Improving Business Model Configuration through a Question-based Approach

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Abstract. In the competitive context of agile innovation cycles, it is necessary for companies to construct their business model leading them to a creative strategy innovation. There already are a number of methods to create business models, many of which are also implemented in software. However, these are often unstructured, unguided and static, resulting in diverse and heterogeneous business models. This complicates automated evaluation allowing recommendations. The aim is to develop a question-based tool yielding for comparable and, thus, analyzable business models based on a developed standardized taxonomy. The questions guiding through the configurator were derived from this taxonomy. A tool was developed implementing the question-based concept. User tests were conducted as part of an evaluation showing promising results concerning usability in addition to the already achieved standardization.

Keywords: business model, business model configuration, business model innovation, tool development, question-based design

1 Introduction

1.1 Motivation

Today's development in digitalization and fast innovation shows the necessity for companies to remain profitable and competitive [1]. The constraint to keep up with change pressures companies to rush transformation without really knowing where to begin [2–4]. One significant trend to achieve durable success in the market is to utilize business models as a navigation instrument towards increased profits or finding their niche in the market [5]. They indirectly define the strategy being realized in an organization [6].This explains the necessity of a consulting-based support besides conventional consulting services.

Hence, a faster and simpler way to promote innovation in a complex, uncertain and dynamic environment needs to be available [7, 8]. By describing an organization in a

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clearly arranged way, business models display weaknesses and potentials [9]. However, even with newly emerging business modelling tools, the construction process can still be considered a self-service, where companies utilize implicit knowledge to depict their organization [10]. The common online business model configurator comprises business model canvases and removable and exchangeable sticky notes [11, 12]. Therein lies the difficulty of business model configuration. Lacking any degree of moderation, users are left to device elements of their own. A question-based instruction of modelling a business can give users momentum to ponder their strategic direction without any refactored domain knowledge and take advantage of already available explicit knowledge [10, 13].

1.2 Objective

The research objective is to improve already existing modelling methods by using a question-based approach to guide the user more efficiently and effectively through the configuration process.

Our central artifact is an online-based business model configurator which should enable companies to describe their business model as completely as possible and on a high enough level to create a certain degree of standardization. For this, the construction can be based on a general process framework reducing the effort for the user. Focus of this paper is not to describe how the developed tool works in detail, but much rather the improvement of business model configuration. Based on a developed questionnaire, the user can fill out their business model by providing input through answering questions [14]. The aspects stem from a generic, high-level business model framework. If companies want to further expand their model, they can add items, which can durably be included in the configurator. The configurator's implementation allows technologies to be matched to certain business model aspects. Ultimately, interdependencies can be detected when a significant number of users is reached.

The question-based configurator should be easy to use and aim at enabling an intuitive, flexible and guided business modelling with a low error ratio. This offers an effective and standardized solution considering more aspects than would be possible if the practitioners fill out an unguided business model canvas. It also has to support the efficient and effective construction of an informative business model with minimal effort. It also enables companies to understand, map and share the business logic [8].

1.3 Methodology & Structure

The derivation of the question-based business model configuration is based on the design science approach [15]. Iterative steps help reevaluate and validate findings at any point during the construction phase [15]. After a research review of business models and existing business modelling tools, the business model framework will be explained, which is based on an extensive literature analysis, which ultimately poses the foundation for the questionnaire [16]. It will utilize the building block system according to the business model canvas from Osterwalder et.al. [5, 8]. As a result, a software product is conceived in form of a business modeling tool [17]. The evaluation

is conducted with unrelated test subjects to validate the effectiveness and efficiency of the configurator over an unguided paper-based canvas and post-it approach.

The paper itself is structured as followed: in chapter 2, a general research review of business models and existing modelling tools is given. In section 3, the business model framework and the questionnaire are constructed followed by the proof-of-concept in section 4. Chapter 5 depicts the evaluation and section 6 concludes the paper and gives implications on further research and developments.

