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BUSINESS MODELS OF ARCHITECTS, A QCA ANALYSIS

In this paper the QCA method was used to research the business models of architects. This field of business had some difficulties in the financial crisis. To see in what way the firms in the architectural field can improve their business model the following research question was constructed: Using the fsQCA method, which strategy used in different configurations in the business models of architectural business firms lead(s) to the best financial performance? The focus was on how diversified or focussed the different blocks of the business models were. Different configurations were found, based on these findings we can conclude that there are multiple different ways to achieve a high operational profit.

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Introduction

The project futurA (future value chains of architectural services) is a collaboration of multiple institutes in the Netherlands, such as the TU Delft and the Radboud University Nijmegen. The project is about the analysation and development of new business models for the architecture business. The goal of the project is to create understanding of the challenges that came forth after the financial crises and find new opportunities for the future; this project contains five studies which analyse the current state of affairs of the governance- and business models of architects. This way the trends and developments in the market are identified and this knowledge could be used to identify new opportunities (futurearchitect, 2018).

Before the crisis, the large housing projects, the constant demand for offices, company buildings and educational institutes and the urge to build iconic architecture, which was present everywhere in the country, triggered a continuous flow of projects. After the financial crisis the amount of project for architects declined heavily, since companies and government had less funds to invest in new buildings (dearchitect, 2016). To counter the decline in demand for architects there is a need for a new role for the architect. Architects could be involved in different roles in building projects, for example they could just make the drawings for a new building. However, they can also integrate more within a project, for example by leading a project and making sure all the work is carried out correctly. The different positions an architect can be active in call for different business models.

When companies have implemented a business model it is important to keep it up to date. Recent progress in the development in research towards business models shows that business models need to change over time to achieve sustained value creation (Achterhagen et al., 2013). The main reason for this is that companies which have been successful for some time, do change their business model over time. The environment businesses are working in is changing constantly, for example competitors can change their strategy or product. Next to that, laws or customer demands can change over time. So, there is a risk to fail if businesses continue doing for too long what used to be right, without adapting their business model to changes in the competitive situation (Doz & Kosonen, 2010). Therefore, it would be wise to keep looking at business models even when a firm is doing well and making profits. The field of architecture is not performing too well at the moment. So, it would be useful to investigate the business model in this field to see whether they could improve these business models and if so where these improvements can be made.
However, in the article of Teece (2010) the author states it is difficult to change an already implemented business model. Business model choices define the architecture of a business, and expansion paths develop from there on out. Once a business model is established, enterprises often encounter immense difficulty in chancing the business model (Teece, 2010).

There is a lot of research done in the field of business models. However, Täuscher (2017) argues that there is a mismatch between the business models conceptual characteristics and the methods used to investigate them. These conceptualizations imply that the success of a business model does not depend on individual factors, choices or consequences, but on how well these factors align with each other (Täuscher, 2017). In fact, Casadesus-Masanell and Ricart (2010) propose that the effectiveness of business models depends on whether they can realize self-reinforcing feedback loops between their choices and consequences. Furthermore, researchers agree that the concept is multi-dimensional and boundary-spanning in nature (Zott et al., 2011). In another article it is proposed that a qualitative

comparative analysis and system dynamics simulation modelling can offer two suitable methods for investigating business models empirically (Täuscher, 2017).

The business model should be considered within the field of study of organizational configurations, this study is broadly defined as "any multidimensional constellations of conceptually distinct characteristics that commonly occur together" (Meyer, Tsui, & Hinings, 1993). In other words, a configurational approach says that organizations or business models are best understood as clusters of interconnected structures and practices, instead of loose coupled entities of which the components can be understood in isolation. A configurational approach takes a systemic and holistic view of an organization or business model, where patterns or profiles are related to an outcome such as performance (Fiss, 2007).
In this configurational approach often a causal complexity is considered, which can be characterized by three features: (1) conjunction, which means that outcomes rarely have a single cause but rather result from the interdependence of multiple conditions; (2) equifinality, which entails more than one pathway to a given outcome; and (3) asymmetry, which implies that attributes "found to be causally related in one configuration may be unrelated or even inversely related in another" (Meyer et al., 1993: 1178).
Qualitative comparative analysis (QCA) explicitly casts causal relations along all three lines of complexity highlighted by earlier configurational theories in management, defining causal complexity as composed by "equifinality, conjunctural causation, and causal asymmetry" (Schneider & Wagemann, 2012: 78). This approach enables researchers to identify how multiple causal attributes combine into distinct configurations to produce an outcome of interest which is called conjunctural causation. It assesses whether multiple configurations are linked to the same outcome (equifinality), as well as the relative empirical importance of each of these configurations, and examine whether both the presence and the absence of attributes may be connected to the outcome (asymmetry) (Misangyi et al., 2016)

So, in this introduction the problem architects have is discussed. A possible solution to their problem is the defining of a new more suitable business model. As shown before the business model should change over time. However, it is hard to change an existing business model. A lot of research has already been conducted in the field of business models. However, according to Täuscher (2017) the methods used to investigate business models should be altered, instead of looking at individual factors the focus should be on how well these factors are aligned. In this paper we will build on the framework (the business model canvas) which is provided by Ostwalder and Pigneur (2010), which will be discussed in the theoretical framework.
The key focus of QCA is to study configurations of complex systems. The main applications of this method are to explore patterns across cases that lead to a common outcome, investigate complex theories, assess whether attributes are substitutes or complements for each other, and evaluate whether configurations and attributes are necessary or sufficient for an outcome (Täuscher, 2017).

Thus, in this research the different dimensions of a business model will define the configurations; and the common outcome will be the financial performance. The dimensions of the business models that will be used in this research are the customers interface, the infrastructure management, and the product as well as the outcome variable the financial aspects. These dimensions will make up the different configurations. Within these variables in this research the focus will lie on differentiation and

focus. The architectural business firms can use multiple attributes of a dimension, differentiation. Firms can also focus on one or maybe two attributes within a dimension, a focussed approach. Scholars are divided about this topic; some argue that a diversified approach is more profitable for companies while others say that this approach brings extra complications and that it is better to use a focussed approach. The differences between these scholars and their arguments will be discussed in the theoretical framework; in the chapter differentiation and focus.

This leads to the following research question:

- *Using the fsQCA method, which strategy used in different configurations in the business models of architectural business firms lead(s) to the best financial performance?*

This research question has a practical relevance since it can help architect companies that are now having struggles to be competitive. This research will give these companies insights in how they can organise their business model to achieve a better financial performance. The research question has also a theoretical relevance, because at this time there is a lot of research done in the field business models. However, until now little research is conducted in this field that uses the QCA method to investigate business model, the method is mostly used in other fields. Kraus et al. (2018) conducted a literature review on articles that used the FsQCA method in the field of entrepreneurship and innovation. They found a rising number of articles written in this field. However, in their recommendations for further research they find that the use of this method can improve the view on business models. The authors recommend the following: “rather than focusing on effects of individual variables of the constructs, future research should focus on the several configurations of the divergent theoretical concepts with their contextual influences that explain firm performance.” (Kraus et al., 2018).

This study will make an addition to the existing literature by showing how the FsQCA method can be used when studying business models. This paper will provide an example study for using the method. When the study is successful in this sector, the FsQCA method could be useful for other companies in other sectors to evaluate their business models.

