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Research article

Platform Business Models in Sharing Economy: Using a Balanced Scorecard Approach to Compare Airbnb, Marriott and Uber Business Model Canvases

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Abstract:

Purpose: To remain competitive, companies need to understand how to innovate their platform business models to be successful. Thus, being able to compare platform businesses is key. Literature shows that there is no proven approach to compare platform business models. This paper fills this gap by following the design science approach to develop a management tool based on the balanced score card and the platform business model canvas by Eisape. The platform business model components are clustered according to the balanced scorecard perspectives and interlinked according to their influence onto success. This paper identifies key performance indicators for successful platform business models and tests the model by comparing the (platform) business models of Airbnb, Marriott and Uber.

Methodology: This research methodically follows the Design Science Framework by March & Smith. Within this framework the components of the Platform Business Model Canvas introduced by Eisape are analyzed using the Balanced Scorecard Approach. A model is developed and tested employing literature review, three case studies (Uber, Airbnb, Marriott) and visualizes key performance indicators in a Radar Diagram Profile.

Findings/Contribution: Firstly, this research directly corresponds to the scientific discussion in literature on how platform business models can be compared by key performance indicators, that are quite generic and therefore true to most platforms. Secondly, this research allows for practitioners to use the developed tool in their strategic management, for platform business model innovation in a competitive environment.

Keywords: Platform Business Model Canvas; Key Performance Indicators; Business Model Innovation; Design Science; Strategic Management; Balanced Score Card; Marriott; Airbnb; Uber; Case Study.

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1. Introduction

Companies like Uber or Airbnb have initiated far-reaching changes in mobility and tourism and transformed their industries. The success of these companies is based on the same economic principle: they link providers and buyers in the digital space within platform markets. The development of digital marketplaces simplifies transactions, creates networks with a wide reach and is easily scalable. All these characteristics suggest that such ecosystems will continue to shape the future of the digital economy. To remain competitive, companies need to understand how to innovate their platform business models or transform their pipeline business models to be and remain successful. Thus, being able to compare platform business models (e. g. with the help of a platform business model canvas) is key.

A platform business model canvas is basically a combination of assumptions and hypothesis, which gives a visually well sorted and comprehensible overview of an existing platform business model or a platform business model to be developed (Planellas & Muni, 2019: 130). Following the platform business model canvas introduced by Eisape (2019; 2020), the logic of the business model with its elements, the core value unit, the needs of the various stakeholders - consumers, providers, partners and owners - as well as resources, transaction contexts, access conditions and rules can be presented in an understandable and coordinated manner (Osterwalder & Pigneur, 2010; Kreutzer, Neugebauer & Pattloch, 2018: 62). Of course, this also makes it possible to compare similar platform business models with each other (Seeborg & Meyer, 2013; Crespo *et al.*, 2020).

A business model canvas serves the purpose of enabling research and practitioners to describe (Baden-Fuller & Haefliger, 2013; Sanderse, 2014), capture (Osterwalder, 2004; Sanderse, 2014), understand (Osterwalder, 2004; Casadesus-Masanell & Ricart, 2010; Sanderse, 2014), share (Osterwalder, 2004; Sanderse, 2014), communicate to stakeholders (Osterwalder, 2004; Shafer, Smith & Linder, 2005; Sanderse, 2014), analyze (Osterwalder, 2004; Shafer, Smith & Linder, 2005; Sanderse, 2014), manage and plan (Osterwalder, 2004; Demil & Lecocq, 2010; Sanderse, 2014), explore (Osterwalder, 2004; Sanderse, 2014), protect the business model via patents (Osterwalder, 2004; Sanderse, 2014) and compare business models (Kamprath & Halecker, 2012; Coes, 2014). Introducing a set of criteria or metrics for a comparison of platform business models is the goal of this research. In order to achieve this, the balanced score card approach is utilized based on the platform business model canvas by Eisape (2019; 2020) and within the design science framework.

2. Literature Review

2.1 Comparing Platform Business Models

As soon as you start comparing one business model with another, you enter the realm of strategic management (Abraham, 2013; Kittlaus & Fricker, 2017; Umar, Sasongko & Aguzman, 2018). Strategic management has the goal of identifying and realizing competitive advantages through the anticipatory observation of competitors, markets and one's own platform business enterprise. It should put the enterprise in a position to be permanently better than the competition by distinguishing itself from its competitors with distinctive characteristics (Landes, 2008: 4; Baecker, Dievernich & Schmidt, 2013: 20). A platform business model describes how it works and how the owner wants to earn money. A competitive strategy describes how the platform wants to stand out from the competition (Abraham, 2013; Dudin *et al.*, 2015) and what measures support strategic goals that are designed to ensure success. As a precondition to be able to stand out, platform business owners need comparable, stable, measurable and largely standardized attributes or scaled characteristic descriptions for their platform business model (Osterwalder, 2004). Simply filling the building blocks with descriptions and comparing them, can help get a simple qualitative understanding of existing differences (Seeborg & Meyer, 2013). Getting a deeper understanding of patterns and differences in characteristics as well as their combination and correlation, will allow to

derive a platform business model profile, that can help define the state of a platform business model and develop a strategy that may result in business model innovation or a refocused business model implementation (Osterwalder & Pigneur, 2010).

Strategies are thus to be understood as measures to ensure the long-term success of a (platform) business (Bea & Haas, 2017: 178,203). They are characterized by a consistent connection between initial action and final success in relation to an overall objective (Gälweiler, 2005: 66). They determine the business orientation of a company by defining the long-term business objectives by specifying how the company should position itself in its markets and by ensuring that the resources relevant to competition are identified and built up (Hungenberg, 2014: 7). In order to reduce the complexity of competitive conditions and to be able to take targeted action in the market, the entire business activity of a company is often divided into individual strategic business areas (Goold & Luchs, 1996: 178). Accordingly, a corporate strategy must be developed and implemented for the company as a whole and, derived from this, so-called business area or competitive strategies must be developed and implemented for individual strategic business areas (Hiriyappa, 2015: 31). The success potential is generally defined as the input parameters or the basic requirements necessary to achieve corporate success (Langer, 2005: 19). The core task of strategic corporate management is to ensure that the best opportunities for success, i.e. the potentials for success, are created and maintained in proper time (Gälweiler, 2005: 242). According to Langer and Gälweiler, the potential for success comprises "all material and human resources that must be available at the latest when success is to be achieved in a specific business area (Gälweiler, 2005: 242; Langer, 2005: 19).

This includes the establishment of production capacities, of cost-efficiently functioning organizations in the individual functional areas, of product developments or market positions, etc. (Langer, 2005: 19). Since market positions directly establish and represent potential for success, their establishment and maintenance must be given a central role (Langer, 2005: 19). According to Kühn and Grünig,(2000: 20,73) the success potential also includes intangible characteristics and abilities, such as image in the sales market, quality of the products or management skills. The success potential is in turn influenced by a variety of multicausal and multidimensional factors, the so-called success factors (Langer, 2005: 20). The success factors represent success-relevant strengths and weaknesses of a company (Langer, 2005: 20; Bea & Haas, 2016: 129). By identifying the success factors that are significant for the success or failure of a company or a platform business, the success potential is made measurable and controllable (Langer, 2005: 20). The critical success factors can thus be regarded as measurement and control parameters of the success potentials and thus as central determinants of entrepreneurial success (Langer, 2005: 20). Since the success factors are the keys to success, these factors are also referred to in management literature as "key factors" or "key performance indicators" (Langer, 2005: 20).

The success potentials of an enterprise, which are composed of the "key performance indicators", are therefore also referred to as performance potentials (Langer, 2005: 20). According to Saint-Denis key performance indicators (KPI) are commonly used as management tools in order to monitor and asses how an objective is achieved (Saint-Denis, 2017). They are linked to strategic goals and help decision makers to monitor whether the realization is on target. Saint-Denis argues that in most cases, there are some universal KPIs (Saint-Denis, 2017), but additional KPIs are very project-specific and KPIs for one project are likely unsuitable for another one, as they are linked to specific goals and strategies, that may as well alter over time. Therefore, in order to be able to compare Platform business models a common goal (here: success) has to be presumed. it is essential in order to identify universal indicators that describe all relevant areas of a platform business model on the road to success (Niven, 2002: 83; Nair, 2004: 22,70; Landree *et al.*, 2009: 1).

For the evaluation of business models, various qualitative evaluation criteria have been described over the past decades, which are mostly based on the previously developed frameworks and formulate specific questions about individual components. The questions relate, among other

things, to the degree of customer satisfaction, the predictability of payment flows or the substitutability of strategic resources (Mukayani *et al.*, 2015). Osterwalder proposes to evaluate business models with nine axes, which represent the nine basic building blocks of a business model in his Business Model Canvas (Osterwalder, 2004). He argues that each of these axes would allow the characterization of a certain part of a company's business model. His approach represented a further development of the hitherto rather roughly grained characterization of business models according to cost leaders and differentiators, according to degree of innovation and integration, and according to economic control and value integration. In concrete terms, Osterwalder presents the attributes "*price/value leadership, market share, channel complexity, customer integration, degree of [business model] integration, capability spread, degree of networkedness, low-cost leadership [and] revenue diversity"* (Osterwalder, 2004: 156), whose characteristics can be described from low to high. Amit and Zott summarize four further criteria for successful business models under the acronym NICE (Trapp, 2014: 19).

These include the ability of a business to generate and implement innovations (Novelty), to secure strategic resources against the competition and thus to create competitive barriers (Lock-In), to bundle activities (Complementarities) and to become a transaction cost-reducing organization (Efficiency) (Trapp, 2014: 19). Preissl, Bouwman and Steinfield (2013: 5, 86) describe relatively intuitive criteria, such as the proportionality of profits and risks and the sustainability of the network strategy, for their framework. In addition to a number of other important factors, Horsti, Tuunainen and Tolonen (2005: 4) also add the life cycle of a business model as an evaluation criterion. Thus, the multitude of available qualitative evaluation procedures provides the opportunity to develop a holistic picture of the business model. In addition to the quantitative instruments, they are thus suitable for providing the user of a business model with a comprehensive impression of the value of a business.

