecological burdens upstream to suppliers. This involves incorporating all stakeholders into a sustainable supply chain management. Likewise, a shift in socio-ecological burdens downstream the supply chain is undue. Instead, *customers* and the focal company accept responsibility for consumption and production, respectively. The *financial model* ensures a fair distribution of costs and benefits among the supply chain and covers non-financial effects as well [26].

Another approach to embed sustainability into business model development is the use of a sustainable business model canvas, based on the BMC by Osterwalder and Pigneur [14].

There are various ways to adapt the canvas (or similar frameworks) towards a triple-bottom-line business model framework [27]. Regarding sustainable business model canvases, the following approaches exist: extending the canvas in terms of economic, ecological and social layers (one canvas each) [28]; incorporating the dimensions of sustainability in each of the nine elements [6] or adding and replacing single elements, such as ecosystem services or actors to the original canvas [29]. Osterwalder and Pigneur themselves proposed to add the two elements of social and ecological costs and benefits to the original canvas to generate a triple-bottom-line business model [14].

One approach that enlarges the included aspects of sustainable business models was developed by Tewes et al. In their study, they draw the attention to the technical and social influences on business models in the present and in the future. Instead of adding social and ecological elements (or so-called building blocks) to the business model, they add an element called influences and subsume the influence of megatrends, such as social imbalance, responsibility (i.e., sustainable products and activities), urbanization or gender shift on the business model [30].

Based on the traditional BMC, in this paper, the adjusted BMC for sustainability developed by Cardeal et al. is used, incorporating the three dimensions of sustainability in each element of the BMC [6]. Figure 4 shows the business model elements assigned to the main pillars that the canvas was originally built on. The adaption to a BMC for sustainability is revealed in the description of the elements, now referring to all three dimensions of sustainability and indicated by different colors—blue for economic, green for ecological and yellow for social aspects.