Theoretical framework

In this theoretical framework first the field of the architecture which is part of the cultural economy is discussed. There are different challenges in this specific type of economy that apply to the architecture field. Furthermore, the challenges of project-based firms will be discussed, mainly because most architecture companies work on project base. Then the term business models will be discussed and recent developments in this field will be discussed. After that the configurational perspective will be discussed. Lastly, the method that will be used in this project, the QCA approach will be explained.

The cultural economy

In the paper of DeFillippi et al. (2007), the managerial and organizational challenges of the culture economy are discussed. In the article the authors use a rather pragmatic understanding of the cultural economy: the cultural economy consists of those economic activities in which symbolic and aesthetic attributes are at the very core of value creation. The field of architects is part of this cultural economy, since they are conducting economic activities in which aesthetic attributes are part of the core of the value creation. Competition in these activities, broadly speaking, shifts from the 'use-value' of products to the 'sign-value' embodied in design and branding (Du Gay, 1997; Lash & Urry, 1994).

DeFillippi et al. (2007) also discusses the fact that it is difficult to manage firms working in the cultural economy. Since creativity is also popularly regarded as something genuinely spontaneous and irrational, by its very definition, it is impossible to control. The current focus with creativity as a strategic asset for gaining competitive advantage must be squared with empirical research and existing theories (DeFillippi et al., 2007). Firms working within this business need to find a balance between an environment where creativity can thrive, but they also have to consider that they still need to make profit.

Following this, projects can have a 'hard architecture' or a 'soft architecture'. These two types of doing business are inseparably entwined (Cohendet & Simon, 2007). The soft architecture is about professional networks and communities of practice. The focus with this type lies on open exchange of ideas, for collective problem solving and critical debate among professional colleagues (Brown & Duguid, 1991). When thinking about hard architecture, one could think about the form of hierarchical devices, such as strict procedures to be followed in projects, specific committees, project managers, shared spaces and innovating routines (Cohendet & Simon, 2007). Put briefly, the soft architecture generates new ideas; the hard architecture is more geared towards making money out of these ideas (DeFillippi et al., 2007). When introducing a new business model for architects the architecture of the project should be considered, is it better to follow a soft architecture in a project? This way the most creative ideas should come forward. It could also be better to focus on making money out of these ideas; the hard architecture. It is also possible to make a combination of these two architectures and follow a more hybrid form as proposed by multiple authors, such as Cohendet & Simon (2007).

In the article of Kujala et al. (2009) the business models in project-based firms are investigated. The businesses in the field of architects are project-based firms, since they are working on different projects. Project suppliers are taking increasing responsibility for their customers' businesses by servicing and operating their installed base of equipment. Simultaneously, the focus on value creation in the project suppliers' deliveries and business models has changed from short term project deliveries to also include the operation of systems (Kujala et al., 2009). This trend is also called servitization of

business which is defined as the following: a trend in manufacturing to offer for integrated bundles, or both solutions and operational services in the value stream (Vandermerwe & Rada, 1988). Although most research to servitization is done in the manufacturing field, Kujala et al. (2009) argues that this type of research could help improve the results for project-based firms. The offering of integrated bundles could also be applied in project based firms, this way they could offer to do more work for their clients. This trend of servitization can be seen as the diversification of firms in the architectural business field.

Business models

A business model defines the logic, data, and other evidence that support a value proposition for the customer and a viable structure of revenues and costs for the enterprise delivering that value. In short, it's about the benefit the enterprise will deliver to customers, how it will organize to do so, and how it will capture a portion of the value that it delivers (Teece, 2010). A business model is more generic than a business strategy. Coupling strategy and business model analysis is needed to protect competitive advantage resulting from new business model designing. However, after creating a business model it is essential to create the right strategy for this model, otherwise there is a possibility the business model won't work (Teece, 2010).

In this paper the following definition will be used when spoken about a business model: A business model defines how the enterprise creates and delivers value to customers, and then converts payments received to profits. A business model can be enough for a competitive advantage. However, then the model should be sufficiently differentiated and hard to replicate for incumbents and new entrants alike (Teece, 2010). Business models can also be used by managers to conceptualize and prototype new or changing businesses, or to map out competitive environment; researchers can also use them to better understand how businesses function (Rumble & Mangemation, 2015).

The authors Zott, Amit & Massa (2011) researched the recent developments in the field of business models. They found that researchers do not have a consistent definition of the business model. However, they did find four emerging common themes among researchers of business models. Specifically, (1) the business model is emerging as a new unit of analysis; (2) business models emphasize a system-level, holistic approach to explaining how firms "do business"; (3) firm activities play an important role in the various conceptualizations of business models that have been proposed; and (4) business models seek to explain how value is created, not just how it is captured (Zott et al., 2011). Next to this they divide the research performed among three different areas. These areas are the (1) e-business, which is the use of information technology in organizations; (2) strategic issues, such as value creation, competitive advantage and firm performance; and (3) innovation and technology management (Zott et al., 2011).

Business models act as mediators between theory and practice, enabling researchers and managers to enquire the world and to infer things about reality (Morgan, 2012). As mentioned before one of the most important tools of the business models is that it enables the view for firms how to create value for the customer/stakeholders and capture the value for themselves. In the article of Achterhagen et al. (2013), the authors propose to not focus on what business models are; instead the focus should lie on what business models are for. They focus on the critical capabilities, which they conceptualize as

those dynamic capabilities that enable a company to shape, adapt and renew business models to create value in a sustainable way.

In order to execute the analysis that will be conducted in this paper a framework is needed. The framework that will be used is provided by Ostenwalder et al. (2014). They identify four pillars of a business model, the product, the customer interface, the infrastructure management and the financial aspect. These pillars are made up of business model building blocks. The main idea of identifying the domains, concepts and relationships addressed in the business model field is to create a common language. That is, creating a reference model shared among a specific community of practice or creating a more formal ontology of the business model domain (Ostenwalder et al., 2014).

According to Ostenwalder et al. (2014) the pillar product consists of the value proposition. The value proposition gives an overview of a company's bundle of products and services. The pillar customer interface consists of three blocks. The target customer; this block describes the segments of customers a company wants to offer value to. Next to that there is the distribution channel, which describes the various means of a company to get in touch with its customers. At last there is the relationship; this explains the kind of links a company establishes between itself and the different customer segments they are active in. The pillar infrastructure management also consist of three blocks. The first block is the value configuration; this block describes the arrangements of activities and resources. Next there is the core competency; this outlines the competencies necessary to execute the company's business model. The last block of this pillar is the partner network, this shows the network of cooperative agreements with other companies necessary to efficiently offer and commercialize value. The last pillar is the financial aspects; this pillar consists of two blocks. The first block is the cost structure, this sum the monetary consequences of the means employed in the business model. In other words, all the costs that are made within the business. The other block in this pillar is the revenue model; this describes the way a company makes money through a variety of revenue flows.