In the context of a platform business model canvas, these attributes are not sufficient because, according to Eisape, a platform business model consists of 37 building blocks representing the four perspectives of the stakeholders - consumer, provider, partner and owner (Eisape, 2019: 93). Osterwalder's Business Model Canvas is primarily aimed at one-dimensional pipeline business models, that reflect solely the companies – the owner's - view. Therefore, more attributes are needed. Little is to be found in literature, when it comes to platform business model attributes (Zagorsek, 2014; Blokdyk, 2018). This research aims to fill this gap by employing the balanced scorecard.

2.2 The Balanced Scorecard

The Balanced Scorecard (BSC) was developed in the early 1990s as part of a research project by Kaplan and Norton in cooperation with twelve companies as an instrument for measuring and assessing the performance of companies and thus as a performance measurement instrument (Kaplan & Norton, 1998; Kaplan, 2010). Since then, the system has been introduced worldwide in the public and private sectors. The Balanced Scorecard is a planning instrument that captures all the essential perspectives of a company and provides each perspective with goals, key figures, targets and measures (Kaplan & Norton, 1998). The BSC is based on the vision and strategy of a company and is designed as a tool to ensure the long-term success of a company. In contrast to a conventional key indicator system, it does not only consist of financial key figures and does not solely rely on a retrospective perspective. Instead, it also focuses on strategic and qualitative goals. It supplements the system of key financial figures with (usually three) additional perspectives: The financial perspective, the customer perspective, the process perspective and the organizational capacity and improvement (learning and development) perspective (Kaplan, 2010: 4).

In order to translate a selected strategy into concrete actions and to be able to measure the achieved performance, it is necessary to determine strategic goals, metrics, target values and then, of course, measures and deadlines for the individual company perspectives from the vision and the

long-term corporate goals derived from it. This process is called strategy implementation. The individual steps of strategy implementation with a Balanced Scorecard can be outlined as:

- Defining the strategic goals for the individual perspectives from the vision and the strategic corporate goals,
- Linking the strategic goals to cause-and-effect chains,
- Definition of measured variables and target values,
- followed by the definition of operational measures and deadlines.

The Balanced Scorecard is thus a link between the strategic and operational levels (Kaplan, 2010: 18). This approach is suitable for comparing two business models, because by defining a common goal (here: success), an interlinked cause-and-effect chain between the perspectives of the Balanced Scorecard, that is based on the Platform business model canvas, and the associated measures and target values, it is possible to create a profile for each business model that can be compared with others.

For the Balanced Scorecard to be applicable to platform businesses, the balanced scorecard is adapted, as platforms don't function like pipeline businesses. Talking of internal processes and organizational structure is a concept that works perfectly with pipeline businesses, that have certain inputs that run through a value creating process backed by an organization creating a value unit output that is then made available to customers. Platform business models connect customers, providers and partners in a digital market space. The internal process here is the ability to facilitate and enable interactions and transaction between these parties. Therefore, the internal process perspective is substituted with the "*interaction/transaction-facilitation perspective*".

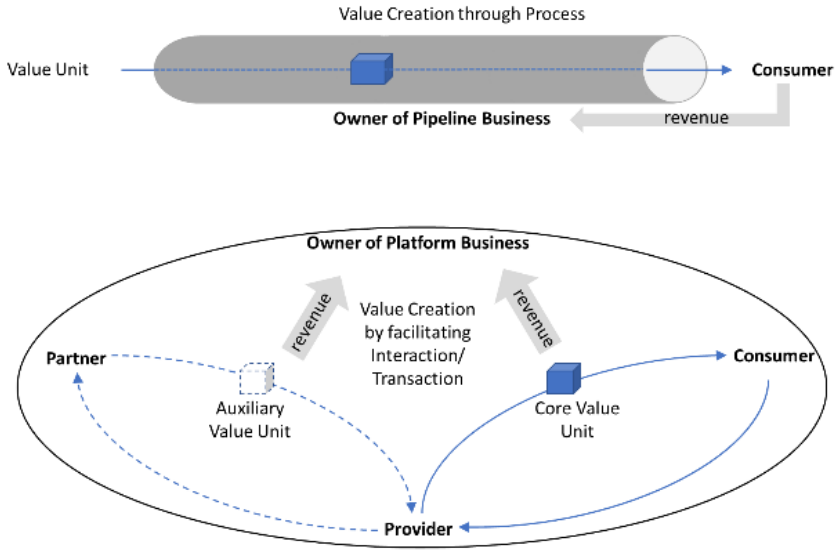

Figure 1: Value Unit and Value Creation in a Pipeline and a Platform Business – own illustration

Core value units (value units introduced by providers) and auxiliary value units (introduced by partners) are created by the partners and providers and not by the platform business owner. In a pipeline business room of improvement often lays within the efficiency and capacity of a value creation process. In a platform room for improvement is within the ability to effectively facilitate interaction and transaction by matching platform user's needs and interests. Therefore, the organizational capacity/learning and development perspective in this paper is transformed into the

"*value proposition perspective*", describing the ability to match needs of platform users, that offer and consume value units (Black, Washington & Rasheed, 2014).

2.3 Success of a platform business model

As stated above a common goal is necessary to compare the platform business models, as otherwise differences regarding the indicators have no common ground to be compared against (Doukidis, Mylonopoulos & Pouloudi, 2004: 165; Lee, 2007: 202; Husa, 2015: 148). In this paper success is the goal of every platform business and is defined as the combination of an increased revenue and brand worth.

What constitutes firm success varies between studies and includes a range of financial performance measures such as revenue growth, profitability, market capitalization, and equity growth (DeYoung, 2005; Al-Matari, Al-Swidi & Hanim, 2014), in addition to non-financial measures such as the resilience in challenging markets and the ability to provide social value to stakeholders (Davila & Venkatachalam, 2004; Abdel-Maksoud, Dugdale & Luther, 2005; Cardinaels & van Veen-Dirks, 2010). Schlie, Rheinboldt and Waesche (2011) state that "a successful platform is a very powerful integrated ecosystem of interdependent". "Successful platforms like Twitter and Facebook have been […] growing […] constantly in an organic way (Notter & Grant, 2012: 97)". "Successful platforms […] thrive on having a large number of contributions from a multitude of users (Dunkel & Kleemann, 2013)". "Facebook and Twitter, as examples of *successful platforms*, concentrated on becoming the largest social network and microblogging network, respectively (Dijck, 2013)". Branding is also seen as a key element of successful platforms, as a strong brand is critical to engage users effectively and grow the platform's user base (Siegert *et al.*, 2015: 54), resulting in a growing number of interactions and transactions on the platform. "Increased revenue is the goal for every company and CEO (Fetscherin, 2015)". Nevertheless, platforms differ in how they generate income, some generate revenue from advertising, some from transaction fees, some from subscriptions and some from a combination of the mentioned (OECD, 2019: 71).

3. Materials and Methods

3.1 Approach

The relevance of the intended methodology is obvious: measurement techniques that are detailed enough to be useful enough do not yet exist. Only very few platform companies use the Platform Business Model Canvas according to Eisape (2019; 2020). Empirical approaches are therefore not suitable for defining a general metric. Consequently, a methodology is proposed to construct suitable metrics for comparing platform business models based on the platform business model canvas of Eisape.

Following the Design Science Framework, this paper will employ this methodology to build and evaluate constructs, a model and an instantiation with regards to platform business model related metrics. March & Smith presented design science as a scientific category to find solutions to real-world problems (Stefik, 1984; Nunamaker, Chen & Purdin, 1990; March & Smith, 1995; Wieringa, 2009). They defined four types of output with regard to design science: constructs, models, methods, and instantiations (March & Smith, 1995; Osterwalder, 2004; Gregor & Hevner, 2013). "Constructs" are a collection of terms used to describe and define artefacts and phenomena. "Models" are descriptions of situations, tasks and artifacts involving constructs. "Methods" are target-oriented instructions for action with the integration of constructs and models. "Instantiations" are the practical implementation of methods and models for certain tasks (March & Smith, 1995; Osterwalder, 2004; Caspar *et al.*, 2013).

The question whether the solution orientation of this paper is sufficient for a scientific work is answered by the methodological context put forward by Hevner, March, Park and Ram (2004), as Wieringa (2009) summarizes: *(1) business needs motivate the development of validated artifacts that meet those needs, and [...] (2) the development of justified theories about these artifacts produces knowledge that can be added to the shared knowledge base of design scientists*.

The search for attributes and characteristics to describe platform business models in this paper is based on the design science framework described above and covers the research activities *Build* and *Evaluate* and has the research output of *Constructs*, *Models* and *Instantiations*. As already mentioned, the main objective of this paper is to develop attributes and characteristics that enables the profiling and comparison of two firm's platform business models. Therefore, *Constructs and Model* will develop attributes and characteristics and their visualization alongside the building blocks that constitute the platform business model canvas. A comparison of Airbnb and the Marriott hotel chain will help to evaluate the adequacy of these derived characteristics and attributes. *Instantiation* will apply them to compare two platform business models with the help of the Airbnb-Case study (Eisape, 2020) and an Uber case study. The research activities *Theorize* and *Justify* as well as the research output *Method* are not part of this research. Testing the adequacy of the attributes and characteristics against reality will be done through case studies to Marriott, Airbnb and Uber, (compare (Eisape, 2019)).

Within the design science framework this paper uses the balanced scorecard and the platform business model canvas according to Eisape (2019; 2020) to identify characterizing constructs and cluster them by perspective. In the second step, each construct is assigned a goal and a scale. To create a model, the constructs and their goals are interlinked in the logic of a cause-and-effect chain helping identify preceding and succeeding indicators regarding the goal "success". The adequacy of this model is then tested with a comparison between Airbnb and Marriott (as mentioned above). Finally, a prototype visualization is presented in order to compare two platforms which is then instantiated by a comparison between Airbnb and Uber.

