Developing a robo-advisor typology - lessons from action design research at Beterinbeleggen.nl

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ABSTRACT
Robo-advisory is a fintech innovation that can potentially change the investment advisory industry by reducing service times and costs of advice. Robo-advisory may cause disintermediation in the advisory branch. This study will try to answer the following explorative research question: How can traditional investment advisors strengthen their competitive position by implementing robo-advisory systems? Three Dutch investment advisors that use robo-advisory serve as case study for this research. These companies and their customers were analysed with the Value Proposition Canvas of Osterwalder, Pigneur, Bernarda, and Smith (2014). The results of this analysis were used for an action design research conducted for Beterinbeleggen.nl, a Dutch investment advisor which does not use robo-advisors. The action design research aimed to advise Beterinbeleggen.nl on the possibilities of robo-advisory. The recommendation to Beterinbeleggen.nl contributes to practice by presenting an incremental roadmap that helps to implement robo-advisory for traditional investment advisory companies. By generalising the findings, it became viable to categorise robo-advisors. The two proposed categories are customer investing experience and technology complexity. With these two categories, four types of robo-advisory systems were distinguished, ranging from low to high levels of investing experience and complexity. The presented framework contributes to future research and practice; future research can choose and specify a robo-advisory typology to study or implement. Future research could focus on further clarifying the definition of robo-advisory and the value capture mechanisms that are needed for success.

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Keywords
Business models, Robo-advisory, Value proposition, Value creation, Value capture, Value proposition canvas, Action design research, Fintech

11th IBA Bachelor Thesis Conference, July 10th, 2018, Enschede, The Netherlands.

1. INTRODUCTION

This research explores robo-advisory solutions for investment advisory services. The goal of this study is to clarify the robo-advisory concept to guide future research.

1.1 Fintech

The firms in the financial services industry are primarily active in retail banking, commercial lending, insurance, credit cards, mortgage banking, investment advisory and asset management (Hatzakis Emmanuel, Nair Suresh, & Pinedo, 2010). In the last quartile of 2017, the financial services sector contributed 13.7% to the gross domestic product (GDP) in the Eurozone (Eurostat, 2017a) and employed approximately 2.6 million people in Europe (Eurostat, 2017b).

New technological innovations and digitalisation impact the financial services industry, often referred to as financial technology or fintech (Haddad & Hornuf, 2018). These developments are called a fintech revolution by some authors (Gomber, Kauffman, Parker, & Weber, 2018; Jiang, Ho, Yan, & Tan, 2018; Mackenzie, 2015). However, the term fintech is still ambiguous. Most often it is referring to innovative start-ups or technology companies offering a financial service in an innovative manner. In other cases, the term refers to innovative business models and emerging technology that can change the financial industry (Minto, Voelkerling, & Wulff, 2017). For this paper, the term fintech describes emerging technology that can be used by financial service companies to offer new services and adapt their business model.

The total investment in European fintech companies in the last quartile of 2017 totalled $2.05 billion across 94 companies (KPMG, 2018). Fintech changes the financial services industry through three main pillars; technologic innovation, process disruption and services transformation. Technological innovations like blockchain payments or cloud-computing are developing at a fast rate and influence the financial sector. Next to that, processes of financial service providers are disrupted by emerging fintech innovations. Financial institutions must find ways to adapt to technology without losing their core value proposition. Lastly, financial services need to transform to adapt to these technological innovations and process disruptions (Gomber et al., 2018; World Economic Forum, 2017).

According to PricewaterhouseCoopers (2017), 88% of the financial services executives believe that parts of their business are at risk to fintech companies. When asked what areas are most important to keep customers, the executives place ease of use and intuitive product design first. Adapting a product better to customers to enhance ease of use may be vital to surviving for the financial service industry.

The fintech trend is generating a disintermediating effect. Disintermediation is the removal of a third-party barrier. This removal may speed up communications and services and reduce costs (Nordin, Brozovic, & Holmlund, 2013). For instance, in the banking sector, online platforms for lending make it possible for individuals and business to lend to each other without a mediating bank between them (PricewaterhouseCoopers, 2016). The investment management and advice sector appear to be less at risk for fintech than other financial sectors like payments, personal finance and fund transfers (PricewaterhouseCoopers, 2017). Nevertheless, the disintermediating effect of certain fintech may still influence the future of the sector. According to PricewaterhouseCoopers (2017), robotics process automation is perceived as one of the leading technologies that executives plan to invest in.