The difficulties in innovating an existing business model is also recognized by Berends et al. (2016). They looked at the business model innovation through organizational learning theory as an analytical lens, since several authors have referred to innovation in general (e.g. Guard &Van de Ven, 1992) and business model innovation in particular (e.g. Mezger, 2014) as a learning process. Cognition and action iterate in processes of organizational learning (Fiol & Lyles, 1985). Berends et al. (2016) draw on the distinction between two basic modes of organizational learning: cognitive search and experiential learning. In cognitive search, action follows cognition (drifting); in experiential learning, cognition follows action (leaping). The authors use this organizational learning lens to investigate how business model innovation arises through interactions between cognition and action (Berends et al., 2016).
When thinking about changing a business models it is important to overthink this well before making actual changes. Two mechanisms are characterized primarily by cognitive search: conceptualization and creation.

Conceptualization refers to the development of concepts, ideas, and analyses for one or more business model components and their interactions, without actually changing or creating any of the components. Conceptualization may occur before any aspect of the business model gets implemented (Berends et al, 2016).

Creation refers in this study to the actual realization of new business model components or a new essential part of components, primarily informed by preceding analyses of components and the interactions among them. While it shares with conceptualization that it is rooted in cognitive search,

creation means that ideas are also implemented in reality. Creation primarily relies on cognitive search through the ideation and analysis of business model components and their relation with other components (Berends et al., 2016).

Business model as configuration

Complexity is an inherent dimension of business models (Rumble & Mangemation, 2015); they will be more or less complex depending on the numbers and types of constituent elements and their interrelations. Conceptual complexity is important, since it has general implications for stakeholders' ability to comprehend, manipulate, or communicate a firm's value creation and capture mechanisms (Rumble & Mangemation, 2015). While business models are so complex, the best way to approach them is with a configurational approach. A configurational approach is the understanding that organizations are a cluster of interconnected structures, linked processes, and mutually dependent practices that are best viewed in a systemic or holistic manner (Rumble & Mangemation, 2015).
As a configuration of components, a business model involves interdependent strategic decisions. The effectiveness of any set of business model components depends heavily on the interactions among those components (Berends et al., 2016). The components are the blocks a business model is built on; together they form the configuration of a business model.
Consistency can be described in terms of both internal and external ''fit'', where the former is concerned with a coherent configuration of key activities within the firm and the latter addresses the appropriateness of the configuration given external environmental conditions, so when a business model achieves fit, it consists of a coherent set of reinforcing choices (Morris et al., 2005). Mismatches instead occur when business model components have adverse or conflicting implications for other components (Lehoux et al., 2014).

Differentiation and focus

In this research we will emphasize on the differences in the business models of architects. The companies will be compared on the diversity they show per business model building block. The companies can either focus on one or two points in areas where they are strong. For example, for the product a firm can offer, they can focus on making drawing for a building and just be involved in this part of creating a new building. However, they can also be involved further in the process, by for example deliver project managers or help on the building sight or they can even do both.

In literature there is a lot of debate about the right course of action. Some researchers argue that it is best to focus on your strongpoints, while others propose that diversification is a better way to make profit. This is acknowledged by Palich et al. (2000), they found a lot of inconsistency in findings from the last thirty years, and they also argue there is no consensus regarding the linkage of diversification or focus and the performance of a company. In a review of relevant research, Denis et al. (1997) conclude that empirical evidence suggests that the costs of high levels of diversification outweigh the benefits, that focused firms outperform their more diversified competitors. A more diversification approach also ensures a more complex business model, simply because a company has more different aspects they have to deal with (Snihur and Tarzijan, 2018). The complexity of a business model could bring along extra cost and the requirement for more employees, because the businesses need to keep track of all their organizations. Milgrom and Roberts (1995) argue there is no explicit theoretical argument suggesting that complementarity should stem from similarity, in their examples they are considering practices 'of the same kind' as complementary. For example, 'mass production' practices versus 'flexible manufacturing' practices. They found results that suggest elements of different kinds

can be successfully combined (Milgrom and Roberts, 1995). Although the example may not be suitable for the architect industry, the outcomes suggest that a diversification approach is generally more profitable for companies.

As mentioned before, "there is still considerable disagreement about precisely how and when diversification can be used to build long-run competitive advantage" (Markides and Williamson, 1994). The option of related diversification is supported by Palich et al. (2000), they found that performance increases as firms shift from single- business strategies to related diversification, but performance decreases as firms change from related diversification to unrelated diversification (Palich et al., 2000). In the case of the architect firms, in this research we will look for related diversification and focus. So are the firms for example focussing on only drawing or are they involved further in projects, this will be elaborated in the methodology.

Qualitative Comparative Analysis (QCA)

QCA is an analytic technique that uses Boolean algebra to implement principles of comparison used by researchers in the study of macro social phenomena. Typically, qualitatively oriented scholars examine only a few cases at a time, but their analyses are both intensive, addressing many aspects of cases, and integrative, examining how the different parts of a case fit together, both contextually and historically. So, if researchers want to investigate more cases, the time consumed will rise heavily. The QCA approach makes it possible to bring the logic of qualitative approaches to studies that embrace an extensive amount of cases. In other words, research situations that normally call for the use of a variable-oriented approach can now be solved by using qualitative methods (Ragin, 2018).

The Boolean method of logical comparison represents each case as a combination of causal and outcome conditions. These combinations can be compared with each other and can be logically simplified through a bottom-up process of paired comparison. The data matrix is reformulated as a “truth table” and reduced in a way that parallels the minimization of switching circuits. This minimization procedure mimics comparative methods. This makes sure the most cognitively demanding task, making the multiple comparisons of the configurations is done through algorithms. The goal of the logical minimization is to represent the information in the truth table regarding the different combinations of conditions that produce a specific outcome (Ragin, 2018).

When conducting a research most of the time the fs/QCA method is used. The fs in this name stand for fuzzy set. A conventional set is binary; a case is either in or out. For example, for employment, you could either be employed or you’re unemployed. A conventional set gives these two values, 1 if you’re employed and 0 if you’re unemployed. However, in reality there is the possibility to work part time, and then you work for example half a job. A fuzzy set permits membership in an interval between 0 and 1, while retaining the two qualitative states of full employment and unemployment. So, the fuzzy set of employment could include individuals that are working full time, given a 1 but also include people who work almost full time (membership =.90) or just working half a job (membership = 0.5). It is up to the researcher to specify procedures for assigning fuzzy membership scores to cases, and these procedures must be both open and explicit so that they can be evaluated by other researchers (Ragin, 2018).

The key focus of QCA is to study configurations of complex systems. The main applications of this method are to explore patterns across cases that lead to a common outcome, investigate complex theories, assess whether attributes are substitutes or complements for each other and evaluate

whether configurations and attributes are necessary or sufficient for an outcome (Täuscher, 2017). QCA is seemingly aligned with the logic of business models in that the method assumes that (a) performance outcomes are rarely caused by any single factor, (b) factors rarely operate in isolation from one another, and (c) multiple solutions generally lead to the same outcome (Greckhamer et al., 2008).

Why QCA is used

So, in this article the focus will lie on the architecture business which experienced a decline in projects after the economic crisis. The architecture business is part of the cultural economy since the cores of their value creation are symbolic and aesthetic attributes. Besides that the architects are also part of the project-based economy, since they work from project to project. Since the market for architects is in decline, they are looking for opportunities to reinvent their selves. A way to do this is looking at their business models. However, it is hard for companies to change their existing business models. There is a lot of research done in the field of business models but there is still no consensus about the right way to define and how to deal with business models.