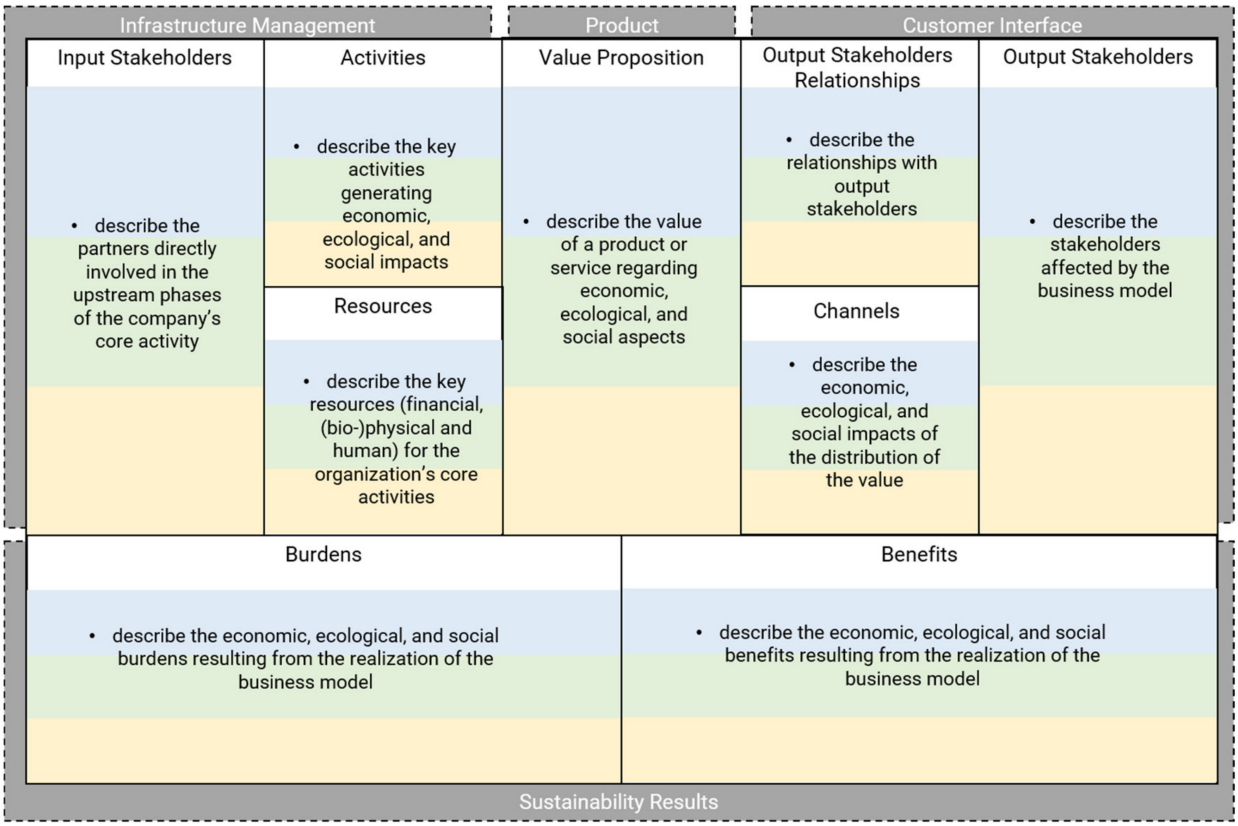

Figure 4. Business Model Canvas for sustainability based on [6,14].

The specific development of circular business models is already discussed in the literature, presenting, for example, different strategies to move from a linear to a circular economy model [23,31].

The *business model evaluation* with regard to sustainability within the development process can vary, depending on the stage of development of the business model. Based on Figure 2, in the following, different methods are considered. Existing approaches for assessing the economic, ecological and social or the integrated sustainability of other objects (e.g., products, processes) can be applied for the sustainability-related evaluation of business models; for an overview of such methods, see [32]. For *economic sustainability*, life cycle costing—especially the net present value method—seems to be suitable (the net present value method has already been applied to business models (e.g., by [5,6,33]). For assessing *ecological sustainability*, the life cycle assessment is an established method [34]. It has already been applied to business models as well (e.g., by [6,35]). The social life cycle assessment can be applied to assess the *social sustainability* of products [36]. It was already applied to business models by following the UNEP/SETAC guidelines [6]. However, these methods each refer to only one sustainability dimension (economic, ecological or social). Thus, methods to aggregate the single results to an integrated sustainability value should be used, e.g., the utility value analysis suggested by [37]. However, all these methods require data of a certain level of detail that are normally not given during the early phases of the business model development process.

Additionally, several authors have considered specific methods for business model evaluation regarding sustainability principles. An overview of the existing sustainability-related business model evaluation methods is given by [38]. However, they found that only a fraction of the identified studies comprised all three dimensions of sustainability within the evaluation. To complement and extend this research, we conducted a systematic literature review on sustainability-oriented business model evaluation, including only methods that address the economic, ecological and social dimensions [39]. Nevertheless, our study did not reveal any approaches that refer to the resource-based view directly.

Cardeal et al., proposed to conduct a double-stage assessment similar to that in Figure 2. This enables a preselection on the basis of criteria derived from the resource-based view (RBV) as proposed by [5], which is followed by an assessment applying concrete methods, such as life cycle costing, life cycle assessment and social life cycle assessment [6]. This approach implements sustainability aspects in the second stage (detailed evaluation), but fails to integrate sustainable criteria in the preselection during the early steps of business model development in which data availability is low. Another approach that is also included in our previous literature review is that of Lüdeke-Freund et al. They merged the business model concept with a sustainability-balanced scorecard into their SUST-BMA framework, presenting a sustainability-oriented business model assessment which aims at evaluating an organization's sustainability on the level of the business model [7].

Even though all of the above-mentioned studies contribute to the development and/or evaluation of sustainable business models, none of the approaches meets all of the requirements we determined above. This raises the following two questions: *How can the sustainability of business models and design options be evaluated in the early phases of their development? In addition, how can this evaluation be carried out based on strategic management theory?*

3. Methods

3.1. Developing Criteria for a Strategic Evaluation of Business Models

For elaborating a set of criteria suitable for the evaluation of the strategic success potential of business models, it seems useful to use the existing body of knowledge of strategic management theory. This theory primarily refers to companies and not to business models; however, due to the close relationship between companies and business models, a transfer to business models seems to be possible. Strategic management theory provides different concepts for explaining the strategic success of companies, especially studies on success factors, the market-based view (MBV) (e.g., [17,40]), the resource-based view (RBV) (e.g., [41]) and some concepts specifying the RBV (e.g., [42]). Elements of these concepts are already occasionally mentioned in the business model literature [5,43].