1.2 Robo-Advisory Systems

Investment advice is the provision of personal recommendation to clients concerning transactions relating to financial instruments (Salo & Haapio, 2017). A fintech innovation in the investment advice sector is robo-advisory. Robo-advisors give customised advice to customers through an online platform. Based on information provided by the customer, like age, risk aversion, income and investment goals, the robo-advisor can advise to invest in a customised portfolio. Some robo-advisors are entirely automated, and some enable human-to-human interaction at some stage. The robo-advisory system can use customer information, market-algorithms, mathematical rules and internet information to give advice (Minto et al., 2017; Salo & Haapio, 2017). Not all robo-advisory systems that are offered are highly advanced. Some only ask for customer information to be able to choose between predefined portfolios. Since the technology used for robo-advisors is diverse, it may be best to use a broad definition for this study. Robo-advisors are investment advisory services that provide advice to customers with minimum human interaction.

Robo-advisors may have a disintermediating effect on the investment advisory market. A broker can offer a robo-advisor, which bypasses the traditional advisory firms. This way, costs can be saved, customers get personal advice adapted to their needs, and the service is free from time and place constraints (Salo & Haapio, 2017). Although the robo-advisory trend is recognised as promising (PricewaterhouseCoopers, 2017), there are some issues. The European Supervisory Authorities (ESAs, 2015) have expressed several concerns with robo-advisors. They argue that traditional advisors explain about their advice, which is something a robo-advisor does not do. Consumers may have a limited understanding of the advice that has been given to them by a robo-advisor, which may result in bad decision making. Consumers also have a limited understanding of how a tool works and how the information they give about themselves may alter the advice (ESAs, 2015). It may be an opportunity for traditional advisory firms to offer a robo-advisor in combination with human-to-human advice. By offering a robo-advisor, they reap the benefits of low costs and flexible service, while at the same time giving the customer the benefits of human-to-human advice.

1.3 Research Introduction

This research explores how traditional investment advisory companies can improve their competitive position by implementing robo-advisory systems. A competitive position is the position a firm occupies in a market relative to competitors. The market position is determined by advantages that the firm has over competitors (Fjeldstad & Ketels, 2006). According to Porter (1985), competitive advantage grows when created value exceeds the costs of value creation. The advantage over competitors can be achieved by providing products or services cheaper than competitors or by providing a better product or service (Porter, 1985). The focus of the research is on business models, and in specific value creation and value propositions.

This research is relevant because robo-advisory is a recent topic which has not been studied much before. The Web of Science database returns three results when there is searched for papers with "robo advisor" in their title. Robo-advisory can become a trend in investment advisory and will need to be defined better to aid future research.

First, a literature review on business models will be conducted to be able to define the concept and choose a framework for this research. Secondly, the chosen framework will be applied to several Dutch investment advisory companies that use robo-

advisory systems. Lastly, an action design research approach will be applied to a traditional Dutch investment advisory company. The action design research will focus on how this traditional advisor can benefit from implementing a robo-advisory system.

This study will try to answer the following explorative research question: How can traditional investment advisors strengthen their competitive position by implementing robo-advisory systems? To answer this question, a way to implement robo-advisory systems should be presented with the help of a roadmap. Aside from answering the research question this research aims to contribute to future research by clarifying the robo-advisory concept from a business model perspective.

2. THEORETICAL FRAMEWORK

2.1 Business Models

2.1.1 *The Rise of the Business Model Concept*

The term 'business model' was first used in an academic article by Bellman, Clark, Malcolm, Craft, and Ricciardi (1957) (Wirtz, Pistoia, Ullrich, & Göttel, 2016). The term is mentioned only once in the article and appears to be defined as a representation of reality, a model of the real world (DaSilva & Trkman, 2014). Until the 1990s, the term business model is only used a few times, mainly in the context of information technology. In the 90s the popularity of the term in academic literature rose together with the technologic advancement of the internet (Osterwalder, Pigneur, & Tucci, 2005). The term business model spread to various research communities (marketing, purchasing, strategy, computing, investments, etc.) in this period (Ghaziani & Ventresca, 2005). Some authors ((DaSilva & Trkman, 2014; Wirtz et al., 2016)) claim that the term 'business model' rose in popularity together with technologic innovation because it explains how technologic innovation manifests itself in business. However, there is no strong evidence supporting these claims, only the correlation of the usage of the term 'business model' in academic articles and the trendline of the NASDAQ-index[1] is given as evidence for the link between technologic innovation and business models. DaSilva and Trkman (2014) argue that in the dotcom-period (1995-2000) the term business model was used as a buzzword. The business model hid the lack of strategy and poor revenue models of internet-companies. In 2000, the dotcom-bubble started to burst, and many internet-companies went bankrupt. However, the term business model did not die together with the companies that used the term. In the period 2001-2006 the number of papers in the Web of Science database with 'business model' in their title remained relatively stable. After 2006, the number of articles in the Web of Science database with 'business model' in their title grew, see figure 1.