March and Smith (March & Smith, 1995) proposed a structure with four by four cells (Osterwalder, 2004: 5). The different cells have different objectives with different suitable research methods. A research project can cover several cells, but not necessarily all of them (Osterwalder, 2004: 5).

In terms of research activities, March and Smith identify *build* and *evaluate* as the two main topics in design science (Osterwalder, 2004: 5). In parallel to these two research activities, March and Smith add the natural and social science pair, namely *theorize* and *justify*. *Theorize* refers to the construction of theories that explain how or why things happen. *Justify* refers to theory validation and requires the collection of scientific evidence that supports or refutes the theory. These two research activities become relevant when a model is widely used, and certain effects and results are observed that need to be explained by a theory that is then justified (Osterwalder, 2004: 5). This is not part of the scope of this paper.

Table 1: Design Science Framework according to March and Smith

		Research output			
		Constructs	**Model**	**Method**	**Instantiation**
Research activities	**Build**	construct characteristics and attributes for the components and stakeholders in the logic of the Platform Business Model Canvas cluster constructs according to the Balanced Scorecard's perspectives	Define a model that will enable firms to express the attributes and characteristics of a platform business model with the help of the Balanced Scorecard Identify key performance indicators for each perspective of the balanced scorecard		Build Prototype Visualization of key performance indicators of two platform business models
	Evaluate	Test Adequacy with Airbnb case study	Test Adequacy with Airbnb and Marriott case study		Apply to Airbnb and Uber Case Study
	Theorize				
	Justify				

4. Results

4.1 The Constructs for Attributes and Characteristics

In this chapter, the constructs for Attributes and Characteristics with regards to the components of the platform business model canvas are defined and clustered according to the four perspectives of the balanced scorecard, as introduced above. By incorporating the four main categories of the balanced scorecard and the components and the stakeholders of the platform business model canvas introduced by Eisape, the platform business model in its entirety is described by the balanced scorecard. For an enhanced readability Consumers, Users, Customers, Buyers as described by Eisape (Eisape, 2019) are subsumed under *consumers* and Provider, Contributor, Seller and Provider as described by Eisape (Eisape, 2019) are subsumed under *providers*. According to Eisape these in addition to *partner* and *owner* are "perspectives" regarding the platform business model. In order not to confuse the reader with the 'perspectives' introduced by Eisape with the 'perspectives' in the context of the balanced scorecard introduced by Kaplan and Norton, in this paper the former is described as stakeholders whereas the latter is further described as perspectives. And so, the **customer perspective** is associated with the components and stakeholders: consumer, filter for consumer, channel for consumer, partner, filter for partner, channel for partner, provider, filter for provider, channel for provider, channels for promotion by the owner and gain for owner. The **Interaction/ transaction facilitation perspective** combines the platform business model canvas components: governance by owner, key activities for owner, job for owner, pain for owner, core value unit (and auxiliary value unit), transaction for consumer, key activities for consumer, key resources for consumer, transaction for partner, key activities for partner, key resources for partner, key activities for provider, transaction for provider and key resources for provider. The **value proposition perspective** clusters the components: job for consumer, pain for consumer, gain for consumer, job for partner, pain for partner, gain for partner, job for provider, pain for provider, gain for provider and the owner as the one offering the platform where these needs are being met. The **financial perspective** is associated with the platform business model components: key resources for owner and transaction for owner. Following the goal to be successful in the sense of an increased revenue and brand worth (see above), the following attributes and characteristics for each component are constructed.

Table 2: Balanced Scorecard Perspectives, Platform Business Model Canvas Components as Attributes and their Characteristics (described on a scale from "low" to "high")

Bal. Scorec. Perspectives	PBMC Components as Attributes	Characteristics
Customer perspective	consumer	With regards to the consumer, a scale could show the market share by grading the amount of registered consumers, demonstrating the platform's reach and dominance in a specific market. At the top end of the scale you will find the platforms with the greatest consumer market share.
	Filter of consumer	A scale could show how low-barrier and inclusive it is to get access to the platform for consumers, demonstrating the platform's accessibility for consumers. The top end of the scale would represent platforms with a very broad accessibility. Another criterion could by, how good platforms keep "bad" consumers out. The top end of the scale would characterize platforms that are very "hygiene", whereas the low end shows platforms that have trouble coping with "messy and destructive" consumers.
	Access channel of consumer	Access channels for consumers could be characterized by their diversity, having platforms with a single access channel at the low end of the scale and platforms with several stand-alone access channels or a range of complex and interrelated access channels at the higher end.
	provider	With regards to the provider, a scale could show the market share by grading the amount of registered providers, demonstrating the platform's reach and dominance in a specific market. At the top end of the scale you will find the platforms with the greatest provider market share.
	Filter of provider	A scale could show how low-barrier and inclusive it is to get access to the platform for providers, demonstrating the platform's accessibility for providers. The top end of the scale would represent platforms with a very broad accessibility. Another criterion could by, how good platforms keep "bad" providers out. The top end of the scale would characterize platforms that are very "hygiene", whereas the low end shows platforms that have trouble coping with "messy and destructive" providers.
	Access channel of provider	Access channels for providers could be characterized by their diversity, having platforms with a single access channel at the low end of the scale and platforms with several stand-alone access channels or a range of complex and interrelated access channels at the higher end.
	partner	A scale could show the amount of partnerships or the degree of networkedness a platform has. At the top end of the scale you will find the platforms with a multitude of partners or other market leaders as partners.
	Filter of partner	A scale could show how low-barrier and inclusive it is for partners to get access to the platform, demonstrating the platform's broad accessibility for partners. Another criterion could by, how good platforms keep "bad" partners out. The top end of the scale would characterize platforms that are very "hygiene", whereas the low end shows platforms that have trouble coping with "messy and counterproductive" partners.
	Access channel of partner	Access channels for partners could be characterized by their diversity, having platforms with a single access channel at the low end of the scale and platforms with several stand-alone access channels or a range of complex and interrelated access channels at the higher end.
	promotion channel of owner	Promotion Channels could be characterized by their diversity and reach, having platforms with a single promotion channel or low reach at the low end of the scale and platforms with several stand-alone promotion channels or a range of complex and wide-reaching promotion channels at the higher end.
	gain for owner	A scale could represent the network size as well as the ownership of the network. The top end of the scale would stand for a large network, that is entirely within the platform ecosystem. At the lower are platforms with small network size that is mostly outside of the platform ecosystem.

Interaction/ transaction facilitation perspective (internal process)	job of owner	The capabilities of a company could be characterized by the range or spread of the different capabilities necessary to execute the platform business model. A platform that builds on few and similar capabilities would be found at the low end of the scale, whereas a platform that facilitates many and diverse capabilities would be found at the other end.
	pain of owner	To characterize the pain for a platform owner, a scale could grade the efforts to reduce severity and complexity of possible risks. The top end of a scale would represent platform owners that understand how to minimize their risks, thus being low risk leaders.
	transaction of consumer	The consumer's transaction diversity could be characterized by the diversity of its transaction streams. A Platform with a single transaction stream with regards to a consumer would be found at the low end of the scale and a platform with diverse streams with regards to a consumer at the other end.
	key resources of consumer	With regards to key resources, a scale could show how resource-lite using the platform is. The top end of the scale shows the low-resources leaders with regards to consumers.
	key activities of consumer	With regards to key activities, consumers must accomplish certain activities in order to be able to use the platform. The top end of the scale reflects the least amount and complexity of obligatory activities for consumers.
	transaction of provider	The provider's transaction diversity could be characterized by the diversity of its transaction streams. A Platform with a single transaction stream with regards to a provider would be found at the low end of the scale and a platform with diverse streams with regards to a provider at the other end.
	key resources of provider	With regards to key resources, a scale could show how resource-lite using the platform is. The top end of the scale shows the low-resources leaders with regards to providers.
	key activities of provider	With regards to key activities, providers must accomplish certain activities in order to be able to use the platform. The top end of the scale reflects the least amount and complexity of obligatory activities for providers.
	transaction of partner	The partner's transaction diversity could be characterized by the diversity of its transaction streams. A Platform with a single transaction stream with regards to a partner would be found at the low end of the scale and a platform with diverse streams with regards to a partner at the other end.
	key resources of partner	A scale could show how resource-lite using the platform is. The top end of the scale shows the low-resources leaders.
	key activities of partner	Partners must accomplish certain activities in order to be able to use the platform. The top end of the scale reflects the least amount and complexity of obligatory activities.
	core value unit	The core value unit could be represented by the number of available value units on a platform (e.g. in the case of Airbnb this would be the number of listed accommodations).
	auxiliary value unit	The auxiliary value unit is not an explicit component within the platform business model canvas. It is implicitly expressed by the job that partners get done on a platform. With regard to the auxiliary value unit, which are often support services made by partners (e.g. in the case of Airbnb this would be publishing and listing services offered to accommodation owners (Eisape, 2020b; Reillier & Reillier, 2017)), they could be represented by the number of listed services. Although this not perfectly in line with the platform business model canvas according to Eisape it can help to measure the performance and diversity of services offered on a platform by partners.
	key activities of owner	A scale could show, how effective a platform owner realizes key activities. The top of the scale represents high effectivity, whereas the bottom of the scale represents low effectivity.
	governance of owner	A scale could show if the governance is organized in a centralized or decentralized manner. The top end of the scale would show a high scale of self-healing mechanisms, whereas the lower end represents a strong platform owner driven governance.