The RBV is a strategic management approach with the goal of explaining the long-time success of companies on the basis of resources [44,45]. As resources in the context of RBV are analyzed regarding their ability to create competitive advantage, they are understood in a broader sense in this context, comprising not only production factors, but also competences and abilities resulting from these factors [46]. According to the VRIO-framework by Barney, four questions can guide the analysis and evaluation of the strategic value of resources with regard to competitive advantage [41]:

- **V**alue: Is a company able to react to environmental opportunities/threats with the assistance of its resources?
- **R**arity: Do only a few companies have the control over a resource?
- **I**mitability: Does a company face a disadvantage by obtaining a resource it does not have but competitors have?
- **O**rganization: Is a company organized in a way that enables exploiting the potential of its resources and capabilities?

Largely corresponding with these questions, resources should fulfil four criteria for enabling competitive advantage and above-average profit ([5,42] based on [41,44]):

- Eligibility of providing customer benefits/value;
- Heterogeneity;
- Permanence;
- Eligibility to generate profit.

Additionally, the criteria of heterogeneity and permanence are concretized by sub-criteria, such as immobility, specificity and scarcity (for heterogeneity) and non-transferability, non-imitability, non-substitutability and long duration of usability (for permanence) [42]. In the strategic management literature, these (or similar) criteria are considered adequate for analyzing and evaluating the resource-based potential of a company for long-term success (e.g., [41,44]). To consider the potential of a competitive advantage through the technological superiority of the business model or business model elements as well, this is added as a sub-criterion of heterogeneity. Due to the aforementioned close relationship between companies and business models, they can and should be used as criteria for a strategic evaluation of business models, as already suggested by [5].

However, the market attractiveness is an essential determinant of business models' success as well [16]. Wirtz proposed to use Porter's five forces (new entrants, substitutes, bargaining power of suppliers, bargaining power of customers and competitive rivalry [17,40]) as one instrument to examine parts of business models [16]. This idea is used here by complementing the criteria from the RBV with the criterion of market attractiveness, and including the five forces as sub-criteria determining market attractiveness. In addition to these five sub-criteria, the market potential is added as a sub-criterion due to its high impact on a business model's potential.

3.2. Including Sustainability Aspects within the Strategic Evaluation Criteria

The theoretical concepts used (RBV, MBV, BMC) are originally focused on an economic analysis and, therefore, the evaluation criteria too. Thus, the identified evaluation criteria need to be analyzed in more detail to identify potential modifications and extensions necessary for addressing sustainability aspects. Therefore, in some cases, we recommend enhancing the criteria or building additional criteria. This seems to be necessary as the number of actors to be considered increases; not only customers, but also the society as well as the environment are relevant stakeholders while integrating sustainability [22]. Additionally, not only cost structure and revenue streams but also environmental and societal burdens and benefits have to be included. In other cases, the criteria should remain the same; only on a more detailed level might their interpretation or measurement change. In some cases, it could be unnecessary to include additional sustainability aspects.

As the BMC presented in Figure 4 focuses on output stakeholders instead of only customers to include the three elements of sustainability, the RBV criterion of eligibility to

provide customers' benefits is changed to eligibility to provide stakeholders' benefits. As a result, it includes benefits for customers but also for the environment and the whole society.

For market attractiveness as a criterion associated with the *customer interface* area, enhancement of this criterion and its sub-criteria does not seem to be essential. Depending on the business model under consideration, e.g., product substitutes can be analyzed from a sustainability point of view without adding new criteria. As an example, Porter focuses particularly on substitutes (products with the same function), which restrict the profit potential of a company/branch [40]. Additionally, substitutes could be analyzed in terms of their ecological or social potential or image compared to the product of the business model to be evaluated. Additionally, the existence of ecological and social values of customers can increase the diversity of customer demand, resulting in a variety of different groups of customers offering means for attaining quasi-monopolistic positions by focusing on the needs of one or some of them.