In this paper we assume that the business model is a set of interdependencies. This is why the focus will lie on the configurational perspective, which is the understanding that organizations are a cluster of interconnected structures, linked processes, and mutually dependent practices. Thus, a business model is viewed in a systemic or holistic manner. In order to do so the traditional way of looking at business models, by using linear methods that only including a couple of variables which are looked at separately, this is not sufficient. That is why for this research we decided to use QCA for our analyses. The QCA method is a relevant way to research business models, since it allows retaining a configurational perspective while exploring the different sets of configurations and their outcome.

Another feature of QCA is that it accounts for complex causality, that is, it allows us to see if there are multiple, configurational, asymmetric relationships between businesses model types and their attributes (Ragin, 1987, 2000, 2008; Schneider & Wagemann, 2012). The use of regression-based methods is ruled out, since they are unsuitable for mapping the non-linear and conjunctional causal relationships that are expected to be found when working with business models (Fiss, 2007, 2011; Grandori & Furnari, 2008).

Materials & methods

Building the model

In this paper our framework will be built on the proposed attributes of the business model by Ostenwalder et al. (2014), as mentioned before in the theoretical framework they propose a business model with four pillars. In figure 1 the proposed framework for this research is shown, it is consisting of two parts. The first part are the configurations, this contains the business model of a company, based on the pillars of business models as mentioned by Ostenwalder et al. (2014). The second part is our outcome variable, the financial aspects.

In this research we are interested in how the differences between different business models will affect the financial performance of the businesses in the architectural field. This performance can be derived by looking at the financial aspects of the companies, which is the second part of the model. This financial aspect will define the outcome variable; in this case the operational profit will be used as the outcome variable. So, the different configurations could lead to either a high or low financial performance.

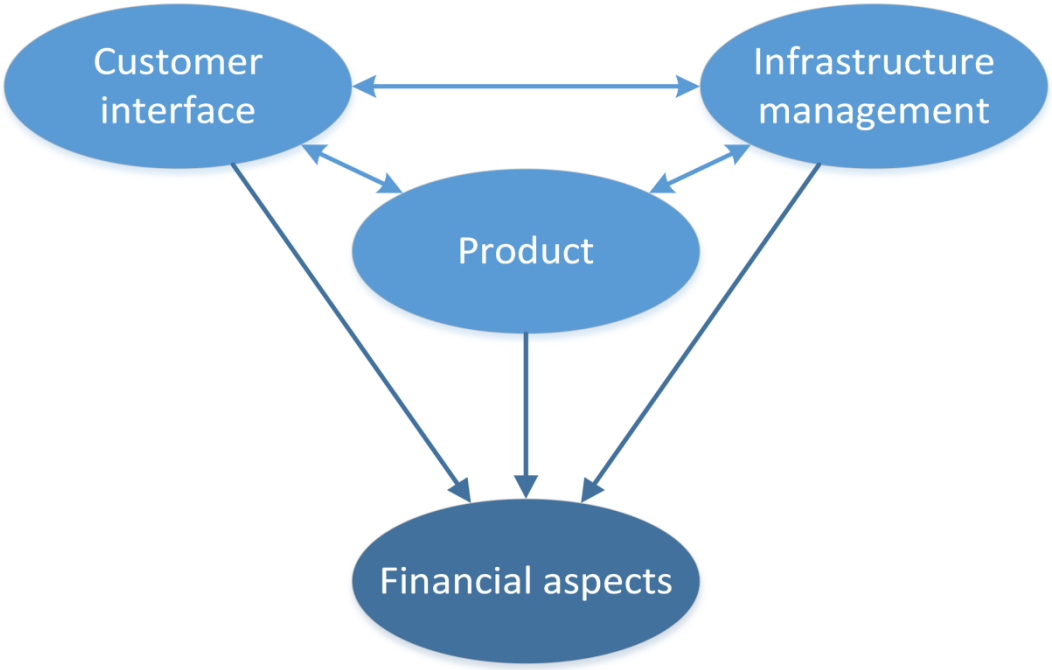

Figure 1: Configuration model

For the different parts of the configuration different variables of the data set are chosen. An overview of the variables and their attributes are given in Table 1. Below the different variables will be shortly introduced.

For the infrastructure management we looked at the composition of a firm, there could be a lot of different employees involved in a firm. In the table most of these functions are described. There are two functions described as rest (direct and indirect). Rest (direct) involves functions that are not yet described, but these functions are directly involved in the primary task of the architects or other parts of the company. This is a good indicator for the infrastructure of a company, because the employees of a company are one of the most important recourses for a company. It will tell something about how

these resources are allocated and used by the company. The function rest (indirect) involves functions that are not directly related to the primary functions, this could be a secretary or lunch lady. The number of employees is measured in FTE's; this means a full time equivalent. A full week work equals 38 hours, if someone work for example if someone work 0.5 FTE this means he/she work 0.5*38=19 hours in a week. This is done to make the analysis fairer, because two employees can fill in one FTE, in which case a firm would appear bigger than it is in reality.

The other attribute of the infrastructure management is the acquirement of new assignments; this indicator is chosen because it is an indicator of the commercial competences of a company. The acquirement of new assignments could be done in multiple ways. There could be a direct assignment to a European contract. In these different forms of acquiring new contracts the main difference is in the competition a firm encounters when trying to get the assignment. The European contract is acquired in heavy competition since many firms try to acquire these assignments, while a direct assignment could mean the client didn't even consider other options.

The second variable is the customer interface, which includes the target customers, distribution channels and the relationships of a company. To measure this variable the attributes, customers and sectors are chosen. The different customers are chosen because this is a good way to see whether a company is focussing on a particular group of customers, or is trying to get in as many customers as they can and use a more differentiated approach. For the sector the same reasoning applies, a firm can just focus on housing or buildings in the city. However, they can also try to be active in a lot of different sectors.

At last the product is included; this includes the value proposition of the companies. In this case the bundle of services is measured at the extent to which an architect firm is included in a project. They could be involved in just a small part, just an initiative-feasibility research, or they could be involved in designing and managing a whole project. This also includes work on the actual building side. They can also do multiple options depending on what the clients asks from the companies. This variable is chosen because it is a good indicator of the bundles a company offers, the less products a firm offers the more focussed their business model will be, while firms that offer a lot of these products aim for a more diversified approach.

All these variables and attributes will make up configurations. The outcome that will be used is the financial aspects. This includes the cost structure and the revenue model, so the costs that are involved to keep the firm running and how the companies make money. To include both these parts we looked at the operational profit of the firms. This includes both parts because this is the revenue or loss that the architects made.

Table 1: Attributes of the variables

	Infrastructure management		Customer interface		Product
Variable	Composition firm	New assignments	Customers	Sector	Position in the project
	Number of architects	European contract	Private individuals	Houses	Initiative- feasibility research
	Number of drawers	After a vision presentation	Businesses	Offices	Only design
	Controllers	After a price request	Project developers	Shops	Design - building permit
	Project leaders	Quotation with competition	Contractors	Education	Design - aesthetic appeal
	Engineers	Quotation without competition	Housing corporation	Health	Design - managing the project
	Firm Management	Direct assignment	Government	Sport and recreation	Other
	Rest (Direct)		Other customers	agriculture and industry	
	Rest (Indirect)			City building	
				Mixed Projects	
				Other sectors	

The data

The data is obtained from the company Panteia, this is a company that conducts research in multiple business fields. They for example carry out market research and collect data to give managers insight in various markets. The data that will be used in this paper is collected through the site: http://bnabenchmark.onderzoek.nl, were all companies involved in the benchmark could submit their company information. The BNA, which is the Industry association Dutch architectural offices, carries out company comparative research since 1992. This comparison consists of comparing the yearly results and various researches which could be interesting for companies in the architectural field. This way they try to support this sector, by giving them a lot of knowledge and insights within their business field.