2 Related Work

2.1 Business Model

Business models essentially describe how organizations function [18]. They reproduce a generic strategy as a mapped-out list of aspects the organization focuses on in order to remain successful. A digital business organization should be reviewed continuously to ensure its consistency concerning effectivity and efficiency [4]. Thus, a business model is a simplified structured image of reality and consists of connections and elements with characteristics and relations [19, 20]. However, different component compilations exist due to the lack of a uniform understanding of which elements constitute a business model and business models themselves. Depending on the objectives an organization has, the number of potential business models is endless [21]. Therefore, a standardized taxonomy needs to be developed.

As part of a continuous business model improvement, influencing factors such as political, economic, social, technological, legal or ecological changes have to be considered [22]. This enables business model innovation by consciously altering the already existing business model [23]. Hence, a flexible and adaptable way of assembling a business model has to be used to continuously work and improve it. One example of such a tool is the business model canvas by Osterwalder [5].

2.2 Business Modelling Tools

Besides the most frequently used business model canvas [5, 24], a number of other canvas-based business modelling tools can be found online [25]. These tools focus on the visualization of business models, closely resembling the business model canvas, but non-offer any support during the configuration.

As an example of a not question-lead canvas-based configurator, the Canvanizer [11] does not provide any support. It is a static tool to textually describe the user's business model, basically digitalizing the otherwise paper-based canvas approach. The only reference to the required input comes from the title of the building block as determined by Osterwalder [5], but it does not lead through the configuration process.

The only identified semi question-lead canvas-based configurator is the Start-Green [12] sustainable business model configurator. For each building block, different key questions are specified. However, the questions have a strong reference to sustainability aspects, instructing the user to describe their company textually on a very high and

abstract level. The user is given the option to declare a question irrelevant and further explanations are provided through keyword examples. Nonetheless, no answers are available towards which the user can be oriented. This prevents standardization and leads to fewer considered aspects then otherwise possible.

3 Concept Development

In the previously mentioned tool survey [25], the business model canvas is the basis of most of the identified construction tools. Since this is also the tool most users are familiar with, it seems appropriate to also base the tool to be introduced in this paper on the business model canvas by Osterwalder. In order to facilitate a certain degree of standardization of the resulting business models, a taxonomy of possible aspects constituting the business model has to be created. Building on an extensive literature analysis, aspects subdividing Osterwalder's building blocks were created, forming an incomplete and not disjoint taxonomy as can be seen in table 1.

Table 1. Extract from the business model taxonomy

Building Blocks	Aspect	Items
Source of Income	Distribution Type	Sales
		Royalties
		License Model
		Leasing, Rental
		…
	Revenue Stream	Core Business
		Diversification
		Large Product Portfolio
	Payment Terms	…
	…	

This is necessary, since the criterion of completeness is unachievable and a termination has to be made after a certain hierarchy level. The aim is to allow users to extent the taxonomy depending on their own requirements, ultimately also lowering the frustration because researchers have not considered all potential responses [26]. Eventually, these aspects will be durably considered in the taxonomy after a certain threshold is crossed. A questionnaire is a formalized set of unambiguous questions translating the researcher's information need to questions, in order to obtain information from applicants [27]. By offering specific response options through a drop-down box, the collection of standardized data is possible. Subsequently, this data can be compared and analyzed. It also enables a faster and more accurate recording of the data. The target is to enable the user to configure their company's business model in its entirety. Hence, the questions themselves and the questionnaire's structure are predefined by the underlying business model taxonomy. The questions are worded around the aspects using natural language to convey further information to the user.

Most questions follow the multiple-choice structure, covering a full range of possible mutually exclusive and collectively exhaustive alternatives. This also eliminates the wording problem, since it is aligned with the taxonomy and the provided answers.

