

Systemic Business Modeling – A Pragmatic Tool Grounded in System Theory

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ABSTRACT

Designing and implementing a viable and sustainable business model is key for entrepreneurial activities. This challenge cannot be done in isolation. The design of a business model needs to be a systemic challenge, where the venture itself operates as a system with functions, structures, and hierarchies and is embedded in a meta-system of other market players, regulations, transactions and exchanges with own functions, structures, and hierarchies.

To master the challenges that come with these requirements, business model design needs to be systemically understood and implemented. For this paper, we analyzed the usage of existing models and developed a tool that supports systemic business model design. The tool combines the theories of the activity system and the network theory with current tools and methods for business model design and strategic planning.

Keywords: Business Model, Systemic, Business Model Design, System theory, Activity system.

1. INTRODUCTION

Businesses do not operate in a vacuum but are embedded in market or industry structures that influence their business operations directly or indirectly [1]. When designing a viable business model, ventures, therefore, need to be aware of their surrounding structures. Furthermore, they need to be aware of the dynamic elements of their business model and how these elements react to changes in the underlying industry structure.

We followed a Design Science approach to support business modeling using system theory and to create a new and purposeful artifact, the Systemic Business Model. It conquers the challenges of current business modeling tools by fostering the interdependence of its components. Design Science produces four types of artifacts, namely constructs, models, methods, and instantiations [2], and originated in engineering and the sciences of the artificial [3]. During all steps of the process, we complied with the research framework and guidelines for Design Science introduced by Hevner, March, Park, and Ram which are based on the principle that knowledge and understanding are derived from the building, application and, evaluation of an artifact [4].

2. THEORETICAL BACKGROUND

What is a system?

System theory is the interdisciplinary study of organizations with systems language and thinking. More specifically, it is a framework by which any group of objects that work in concept to produce results can be analyzed and/or described [5]. According to Ropohl, a system is the model of a part of reality that has (a) relationships between attributes (inputs, outputs, conditions, etc.) consisting of (b) interrelated parts or subsystems, and (c) their environment is delimited from a super-system. In this definition, the three concepts of a system are combined; (a) defines the function, (b) the structure and (c) the hierarchy of a system. When all three system aspects are described, a complete system model exists [6].

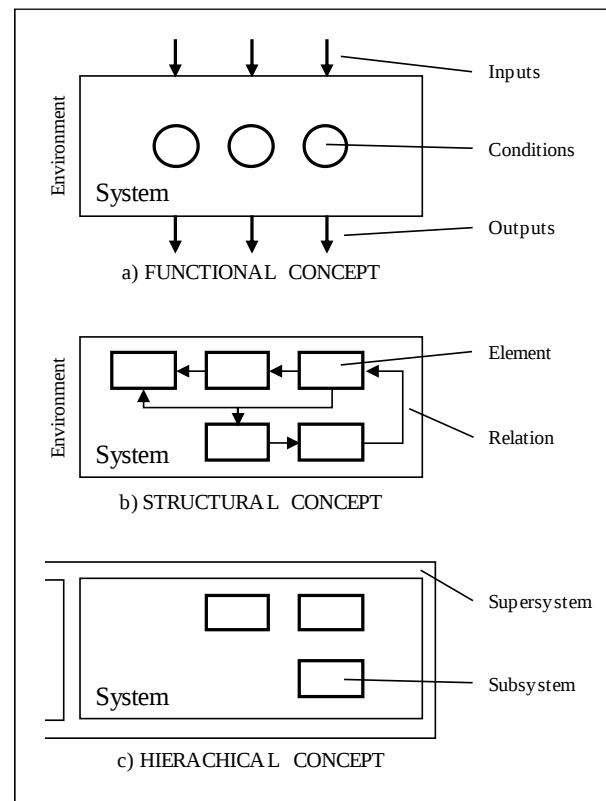


Figure 1: Concepts of System theory (Ropohl, 2009)

What is a Business Model?

Since the turn of the millennium researchers and practitioners have increasingly dealt with the topic of business models. In this context, numerous models and tools have been introduced to help users develop their business model in the most practical way possible. While definitions and descriptions in textual form were often suggested at the beginning of business model research, most tools used today use an abstract, component-based description that bundles certain aspects and characteristics of the business model into specific components. Despite the widespread use of certain tools, such as the Business Model Canvas by Osterwalder and Pigneur [7], to date, no uniform definition of the term 'business model' has prevailed [8,9].