In this report a lot of data is provided, there were 135 companies that were involved in the benchmark research. The total amount of members involved in the BNA is 1241, which means there were quite a lot of companies willing to answer the questionnaire. As a lot of information is given in this BNA benchmark report, not everything will be discussed in this paper since only a couple of variables will be needed here. Only the variables that were mentioned before and are stated in Table 1 are used. In the process eight companies who did not fill in the questionnaire correctly were deleted, they all failed to answer the question how they obtained new assignments.

Recoding the data

While working with these variables the focus of this research will lie on differentiation and focus. In table 1 the different attributes belonging to each variable are included. In the dataset we observed that some of the firms who participated in this research only used one or two of these attributes. Others used all of them divided in smaller parts of the business. If a firm only used one or two of the attributes it is assumed that they use a focussed approach to do their business. If they use multiple attributes they use a more diversified approach.

However, the QCA program cannot process so much attributes. That is why we decided to recode the different attributes into a score. This score will indicate how diversified a company is on the independent variables. In order to do so the Herfindahl index will be used. The Herfindahl index is mostly used to assess the market share of companies. The result is proportional to the average market share, weighted by the market share. As such, it can range from 0.0 to 1.0, moving from a huge number of very small firms to a single monopolistic producer. Increases in the Herfindahl index generally indicate a decrease in competition and an increase of market power, whereas decreases indicate the opposite. However, it can also be used for assessing other forms of diversity. In this case we will use the index to form one score out of the different attributes each variable includes. The Herfindahl index is a method that is widely used to measure forms of diversity, for example Blau's index (1977) builds on the Herfindal index as a qualitative difference foundation, and it is the most commonly employed measure for diversity as variety (Harrison & Klein, 2007). However this index is used in another field of interest, the social sciences.

In a diversity index to following three things are taken into account: (1) the richness, which is the number of differing elements, variety of characteristics, (2) the abundance, which means plentiful or over sufficient quantity or supply, this occurs when one of the variables is found far more than the other variables, (3) the evenness are the elements free from variations, equal in measure or quantity.

In this case we use formula 1. The p_i is the percentage of an attribute which is multiplied by itself, R is the amount of cases. These scores are all added up and taken from one.

$$1 - \sum_{i=1}^{R} p_i \cdot p_i \quad (1)$$

So, after the data is recoded a score for each of the five main variables (composition firm, new assignments, customers, sector, position in the project) is obtained. The score indicates if a company is focused on that part of the business model or if this part of the business model scores higher on diversity. The higher the score gets the more diversity there is in a company.

Calibrating the data

QCA is a set-theoretic method and both outcomes and conditions are conceptualized as sets (Greckhammer et al., 2018). Another key feature of high-quality QCA research therefore regards "calibration", that is, the process of determining cases membership in the sets representing the outcome conditions (Ragin, 2008).

Effective calibration is a half-conceptual and half-empirical process of identifying thresholds that meaningfully represent differences in kind and differences in degree among cases (Greckhammer et al., 2018). In theory this should follow three principles: (1) clearly define each set representing outcome and causal conditions; (2) to use appropriate theoretical and substantive knowledge to identify sensible thresholds; and (3) to transparently report chosen thresholds so that readers can assess the validity and robustness of the calibration process and the resulting sets (Greckhammer et al., 2018).

However, in practice, scholars (Whittington et al., 2013) have often been confronted with theory and substantive knowledge not being available. Hence no clear indicators are available on were to set the thresholds (Chappin et al., 2015). In the article of Chappin et al. (2015), the authors tested different ways of data calibration, looking for substantive differences in cases, for gaps in the data distribution, and for different boundaries based on percentiles. They found that there were only minor differences for which no theoretical base was found. So, when no other options are available they prefer a straightforward calibration based on percentiles (25, 50 and 75) (Chappin et al., 2015).

For this study there was no theory or substantive knowledge available on were to set the thresholds. Especially since the data, on first-hand, was not collected for the QCA method and was rearranged with the Herfindal index as mentioned before. This means a different approach for setting the thresholds was needed, and since there were no other options available calibration based on the percentiles was chosen.

The percentiles were extracted using Microsoft excel, this program was used to redefine the variables using the Herfindal index. All variables were present and the function in Excel that was used was the percentile function. The matrix of the different variables was selected and the percentiles needed were filled in. In this way for each variable the needed percentiles were found. Next the data was put in the QCA programme. When all the data was inserted in the programme in every variable some scores of 0.5 were observed. The program does not recognize these score, and will not include these scores. However, we still wanted to use these scores in our analysis. To counter this effect whenever a score of 0.5 within a variable was observed 0.001 was added to this score. This way the programme includes

these scores and because such a small amount is added this won't have any significant changes in the outcome of the analysis. To calibrate the data the calibration function within the QCA program was used.

Analysis of necessary conditions

After the calibration the analysis of necessary conditions is carried out. All the variables are checked with the presence and absence of high operational profit. The ~ sign stands for the logical operator; not (Fiss, 2007). If the consistency scores is higher than 0.9 the variable is necessary in the configuration (Ragin, 2006). When a condition is necessary it means the condition has to be included in the solution for the outcome. The higher the score of the consistency the more likely it is that a condition is included in the solution. However, when a necessary condition is found it should be included in all the solutions. That is why the score should be higher than 0.9, it is undesirable to mark a non-necessary condition as necessary. In Table 2 and 3 the outcomes of the necessary conditions analysis are shown. Table 2 show the conditions for a high operational profit, and table 3 shows the results of the consistency and coverage for the variables with a low operational profit. Both tables show no score of consistency above the 0.9 point; this means none of the variables are necessary for achieving the outcome.

Table 2: Necessary conditions

Outcome Variable:	Profitfin	
Conditions Tested	Consistency	Coverage
Firmcompositionfinal	0,77	0,70
~Firmcompositionfinal	0,32	0,35
Assingmentnewfinal	0,42	0,43
~Assingmentnewfinal	0,67	0,65
customersegfinal	0,44	0,43
~customersegfinal	0,63	0,64
sectorsegfinal	0,48	0,47
~sectorsegfinal	0,62	0,61
posinprojectfinal	0,49	0,49
~posinprojectfinal	0,60	0,58

Table 3: Necessary conditions

Outcome Variable:	~Profitfin	
Conditions Tested	Consistency	Coverage
Firmcompositionfinal	0,41	0,38
~Firmcompositionfinal	0,68	0,75
Assingmentnewfinal	0,65	0,66
~Assingmentnewfinal	0,44	0,44
customersegfinal	0,65	0,64
~customersegfinal	0,42	0,43
sectorsegfinal	0,62	0,62
~sectorsegfinal	0,47	0,48
posinprojectfinal	0,58	0,60
~posinprojectfinal	0,50	0,50

Truth Table

After the program showed that none of the variables was necessary, the next step was the creation of a truth table. There were two truth tables created, one with the outcome variable high operational profit and one with the outcome variable low operational profit. In the truth table can be observed whether a variable is present or absent in the solution, a one indicates the variable is present in the solution a zero means the variable is absent in the solution. In this case, this means whether a variable is focussed or divers. In the number the amount of firms where this configuration can be observed is stated. So, the first configuration for high operational profit can be found in five firms. In both the truth table for high and low operational profit a configuration with the number zero was found. Therefore, these scores were deleted because the configuration was not found in any case.