Value proposition perspective (learning and development)	job of consumer	To characterize the job a consumer can get done on a platform, one could imagine a scale grading how much value the platform offers consumers. The top end represents platforms that are leaders in enabling consumers to get their job done, or their need met.
	pain of consumer	In order to characterize the pain for a consumer on a platform, a scale could grade the efforts to reduce severity and complexity of possible risks. The top end of a scale would represent platforms that minimize the risk for their consumer, thus being low risk leaders.
	gain of consumer	To characterize the benefits for a consumer on a platform, a scale could grade the amount and value of the offered benefits. At the top end of the scale, a platform offers its consumers the most benefits, while they are getting their job done on the platform.
	job of provider	To characterize the job a provider can get done on a platform, one could imagine a scale grading how much value the platform offers providers. The top end represents platforms that are leaders in enabling providers to get their job done, or their need met.
	pain of provider	In order to characterize the pain for a provider on a platform, a scale could grade the efforts to reduce severity and complexity of possible risks. The top end of a scale would represent platforms that minimize the risk for their provider, thus being low risk leaders.
	gain of provider	To characterize the benefits for a provider on a platform, a scale could grade the amount and value of the offered benefits. At the top end of the scale, a platform offers its providers the most benefits, while they are getting their job done on the platform.
	job of partner	To characterize the job a partner can get done on a platform, one could imagine a scale grading how much value the platform offers partners.
	pain of partner	To characterize the pain for a partner on a platform, a scale could grade the efforts to reduce severity and complexity of possible risks. The top end of a scale would represent platforms that minimize the risk for their partner, thus being low risk leaders.
	gain of partner	To characterize the benefits for a partner on a platform, a scale could grade the amount and value of the offered benefits. At the top end of the scale, a platform offers its partners the most benefits, while they are getting their job done on the platform.
Financial perspective	owner	A scale could show the brand value, demonstrating the platform's reach and dominance in a specific market. At the top end of the scale you will find the platforms with the greatest brand value.
	transaction of owner	The owner's transaction building block could be attributes as revenue value and diversity and could be characterized by the number and value of its revenue streams. A Platform with a single and low valued revenue stream with regards to the owner would be found at the low end of the scale and a platform with diverse and high valued streams at the other end.
	key resources of owner	A scale could show how resource-lite running the platform is. The top end of the scale shows the low-resource efficiency leaders.

4.2 Testing the Adequacy of the Model – the Airbnb Case Study

Having defined the attributes and characteristics, they need to be tested, whether they adequately help characterize a platform business model, which is in accordance to the design science framework of March and Smith (see method of research above). To evaluate the attributes and characteristics a case study of Airbnb is employed.

The design of the case study will be based on a literature review. Thus, content of the website of Airbnb, academic journals, secondary company information, business publications, market research or newspaper articles are reviewed for information, that apply to the above developed attributes. In

his research paper "The Platform Business Model Canvas - Designing and Visualizing Platform Business Models" Eisape modelled and visualized the platform business model of Airbnb with the help of the platform business model canvas (Eisape, 2020). That information as well as further information from the literature review help map the found information to the proposed attributes and characteristics.

4.2.1 Airbnb - the customer perspective

Consumers on Airbnb are private or business traveler. With regard to the attribute **market share** Wieditz states that "*with over 85% of market share, Airbnb is unambiguously the market leader, turning residential homes into quasi-hotels more rapidly than any other competitor."* (Wieditz, 2017) The Airbnb website states that Airbnb [has] "*500M guest arrivals all-time"* (Airbnb: website), "*2M+ average number of people staying on Airbnb per night*" (Airbnb: website), "*1K+ cities with Airbnb Experiences*" (Airbnb: website) and "*40K+ Experiences worldwide*" (Airbnb: website). Fortunly.com notes that "*At least 2 million people stay with Airbnb every night. Today, Airbnb has over 150 million registered users. According to the most recent Airbnb statistics, there are at least 2 million staying at one of the hosts on any given day."* (fortunly.com)

With regards to the attribute **broadness of accessibility / Platform hygiene**, Airbnb uses a "*watchlist and background checks*" (OECD, 2019: 87) to ensure a certain degree of 'hygiene' on their platform, restricting access for certain guests. On the Community Website of Airbnb hosts insist that "*Hosts need a safe way to block people from contacting them or booking their listings*" (Airbnb: website), which is not effectively possible at the time of the comment made. At the same time, Airbnb can be considered to have a broad accessibility, as it has "*7M+ Airbnb listings worldwide, 100K+ cities with Airbnb listings [as well as] 220+ countries and regions with Airbnb listings*" (Airbnb: website). This means that almost every country allows for an Airbnb-experience. But also accessibility online is made "*available 24-hours-per-day, seven-days-per-week, from any computer or mobile device that connects to the internet*" (The Staff of Entrepreneur Media, 2017; Airbnb: website) .

With regards to the attribute **Access Channel diversity** consumers can access the platform through the website and the Airbnb app (Airbnb: website).

Providers are "*homeowners or first-hand renters*" (Tarek, 2017: 29) as well as "*experience hosts [that] create unique experiences based on their passions or interests*." (Fauvel, 2017: 8) With regards to the attribute **market share** the website of Airbnb states it has "*7M+ Airbnb listings worldwide"* (Airbnb: website), "*100K+ cities with Airbnb listings*" (Airbnb: website) and "*220+ countries and regions with Airbnb listing*" (Airbnb: website). "*With over 85% of market share, Airbnb is unambiguously the market leader, turning residential homes into quasi-hotels more rapidly than any other competitor."* (Wieditz, 2017) In total Airbnb has 375,000 hosts (providers) in its community center (Airbnb: website).

With regards to the attribute **Broadness of accessibility/ Platform hygiene** hosts of accommodations and experiences worldwide have close to none barriers to come to the platform. "*With more than half a billion guest arrivals to date, and accessible in 62 languages across 220+ countries and regions, Airbnb promotes people-to-people connection, community and trust around the world*" (Airbnb: website). Airbnb offers a "*24/7 customer service*" (Airbnb: website) and is "*available 24-hours-per-day, seven-days-per-week, from any computer or mobile device that connects to the internet*" (The Staff of Entrepreneur Media, 2017). Experience hosts have to meet a certain standard as "*all adventures must meet certain quality and eligibility standards before being offered to guests, and every host must demonstrate expertise relevant to the experience they host. Hosts who would like to lead an adventure with activities that may require special skills or certifications as part of that trip, must attest to having the appropriate skills certification, current first aid and CPR training, and/or access to medical services relevant to the activity they would like to lead*" (Airbnb: website). This is to ensure the Platform hygiene.

With regards to the attribute **Access Channel diversity** "*Airbnb is an online community and service that's based on the internet. It's available 24-hours-per-day, seven-days-per-week, from any computer or mobile device that connects to the internet*" (The Staff of Entrepreneur Media, 2017; Airbnb: website).

With regards to the attribute **amount of partnerships /degree of networkedness** Airbnb offers access to quite an amount of partners, that support the platform activities, as "*Maps, payment platforms, cloud storage, identification platforms are important but they are not proprietary any longer*."(innovationtactics.com, 2017). So also "*insurance companies, while very important and initially challenging to make a deal with, by now are not a big challenge any longer*."(innovationtactics.com, 2017). Partners can be payment method partners: PayPal, Alipay, PayU, Sofort Überweisung (Airbnb: website), IT-Infrastructure-partners: Amazon Web Services (Morgan, 2015; Stair & Reynolds, 2015: 321) or services supporting hosts, like: "*Guesty: An integrative platform to manage multiple accommodation rentals via a single, integrative, cloud-based solution*" (Dolnicar, 2017: 44), "*HonorTab: "A minibar-like service that allows hosts to manage inventory and charge for groceries and other consumable amenities (shampoo etc.)*" (Dolnicar, 2017: 44), "*Hostmaker: A Management company for accommodation rentals that handles everything from furnishing, to listing, housekeeping, pricing, and maintenance*" (Dolnicar, 2017: 44), "*Keycafe: A service that mediates access to accommodation rentals by providing pickup and drop-off points from lockers*" (Dolnicar, 2017: 44) and "*Pillow: A management company for accommodation rentals that takes the work out of renting*" (Dolnicar, 2017: 44). In addition, Airbnb has over 160 Software partners to help providers create a core value unit as well as promote and manage it (Airbnb: website).

4.2.2 Airbnb - The Interaction/ transaction facilitation perspective

With regards to the attribute Number of **(core) value units** Airbnb offers "7M+ Airbnb listings worldwide" (Airbnb: website). According to the website airbnbvsberlin.com "*around 11 700 accommodation units are offered for rental in Berlin each day. If rooms are excluded and only entire flats are taken into account, this number still amounts to 7 714. This means that out of the 1.9 million flats in Berlin roughly 1 in 240 can be found on Airbnb*."

With regards to the number of **(auxiliary) value units** partners offers more than 17 payment methods on the platform (Airbnb: website).

With regards to the attribute **transaction diversity**, consumers are involved in two transactions. "Guests pay money in return for having short-term access to the host`s space." (Dolnicar, 2017: 69) and "on each booking the company charges guests 6-12%." (Žarkić-Joksimović & Marinković, 2018: 537)

With regards to the attribute **low-resources leadership** "*Airbnb's requirements for guests include: Full name, Email address, Confirmed phone number, Introductory message, Agreement to house rules, Payment information. Guests are encouraged, but not required, to have a profile photo*." (Airbnb: website).

With regards to the attribute **low-obligations leadership** obligations include "*1. Complete your profile, 2. Find the right place/experience, 3. Book it: a) On airbnb.com, enter your destination, travel dates, and number of guests, b) Click Search, c) If you want, use the filters (for example, price range) to narrow your options. Click More Filters to see all available filters, d) Scroll through the listings or use the map to find listings in the location you want, e) Click on a listing to open it. To learn more about it, read the description, check the available amenities, review the House Rules, and see reviews that other guests have left for the host. If you have any questions, send the host a message. Or, if you're ready to book, request to book the listing (or use Instant Book if the host has it turned on)"* (Airbnb: website).