Regarding the *infrastructure management* area, criteria should be interpreted more broadly. If, for example, the sub-criterion of permanence "duration of usability" is analyzed, not only the economic lifetime but also social as well as ecological consequences should be examined—for example, the ecological lifetime of material influenced, amongst others, by recycling opportunities of the resources. Regarding the "non-substitutability" and "non-imitability" of resources, not only economic aspects, such as prohibitive costs, but also ecological and social barriers, such as ecological and social burdens caused by possibly substituting resources, could be relevant. The technological superiority, however, is seen as an aspect beside the three dimensions of sustainability in terms of enabling sustainability benefits through technological innovations.

Analogously to the criterion of eligibility to provide customers' benefits, the criterion of eligibility to generate profit reflecting the economic consequences of the other business model areas needs to be enhanced with regard to sustainability. Thus, regarding the three pillars of sustainability, it is suggested to tripartite the criterion to enable a social, ecological and economic analysis of the value creation instead of only considering the financial consequences. Hence, the area of financial aspects that is evaluated by this criterion is changed into *sustainability results* and evaluated by the criterion of eligibility to generate sustainability-oriented value (with separation into economic, ecological and social value).

4. Results

4.1. Resulting List of Criteria for Strategic Evaluation of Business Models

The resulting list of criteria and sub-criteria suggested here for the strategic evaluation of business models is shown in Figure 5. In order to enable a systematic alignment of strategic evaluation and business model development, especially further systematic development of business models based on evaluation results, these criteria are matched with the elements of a BMC. Figure 5 shows the following:

- The eligibility to provide customers benefits is reflected by the value proposition;
- Market attractiveness refers to the customer interface elements (customer relationships, channels and customer segments);
- The heterogeneity and the permanence of resources are the results of the infrastructure management (and its elements key partners, key activities and key resources);
- The eligibility to generate profit is considered by financial aspects (cost structure, revenue streams).

In conclusion, there is a quite close and clear connection between the evaluation criteria and the elements of business models to be developed, and all elements are reflected in the set of evaluation criteria. However, one of Porter's five forces is the bargaining power of suppliers, and therefore, part of the market attractiveness sub-criteria, which refers to the customer interface area. Nevertheless, in the BMC, suppliers are regarded as one of the key partners (in the sector of infrastructure management). As reasonable and non-debatable allocation to one of the areas is not possible, nor to the evaluation criteria, it is suggested to

consider suppliers in only one of the areas to avoid a double analysis and counting—e.g., as part of market attractiveness, as shown in Figure 5.