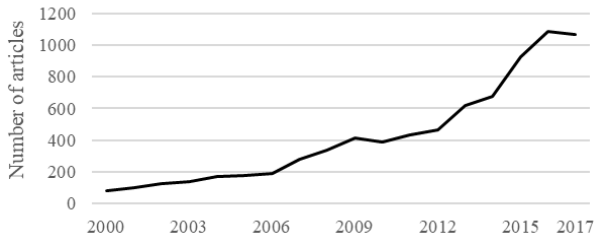

Figure 1. Number of articles published on business models.

The generalisation of usage can explain this rapid increase, authors applied business models to general business instead of only applying them to internet-companies (DaSilva & Trkman, 2014). Next to that, the fast development can be explained by the diversification of usage; business models have been used in management, political science, biology and macroeconomics (Ghaziani & Ventresca, 2005).

2.1.2 *Categorising and Defining the Business Model Concept*

The term 'business model' has been mistakenly used by academics as substitute for other popular management terms like 'strategy', 'business concept', 'revenue model', 'economic model' and 'business process model' (DaSilva & Trkman, 2014; Magretta, 2002). This confusion may be linked to the early stage of academic research the concept of business models is still in. Researchers do not entirely agree on the definition of business models and the components out of which a business model is built up. Last 15 years, various authors tried to come up with a definite answer to the question of what business models are and what they are comprised of. Because many authors tried to come up with an answer, there are many different definitions and frameworks. The business model landscape seems scattered (Baden-Fuller & Morgan, 2010; George & Bock Adam, 2011). Several authors tried to give an overview of the academic business model landscape in the past years. These papers often categorise the different definitions and frameworks. Christoph Zott, Amit, and Massa (2011) divide the literature in three silos of interest, which are (1) e-business and the use of information technology in organisations, (2) strategic issues, and (3) innovation and technology management. Inside these silos, definitions and frameworks have specific shared characteristics. In the e-business silo, scholars try to understand how internet-based companies work and what role they play in their ecosystems. To be able to understand these internet companies, scholars tried to make generic e-business models. In the strategy silo, the literature addresses four aspects: value creation, value capture, the relationship between firm performance and business models, and the distinction between business models and other strategy concepts. In the innovation and technology management field, the business model is seen as a mechanism that connects the innovative technology of companies with customer needs and resources of other companies (Christoph Zott et al., 2011).

As Achtenhagen, Melin, and Naldi (2013) mention, the inconsistency in the business model concept may not be a problem, as business models can be used in multiple ways, as presented by Baden-Fuller and Morgan (2010). Three modes of use are distinguished, namely (1) business models as a description of typical kinds of organisations and behaviours by firms, (2) business models as a model for investigating how and why business can be successful and (3) business models as recipes for managers on how to conduct business. The first mode of use, describing typical kinds of organisations, is a way to classify organisations and to distinguish and sort them. There is no fixed number of kinds or labels, but some examples are firm structure, firm governance, firm strategy and tactics and interdependency between firms. The second mode of use, as model for investigation, helps to find out how and why business is successful through modelling the reality and experimenting with these models. Baden-Fuller and Morgan (2010) compare this with the way biologists use model organisms to learn more about life. The biologist experiments in a lab on, for example, a mouse, to learn more about mice in general or even about mammals. This process of studying a single case to learn more about the broader reality can also be applied to business models. Lastly, the mode of business models as recipes can help to

[1] NASDAQ is an American stock exchange. The NASDAQ-index displays the weighted performance of all listed companies on the exchange. Companies on the NASDAQ exchange are mainly technology-based. ("About NASDAQ, Inc.," n.d.)

Table 1. Summary of the business model literature field.