With regards to the attribute **transaction diversity** providers basically have two or three transactions. They pay 3-5% service fee, or in case of experiences up to 20% to the platform owner

(Žarkić-Joksimović & Marinković, 2018: 537), they transact access to their property to guests and in some cases they pay a fee to a partner that supports the host with so called host services. The listing of a space or an experience itself is free: "Airbnb never charged a fee for listing" (Dolnicar, 2017: 45).

With regards to the attribute **low-resources leadership** providers need access to the internet, resources to prepare property, resources for investments into basic amenities for added comfort of guests and payment methods (The Staff of Entrepreneur Media, 2017). In total financial resources, data and time are needed.

With regards to the attribute **low-obligations leadership** providers do have to tackle quite some obligations. They have to "*create a personal Airbnb account, create one or more property listing, managing account and listing, all administrative tasks associated with being a host, Refer Friends to Airbnb, Adjust Account Settings, Learn About Airbnb for Business, Access and Manage City, Communicate with potential Guest using the Airbnb Messaging Service, Access the Host Dashboard, Access and Manage Reservations, Access Transaction history, Access Reviews, Learn about host assist Services, Master hospitality skills, get online help, Contact Airbnb, Learn about Home safety*" (The Staff of Entrepreneur Media, 2017), "*Guest check-in and checkout, Housekeeping and maintenance between stays, Laundering and replacing linens, 24/7 guest support, Listing creation with competitive pricing, Booking request management, Professional photography*" (Airbnb: website).

With regards to the attribute **transaction diversity** partners only have one transaction, which is between partner and provider, as partner offer their services and providers pay with a fee, e.g. 7% for Century 21 agency" (Airbnb: website) .

With regards to the attribute **low-resource leadership** partner, who are often little businesses, no matter how small basically need everything from a development team (Airbnb: website), to a marketing team, contracts and in some cases local employees.

With regards to the attribute **low-obligations leadership**, partners have to "*ensure Scalability, ensure reliability, ensure 24/7 uptime [as well as cover the field of] data analysis and risk mitigation*." (Eisape, 2020: 67) "*Scalability and reliability and 24/7 uptime were big factors, said Shirley Lin, product lead for the Support Products Group, of Airbnb's decision to initially adopt Zendesk."* (Zendesk, 2020)

With regards to the attribute **capability spread in order** to successfully run the platform. Expressing the spread by the number of departments Airbnb has, gives a hint on how wide spreading Airbnb's capabilities are. They are "*Business Development, Community Support, Contingent Work, Data Science/Analytics, Design, Employee Experience, Engineering, Experiences, Finance, Information Technology, Legal, Luxury Retreats, Marketing, Olympics, Operations, Product, Public Policy/Communications, Research, Transportation, Trust And Worldwide Sales Operations*" (Airbnb: website) totaling at 21 Departments**.**

With regards to the attribute **low risk leadership**, there some things, that could harm the Airbnb's platform business model success. For example "*direct transactions between the two parties had to be prevented as this would lead to a one-sided business*" (Oskam & Boswijk, 2016). It would reduce the platform to an advertising or information website, missing the network-effects that make it grow. "*Trust is an important concern […], and more so if the transaction entails admitting strangers to one's private environment.*" (Oskam & Boswijk, 2016) Therefore Airbnb cannot shy away from any effort to ensure and promote trust. Nevertheless it remains a pain point as there is an "*inability to monitor or ensure trust*" (Albinsson & Perera, 2018: 225). More technical pains are server errors (Airbnb: website) , that need to be avoided.

With regards to the attribute **Key activity efficiency** Airbnb has to deal with activities like, "*optimize […] website and provide a better user experience*" (OECD, 2019: 87), "*Growing and nurturing guest and host networks, Search optimization to match guest and hosts, Understanding and tracking guest and*

host behavior, Building confidence by mitigating risk, Cost management" (Dolnicar, 2017: 45), "*To build data models that support personalized flows*" (Zendesk, 2020), facilitate "preparedness workshops", "secure payment", "refunds, guarantees and insurance" (OECD, 2019: 87), etc. Measuring how effective the activities are is best done by looking at the average annual growth. "*In most markets except those where cities are enacting strict regulations, the percentage of revenue growth for whole-unit rentals has increased by an average of 76% each year*" (ipropertymanagement.com, 2020) In August 2019 Reuter reported, that "*the company reported a 40% revenue growth rate in 2018 compared with the previous year, according to the source."* (Reuters, 2019) Again, this is great for representing and comparing companies that already exist, but when designing a platform an estimation between low and high is necessary to describe how effective key activities for the business model are. Which can be quite a challenge.

With regards to the attribute **decentrality of governance** Petersen et al. state that there are 3 aspects to estimate community governance: owner acting as an regulator, owner acting as an implementer, owner acting as a dispute resolver (Petersen, Ulfbeck & Hansen, 2018). This helps to estimate whether a platform-community is self-governed or not.

Airbnb has put a community governance system in place, as "*Airbnb regulates not only commercial aspects of these activities but also aspects of general public interest such as consumer protection and nondiscrimination*."(Petersen, Ulfbeck & Hansen, 2018: 46) Airbnb acts as a regulator, as it "*has also created systems that fill out the role of supervision, control and enforcement of the contractual setuThe fundamental tool in this regard is the review system, which primarily is of a non-legal nature and based on reputation of users. Like many other platforms, Airbnb "outsources" core implementation tasks to the customers themselves while the platform primarily takes on the role of facilitator of exchange and disclosure of relevant information"* (Petersen, Ulfbeck & Hansen, 2018: 47). But the enforcement or implementation is for the most part outsourced to the hosts and guests, still Airbnb acts as an implementer, as "*Airbnb may also undertake a more active role as implementer. Airbnb emphasizes that it has no obligation to monitor the access to or use of the Airbnb Platform by any Member (…) but has the right to do so (…)". In this regard, Airbnb may use several means to enforce its rules and policies on the platform. Most severely, Airbnb may terminate the contractual relationship with the user and/or stop providing access to the Airbnb platform."* (Petersen, Ulfbeck & Hansen, 2018: 48) When there are disputes on the platform Airbnb also acts as a dispute resolver, for it "*has created its own system for solving certain types of disputes between its users (the "Resolution Center"). In particular, users can use the Resolution Center to send or request money for refunds (e.g. in cases of cancellation) or to send or request money for damage claims related to bookings.40 The Terms of Service describes the dispute resolution procedure for damage claims"* (Petersen, Ulfbeck & Hansen, 2018: 49) . Altogether, although Airbnb has a somewhat lively community, the platform has a rather centralized governance.

4.2.3 Airbnb - The value proposition perspective

With regards to the attribute **job value leadership** "Airbnb is a peer-to-peer travel marketplace" (Žarkić-Joksimović & Marinković, 2018: 537) where consumer can find "short-term accommodation" and "discover their holiday destinations, or the city they just permanently moved to, just like the locals do" (Jacobson & Segebarth, 2019: 35).

With regards to the **attribute low-risk leadership**, according to a research by Xu et al. in 2017 "*Airbnb is positively related with property crime, and negatively related with violent crime*." (Xu, Kim & Pennington-Gray, 2017) XU et al were able to show, that there are certain areas in the United States with offered accommodations that ought to be carefully reconsidered, before booking a stay. A frustrated guest has launched a private website, after experiencing "horror" with Airbnb hosts. Airbnb tries to exclude "bad" hosts (e.g. (*Airbnb permanently bans white supremacists from making reservations*)), but unfortunately "*If a "bad" host is "permanently banned" from Airbnb, they can just go ahead and create a new account under a different name. They can even use the same listing photos from before!*" (asherfergusson.com, 2020) "*Social media and websites such as airbnp.bhell.com abound with stories from*

hosts, guests and neighbours of excessive noise, trashed homes, wild parties, last-minute cancellations and scams" (Sherwood, 2019). There even exists an Airbnb Community called "*Bad host behaviour damaging Airbnb*" (Airbnb: website) where people share their stories. This is a problem for the platform as "*perceived risk negatively impacts Airbnb consumers' perceived value and repurchase intention*" (Liang, Choi & Joppe, 2017).

With regards to the attribute **benefits leadership** Liang et al. collected 395 surveys "*to extend the research on consumer repurchase intention, perceived value, and perceived risk into the realm of the peer-to-peer economy, specifically in the context of Airbnb*" (Liang, Choi & Joppe, 2017). They found out that "*perceived value positively enhances their repurchase intention. […] price sensitivity can improve their perceived value. […] Perceived authenticity was found to have a significant effect in reducing Airbnb consumers' perceived risk and positively influencing their perceived value. Electronic word-of-mouth has a positive effect on repurchase intention as well as perceived value whereas it negatively affects perceived risk.*"(Liang, Choi & Joppe, 2017) According to Lalicic and Weismayer (2017) "*Airbnb brands itself as a platform providing authentic peer-to-peer accommodations. Living the local life and coming closer to culture*". Airbnb conducted a survey with 90.000 guest responses in 2018 and found out that "*96 percent said they wanted a more local, authentic experience, 94 percent said they wanted ease and security of payment offered by Airbnb and 92 percent trusted the Airbnb brand to have better quality Experiences*" (Airbnb: website).

With regards to the attribute **job value leadership** Airbnb helps providers *"[…] rent or […] sublet [an] apartment*" or a single room (Tarek, 2017: 29). In addition to that "*Experience hosts [can offer] […] unique experiences based on their passions or interests*" (Fauvel, 2017: 8) thus, "*earn money leading people on activities*" (Airbnb: website).

With regards to the attribute **low risk leadership** Airbnb is facing a challenge with betrayal, flawed and frustrating communication (Touval, 2016: 67), inconsiderate guests, unexpected fines, fraud, […] crime and financial loss" (Media & Rich, 2017) and in addition to that hosting is time consuming, somewhat complex and difficult (Airbnb: website). Airbnb tries to tackle these challenges with a Host Protection Insurance, a risk scoring algorithm, Watchlist & background checks, safety workshops, Secure payments, Account protection, Scam prevention and a global hotline team, standing by 24/7 in 11 different languages (Airbnb: website).