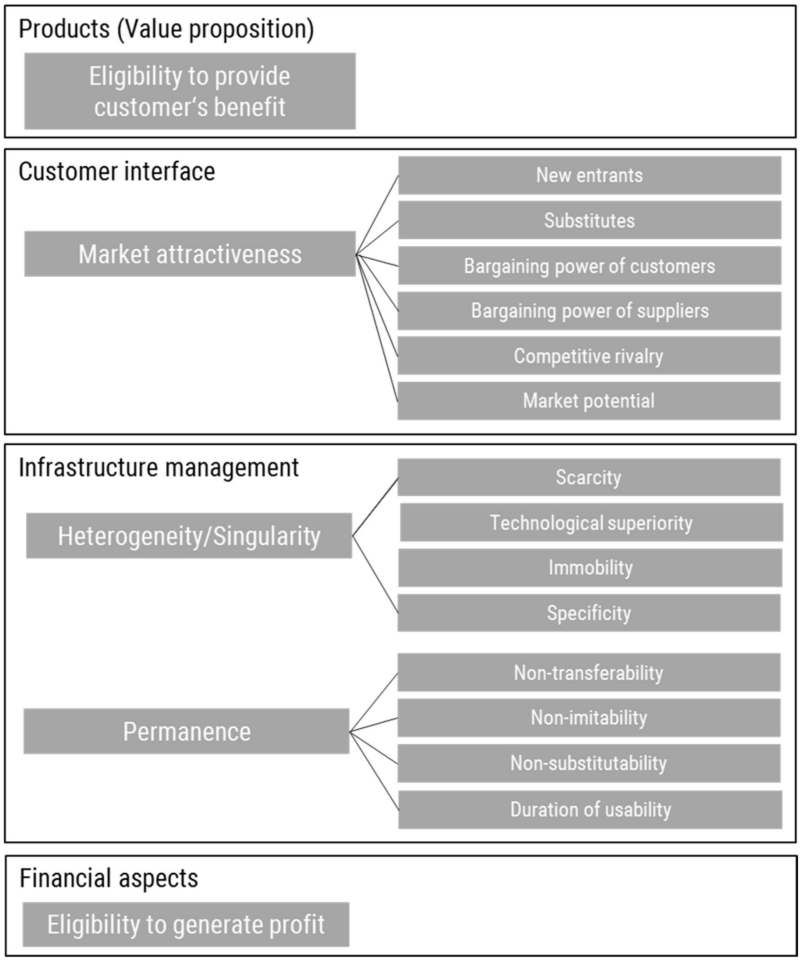

Figure 5. Criteria for a strategic evaluation of business models (based on [5,14,15,17,42]).

In summary, a generally applicable criteria catalogue for the evaluation of the strategic success potential of business models has been built here based on strategic management theory, thereby contributing to linking strategic management and business model theory and enriching the instruments of developing and evaluating innovative business models. However, this catalogue does not explicitly refer to sustainability and therefore has to be extended in that respect in the next step.

4.2. Resulting List of Sustainability-Related Criteria for Strategic Evaluation of Business Models

Figure 6 shows the modified set of criteria that is suggested for the sustainability-oriented strategic evaluation of business models based on the above findings.