Nevertheless, in literature and practice, an increasingly homogeneous understanding of the term itself and the purpose of a business model, the level of abstraction of corresponding tools and the classification or differentiation from the strategy concept is developing [9–11]. For example, it is now widely accepted and implicitly and explicitly recognized that the business model represents a new unit of analysis that differs from product, company or industry [10,11]. The concept is focused on a company, but the implications of the concept go beyond this considered company. Furthermore, many researchers acknowledge that business models usually explain not just how customer value is created, but also how it is delivered and captured [9,10].

According to Richardson, the business model explains how the company's activities collaborate in implementing its strategy, thereby bridging the formulation and implementation of the strategy [10,12]. Similarly, Shafer, Smith, and Linder, as well as Casadesus-Masanell and Ricart, describe the business model as a reflection of a company's strategy [13,14]. According to Osterwalder, Pigneur, and Tucci, the business model depicts the added value logic of a company with a holistic description of the company's activities in an aggregated form [15]. The business model is thus an instrument for the coherent implementation of a strategy [16], based on which operational implementation can take place within the framework of an organizational design or business process model. It can, therefore, be understood as a link between future planning (strategy) and operational implementation (business process management) [9,10].

The business model is thus increasingly understood as an abstract representation of a broad company perspective, which includes both an external, market and competitive view, as well as a process-related, internal view of the company. This more homogenous view of the concept of the business model is also reflected in the component-based view and respective definitions. Although there are still large differences between the individual components, for example, the number of included components ranges from four (Value Architecture, Value Finance, Value Proposition and Value Network) at Al-Debei and Avison [17] up to nine components (customer segments, value propositions, customer relationships, distribution channels, revenue systems, key resources, key activities, key partners and cost structure) at Osterwalder and Pigneur [7].

Nevertheless, the business model components in the literature are understood as interdependent elements [11]. Summarizing the findings of this growing, converging view, it seems that business model building blocks in most cases already emphasize a holistic approach at the system level and describe the structure and

hierarchy of a business model to explain how companies operate [10,11].

This idea of the business model is not only reflected in the structure and hierarchy of the components themselves. The underlying model principles also show a strong overlap with systemic thinking. For example, Al-Debei and Avison describe the business model as a coherent, granular, and versatile concept [17]. The business model thus describes a holistic view of a company, which describes not only the internal structure but also the connections of the enterprise to the external environment [17,18]. The granularity in this context means that the individual components can be broken down into finer dimensions and these into even finer elements. The versatile principle means, among other things, that a business model can model the logic of a company at different levels of abstraction, thus it can provide a multi-level view [17]. These three principles overlap directly with the structural and hierarchical concept of system theory, in which a system consists of interrelated elements and subsystems, which in turn can be subdivided into even finer sub-subsystems, and so on.

However, detailed analyses of how exactly these individual components are related are still lacking in the literature [11]. One attempt of such an analysis can be found at Wirtz [19]. This analysis, however, primarily deals with already existing business models, less on the new conception. As a result, the question of how changes in a component affect other components on the one hand and, consequently, the internal structure of business models on the other, needs further investigation. In other words, in order to be able to speak of a systemic field of vision, there is still a lack of knowledge about the functions of the sub-systems.

This is also one of the biggest problems of business model design in practice. The lack of understanding of the dependencies between business model components inevitably leads to insufficient knowledge about the valuation of business models. Many users go through the components of the chosen tool one by one and add elements as if it were a checklist [20]. The accompanying neglect of the dependencies between the individual components means that, above all, external influences, as well as the environment itself, are neglected. Particularly in the practical application of many tools in the context of business model design, the view of the users is again strongly limited to their own company and its internal processes.

Our tool, therefore, tries to integrate the external influences as well as the environment itself into the use of the tool in order to better understand the dynamic dependencies of the business model with its environment.

The firm as an Activity system

The strategic orientation of a company directly influences the activities of a company and thus also the design of the business model. With this direct interweaving of entrepreneurial actions and the business model, combined with the implicitly mentioned system properties of the business model, it is not surprising that some conceptualizations of both the business model and the strategy draw on or at least integrate the theory of activity systems [21]. According to Ropohl, an activity system is 'an empirical subject of acting, a system that acts.' [6]. He defines acting as transforming an input into an output, according to pre-set goals or conditions. Based on his definitions of the functional, structural and hierarchical system concepts, Ropohl develops a general model of an activity system which is characterized by

three subsystems: the goal setting system (GS), the information system (IS) and the execution system (ES). The GS defines the system's overall goals and defines in this sense what type of information the IS needs to collect. The IS does not only refer to the conventional information system (e.g. business or enterprise software). Rather, the IS absorbs and processes information from inside and outside the action system, from which it deduces instructions for the ES as well as the GS. The ES performs the basic work by obtaining material and energy-related attributes [6].