In the assessment of sufficiency, consistency is calculated for conditions and for combinatorial solutions. The parameter "provides a numerical expression for the degree to which the empirical information deviates from a perfect subset relation" (Schneider & Wagemann, 2012, p. 129) in the verdict of whether or not a configuration in a truth table row is a sufficient condition. Schneider and Wagemann (2012, p. 129) name a consistency of 0.75 or higher for a verdict of sufficiency. Coverage expresses to what extent the outcome is explained by the sufficient condition or combination. The parameter has no minimum threshold for relevance; conditions or paths with low coverage can be of importance. The results were sorted again based on the raw consistency.

Both of the truth tables that were constructed can be found in the appendices of this report. Appendix 1 shows the results for the outcome variable high operational profit, appendix 2 shows the results for low operational profit. The whole truth tables are added to the report, only the scores with a raw consistency higher than 0.75 are considered, these configurations are written in bold.

For the outcome high operational profit there were nine configurations with a raw consistency score higher than 0.75. For the outcome variable low operational profit eleven configurations were found. For the next step in our analysis these configurations that were above the 0.75 in consistency were considered by filling in a 1 in the box of the outcome variable. The other observed configurations were given a zero. This way the program assesses which of the configurations should be considered for the standard analysis.

Then a standard analysis was carried out. Before carrying out the standard analysis the variables could be specified. The causal conditions or variables can either be present, absent or present or absent. With this option a variable could be included or excluded for further analysis, when a variable comes forward as a necessary condition this one should be marked with present or when there is a well augmented reason for in- or excluding this variable. In this analysis we chose the last option the option present or absent, the information that was provided a priori did not gave an indication that some of the variables should be included or excluded, also there were no necessary conditions found.

There are three solutions derived after the standard analysis, the complex, intermediate and the parsimonious solution. Two of these solutions will be used, the intermediate and the parsimonious solution. The intermediate solution includes selected simplifying assumptions to reduce complexity but should not include assumptions that might be inconsistent with theoretical and/or empirical knowledge. It can be understood as the complex solution reduced by the conditions that run counter to fundamental theoretical or substantive knowledge (Schneider & Wagemann, 2012). The

Parsimonious solution (all simplifying assumptions) also makes assumptions on the logical remainders; it removes a known causal condition from a configuration displaying the outcome. This is based on the assumption that this case is redundant and the reduced configuration would still produce the outcome (Schneider & Wagemann, 2012). The complex solution does not consider any logical remainder. It thus produces the most complicated result and plays a minor role when it comes to interpretation of findings (Fiss, 2011), therefore it will not be used in our analysis.

The results of the standard analysis will be discussed in the next chapter.

Results

In this chapter the results that are abstracted after analysing the truth table will be presented. This will be done with the symbols presented below. The solutions abstracted can contain one or more variables. The circles indicate whether a variable is present in the solution, if the variable is present this will be shown with the circles below. When the circle is big the variable is present in the intermediate and the parsimonious solution. For the interpretation of this, Fiss (2011) proposes core and peripheral conditions. Core conditions are solutions belonging to both parsimonious and intermediate that show a strong causal relationship with the outcome, whereas peripheral conditions are solutions appearing only in the intermediate solutions and presenting a weaker relationship with outcome. When the circle is small the variable is only present in the intermediate solution. Circles can be either filled completely or they are just marked with a cross. This indicates whether the variable is focussed or diverse. The completely filled circles indicate that the variable is diverse. The circle with a cross in the middle indicates the variable is focussed.

In table 4 the configurations that were left after the standard analysis are reported. These are the results for the outcome variable high operational profit. First we look at the solution coverage and consistency, these are the scores of the solutions combined. The consistency is 0.81 which exceeds the threshold of 0.75 so the solutions are suitable. The solutions coverage indicates what percentage of the firms, or cases, is taken into account with all the solutions. The raw coverage of the solutions, the proportion of outcome cases that were covered by each configuration (Chappin et al., 2015), varied between 0.54 and 0.13. The unique coverage measures the portion of all outcome cases that are only covered by that configuration (Ragin, 2006). The consistency of the solutions should exceed the 0.75 threshold that was chosen earlier when the truth table was created. This means that all the solutions in table 4 are acceptable and suitable for analysis.

Table 4: configurations high profit

Configurations for achieving high operational profit			
	Solution 1	Solution 2	Solution 3
Composition firm	●	●	●
New assignments	⊗		
Customers		●	⊗
Sector		●	●

Position in the project			
raw coverage	0,54	0,13	0,14
unique coverage	0,39	0,03	0,03
Consistency	0,83	0,75	0,80
Solution coverage	0,60		
solution consistency	0,81		

The same procedure that is followed to extract the solutions for high profit is followed for a different outcome variable; low operational profit. The results of this procedure are shown in table 5. The overall solutions consistency is 0.80 which again exceeds our threshold, the coverage is 0.58. As can be observed, there are two solutions shown that meet the 0.75 threshold for consistency. The raw coverage of these solutions varies between 0.35 and 0.49, the unique coverage is a lot lower for both these solutions. This varies between 0.05 and 0.16.

Table 5: configurations low profit

Configurations for achieving low operational profit		
	Solution 1	Solution 2
Composition firm		
New assignments		
Customers		
Sector		
Position in the project		
raw coverage	0,49	0,35
unique coverage	0,16	0,05
Consistency	0,80	0,84
Solutin coverage	0,58	
solution consistency	0,80	

Comparison of solutions

In table 4 there are three possible solutions for achieving high operational profit, all the circles are big so there are only core conditions found here. The first solution shows a diverse firm composition and a focussed approach for obtaining new assignments. The rest of the cells are empty, this means these conditions have no effect on the outcome variable. The second solution shows also a configuration including a diverse firm composition. Furthermore, this solution also shows the conditions customer segment and sector as diverse. The condition, position in project, is focussed in this configuration; the condition of obtaining of new assignments has no impact in this solution. The third solution shows a configuration where the composition of the firm is also diverse, the condition of obtaining new assignment also has no impact on the outcome variable in this solution. Next to that the third solution shows the condition customers as focussed and the conditions sector and position in project as diverse.

In table 5 the solutions for achieving low operational profit are shown. The first solutions show a configuration where the composition of the firm is focussed and the obtaining of new assignments is diverse. Both these conditions are core conditions, the rest of the conditions do not matter in this configuration. The second solution shows a configuration with core and peripheral conditions. There are two core conditions in this configuration. The first is composition of the firms, which is focussed in this configuration. The second core condition is the obtaining of new assignments which is focussed in this solution. The peripheral conditions that are shown are the customer segments which is focused and the position in the project which is diverse. The sector does not show in this solution.