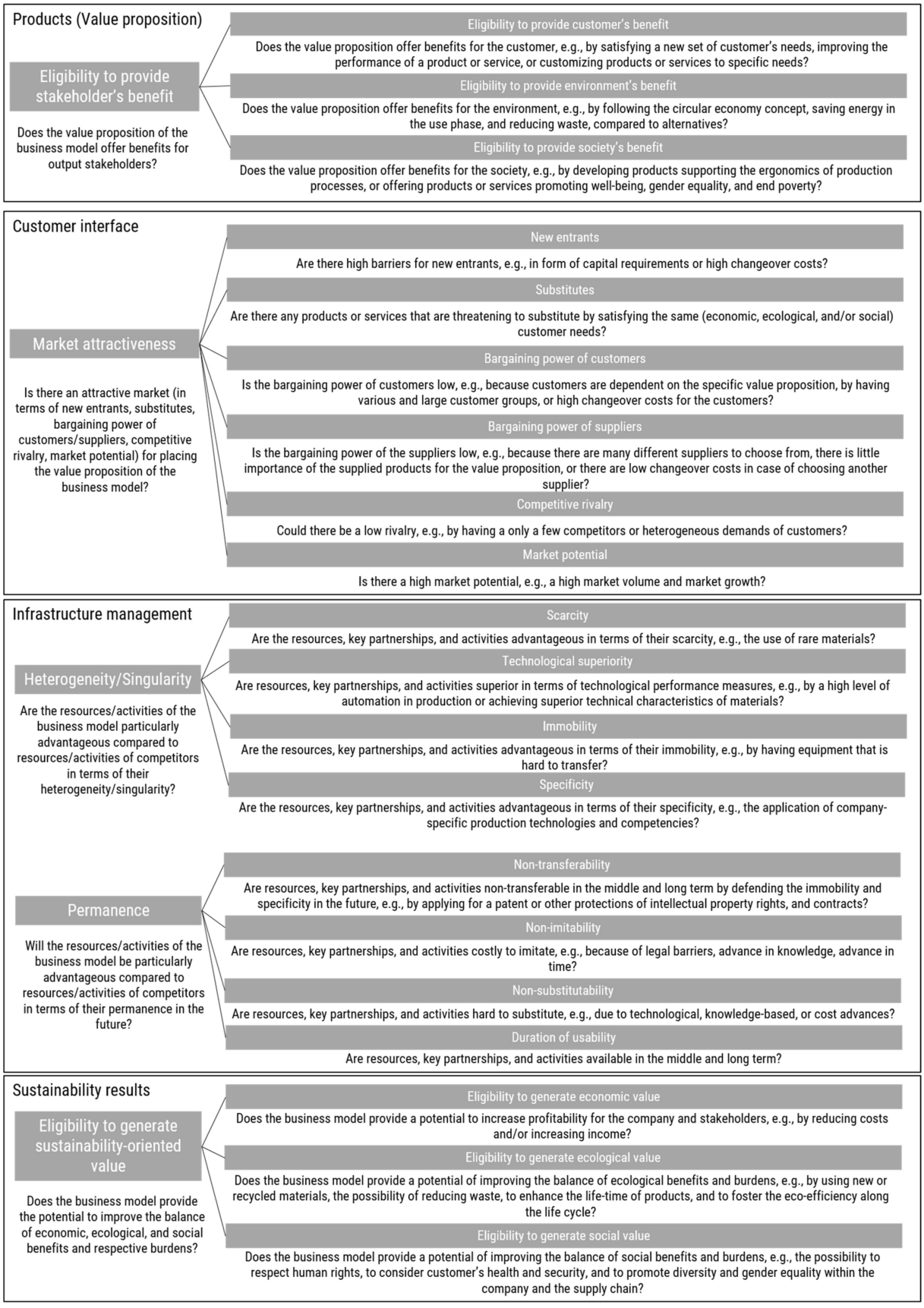

Figure 6. Criteria for the sustainability-oriented strategic evaluation of business models based on [5,6,14,15,17,40–42,47].

To enable the use of the criteria presented above, specific questions were formulated (see Figure 6). These can be answered among others with the assistance of experts or based on research that is specific for each criterion (in the literature, statistics, market analysis . . .). In that way, criteria are illustrated, exemplified and thereby operationalized on a strategic level. It is assumed that answers and argumentative analyses based on the questions given in Figure 6 allow the derivation of evaluation results to be measured on an ordinal or cardinal scale, even when data availability is rather low. Such measurements seem to be sufficient in the early phases when developing sustainable business models, considering that the purpose of the evaluation results is to reject unfavorable business model ideas, design options and/or indicate directions for the further development of a business model concept. In that way, a first, preliminary evaluation on a strategic level is feasible. Furthermore, case-specific adjustments and the addition of questions to determine the outcome of each criterion are possible.

The criteria should be perused in the given order by answering the questions for the business model idea. In case a strong need for improvement is detected regarding one or more criteria, the user of this method should—besides identifying potential for improvement—consider referring to an exit strategy and end the development of the business model idea.

5. Discussion

The method presented in Section 4 enables the strategic evaluation of business models in the early stages of the business model development process. However, mainly the following challenges are expected to arise during the application of the method: the restricted availability of data and the systematic usage of results.

The first aspect refers to the data collection needed for the assessment. The assessment is conducted during the early phases of the business model development process. This leads to uncertainty of the collected data as, for example, predicted data for the following years are based on various assumptions. One implication is the need for adequate forecasting techniques; in particular, the scenario method can be applied here to show some possible future developments of relevant factors. Sensitivity analyses seem to be another solution to deal with uncertainty as different input parameters can be varied to simulate the consequences of them on the target value. Alternatively, target values can be determined to analyze the necessary outcomes of input parameters [48].

The second challenge refers to the systematic usage of results. The results of the applied method should support the decision making during the early phases of the business model development process. However, it has to be discussed how to interpret the single outcomes of the criteria and how to derive conclusions for business model development, especially if assessing one or more criteria as negative (e.g., see the criterion bargaining power of suppliers in the case of Section 4). Here, it is recommended to consider the four business model areas (infrastructure management, product, customer interface and sustainability results) with their associated criteria to assess each area separately. As a result, areas of the business model that need improvement can be specifically identified. If, for example, the non-transferability of resources or activities is assessed to be weak, it might be possible to apply for a patent to protect intellectual property. In case of a high bargaining power of suppliers, it could be analyzed whether own production of supplied parts would be better than to rely on suppliers (make-or-buy decision).