Authors	Definition	Components	Silo of interest	Mode of usage
Al-Debei & Avison (2010)	*A conceptual coherent framework that provides a holistic but abstract understanding of the underlying business logic of an organisation.*	Value proposition, value architecture, value finance and value network.	Strategy	Investigation/Recipe
Baden-Fuller & Haefliger (2013)	*A system that solves the problem of identifying who is (or are) the customer(s), engaging with their needs, delivering satisfaction, and monetising the value.*	Value creation and value capture.	Innovation and technology management	Investigation
Casedusus-Masanell & Ricart (2010)	*Concrete choices and the consequences of these choices.*	Strategic choices, value network, capture value, create value.	Strategy	Investigation/Recipe
Chesbrough & Rosenbloom (2002)	*The heuristic logic that connects technical potential with the realisation of economic value*	Value proposition, market segment, value chain, revenue, costs, value network and competitive strategy	Innovation and technology management	Investigation/Recipe
Demil & Lecocq (2010)	*The way activities and resources are used to ensure stability and growth.*	Value proposition, resources, revenue and costs.	Innovation and technology management	Investigation/Recipe
Fjeldstad & Snow (2018)	*How a firm creates value for customers and appropriates value by performing its activities efficiently and effectively./How a firm modifies the elements of its business model over time in order to adapt to changes and disruptions in its environment.*	Customers, value propositions, product/service offerings, value creation mechanisms, and value appropriation mechanisms.	Strategy	Investigation/Recipe
Foss & Saebi (2018)	*The architecture of the firm's value creation, delivery and appropriation mechanisms.*	Architecture of relationships between creating, delivering and capturing value,	Strategy	Investigation/Recipe
George & Bock (2011)	*The design of organisational structures to enact a commercial opportunity.*	Value creation, value capture and resources.	Strategy	Investigation
Magretta (2002)	*The business model tells a logical story explaining who your customers are, what they value, and how you will make money in providing them that value.*	Value creation and value capture.	Strategy	Recipe
Osterwalder et al. (2005)	*A conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm.*	Value proposition, partners, activities, resources, customers, channels, costs and revenue.	Strategy	Investigation/Recipe
Teece (2010); Teece (2018)	*Architecture of the value creation, delivery, and capture mechanisms a firm employs. How a firm delivers value to customers and converts payments into profits*	Value creation, value capture, revenue and costs.	Strategy	Describing kinds of organisations
Wirtz et al. (2016)	*A simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company's value-added component.*	Value creation, market segment, revenue, resources, strategy.	Innovation and technology management	Investigation/Recipe
Zott & Amit (2010)	*A system of interdependent activities that transcends the focal firm and spans its boundaries.*	Content, structure, governance, novelty, lock-in, complementarities and efficiency.	Strategy	Describing kinds of organisations

describe and distinguish the types of business behaviour and how companies fit into these types. Business models can show how business was previously conducted and how new business can follow these tried and tested business models (Baden-Fuller & Morgan, 2010).

2.1.3 *Review of Business Model Literature*

Several authors, for example Al-Debei and Avison (2010); Baden-Fuller and Morgan (2010); DaSilva and Trkman (2014); Foss and Saebi (2018); Saebi, Lien, and Foss (2016); Wirtz et al. (2016); Christoph Zott et al. (2011), have recently done a review of the business model literature. Most of the times these authors state the definitions that several relevant authors have for business models, Wirtz et al. (2016) also do a review of the different components that authors assign to business models. However, few of them tried to classify the literature in predefined classes, like the silos of interest of Christoph Zott et al. (2011) or the modes of usage of Baden-Fuller and Morgan (2010). It can provide useful to categorise literature in these two classes. Firstly, the silo of interest a paper is written in can give an indication on how a certain definition or framework has been developed. Next to that, this classification can help to find differences and similarities between papers (Christoph Zott et al., 2011). Secondly, the modes of usage can help practitioners and

scholars to know what definitions and components of business models are relevant for their management practices or research (Baden-Fuller & Morgan, 2010). Table 1 summarises the definition and components recognised by various authors and classifies these papers in the silos of interest and modes of usage. This review of business model literature was not conducted systematically. Papers have been selected based on journal quality and citation score. Many papers were published in Long Range Planning, which had special issues on business models in 2010 and 2018. The basic selection method increases the chance of selection bias. However, the goal of this review is not to visualise an integral picture of the business model literature. The goal of the review is to find a consensus on business model definitions and components.

Although table 1 does not depict all the business model literature, the result can indicate how the business model concept is developing. As Wirtz et al. (2016) already noted, the earlier literature mainly used business models in the information technology and e-business sectors. After 2000, the focus of the literature shifted to a strategy perspective. This notion is reflected in table 1. Since the oldest paper in the review is dating from 2002, there are no papers categorised in the e-business silo of interest. Academic research is currently focussing on strategy and technology concerning business models.

From table 1 it appears that definitions are diversified. Some authors give abstract and broad definitions (Al-Debei & Avison, 2010; Chesbrough & Rosenbloom, 2002; George & Bock Adam, 2011; C. Zott & Amit, 2010) were others give practical and detailed definitions (Fjeldstad & Snow, 2018; Magretta, 2002; Osterwalder et al., 2005; Teece, 2010, 2018). Authors do seem to agree somewhat that a business model gives information about the business, value proposition and value capturing mechanisms of a firm.

The mode of usage that scholars have based their framework on is not diversified. Some authors (Teece, 2010, 2018; C. Zott & Amit, 2010) are aiming to describe kinds of organisations with the use of their business models. However, their definitions and components do not see to deviate from the authors that developed a framework to help investigation and practice to analyse and construct business models.