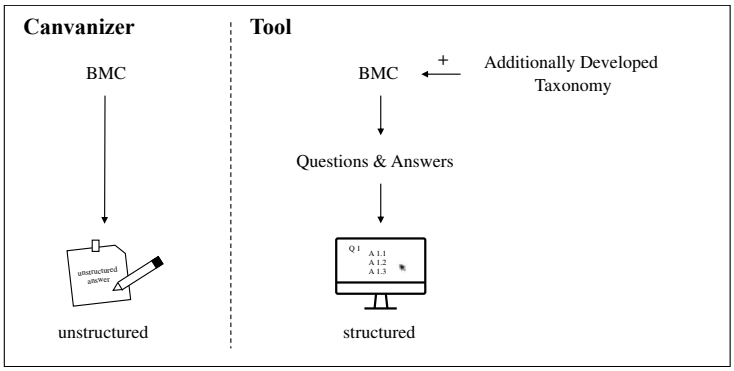

Figure 1. Schematic diagram of the approach

Each selected item is linked to a free text box where they can further explain their selection. For these boxes, information is provided describing the kind of information which can be added in each respective box. This data will only be collected to display in the user's final business model. Since the users are either part of a company's strategy team or, in case of a SME, know the company as a whole, it is ensured that the person using the configurator can actually provide the requested information [28, 29].

Through the question-based approach, refactored domain knowledge is not necessary. By providing answers and giving the option to further expand or explain their selection, the user is also encouraged to be creative and explore different possibilities in the sense of giving more answers than otherwise possible and inspire business model innovation. Whereas, in non-question-based approaches, the level of detail of the resulting business model solely relies on the creativity and experience of the user as can be seen in figure 1. Also, standardization is created allowing the resulting models to be compared and analyzed.

4 Tool Implementation

Based on the conceptualization, an exemplary software prototype was developed that implements the requirements defined in the previous sections. It is built as a modular system as shown in figure 2. The chosen web-based architecture was determined by the framework conditions of the project, the tool is part of. The system consists of two separate user interfaces and a backend. One of the user interfaces offers administrative functionalities. This includes the definition of the business model taxonomy and the creation of the question sequences, the definition of answers to the respective questions and the matching of questions and answers to aspects of the developed business model taxonomy. To do that, the administrator can choose from aspects of the taxonomy or chose his own naming, that can also be linked to a free text field. The question type,

i.e. whether only one, multiple or a specific number of answers to a question can be selected.

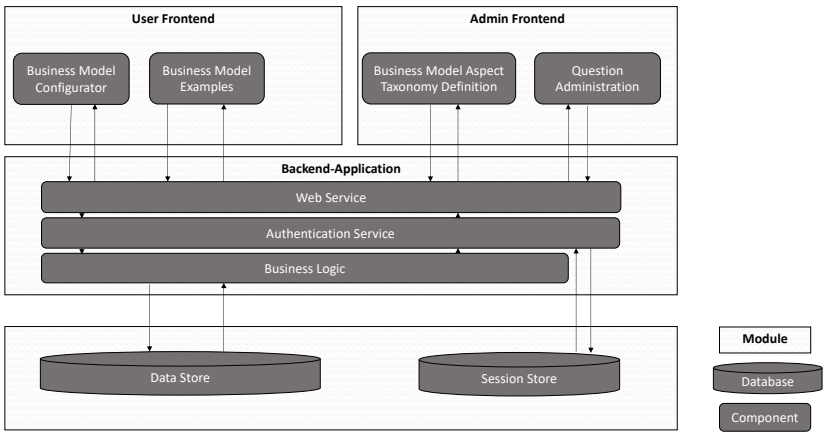

Figure 2. Architecture of the implemented tool

The other UI targets the end user. A user can create, edit and delete business models that are based on the business model canvas. When creating a new business model, the user is first guided through the canvas with the task of answering a number of questions per canvas element. Figure 3 shows an example of such a question as well as the interaction mode via selectable checkboxes and the navigation. Researchers rarely spend sufficient time on the physical layout of their questionnaire, believing that the science lies in the content of the questions and not in such details as the font size or color. Yet empirical studies have repeatedly shown that low response rates are often due to participants being unable to read or follow the questionnaire [28,29].