With regards to the attribute **benefits leadership** the two benefits are "meet new people […] [and/or] earn extra money" (Tarek, 2017: 40). According to Leonhardt "*about half, 54%, of those who own their own home say they'd consider renting it out through a service like Airbnb, according to a recent survey of 1,000 people by real estate data company Clever. And 82% believe this is a good money-making strategy."* (Leonhardt, 2019) The internet is literally filled with handbooks and guides in order to be a successful Airbnb host. In that sense, Airbnb has created an entirely new industry for private and businesspeople. As Hayden and Webster state "*AirBnB […] has proven to be a disruptive force to the hospitality industry*" (Hayden and Webster, 2014).

With regards to the attribute **job value leadership** Airbnb creates opportunities for partners to offer their services on the platform to a great range of potential users. "*Hosting teams are separate businesses that provide professional hosting services to help you manage your listing. If you qualify, we'll match you with a hosting team in your area.*" (Airbnb: website) *"[Airbnb] now uses some 200 AWS instances for its application, memory, storage, and search servers to support its Web site.*" (Stair and Reynolds, 2015: 321) "*Maps, payment platforms, cloud storage, identification platforms are important but they are not proprietary any longer*."(innovationtactics.com, 2017) "*Insurance companies, while very important and initially challenging to make a deal with, by now are not a big challenge any longer*."(innovationtactics.com, 2017)

With regards to the attribute **low risk leadership** for partners, they basically have two great challenges. The first is the strong partner competition which makes it a challenge to catch the attention of guests and hosts: "*Airbnb's business model poses an interesting challenge—the thousands of*

customer service agents, operating out of 20 physical locations around the world, serve both hosts and guests. That Global Customer Experience team aims to ensure a positive customer experience that begins on Airbnb's platform and extends for the duration of a stay." (Zendesk, 2020) The second is the global reach of Airbnb. Partners have to try to keep up, with Airbnb's spread into new Languages and Cultures. "*When the Customer Experience team first started at Airbnb, support was provided in English. Today, Hassell's team monitors 20 languages in text-based support with the assistance of Zendesk multilingual capabilities. Phone-based support is also offered in 11 languages, and English and Mandarin support is provided 24/7*." (Zendesk, 2020)

With regards to the attribute **benefits leadership** partners get access to a vast amount of potential users. (Airbnb: website; producthunt.com, 2020) "*For a fee—generally around 20% per booking—hosting teams will manage everything from setup and booking to checkout and cleaning*." (Airbnb: website).

With regards to the attribute **brand value** according to Brand Finance US 500 Airbnb was worth 5,546 Billion USD in 2018 increasing its value for about 50% each year (Brand Finance, 2019: 19; Doggrell, 2020: 89).

4.2.4 Airbnb - The financial perspective

With regards to the attribute **revenue value & diversity** "both hosts and guests pay a commission that in total amounts to 8-18% of the transaction price." (OECD, 2019: 87) "*Analysts estimate Airbnb's annual revenue at between $4 billion and $5 billion."* (fortune.com, 2020) When designing a platform as a startup, a calculation (e.g. in a business plan) regarding the annual revenue can help to scale this attribute.

With regards to the attribute **resource efficiency** Cost efficiency is defined as the distance between a specific cost and the best practice cost given the assumption that they produce the same output under the same environmental conditions (Tan, 2016) It is a way to describe how resource efficient the platform is managed by the owner. Another attribute could be total expenditures, that are described as "...decreases in economic benefits during the accounting period in the form of outflows or depletions of assets or incurrences of liabilities that result in decreases in equity, other than those relating to distributions to equity participants"(Beckmann, 2009: 418). This is great for representing and comparing companies that already exist. When designing a platform an estimation between low and high is necessary to describe how resource efficient the business model is for the owner.

4.3 Towards a Performance Model for Platform Businesses

An essential feature of the balanced scorecard concept is the linking of the individual perspectives. According to Kaplan and Norton a strategy can be understood as a bundle of cause-and-effect hypotheses. In order to depict a coherent strategy in the balanced scorecard concept, the relationships between the goals and key figures of the different perspectives should therefore also be made clear by the key figure system. The perspectives of the balanced scorecard are connected by a chain of cause-and-effect relationships. Each perspective of the balanced scorecard and the parameters it contains form a part of such a cause-and-effect chain, which starts in the learning and development perspective and ends in the financial perspective. Non-financial indicators are linked both within the respective perspective and with indicators from other non-financial perspectives and with the financial perspective. The relationships are different for each individual strategy, so that the balanced scorecard must be adapted to the requirements of the respective company. Cause-and-effect relationships are used to simulate the causal relationships between financial and non-financial key figures. They can be used to describe what is often a complex corporate process and make it transparent and comprehensible at all levels of the company.

Within the cause-and-effect chain proposed by Kaplan and Norton (organizational learning & development → internal processes → customers → finance), the learning and development perspective is seen as a driver of internal business processes (Kaplan & Norton, 1998; Wallenburg and Weber, 2006: 4). The cause-effect chain captures the ability of employees, information systems and organizational processes to contribute to value creation and to adapt to change (Wallenburg & Weber, 2006: 4). There is no doubt in the literature that this ability positively influences the design and execution of internal processes. Companies that are well managed and - if necessary - adapt to change are permanently able to execute processes that create significant value for customers. Especially in a complex and changing environment, recurring adjustments of business processes are required to meet customer requirements in the long term (Wallenburg & Weber, 2006: 4). This works for a pipeline business, where business owners can control the process and the stakeholders.

With regards to platform business models the driver for success and change is somewhat different. The ability to facilitate interactions and transaction relates to the customer perspective in a two-way interaction, as both influence each other as the facilitation of interactions and transactions also means reaching out to potential platform users. The ability to facilitate interactions and transactions also shapes how well platform users (consumers, providers and partner) can get their mutual needs met (value proposition perspective). In addition, to facilitate interactions and transactions has a direct impact on how much revenue a platform owner makes from successful transactions. The customer perspective has an impact on the number of transactions and on the value proposition perspective, as more users mean a greater network size and more brand value. The value proposition perspective has a connection to the costumer perspective as the brand value correlates with the ability of a platform to own the increasing network size. It also has a connection to the transactions, as needs being met create a positive feedback loop regarding interactions and transactions.

Facilitation of interactions and transaction is the strongest driver, as it influences the other three perspectives (customer, value proposition and financial). The customer perspective is the second strongest driver as it influences two other perspectives (facilitation of interactions/transaction and value proposition). The value proposition perspective is also the second strongest driver as it likewise influences two perspectives (facilitation of interactions/transaction and costumer), whereas the financial perspective is influenced by the facilitation of interactions and transaction. The relation diagram shown in the figure above depicts these dependencies by counting the number of incoming (is influenced by) and outgoing (is an influence to) relations.

Within each perspective there are also cause-and-effect relations between the platform business model components, as shown in figure 2. In order to visualize these according to the balanced scorecard methodology the arcs connecting the components are weighted with a positive and a negative sign. A positive arc indicates that an increase in the influencing component results in an increase in the influenced component. A negative arc indicates that an increase in the influencing component results in a decrease of the influenced component. The strength of each arc is not represented. Identifying and representing the amount of influence could be elaborated through a further research using the fuzzy logic approach (Chytas, Glykas and Valiris, 2011) in conjunction with expert interviews.

Within the **facilitation of interactions and transaction perspective** activities by the owner (governance, job, pain, key activities) help create low barriers for consumers, providers and partners who invest key resources and take obligatory steps (key activities) to be able to use the platform. Reducing resources and obligation for the platform users is key in order to boost the number of core value units (introduced by providers) and auxiliary value units (introduced by partners). The increase in numbers of value units increases the diversity of transactions. The diversity of transactions can be considered a key performance indicator for the facilitation of interactions and transaction perspective. At the same time the amounts of core and auxiliary value units is a great way to measure

activity on a platform, as providers and partners offer services on the platform. These two are therefore useful overall performance indicators.

In the **costumer perspective** the amount of consumers, providers and partners, expressed by their respective market shares, amount or degree of networkedness, are influenced by their ability to access the platform and how broad the respective accessibility of the platform is. Great promotion by the owner also positively influences the number of users. Of course, strong market shares on both sides of the market increase the network size and the ownership, but as network size is best expressed through the respective market shares of consumer and providers and the amount of partners, and so they can be considered an overall performance indicator for the costumer perspective.

The **value proposition perspective** encompasses the value users get (job), what they gain (gain) and what risks they have (pain). Being successful in helping users meet their needs results in a high brand value, as users recommend the platform or keep coming back, causing network effects on both sides of the market. Therefore, this paper proposes brand value as a great overall performance indicator for the value proposition perspective.

The **financial perspective** subsumes resources needed by the owner and revenues created and the brand value of the owner (the platform). The revenue value best describes the financial perspective and is therefore deemed a good overall performance indicator.

4.4 Measuring Platform Business Model success

4.4.1 The graphical representation

In order to create an easy to understand but also pattern-revealing form of presentation, a graphic representation of the attributes and their characteristics is employed. The so-called radar diagram is particularly suitable for showing the characteristics of previously defined criteria (Waniczek, Feichter, Schwarzl & Eisl, 2017: 103). Each criterion has its own axis with its zero point in the center. While the same orientation applies to all axes, the better values are uniformly located outside the beams. The axes are arranged uniformly in a circle of 360 degrees. The values of each series are graphically connected with lines. The enclosed area is often filled in color (Waniczek *et al.*, 2017: 103). There must be at least three categories, because with just two all lines would lie on top of each other and therefore no pattern would be visible. With more than ten axes the diagram becomes fuzzy. But even with less than four axes, the quantitative visual perception suffers because of the large distance between them. It is also important to state that the defined criteria ought to be equivalent in their relevance, as otherwise misinterpretations are possible (Waniczek *et al.*, 2017: 103).