As with the definitions, the components of business models are also diversified across the literature. The 13 reviewed papers gave 27 different components for business models. The most mentioned components are value creation, value capture and value proposition; these terms were specified by at least 50% of the authors. Since these terms were mentioned most often, it appears that they are the core components of business models. Probably a business model is more than only value creation, value capture and value propositions. However, authors do not agree on additional components for business models. Therefore, it can be challenging to research business models as one concept. Until there is consensus on the elements of business models, it may be appropriate to focus on specific components.

In the next subsections, the three core components of business models are further explained, and a framework for analysing the core components is introduced.

2.2 Value Creation and Value Capture

As by the definition of Teece (2010), a business model is an architecture of value creation and capture mechanisms. A mechanism is a process, technique or system of parts for achieving results (Merriam-Webster Online, 2018). Foss and Saebi (2018) indicate that an architecture is not a list of value mechanisms. It is the relations between the mechanisms that create an architecture.

Value creation is a shared process of production between the firm, customers, suppliers and partners (Fjeldstad & Snow, 2018; Hienerth, Keinz, & Lettl, 2011). This shared process, also called co-production, results in a process were members of the co-production process collaborate to create products and services (Fjeldstad & Snow, 2018; Vargo, Maglio, & Akaka, 2008). The focus of value creation is on increasing benefits to customers (Priem, Wenzel, & Koch, 2018). To increase these benefits, the firm must execute specific activities from the value chain. A value chain is a set of chronologic actions co-production members take to contribute to value creation (Hacklin, Björkdahl, & Wallin, 2018). Primary actions in a traditional value chain are inbound logistics, operations, outbound logistics, marketing, sales and service (Porter, 1985). The value chain is not applicable to contemporary companies which do not have physical dimensions (Peppard & Rylander, 2006). Value networks are better suited to modern companies. A value network is a structure of actors who co-produce, exchange service and co-create value (Lusch, Vargo, & Tanniru, 2009).

After the value has been created, the members of the co-production process must capture the value. Value capture focusses on transferring the created value for customers to value for the firm, expressed in profits (Priem et al., 2018; Teece, 2010). Value capturing is not always as simple as charging for a particular product or service. For instance, Goldman Sachs had developed a complex debt instrument which was not profitable as is. Goldman Sachs had to develop the Goldman app to be able to offer the debt instrument to customers and charge them for the usage (Demos & Hoffman, 2016; Teece, 2018).

The activities involved in value creation and value capture mechanisms, the linkage between these activities and who performs them are constructs of the value network (C. Zott & Amit, 2010). The value network framework could be a valuable tool to analyse value creation and capture mechanisms. However, this research aims to also include the value proposition in the analysis. It may be complicated to integrate the value proposition to customers into a value network analysis. Possibly a different framework that integrates the analysis of value creation, capture and value propositions in one tool suits better to this research. Analysing the three components together may return different results than analysing the components apart since the combination of value creation, value capture and value propositions is crucial to a firm (Fjeldstad & Snow, 2018).

2.3 Value Proposition

A value proposition or customer value proposition is a statement that indicates what customers value (Fjeldstad & Snow, 2018). Value propositions are part of the value creation. For this research, it may be helpful to focus on the value proposition to customers since robo-advisory is a relatively new technology. Little research has been done on how robo-advisory systems can be adapted to enhance customer value.

Johnson, Christensen, and Kagermann (2008) define a value proposition as a way to create value for customers, a way to help a customer to get an important job done. When it is clear what job needs to be done, the offering can be designed (Johnson et al., 2008). Value propositions can be developed with different perspectives. A value proposition can be (1) a value offering to customers produced by the producer, (2) a value offering to stakeholders other than customers, e.g.: a value proposition to attract new employees, (3) a value proposition that is created by the producer together with the customer (Ballantyne, Frow, Varey, & Payne, 2011).

A tool that can be used to analyse the value network and the value proposition of a firm is the Value Proposition Canvas by Osterwalder et al. (2014). This tool was designed for managers to analyse their company and its customers. The tool was designed to fit with the popular Business Model Canvas by Osterwalder and Pigneur (2010). The Value Proposition Canvas helps to understand and communicate value propositions. There is plethora literature on the canvas to further develop an understanding of the concept. Opposing the value chain of Porter (1985), the value proposition canvas can fit service companies as well as production companies.

There are drawbacks to using the Value Proposition Canvas for this research. The Value Proposition Canvas was designed for practitioners to design their value proposition. The framework has not been designed to analyse already existent products and services.

The Value Proposition Canvas has got two sides; the customer profile and the value map.