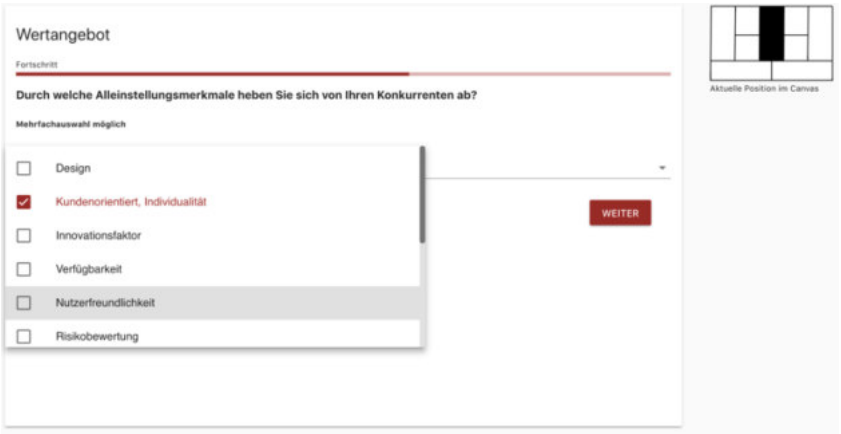

Figure 3. Screenshot of the developed tool's question approach

These aspects are considered in the developed tool, which uses only a small number of UI elements and only a primary and a secondary color. The current position within the canvas as well as the current progress is continuously shown to the user. Navigating between the building blocks of the canvas is also possible. Apart from the actual questions and answers, the aspects are explained using examples. Once the user has answered the questions, the resulting business model is shown in a canvas view.

Figure 4 shows an excerpt of the questions used in the configurator together with their corresponding headline, which are based on the aspects. Answers to the questions are the taxonomy aspects on the lowest hierarchy level.

Building Block	Headline	Question	Type
Customer segment	Market	In which market do you offer your products and services?	Single
	Business relation	With whom does your company maintain business relations?	Multiple choice
	Customer region	Where are your customers settled?	Single
	Industry sector	Which industry sectors do your customers belong to?	Multiple choice
Value Proposition	Products	What kind of products do you offer your customers?	Multiple choice
	Service	What kind of services do you offer your customers?	Multiple choice
	Corporate Responsibility	Through which aspects do you display your sense of responsibility?	Multiple choice
	USP	Through which unique selling proposition do you differentiate yourself from your competitors?	Multiple choice

Figure 4. Excerpt of the developed question catalogue.

This view allows to navigate through the building blocks of the canvas to specify and edit aspects of the created business model with free text elements being offered as shown in figure 5. In this view the user can also decide to revisit some of the questions individually or answer all questions of a building block again. The overview also offers this opportunity and allows the user to download and print the resulting canvas. Since the configurator collects sensitive data, trust in the security of their data needs to be established. This is achieved by implementing a secure login, a session-based authentication and the data being stored in an on-site hosted database. Security aspects are implemented in the backend application. All requests are directed to a web-service that calls an authentication middleware. Valid requests are forwarded to the business logic, which queries a database storing the user specific business model data or if an administrator request arrives taxonomy and question definition data.