Figure 2 shows the model of an activity system according to Ropohl. This model indicates that the GS itself has no direct connection to the systems environment. It only communicates with it indirectly via the IS and ES. The idea behind this is, that these two subsystems act like a filter and protect the GS so that outsiders cannot perceive or influence the plans and intentions of the GS [22].

If we translate the terms GS, IS, and ES into the language of the business world, then the GS defines the medium to long term goals of the company. Furthermore, it sets out the basic rules for the design and implementation of the information system and thus also those of the execution system. In other words, it describes the information and execution logic that is necessary to achieve the company's goals. The GS thus spans the levels of the strategy and the business model. The IS collects and analyses all relevant information from within and outside the action system. The processed information is shared with the GS and the emerging knowledge is integrated into the business model. This, in turn, derives from this information the actions necessary to achieve the company's goals, meaning the design of the ES. The business model, therefore, serves as a roof under which the IS and the ES are harmonized with respect for coherence.

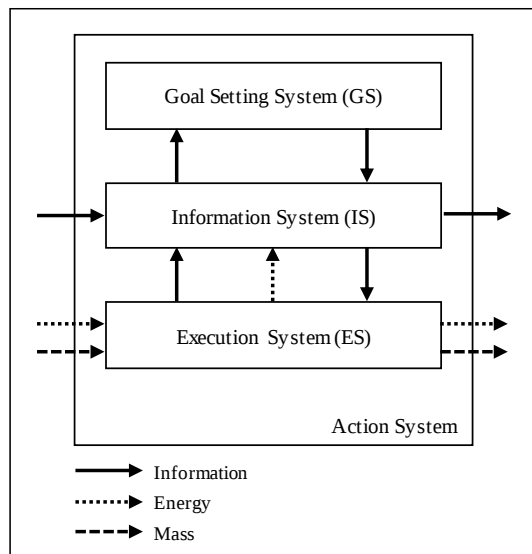


Figure 2: General model of an activity system [6]

3. THE SYSTEMIC BUSINESS MODEL IN THEORY

Following this idea, we divide the firm into the three subsystems proposed by Ropohl, focusing on the GS as the layer of main interest for our Systemic Business Model. Figure 3 shows this Systemic Business Model, its subsystems and components which will be described in the following. Regarding the chosen

components, we combined the results of several intense literature reviews on business model components [9,11,17,21,23] but added or renamed components where necessary.

Goal Setting System (GS)

The GS contains two levels of abstraction. The GS itself, within which the medium to long-term goals and activities of the company are defined. Additionally, we introduced three sub-subsystems that are focusing on the three areas of how value is created, delivered and captured. Consequently, we named them Value Creation System, Value Delivery System, and Value Capture System. Furthermore, the subsystem GS, as well as all three sub-subsystems contain elements, which we called components here, in compliance with the current business model definitions.

The single component of the GS is called *Management*. This component aligns the business vision, purpose or business mission, as well as the values of the companies or the founding team respectively, with the strategic objectives of the company. Within the *Management* component, firstly, the values of the organization are defined. This may seem abstract but, in most cases, each user of the business model tool has values when they start thinking about creating an organization. Their personal values may be independence or innovation or improving something. There are generic values that we share in our culture. For business people, honesty and initiative may be important values. Based on the values, the team can then create a vision from which the mission statement can be derived. From there, the strategic objectives can be articulated, and concrete goals defined, a sequence of how the team wants to fulfill their mission. And then finally, projects with concrete goals are created with figures, performance indicators, and milestones. The *Management* component, therefore, sets the ground rules of how the three sub-subsystems should be designed. As depicted in Figure 3, all relevant information for the GS from outside the activity system is collected and processed by the IS. This follows the idea of Ropohl, that the GS should not be in direct connection to the systems environment (see chapter 2).

Value Creation System: This sub-subsystem contains the arrangement of all activities and resources that are related to the technical architecture and organizational infrastructure of the company. All components of the Value Creation System are necessary to allow the provisioning of products and services that are received as valuable by the customer. The respective components are *Core Factory*, *Value Network*, *Core People*, *Core Assets* and *Core Supplier*.