As a suggestion for application of the method, we selected the order of the criteria according to their relevance and implications for the decision maker—e.g., the value proposition should be considered first (by evaluating it with the help of the criteria), as it is the core of a business model. Then, the decision maker needs to decide individually if the assessment as well as the business model development should be terminated or pursued, i.e., developed further on the basis of the evaluation results. This decision can be made by considering the results of the criteria separately. Alternatively, aggregation methods can be used to support the interpretation of the results. Generally, two levels of

aggregation need to be considered: First, outcomes of the sub-criteria (e.g., eligibility to provide benefits to customers, the environment and society) can be aggregated into an area-specific value (e.g., stakeholders' benefit or sustainability value) each. Second, the results of the five criteria groups (eligibility to provide stakeholders benefits, market attractiveness, heterogeneity/singularity, permanence, eligibility to generate sustainability-oriented value) may be aggregated to an overall value. Therefore, basic methods of multi-attribute decision making (MADM) [48,49], such as utility value analysis or analytical hierarchy process (AHP), could be used, depending on the availability of data/information. However, these methods require independence of the criteria [48], which is not given for all criteria (e.g., the sub-criteria of the infrastructure domain). Additionally, the availability of data could be too low to apply methods of MADM. Additionally, graphical methods, such as the ternary diagram [50], are methods to conduct an integrated strategic assessment of the business model idea(s), including all dimensions of sustainability.

In addition to these challenges, it should be discussed whether the application of the method itself is profitable. Of course, application of the method requires effort (e.g., in form of the time used by the persons applying the method). However, it also promises considerable benefits, as an assessment of business model ideas in the early phases of the development process enables an early exertion of influence on the development process. Additionally, target values for the management of further development of the business models can be determined, including sensitivity analyses with critical values as suggested in the second paragraph of this chapter.

6. Conclusions

This paper contributes to the strategic management, business model and corporate sustainability theory by developing a method for sustainability-related strategic business model (idea) evaluation in the early phases. First, different approaches of strategic management theory (RBV and MBV) were applied and combined with business model theory methods (BMC, business model development process), thereby linking both theoretical fields and enriching their instruments. The RBV-oriented criteria (eligibility to provide customer benefit, permanence, heterogeneity/singularity and eligibility to provide profit) were used as the basis for the evaluation of business model idea(s) (as conducted by [5] to preselect business model idea(s)). As these criteria focus on the competitive advantages of companies achieved by their resources, criteria regarding the external environment of the company (especially the market) were supplemented based on MBV-oriented approaches. Second, the criteria catalogue was extended with sustainability-oriented aspects. Thus, the criteria were enhanced and/or defined more broadly (e.g., eligibility to provide stakeholder benefit instead of customer benefit) to enable a sustainability-related evaluation. The resulting criteria are eligibility to create stakeholder's benefit, market attractiveness, heterogeneity/singularity, permanence and eligibility to generate sustainability-oriented value. We also developed supporting questions for each criterion and sub-criterion to enable an accessible, user-friendly evaluation.

To apply the presented method in organizations, a first idea of the business model should already be drafted so that the criteria defined above can be assessed. To facilitate answering the questions for each criterion, the assistance of experts may be helpful, as well as statistics and analyses. Resulting in 20 single evaluations, the overall impression of the business model is important. In cases when the positive effects seem to outweigh the negative consequences arising from the realization of the business model, the business model should be developed further and evaluated in a more detailed way. In this process, it is vital to consider the effects of each decision on the sustainability dimensions in order to create a sustainable business model.

Further research should concentrate on validating and refining the method (e.g., identification and further development of evaluation methods for each criterion under consideration) in accordance with its application. Additionally, methods to perform sustainability-oriented detailed evaluations of business models at later stages of the business development

process should be identified, structured and developed further, especially the issue of aggregating three single economic, ecological and social values. Finally, the interplay between business evaluation and development activities should be investigated in more detail.

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