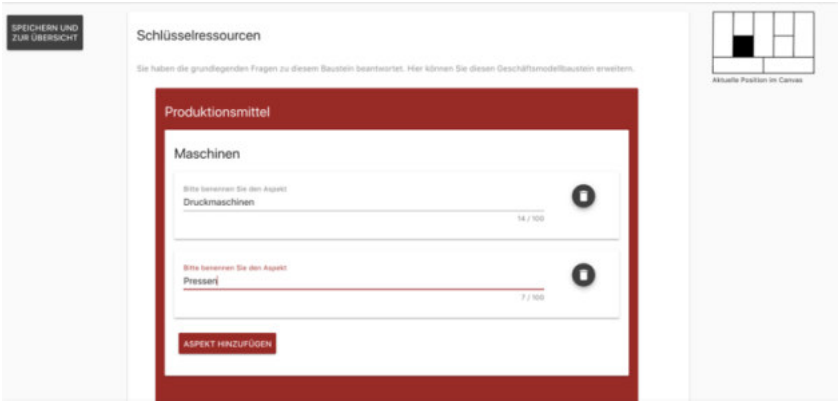

Figure 5. Screenshot of the developed tool's aspect view

5 Evaluation

5.1 Evaluation Approach

The developed concept and its implementation can be evaluated in various ways. However, a content-based evaluation of the resulting business models is difficult to carry out within the limited time. An evaluation aimed at the comparability of the results could be done with an ontology mapping. However, since the approach developed in this paper is based on a taxonomy, it can be expected in advance that an object of comparison will perform worse in matters of comparability and standardization.

Therefore, the effectiveness of the developed concept will be demonstrated in a case study aiming at the usability evaluation of the implemented prototype. The study design was as follows: a user test was conducted with the following hypothesis: the developed question-based tool is more usable in terms of the NASA TLX score, than non-question-based tools. In the experiment, the system serves as the independent variable with two levels: the implemented prototype, using the concept proposed in this paper and the Canvanizer introduced before, which is representative for non-question-based business model configuration. A semi-question-based tool was not considered, since only one could be found and the target was to evaluate the difference in usability compared to a question-based approach. The dependent variable is the previously mentioned NASA TLX score [32], resulting from an established questionnaire for evaluating mental demand, physical demand, temporal demand, performance, effort and frustration when interacting with a system to accomplish a task. The experiment task consists of the creation of a business model for a well-known company whose name and details are handed to the participants at the beginning of the experiment. Based on the knowledge of said company, the participant is asked to create a business model with the respective tool. As the task of creating a business model is complex, a between-subject approach was used, where each participant is assigned a group. Each group operates on one of the tools. This avoids learning effects or fatigue effects.

Each group had a size of ten participants, each participant was asked to construct a business model on their own. The participants had a general business background. This supports the assumption that the configurator can also be used by people who have no strategic or entrepreneurial prior knowledge. First, the participant was given a short introduction into the concept of business models and was told the company the business model should be created for. After they had finished their task, they were asked to fill out the NASA TLX questionnaire, which asks for the assignment of subjective weights to several evaluation criteria. Finally, they were asked several questions about the system they used.

5.2 Results

The participants were asked to fill out the NASA TXL questionnaire including pairwise comparisons of the evaluation criteria, yielding weighted scores as well as raw scores.