The component *Core Factory* refers to the Latin origin of the word 'facere', which means making or doing. It thus contains the essential information about the internal key processes, be it business processes, manufacturing processes or development processes that are relevant for the creation of the products or services offered by the company. In the context of business, however, the level of complexity of these processes should be as low as possible so that every team member can easily understand them.

The components of *Core People* and *Core Assets* shall identify the success-critical competencies, tangible and intangible assets, and resources that are needed along the processes of the *Core Factory*. It is necessary to identify if these competencies and resources are already available or how they can be obtained. Furthermore, it is crucial to building competencies and resources

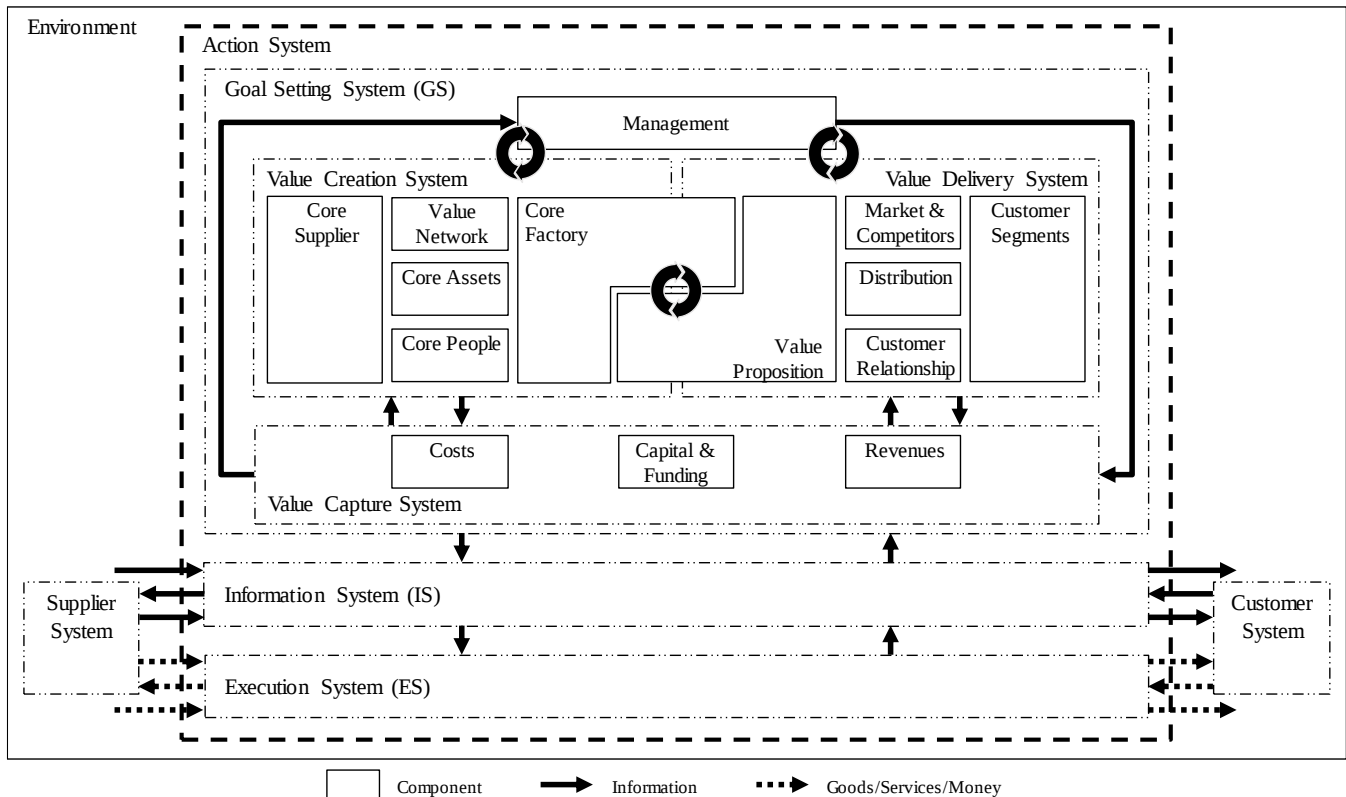


Figure 3: The Systemic Business Model

that can be protected against imitation and, therefore, ensure the competitiveness and sustainability of the business model.