2.3.1 *Customer Profile*

The customer profile consists of customer jobs, customer pains and customer gains (Osterwalder et al., 2014).

Customer jobs are the tasks, problems and needs of a customer. A customer job can be functional, social, personal or supporting. Functional jobs are tasks that need to be completed. Social jobs have the goal to look good or gain power and status. Personal jobs, also called emotional jobs, are intended to find a particular psychological state, such as feeling good and secure. Supporting jobs are involved with buying and consuming value as a buyer, co-creator or transferrer. Customer jobs have different levels of significance to the customer (Osterwalder et al., 2014).

Customer pains are anything that annoys a customer before, during or after a job. Pains can also be risks related to not getting a job done. Osterwalder et al. (2014) indicate that a comprehensive analysis includes three types of pain; undesired outcomes, obstacles and risks. Undesired outcomes are functional pains closely related to a customer job. Obstacles are pains that prevent a customer from doing a job or slow them down. Risks are similar to undesired outcomes, with the difference that risks are only potential outcomes (Osterwalder et al., 2014).

Gains describe the outcomes and benefits that are desired by a customer. There are four distinct types of gains; Required gains, expected gains, desired gains and unexpected gains. Required gains are crucial to the customer, without these, a product or service would not work for the customer. Expected gains are essential gains that are expected, but a product or service could function without them. Desired gains go beyond expectation. A customer would like to have these gains and is aware of them. Nevertheless, a customer can be happy with a product without the desired gains satisfied. Unexpected gains are gains that a customer did not think of before (Osterwalder et al., 2014).

2.3.2 *Value Map*

The value map consists of products and services, pain relievers and gain creators (Osterwalder et al., 2014).

The products and services section is a summation of all products and services the company offers. These products and services help a customer to complete their jobs. Products and services do not create value on their own; the link with the customer is crucial (Osterwalder et al., 2014).

Pain relievers reduce or alleviate customer pains. These relievers specifically describe how a customer pain can be dealt with. It is not necessary to come up with a reliever for every pain. It is only important to relieve the pains that are crucial to a customer (Osterwalder et al., 2014).

Gain creators describe how outcomes and benefits that customers want are created. Similar to pain relievers, gain creators do not necessarily address every customer gain (Osterwalder et al., 2014).

3. METHODOLOGY

3.1 Case Study and Action Design Research

To explore the opportunities for traditional investment advisors to implement robo-advisory systems, four case studies are conducted. Case studies help to study a phenomenon in a real-life context (Yin, 2009). The leading case is undertaken at a traditional investment advisor called Beterinbeleggen.nl. This leading case is compared with three Dutch investment advisors that already implemented a robo-advisory system. The Value Proposition Canvas can be used as a tool for cross-case analysis. The framework aids to construct validity; it helps to identify the correct measures for this research. External validity, the generalisability of findings, can be challenging for case studies in general. That is why multiple companies are compared so that it becomes clearer how findings can be generalised (Yin, 2009). The last issue for case studies according to Yin (2009) is reliability. He argues that to raise the reliability, the data collection method is most important in a case study protocol (Yin, 2009). Data will be collected with the help of several interviews with the founders of Beterinbeleggen.nl and by using online available information on the other case companies.

The case companies are selected on several criteria. The goal of selection was to find similar companies to raise the internal validity of the comparative study. Since Beterinbeleggen.nl is Dutch, the other case companies need to be Dutch as well to better assess the competitive market these companies operate in. Beterinbeleggen.nl was founded in 2007, the other case companies need to be of similar age. The last criterium is that, apart from Beterinbeleggen.nl, the case companies need to employ some sort of robo-advisor. Because robo-advisors are not common in the Netherlands, these criteria are enough to select a limited number of companies that fit to the case study.

The case studies contribute to the action design research approach applied to Beterinbeleggen.nl. Action design research addresses a situational problem in a specific organisation, in this case, Beterinbeleggen.nl. The goal of action design research is to solve the problem of the situational actor and draw generalisable findings from the solution (Sein, Henfridsson, Purao, Rossi, & Lindgren, 2011). The approach can be compared to a consultancy project from which generalised outcomes are drawn. Authors often make a difference between action research and design research. For this research, a combination of both methods will be used, as described by Collatto, Dresch, Lacerda, and Bentz (2018). This approach does not only focus on actions and solving problems but also on designing a solution (Collatto et al., 2018).

In the next sections, the application of the Value Proposition Canvas will be further elaborated. After that, the case companies are introduced.

3.2 Analysing the Value Proposition

The Value Proposition Canvas combines the customer perspective and the firm perspective on the value proposition, value creation and value capture mechanisms. The Value Proposition Canvas, in combination with the instructions for usage by Osterwalder et al. (2014) will be used for this research.