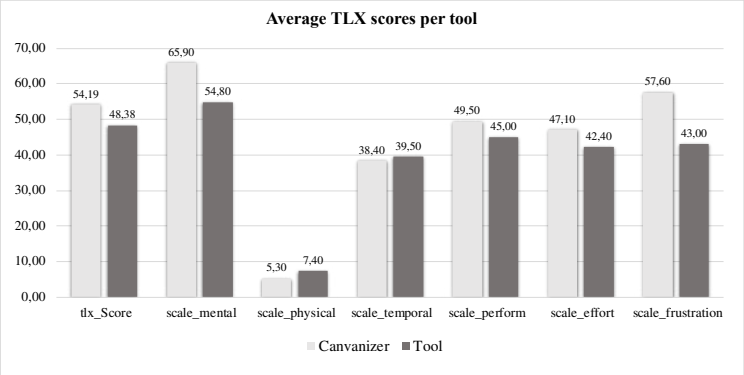

Figure 6. Average TLX scores per tool

Figure 6 shows the average global TLX score and the average scores of the individual criteria per tool. On a scale from 0 to 100, where 100 is the worst possible score. The raw scores are well-suited to evaluate the individual criteria per and across participants to identify general defects. The weighted scores emphasize, which aspects are of central importance for the participant and reveal which criteria contributed most to their workload, when executing the task. Each participant compares the six criteria in pairs. The number of times a criterion is selected represents the weight, which is multiplied by the corresponding raw score and then divided by 15, to get the weighted score. The weighted scores show how much significance the participants assigned to the influence of the criteria to the workload when performing their task.

5.3 Discussion

The results indicate that the participants consider the question-based tool to be significantly less frustrating to use. The improvement compared to the non-question-based tool is clear in the raw scores, but even clearer when the criteria are weighted. The deviations found in the average score were validated and emphasized by the weighted values, because users creating the business model with the non-question-based tool have to ponder about the aspects they want to include. In contrast, the developed tool already gives hints to the expectation of what should be included in a particular building block. This allows for a more creative interaction with additional aspects of innovation. Moreover, the participants found the mental demand to be considerably lower when using the question-based tool, suggesting that the guidance of the user was successful.

Apart from that, the question-based tool performed better when looking at the global TLX score. Except for the mental demand all scores of the question-based tool are below 50 indicating that those criteria are met. Even though on average, the participants, that used our tool, took 33% longer to complete their task, the estimation of temporal effort is only slightly higher. This suggests, that the use of the tool is perceived as engaging by the users.

6 Conclusion & Outlook

The developed tool is a flexible, intuitive and question-based alternative for a standardized business model development, ultimately supporting innovation through an overview-based display of highly comparable business models. It offers an effortless and user-friendly tool for an effective, efficient and guided business model configuration with low error ratio. The resulting business models are homogeneous in terms of detail. This is the case down to a certain hierarchy level, when the taxonomy is terminated for standardization reasons and because completeness cannot be achieved. Evaluation results have shown, that the mental demand is significantly lower in the developed tool than the Canvanizer, implying a success in the developers' effort to make to tool more user friendly. Test subjects stated, that aspects were offered which the user would not have considered otherwise and expressed their content with the instructions and the resulting business models. Furthermore, the evaluation showed, that the perceived time needed to complete the business model was only marginally higher while the perceived frustration level was significantly lower. In long-term empirical studies it should be tested, whether the derived questions serve their purpose. Furthermore, the taxonomy needs to be validated and reevaluated, since the matching of individual aspects to categories could not be deduced from the literature analysis.

Available business modelling tools omit background domain knowledge, neglecting the users' need for a guided model configuration. Hence, important interdependencies between business model elements indicating weaknesses and threats are not revealed. This jeopardizes the exploitation of an organization's total strategic potential.

As can be derived from the average TLX scores, the developed tool performs significantly better than a non-question-based tool. However, the evaluated criteria can be improved even further. The user interface can be adapted in order to guide the user through the configurator more time-efficiently – ultimately lowering the users' frustration even further.

The underlying **taxonomy** was derived under the premise of being flexible. Thus, the aspects added by the user under "other" will be considered in the taxonomy when crossing a certain threshold in relation to the total number of configured business models. Eventually, these aspects will be available for other users as well. Another possible future step could be to reconstruct the questions based on the gained knowledge through the **users' input**. When using the answers to expand the taxonomy's hierarchy levels, a more detailed representation emerges. Also taking the user profiles into account, the provided answer options for selected questions could be prefiltered depending on the answer of previous questions. When a sufficient number of business models is available in the tool, it will be possible to enable a graph-based analysis. By calculating a distance measure between business models and the companies' user profiles, their similarity can be determined. Hence, considering the companies' financials provided through the user profile, an anonymous **recommendation for suitable aspects** can be given – provided the compared organization is more successful than the active user's one.

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