Companies rarely work in isolation as this would limit their options for creating value. Instead, working in a network with suppliers and partners enables them to extend and improve their offer and allows the business to concentrate on its core competencies. To allocate the company's market position and detect its strength and weaknesses, we use the component *Value Network*. This component should give an overview of the different actors and their roles in the company's environment as well as depict the value exchange between these roles. This way, valuable roles and transactions in the network can be identified. Furthermore, this component dives deeper into the *Core Assets* and *Core People* components, analyzing which resources and competencies can be built internally or covered externally by outsourcing partners or complementaries.

The Value Creation System is indirectly connected to the environment of the activity system via sharing and receiving information with the IS. In this case, the IS directly interacts with the Supplier System and passes the collected and processed information on to the component of *Core Supplier* which focuses on the actual configuration of strategic alliances, forms of procurement, possible ways for co-opetition or joint-ventures as well as the buyer-supplier relation. While suppliers can be chosen based on objectives given by the GS, the suppliers itself are external entities not under the direct influence of the GS. As depicted in Figure 3, the Supplier System is therefore not part of the activity system but part of its environment.

Value Delivery System: This sub-subsystem deals with the delivery of the created value to the customer. Therefore,

it contains information about the customer requirements and needs, the company's own offering and the distribution as well as the customer relationship channels. Moreover, the Value Delivery System indirectly interacts with the environment of the activity system via the IS, to gain information about the market and competitors and possible changes in the industry or the customer specifications. The components of the Value Delivery System, therefore, include *Customer Segments*, *Value Proposition*, *Market and Competitors*, *Customer Relationship* and *Distribution*.

As the supplier, the customer itself is an external entity. Therefore, the Customer System shown in Figure 3 is as well located in the environment of the activity system. Nevertheless, the knowledge and understanding of the customer needs directly influences the business model and therefore the whole activity system of the company. The component *Customer Segments* serves as the direct link between the Value Delivery System and the IS concerning all customer related information. This information is again received by the IS via direct interaction with the Customer System. Hence, in the *Customer Segments* component, all information is stored to provide a product or service that will fulfill the customer's needs. From there, target groups ought to be identified and divided into segments based on a certain criterion set.

The component *Value Proposition* is represented in most concepts of business models and plays a central role in the business model design. It contains a detailed description of the products and services that are or will be offered, especially the added value for the customer.

Based on the identified customer segments and the matching value offerings, the enterprise must decide what kind of relationship it wants to build with its customer and through which channels it wants to communicate. Since a close customer relationship might come with a high price, a good balance between costs and customer loyalty must be found [23]. These aspects are analyzed within the components of *Customer Relationship* and *Distribution*. Because these components are highly interweaved with each other and with the *Customer Segments* and *Value Proposition*, it is imperative to ensure a coherent design of these four components.

In order to prevail over the competition in the target market, the component *Market and Competitors* contains an analysis of the market structure and the competitors. On one hand, this helps to design well-fitted products and services that add value to the customer. On the other hand, it provides a strategic advantage over the competitors as it helps to anticipate their actions and to react correspondingly. Additionally, this component contains information about the market potential and demand forecasts.

Value Capture System: This sub-subsystem deals with all financial aspect related to costing, pricing, funding and maintaining the liquidity of the firm. It contains the components *Revenues*, *Costs*, and *Capital and Funding*. The Value Capture System directly shares and receives information with and from the other two sub-subsystems. Further, it is indirectly connected to the environment of the firm and, therefore, to the Customer System and the Supplier System via the IS.

The component *Revenues* includes a description of sources and procedures that the company uses in order to generate income. This can be used as a basis to develop revenue mechanisms which connect the sources with a pricing method to obtain a tailored price for each individual product or service.

The *Costs* component contains two main items: the cost structure and the cost planning. Former allocates all activities of the business model implementation to the corresponding costs. This includes costs along the processes related to the value creation as well as the value delivery. The allocation can be done by analyzing historical data or, if not available, by inferring applicable benchmarks. The analysis can then be used to find potential savings or cost reduction opportunities.

The component of *Capital and Funding* is closely linked to the *Revenues* and the *Costs* because it combines these to calculate the offerings margin. But it also includes other financial resources and plans for refinancing or fundraising. It has, therefore, the function of financial planning and securing the liquidity of the company.

Information System (IS)

As already mentioned, the IS serves as the link between the activity system and its environment regarding all necessary information. Within the IS, the necessary information is processed and shared with the GS. From this constant interaction between the GS and the IS, direct actions for creating, delivering and capturing value are derived. Figure 3 depicts that the IS constantly shares and receives information with and from the environment of the activity system, e.g. customer information or information about the supplier. Please note, that the Customer System and the Supplier System are only two examples of external systems in the company's environment. The IS is also subject to further influences of the environment of the activity

system. Thus, for example, it interacts with the systems of the financial market or the labor market to provide the necessary information.