Firstly, the customer is analysed. Osterwalder et al. (2014) indicate that it is a mistake to mix several customer segments. It is best to analyse the customer segment once, while at the same time indicating possible differences between customers. After the customer analysis, the case companies and their current fit with the customer will be analysed. At this point, the framework by Osterwalder et al. (2014) is not entirely adhered to. The framework has been designed to analyse the customer and then design the company value offering accordingly. For this research, the customer analysis is done once, and the case company current value offerings are analysed aside from that. Pain relievers and gain creators will not be based on the customer analysis but will be derived from the products and services the case company offers. This change in method is essential because the framework is not only used to find a solution, but also to analyse the current situation.

3.3 Introduction to Case Companies

3.3.1 *Beterinbeleggen.nl*

Beterinbeleggen.nl is a Dutch online investment advisor. The company is chosen as main case study because it is a traditional investment advisory firm that considers implementing robo-advisors to create more value. The platform advises with a value investing philosophy. Value investing is investing in an undervalued stock that is expected to become worth more over a more extended period (La Porta, Lakonishok, Shleifer, & Vishny, 1997). Although Beterinbeleggen.nl provide service only via the internet, the company is considered a traditional investment advisor since no robo-advisory technology is used. Beterinbeleggen.nl uses a freemium model to attract customers. They provide blog posts and an e-book on value-investing for free. When customers want access to their market analysis, they have to pay an annual fee. Customers can choose between four different memberships. The basic membership gives access to a yearly report with an analysis of eight value stocks. The memberships above the basic membership give access to monthly analyses of value stocks and access to information of an investment portfolio held by Beterinbeleggen.nl ("Abonnement overzicht," n.d.). The platform Beterinbeleggen.nl is owned by Kingfisher Capital, which was founded in 2007. Beterinbeleggen.nl has currently got 30,000 subscribers to their weekly ValueLetter, a weekly column about value investing (Kijl, personal communication, May 3, 2018).

3.3.2 *Doelbeleggen*

Doelbeleggen is a Dutch investment advisor and portfolio investor. Doelbeleggen is chosen as case company because it integrates a robo-advisor in its full-service. The robo-advisor is simple but is able to adapt advice to stock market circumstances. The Doelbeleggen platform was launched in 2016 by Velthuyse-Mulder, a Dutch wealth management company. Doelbeleggen provides a tool for customers on their website. A customer fills in their investment goal, inlay and time in which they need to reach the goal. The tool then gives instant feedback on the feasibility and risk of the investment. Next to that, the tool advices which of the five portfolios that are held by Doelbeleggen are suited best to the customer. The customer can track its investment with a dashboard on the Doelbeleggen website, which provides information on the performance of the portfolio ("Hoe werkt het?," n.d.). This kind of technology uses minimal to none human-to-human interaction so can be defined as robo-advisory.

3.3.3 *Semmie*

Semmie is a Dutch investment advisor and portfolio investor that uses robo-advisory systems. Although Semmie offers a similar service as Doelbeleggen, the case can still be useful since Semmie serves a different customer group. The website was launched in 2016. On the Semmie website, a tool is provided that asks how much a customer wants to invest and how much risk a customer is willing to take. The tool then provides an estimate of the result and an overview of the fees that must be paid. Semmie provides three different portfolios, all with different risk levels. Customers can track the performance of their portfolio with a dashboard on the Semmie website ("Beleggen met Semmie," n.d.).

3.3.4 *Beleggingsmatch*

Beleggingsmatch is a Dutch investment advisor founded in 2013. The company is chosen as case because it offers a different service and a different type of robo-advisor than Doelbeleggen and Semmie. The website provides customers with personalised advice about which wealth manager or broker suits them best. A robo-advisor does the advice. Beleggingsmatch uses a tool that asks for the customers' investment goals, preference for trackers or funds, preference for additional services and risk aversion. Then the tool gives advice on which brokers or wealth managers fits best to the customer. The tool gives the opportunity to compare three brokers or wealth managers. This comparison is sent via mail. Next to this tool, Beleggingsmatch offers another tool that gives personal advice. The tool asks more questions about the demands of the customer. After completion of all the steps, the customers get a full report with comparisons between wealth managers or brokers. Beleggingsmatch earns money in two ways. The core service is offered for free, but customers can get additional advice for which they need to pay. Next to that, brokers and wealth managers pay for the referral of customers from Beleggingsmatch to their website ("Zo werkt Beleggingsmatch," n.d.).