As the number of attributes identified based on the platform business model canvas is much higher than the recommended amount of criteria for the radar diagram, a limitation helps keep an overview. Nevertheless, it still gives the viewer a rather high level holistic visual understanding of the platform business model's performance. Therefore the following figure presents a model, that consists of seven attributes (key performance indicators) - market share of consumer, market share of provider, amount of partnerships/degree of networkedness, brand value of owner, amount of core value units, amount of auxiliary value unit and the revenue value and diversity – all ranging from *low* to *high* in 5 steps.

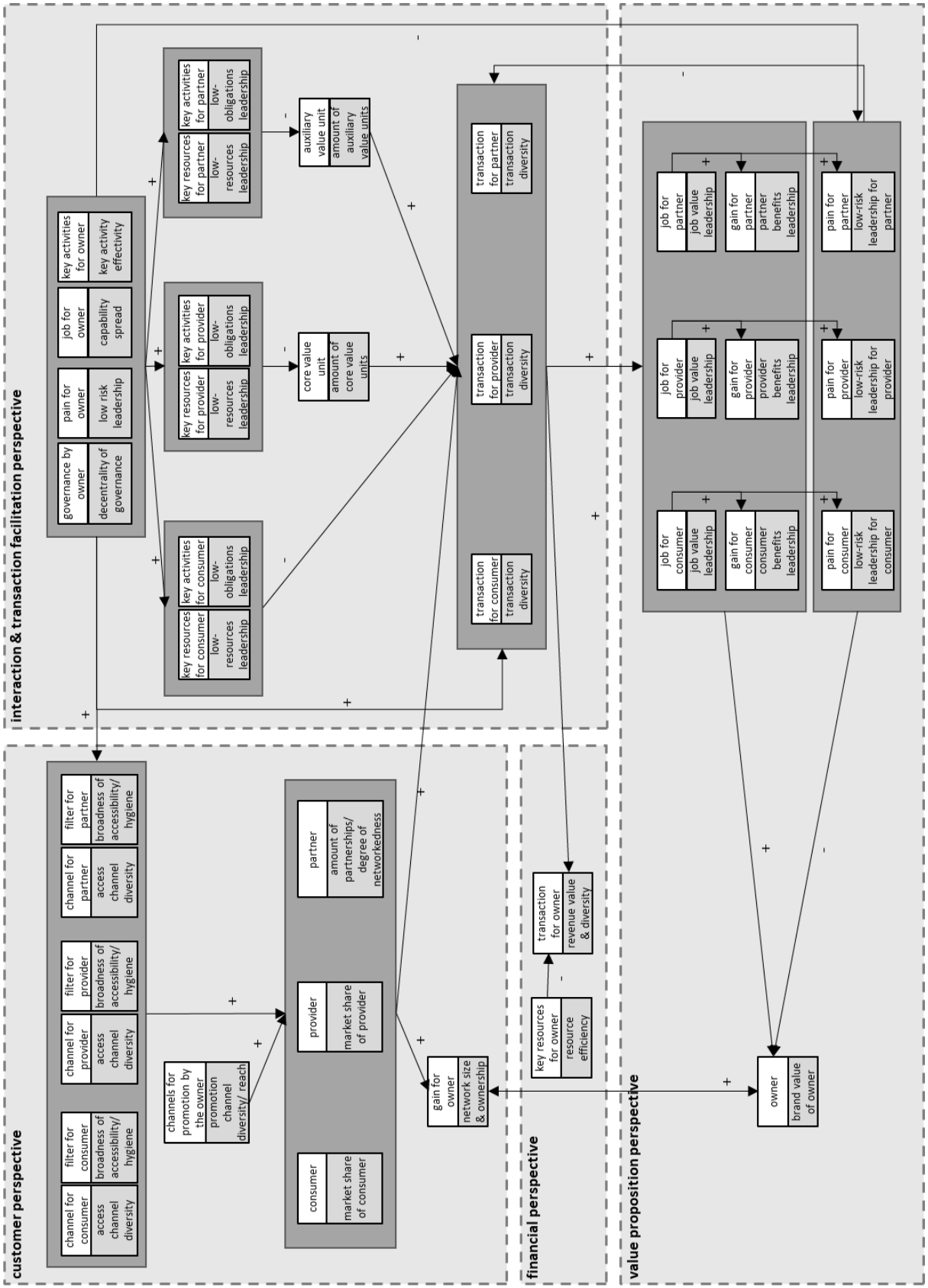

Figure 2: Cause-And-Effect Chain of the Platform Business Model Canvas components – own illustration

4.4.2 Comparison of Airbnb and Marriott – A platform business model and a pipeline business model

Comparing two "giants" in the hospitality business (Guttentag, 2015: 1199; Oskam & Boswijk, 2016) on basis of the key performance indicators of a platform business model, it becomes clear why Airbnb is such a disruptive force in the accommodation sector. It also shows that pipeline business will have a hard time competing with platforms as the reach and scalability with regards to both sides of the market outpace pipeline business (see figure 3). With regards to revenue in 2018 Marriott beats Airbnb with its 21 billion US Dollars compared to Airbnb's 3,6 billion US Dollars. But basically, that is the only indicator where Marriott is ahead of Airbnb. With regards to the amount of users/members in 2019 Airbnb has 150 million users on its platform, while Marriott has 120 million loyalty program members. This is not exactly the same measure, but as an indicator of the reach in the consumer segment the loyalty program can be taken into account.

On the other side of the market, Airbnb in 2019 has 650.000 hosts in 191 countries who offer their properties and experiences for rent. Marriott has 7.349 hotels in 131 countries which is far less. As host may have several properties and accommodations, this paper treats hotels as hosts, that offer several accommodations and services. Both Airbnb and Marriott understand, that in order to grow their business, they need partnerships. Marriott expands by affiliating and buying other brands. In 2019 the Marriott group consists of a portfolio of 30 affiliated brands growing the amount of services and accommodations. Airbnb expands by partnering with services, that help hosts connect to the platform. In 2019 Airbnb's 160 partners help grow the amount of offered accommodations and services. The brand value of Marriott and Airbnb indicate their ability to successfully meet needs, foster a marketplace awareness in connection with positive perceptions (Chiaravalle & Schenck, 2014).

In 2019 Airbnb was rated at round 10,5 Billion US Dollars, while Marriott reached 6 Billion US Dollars. With regards to the core value units of Airbnb and Marriott this paper solely compares the amount of listed accommodations from Airbnb and the number of available rooms from Marriott. 7 Million listings worldwide compared to 1,38 Million rooms means Airbnb has about four times the size of offered accommodations by Marriott. Auxiliary value units are supportive transactions that help make core value unit transactions. In this comparison the number of payment methods is taken in account. As a greater number of payment methods helps lower the barrier for core value transactions. Airbnb offers 17 payment methods, whereas Marriott offers 11. The following figure compares these numbers in a normalized scale from 1 to 5 in order to visually represent the platform business model key performance indicators for both companies. It needs to be stated, that Marriott is not a platform and the key performance indicators reflect this. But it also shows, that in order to compete with a platform, Marriott has to grow in several areas, basically "thinking" more like a platform business model. Recent developments show that Marriott is doing just that. Marriott is hoping to boost its reach in the consumer and provider segment with the home sharing business launched in 2019 (Keyes, 2020) and the Marriott Bonvoy, "the industry's largest loyalty offering" (skift.com, 2019b; 2019a). Considering the design science framework, this is a great way to evaluate the adequacy of the developed key performance indicator diagram. It shows that it adequately represents a platform business model on an aggregated level and helps distinguish a platform business from a pipeline business.

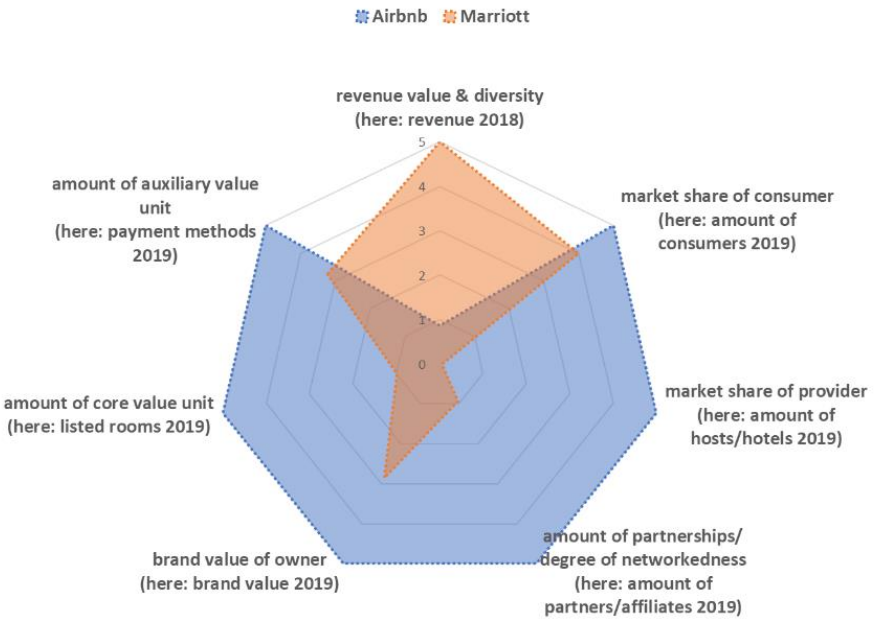

Figure 3: Comparing Airbnb and Marriott with key performance indicators for platform business models

4.5 The Comparison: Uber vs Airbnb

Uber and Airbnb are both platforms that enable private users and businesses to earn money with their assets. Both have disrupted their industries and have had legal issues with cities and local governments. Their business models are somewhat similar as they offer easy access to rides and accommodations globally. The business model of Airbnb has been mapped to the platform business model canvas by Eisape and is described in a tabular form for an enhanced readability. Each platform business model component (Eisape, 2019) is specified with a description of the Uber Case, as follows in the table :