Execution System (ES)

Once all the components of the GS have been filled in and checked for coherence in several iterations, the core business model design process is complete. At this point, it is important to point out that the business model itself is not a static plan, but a model that must be constantly adapted to changes within and outside the activity system. If in a step following the business model design, the ES is derived from the design of the GS and the IS, this may well reflect changes in the business model. The ES itself then contains all the necessary business processes in which the actions prescribed by the GS and the IS are executed.

It is directly connected to the IS by sharing and receiving information necessary to run the operational processes as smoothly as possible. Furthermore, the ES is directly linked to the environment of the activity system, interacting with the Supplier System and the Customer System sharing and receiving goods, services or money. As the IS, the ES is also interacting with several other systems in the environment of the activity systems, to provide the necessary assets, resources, and competencies for carrying out the business processes.

4. THE SYSTEMIC BUSINESS MODEL IN PRACTICE

To test our Systemic Business Model in the practical environment, we transformed it into a more user-friendly one-pager, as Osterwalder and Pigneur did with the Business Model Canvas or Wirtz with his Integrated Business Model [7,19]. We used this tool in several workshops with nearly 30 startup teams. These workshops were set up for two days each, allowing for a short theoretical introduction of each of the components and the additional methods used to gather the necessary information. After each introduction, the teams worked together to get the necessary information and to consolidate the findings. The core essence was then transferred to the one-pager. After each additional component, an iteration cycle was started to see if the new information or the insights gained with the new component had any influence on any other component, therefore, maximizing the coherence of the business model.

The teams started the business model design process with the *Management* component and the definition of the values, vision, mission and strategic objectives. They continued with the components *Customer Segments* and *Value Proposition*, identifying the core jobs and desired outcomes of the customers and deriving product or service requirements from these insights.

Followed by the market and competitor analyses in the component *Market and Competitors*, the value offerings were further defined with a clear focus on the unique selling proposition. Next, the teams analyzed the components *Core Factory* and *Value Network*, focusing on the question what needs to be done to create this value and which actors will be involved in this process, internally and externally. Then, the *Core People* and *Core Assets* components were derived from this knowledge.

While analyzing the gaps between needed and existing assets, resources and capabilities internally and externally, the component of the *Core Supplier* was filled out next. From the first draft of the Value Creation System, the teams went back to the Value Delivery System, analyzing the components of *Customer Relationship* and *Distribution*. This change in

perspectives fostered again the iteration between the individual components aiming for a more coherent result.

Lastly, the Value Capture System was filled out, starting with the components *Revenues* and *Costs*. Defining the pricing strategy and analyzing the assumed cost structure served as an additional sanity check of the previously filled out components. Finishing up with the component *Capital and Funding*, the first full iteration circle was closed by cross-checking the financial goals of the company with the overall goals addressed in the *Management* component.

5. CONCLUSIONS

The motivation for developing this tool was to better understand the interdependencies between the business model components. Reflecting on this motivation, we see the activity system of the firm as a first starting point and believe that the system theory can serve as a meta-model in which these interdependencies can be further analyzed in more detail. Ideally, we can initiate a range of research topics that focus on the empirical study of the dependencies within the subsystems of the activity system, e.g. with regards to collecting, processing and interpreting information from within and from outside the system. Further research can also extend the use of the activity system by integrating existing strategic management theories, such as market-based view, resource-based view or absorptive capacity to better understand the systems internal and external interdependencies.

Based on the promising results of the practical use of the tool, we are confident, that we can further optimize the tool for practical usage. To do so, further evaluation using qualitative and quantitative research is needed. We are conducting qualitative research using expert interviews as well as workshop evaluations to validate the content and the visualization of the tool. Furthermore, we are conducting quantitative experiments with founders and students. We use questionnaires to validate the sub-subsystems and their components by testing their importance, their necessity and their coherence from the founder's perspective. Within the experiments with students, they use the Systemic Business Model as well as other business modeling tools, e.g. the Business Model Canvas, in an A/B test to present the same idea in front of an investment board using different tools. With this experiment, we want to see which tool supports startups best to prepare for an investor's evaluation. To support the validation of the Systemic Business Model, we encourage additional application and validation in different business sectors and with different teams from startups up to established companies.

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