So, in the configurations of achieving high operational profit some similarities are found. In all three configurations it is found that the condition of composition of the firm is diverse. The condition of obtaining new assignments is found focussed in the first solution; in the other solutions this was not found. When a variable does not appear in a solution it means the variable does not have an effect on the outcome variable. For the conditions customer segment and position in project some contradictions are found. The second configuration found the condition customer segment as diverse and the position in project as focussed. In the third solution both conditions are found the other way around. In the first configuration both these solutions do not matter for that configuration. Another similarity can be found in the sectors where architects can be active in. Both the second and third configuration shows that this condition is diverse. In the first solution this condition does not matter.

There were also some similarities found in the configurations for achieving low operational profit. In the first and second configuration the condition composition of the firm is focussed. For obtaining new assignments both configurations found that this condition is diverse. The first configuration shows no other conditions that do matter for the achieving of low operational profit. The second configuration does find some other peripheral conditions that have some impact on the outcome variable. Here the solution shows that the condition customer is focussed and the position in the project is diverse. However, as mentioned before these conditions just have a small impact on the outcome variable.

Discussion & Conclusion

In the conclusion we will try to answer our research question:

- Using the fsQCA method, which strategy used in different configuration in the business models of architectural business firms leads to the best financial performance?

In the result section it became clear there are three possible configurations that will lead to a high operational profit, thus a good financial performance. The first solution that came forward shows a configuration with a diverse composition of a firm and a focused approach on obtaining new assignments. The second solution also shows that the composition of the firm is diverse, next to that this solution shows a diverse customer segment and sector. The positions that a firm takes in the project is focussed in this solution. The third solution again shows a diverse composition of the firm. The customer segment is focused and the sector and position in the project are diverse in this solution. When looking at the solution for a low financial performance, we see that there are two solutions that lead to a low financial performance. These are solutions that lead to a lower financial performance than the solutions that were just discussed. The first solution shows two variables, a focussed firm composition and a diverse approach in obtaining new assignments. The second solution also shows a focussed composition of firms and a diverse approach of obtaining new assignments. Next to that here the solution shows a focussed customer segment and a diverse position in the project.

Distribution of attributes within the variables

After reviewing the results of the different solutions that are discussed above, we decided to look further into the first two variables; the composition of the firms and the obtainment of new assignments. These two variables were chosen because they came forward the same for high and low operational profit, next to that they were contradictory in the different outcome variables. In order to look examine the variables further we looked at the attributes of the variables.

The fsQCA method gives the opportunity to see which cases (these are the different firms) are used in the analysis. These can be found when the truth table is constructed; the number indicates how many cases are taken into account. Only the cases that were used in the standard analysis are investigated, since these made the configurations. These cases were looked up in the data set, for the outcome variable high operational profit 34 firms were used and for the outcome variable low operational profit 44 firms were used. Then we looked at the distribution of the different attributes of the variables. To create an even view the averages of each attribute are calculated, the results in percentages can be found below.

Table 6: Distribution composition of firm

Composition of firm	high operational profit	low operational profit
Number of architects	28,91	69,2
Number of drawers	30,89	21,3
Controllers	1,63	0
Project leaders	14,94	4,4
Engineers	0,66	0,3
Firm Management	9,25	1,7
Rest (Direct)	3,81	0,3
Rest (Indirect)	9,91	2,8

When looking at the distribution of the attributes of the variables composition of the firms in table 6 we can see that the attributes for high operational profit are distributed quit evenly. Most of the jobs are focussed around the number of architects and the number of drawers. However, the other jobs that are listed still filled in. This is in contrast with the distribution for low operational profit; here almost 70% of the distribution is the architect. So, when an architect firm has mostly architect employed the chance is bigger they have a low operational profit. Since it is not a necessary condition, we cannot conclude this is true for every company.

Table 7: Distribution obtaining new assignments

new assignment	high operational profit	low operational profit
European contract	1,77	2,00
After a vision presentation	7,66	6,00
After a price request	7,41	3,00
Quotation with competition	21,84	17,00
Quotation without competition	29,83	32,20
Direct assignment	31,49	39,90

When looking at the results in table 7, it can be observed that there is in this case not a focus on just one attribute for achieving high operational profit. There are two attributes, both the quotation without competition and the direct assignment score around 30% for achieving high operational profit. However, when looking at the low operational profit, we can see that the highest scores can be found in the same attributes. When looking at the different firms, overall an evenly distributed field can be observed, a few outliers do disturb the average in total.
When looking at the different firms with a high operational profit almost all firms focussed on the last two attributes. However, when looking at just the firms of the first solution of high operational profit, it can be seen that the obtaining of new assignments should be focussed. When looking at just the firms of this solution a different view can be observed. Here the focus lies on quotation without competition.
Everything considered, the conclusion is that the focus of an architectural business should lie on quotation without competition and direct assignments in order to achieve a high operational profit. When focussing on a particular way of obtaining new assignment as in solution 1 for achieving high operational profit, it is the best way to focus on the quotation without competition.

The business model as configuration

When looking at a business model as a configuration the fsQCA method is a good tool to investigate business models with a configurational approach. When looking at the results of all of the solutions that came forward after the analysis, it can be concluded that there are multiple variables that together make sure the operational profit of a company is high. Just as Berends et al., predicted: “The effectiveness of any set of business model components depends heavily on the interactions among those components” (Berends et al., 2016).
Next to that, the configurations that are found all have a high fit. As mentioned before in the theoretical framework, by Morris et al., (2005) a high fit ensures that a business model consist of a set of reinforcing choices. When looking at the consistency of the solutions found in this research it can be observed that all of the solutions for achieving high operational profit do have a high consistency. For example, when looking at the first solutions with a diverse composition of firm and a focussed obtainment of new assignments we could conclude that these are coherent reinforcing choices. When

looking at the configurations for a low operational profit here a mismatch between business model components can be observed as described by Lehoux et al. (2014).

Causal complexity

When looking at the configurations for achieving high operational profit some contradictions can be observed in the variables customer segment and position in project. The second solution shows these variables are diverse and focussed while in the third solution this is the other way around.

This can be explained by the configurational approach and the causal complexity that is involved in this approach. As discussed in the theoretical framework this consist of the following: In causal complexity the following three things are considered: (1) conjunction, which means that outcomes rarely have a single cause but rather result from the interdependence of multiple conditions; (2) equifinality, which entails more than one pathway to a given outcome; and (3) asymmetry, which implies that attributes "found to be causally related in one configuration may be unrelated or even inversely related in another" (Meyer et al., 1993: 1178).

The causal asymmetry can explain the contradictory findings in the second and third solutions for achieving high operational profit. When looking at the differences in solutions for achieving high and low operational profit this could also be explained by the causal asymmetry. However, there could be another reason for the finding of a focussed firm composition in the solutions for achieving low operational profit. A problem with this approach could be that there is too much focus on creativity. As DeFillipi et al. (2007) already mentioned it is difficult to maintain a balance between creativity and making profit. This is supported by our findings that a business which mainly employs architects are present in the configurations that leads to low operational profit and thus too much creativity could lead to a low financial performance.