Table 3: Platform Business Model Canvas Components for the use case "Uber"

consumer	People with need to travel (Uber: website)
job for consumer	Get a ride, whenever you need it, book and see in real-time how the driver comes to pick you (Uber: website)
pain for consumer	Trust issues, security concerns and fear of fraud (nytimes.com, 2019)
gain for consumer	High flexibility, wide range of trips, possibility to compare prices. (Uber: website)
filter for consumer	Customer rating (Uber: website), 24/7 access to the platform (Uber: website)
transaction for consumer	The passenger pays the travel expenses. In return, he is transported from A to B. (Uber: website)
channel for consumer	app, website (Uber: website)
key resources for consumer	Registration data, mobile phone, payment data (Uber: website)
key activities for consumer	Register, login, enter destination, book trip (Uber: website)
provider	Driver (fleet partner, rental car company) (Uber: website)
job for provider	Taking passengers from A to B, offering a ride (Uber: website)
pain for provider	Lack of trade unions and labor rights (Ravenelle, 2019: 71)
gain for provider	Flexibility of time management, achieving turnover (Uber: website)

filter for provider	Evaluation system with points and comments, (Uber: website)organizational criteria (minimum age, suitable vehicle, required documents) (Uber: website)
transaction for provider	Service fee to Uber, revenue per trip, fee to payment partner (Uber: website)
channel for provider	The driver app, website (Uber: website)
key resources for provider	The driver app (Uber: website) requirements for vehicles (Uber: website)
key activities for provider	Registration, uploading documents, vehicle provision (Uber: website)
partner	PayPal, credit card company (Uber: website)
job for partner	Cashless and secure payment using PayPal(Uber: website), Supporting Transaction with seamless payment method (Rooney, 2019)
pain for partner	Unauthorized payments, identity theft (Herfors, 2017)
gain for partner	Economic advantages, share of value added, large customer groups (Eisape, 2019)
filter for partner	Restricted access (Blair, Humphrey & Ramsey, 2002: 58; Uber: website)
transaction for partner	Driver pays a fee per transaction to PayPal (Paypal, 2017)
channel for partner	Application programming interfaces (APIs) (PayPal, 2020)
key resources for partner	Developer, software tailored to the special wishes of the customer (McKinsey & Company, 2019)
key activities for partner	Ensure security, enable data protection at all times (Sanoyan, 2019)
owner	Uber Inc. (Uber: website)
job for owner	Bringing passengers and drivers together (Uber: website)
pain for owner	Coordination effort, fierce competition, making changes at any time and adapting structures (Yoffie, Gawer & Cusumano, 2019)
gain for owner	Generate sales, network effects (Cusumano, Gawer & Yoffie, 2019: 15)
transaction for owner	Revenue from drivers (Uber: website)
channels for promotion by the owner	Freemium models and credits for promotions(Uber: website), Outdoor Advertisement (Graham, 2020)
key resources for owner	Personnel, GPS services, Helpdesk 22.000 employees (Uber: website)
key activities for owner	Coordination task (Cusumano, Gawer & Yoffie, 2019: 136), Marketing (Uber: website)
governance by owner	Security, Transparency, About Community Guidelines (Uber: website)
Core Value Unit	An available car in one place, access to rides on demand (Uber: website)

A comparison of the two platforms with regards to their Platform Business Model KPIs shows that both platforms outperform the other in certain areas (see figure 4). In 2018 Uber achieved a revenue of 14,147 billion US Dollars while Airbnb earned a fraction of that with 3,6 billion US Dollars. At the same time Airbnb has 150 million registered guests whereas Uber has half the amount with 75 million registered riders. On the other side of the market Uber with 3 million drivers has five times the amount of providers compared to Airbnb with 0,65 million hosts. Of course, one host may have several properties listed on the platform and rent them from remote, which is expressed by the number of core value units. The number of drivers in contrast to that will most likely be close to the number of actual vehicles available on the platform, as drivers drive their cars which advocates for a 1:1-relation. The amount of core value units at Airbnb has 7 million listings, whereas the amount of listings with Uber stays at 3 Mio. Another important key performance index is the ability to have great partnerships. Both companies have teamed up with insurances, to offer their providers, that offer their assets (cars, accommodations) on the platform cover for possible damages. Airbnb has partnered with one insurance company whereas Uber has partnered with four. The brand value of Uber is estimated to be around 15,3 billion US Dollars while the brand value of Airbnb is at 10,5 billion Us Dollars. Both digital platforms offer seamless payment methods whereby Airbnb lists 17 and Uber lists 9 payment methods.

Following these key performance indicators Uber performs stronger as a platform than Airbnb and shows in what areas Airbnb would have to improve in order to beat Uber. With the help of the balanced scorecard model introduced above the strategic management can now address the

influencing components in order to increase the respective key performance indicators. For example, in order to increase the market share of providers of houses the access channels for providers can be evaluated as well as possible barriers and filters. Another influencing factor is the component "promotion channels" that Airbnb may explore to boost property owner interest in the platform.

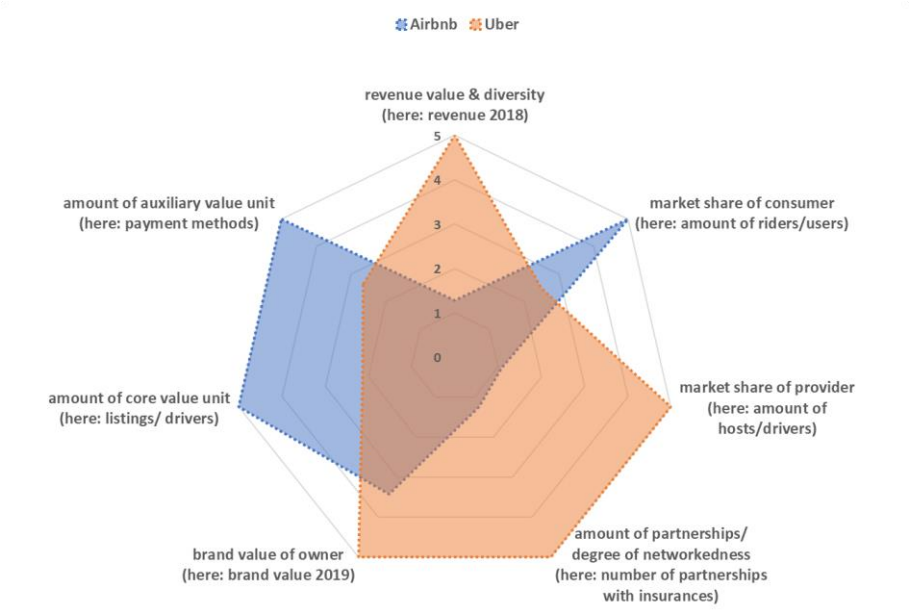

Figure 4: Comparing Airbnb and Uber with key performance indicators for platform business models

5. Discussion

The research purpose was twofold. Firstly, this research directly corresponds to the scientific discussion in literature on how business models can be compared not just by comparing visual representation, but also by key performance indicators, that are universally true to all platforms. Secondly, this research allows for practitioners to use the developed tool in their strategic management, for platform business model innovation in a competitive environment or for the transition from a pipeline business towards a platform business.

The goal of this paper was to develop an instrument that will help platform business model management to systematically compare platforms based on key performance indicators and identify influencing platform business model components. Of course, this only addresses the platform business model inherent "adjustment screws" and leaves out many other possibilities to boost platform business model performance. At the same time platform owners want to make sure, that their business model is set for success in context of competition.

The data used to evaluate the model is based on a literature review. Interviews and internal data of respective platform businesses would provide more accurate and reliable data. Nevertheless, this proposed set of key performance indicators is relatively easy to use even if the user has no insider information. As shown the key performance indicators don't have a narrow definition and can be filled with suitable parameters depending on the respective context. This was indicated by comparing partnerships with cities between Uber and Airbnb and partners and affiliates while comparing Airbnb and Marriott. The proposed set of indicators is also a very good way of distinguishing pipeline business from platform businesses.

This tool helps to identify the gap between the performance of two (platform) business models and hint to the components where measures might be necessary. The amount of influence of the single components with regards to the key performance indicators is something that needs to be addressed in future research for example with a fuzzy logic approach.

Following the design science framework, this paper is intended to lay the scientific foundations in order to start a conversation between practitioners and scientists challenging, improving or approving the proposed attributes and characteristics for each platform business model component. The result is of relevance to the scientific community as it builds upon the discussion of what attributes and characteristics describe (platform) business models and contributes to the discussion on management tools for platform business models. It is of relevance for practitioners as it introduces and evaluates an easy to use visualization tool for a strategic management.

5.1 Suggestions for future researches

With regards to the proposed set of indicators, further research could go even further and calculate the area covered by the radar diagram in order to create something like a *platform index* that would express how much platform characteristics are within an analyzed business model compared to a set of references, that need to be defined. In this research two (platform) business models were compared. Regarding each indicator, the better of the two platforms got 5 points, while the lower got points relative on the scale from 1-5. This means that while comparing two business model on automatically becomes the benchmark (the baseline) to which the other is put in relation with. A future field of research would be to define a baseline, that helps compare a business model to an ideal case (for example with regards to a set of goals or a market specific scenario).

Apart from these points mentioned above, much more comparisons are to be done in research following the developed approach, in order to have more data and case studies. This is then the basis for further scientific discussion. Future research could create a database on the basis of the platform business model canvas and the proposed set of indicators and store and statistically compare data from many platform business models. This would help to discover and identify further common relations and patterns.

5.2 Research limitations

Comparing business models can have various dimensions. This paper focuses solely on the identification of differences that lay within the platform business model logic. External factors are not considered, which of course can have a significant effect on the success of a platform. For example, Uber and Airbnb face deliberate restrictions in various cities. The research activities *Theory* and *Justify* are not part of this research, as they need a vast amount of data. The introduced set of indicators may vary in future research depending on the set goals with regards to the balanced scorecard approach.

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