Focus and diversification

In literature there is a debate going on about diversification and focus within companies, some scholars find that companies need to focus on their core business and some say companies need to diversify as much as possible. For example, Palich et al (2000) stated that related diversification improves the performances of companies. This is in contrast with the findings of Denis et al. (1997) who conclude that empirical evidence suggests the costs of high levels of diversification outweigh the benefits, and that focused firms outperform their more diversified competitors.
When looking at the results of this research, in all of our solutions for achieving high operational profit there are both focussed and diversified variables found. So, in addition to the existing literature we can conclude that the best way to set up an architectural company is to use a mix between focussed and diversified parts of their business model. To assess whether this is true for other businesses the fsQCA method could be applied to find this out.

Limitations & suggestions for further research

Analysis

First, we want to discuss the coverage of the solutions that are found in the result section of this report. As mentioned before the raw coverage of the solutions is the proportion of outcome cases that were covered by each configuration (Chappin et al., 2015). The unique coverage measures the portion of all outcome cases that are only covered by that configuration (Ragin, 2006). Next to that a there is the solution coverage, this measures the coverage of all configurations. The solution coverage in both our analyses is higher than 0.5, which means more than half of the cases are included in the combined configurations. However, when looking at the unique coverage of the different solutions the values of the coverage are a bit lower. Especially when looking at the second and third solutions of the configurations for high operational profit and the second solution for low operational profit. The unique coverage here varies between 0.03 and 0.05, which means that only a small portion of all cases are explained by these individual solutions. However, for our research the consistency of the solutions is far more important than the coverage of the solutions, as we are more interested the ways to achieve the high operational profit than the amount of companies a solution covers.

In this report the size of the firms is not taken into account. The size of the firms could be an important part of the configuration for high operational profit. One could argue that a big firm could make more profit than a smaller company. This could also explain the diverse condition composition of firms in both configurations for high operational profit. When a company is big it is more likely they have more employees working for them in different functions. For example, a company with just two architects has less need for a secretary than a company with 30 or more architects.

Further research

In future research the diffusion of the company size could be fixed by creating focus groups of different sized firms. For example by creating three groups; one for large firms, one for medium firms and one for small firms. This could also be a variable in a fsQCA analysis if the size of the research group is big enough. This way it could be observed whether the results of this research will still stand or that the size of firms has too much influence in this research.

Overall, we can see the QCA method can be useful for the research of business models. When looking at business models we can see all variables are interdependent to each other. The research method used in this research provides a configuration where the given variables are all linked with each other. When looking at future research it is most important to define the right variables and outcome variable. Next to that the analysis is mostly a tool for a general view of a business model. When looking further into, for example the score on the different attributes of a variable, this is possible but takes a lot of work because the program doesn't give the specifics of the variables. The researchers have to investigate these themselves by looking at the cases given by the program and make the analysis themselves.

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Appendix 1

Truth Table high operational profit

Variables						Consistency		
compostition	assignment	segment	sector	position	number	Raw	PRI	SYM
1	**0**	**0**	**1**	**0**	**5**	**0,91**	**0,86**	**0,86**
1	**0**	**1**	**0**	**1**	**1**	**0,90**	**0,84**	**0,84**
1	**0**	**0**	**0**	**0**	**13**	**0,87**	**0,84**	**0,84**
1	**0**	**0**	**1**	**1**	**2**	**0,86**	**0,76**	**0,78**
1	**0**	**1**	**1**	**1**	**3**	**0,86**	**0,75**	**0,75**
1	**0**	**1**	**0**	**0**	**2**	**0,84**	**0,75**	**0,75**
1	**0**	**0**	**0**	**1**	**5**	**0,83**	**0,77**	**0,77**
1	**0**	**1**	**1**	**0**	**1**	**0,79**	**0,65**	**0,65**
1	**1**	**1**	**1**	**0**	**2**	**0,76**	**0,60**	**0,60**
1	**1**	**0**	**1**	**1**	**2**	**0,75**	**0,57**	**0,57**
1	1	1	0	0	1	0,72	0,49	0,49
0	0	1	0	1	3	0,71	0,53	0,55
1	1	0	1	0	3	0,69	0,43	0,46
1	1	1	1	1	6	0,69	0,49	0,49
1	1	0	0	1	6	0,68	0,57	0,57
1	1	0	0	0	4	0,68	0,52	0,52
1	1	1	0	1	3	0,67	0,48	0,52
0	0	0	1	1	1	0,65	0,38	0,38
0	0	0	0	1	2	0,64	0,40	0,40
0	0	0	0	0	5	0,64	0,48	0,51
0	0	1	0	0	3	0,64	0,49	0,49
0	0	0	1	0	1	0,62	0,39	0,39
0	1	0	0	0	3	0,61	0,41	0,41
0	0	1	1	0	4	0,54	0,33	0,33
0	1	0	1	1	2	0,51	0,20	0,22
0	1	1	0	0	2	0,51	0,22	0,22
0	1	0	1	0	4	0,50	0,24	0,24
0	1	1	0	1	3	0,47	0,19	0,19
0	0	1	1	1	5	0,47	0,21	0,21
0	1	1	1	0	5	0,42	0,15	0,15
0	1	1	1	1	15	0,40	0,20	0,21

Appendix 2

Truth Table low operational profit

Variables						Consistency		
composition	assignment	segment	sector	position	number	Raw	PRI	SYM
0	**1**	**1**	**1**	**0**	**5**	**0,90**	**0,85**	**0,85**
0	**1**	**1**	**0**	**1**	**3**	**0,87**	**0,81**	**0,81**
0	**1**	**1**	**0**	**0**	**2**	**0,86**	**0,78**	**0,78**
0	**0**	**1**	**1**	**1**	**5**	**0,86**	**0,79**	**0,79**
0	**1**	**0**	**1**	**0**	**4**	**0,84**	**0,76**	**0,76**
0	**1**	**0**	**1**	**1**	**2**	**0,82**	**0,71**	**0,78**
0	**1**	**1**	**1**	**1**	**15**	**0,82**	**0,76**	**0,79**
0	**0**	**0**	**1**	**1**	**1**	**0,78**	**0,62**	**0,62**
0	**0**	**1**	**1**	**0**	**4**	**0,77**	**0,67**	**0,67**
0	**0**	**0**	**0**	**1**	**2**	**0,76**	**0,60**	**0,60**
0	**0**	**0**	**1**	**0**	**1**	**0,76**	**0,61**	**0,61**
1	1	0	1	0	3	0,74	0,52	0,54
0	1	0	0	0	3	0,73	0,59	0,59
1	1	1	0	0	1	0,73	0,51	0,51
1	1	1	1	1	6	0,70	0,51	0,51
1	1	0	0	0	4	0,66	0,48	0,48
1	1	0	1	1	2	0,66	0,43	0,43
0	0	1	0	0	3	0,65	0,51	0,51
1	1	1	0	1	3	0,65	0,44	0,48
0	0	1	0	1	3	0,65	0,44	0,45
1	1	1	1	0	2	0,65	0,40	0,40
0	0	0	0	0	5	0,63	0,46	0,49
1	0	1	1	0	1	0,61	0,35	0,35
1	1	0	0	1	6	0,58	0,43	0,43
1	0	1	1	1	3	0,57	0,25	0,25
1	0	0	1	1	2	0,54	0,22	0,22
1	0	1	0	0	2	0,52	0,25	0,25
1	0	1	0	1	1	0,47	0,16	0,16
1	0	0	1	0	5	0,44	0,14	0,14
1	0	0	0	1	5	0,42	0,23	0,23
1	0	0	0	0	13	0,34	0,16	0,16