4. ANALYSIS

4.1 Customers

4.1.1 *Customer Segment*

The customer segment of the case companies can be divided into three age groups. The first group is approximately 20 to 40 years old, the second group is currently 40 to 55 years old, and the third group is 50 to 70 years old. These groups are respectively called generation Y or millennials, generation X and baby boomers (Schroer, 2004). The median income in the Netherlands is €24,700 per year (CBS, 2018). Customers are expected to earn more than the median. They want to use their resources to create more wealth for themselves in the future, and they think that stock trading can be a way for them to create more wealth. Some customers have in common that they do not have expertise in stock trading and they do not have the ability or time to become more knowledgeable. Some customers might know about stock trading but want to have a second opinion or do not want to put effort in stock trading. The customers have different levels of risk aversity. It is expected that older customers have higher risk aversion (Albert & Duffy, 2012).

For the validity of this research it is necessary to be more specific about the customer segment. The current customer base of Beterinbeleggen.nl consist of mainly baby boomers (Kijl, personal communication, May 3, 2018). This segment has got enough time and money to invest and pay for the advice by Beterinbeleggen.nl (Oude Nijhuis, Personal communication, June 6, 2018). Although it may be easier to tailor a new product or service to the current customer base, it may not be the best way. Younger generations will become wealthier in the future. Next to that, younger generations are less likely to use traditional financial advice like their parents did. They have less trust in human advice and believe that fintech solutions can give cheaper and more accurate advice (Kerr, B., & Silver, 2016).

Beterinbeleggen.nl currently markets their service to customers who already have knowledge about investing. Other Dutch advisory companies already have a solution for unskilled investors. To successfully market a new robo-advisor, it may be best to target the more skilled and knowledgeable investor since the competition for this customer is lower. Retaining the experienced customer group, instead of acquiring a customer group that is less knowledgeable about investing may be cheaper since less adaption of the current services will be needed (Gallo, 2014). The analysis will focus on Dutch customers between 20 and 40 years old, with medium to high income and medium to high interest for and knowledge about investing. Because of the medium to high knowledge about investing, it is expected that most of these customers invested before and already have a broker.

4.1.2 *Customer Profile*

4.1.2.1 Customer Jobs

To make the right investment decisions, a customer will need to analyse the current market and find promising companies. After the analysis, the customer will need to pick a share that is expected to yield enough for the risk that is taken. The goal of this analysis and picking process is to increase wealth.

4.1.2.2 Customer Pains

Analysing the market and finding promising companies is a task that the customer can do. However, it takes much time to find the right investment, and the customer has not got a second opinion on the investment. Next to that, it is sometimes hard to get all available information on companies to make a thorough risk assessment. The customer may feel insecure or confused about the choice he or she must make. A vital characteristic of the younger generation is that they do not want to wait for advice, they want a fast and straightforward solution, preferably online (Kerr et al., 2016).

4.1.2.3 Customer Gains

Making the right investment decisions can have a positive influence on the customers status within the investment world. Next to that, the wealth of the customer will increase when a right decision is made. The customer will feel more secure about next investments when the previous investment yielded the expected amount of money.

In the next sections, the firm's current value offering is explored. The value map of a company can help to analyse fit with the customer.

4.2 Beterinbeleggen.nl

4.2.1 *Value Map*

4.2.1.1 Products and Services

Beterinbeleggen.nl provides their services through a freemium model. Customers can download a free e-book or audiobook about value investing. Next to that, new customers can subscribe for a ValueLetter, which is a weekly mail with updates on the stock market. A customer can receive more advice by getting a subscription on one of the four packages. Each package unlocks more advice and analyses. The first package, called Aandelen2018, gives access to an annual report on eight promising shares for the respective year. The eight selected companies are analysed on business model, competitive position, appreciation, threats and opportunities and management style. With this analysis a customer can decide if the selected shares are interesting to invest in. The second service, called ValueSelections, gives access to a monthly analysis of three promising companies. These companies are analysed in the same way as in the Aandelen2018 report, but now monthly. This subscription also gives access to all previous ValueSelections analyses. The third subscription, ValuePortfolio, gives insight into a model portfolio which is administered by Beterinbeleggen.nl. The model portfolio started with €100,000 and has a goal to reach €1,000,000. The portfolio is managed with a predefined strategy, based on value investing philosophy. Customers have full insight on the shares and profitability of the portfolio. Every report includes an overview table with metrics like exchange rate, yield and dividend. Next to that, customers get a monthly update on the developments of shares. When shares are bought or sold, customers are notified and the respective buy or sell decision is reasoned. Customers have full access to transaction information since the start of the portfolio in 2009. The fourth and last subscription, called ValueFormula, delivers a similar service to the customer as ValuePortfolio does. However, the ValueFormula is administered with a different strategy. Shares are systematically selected to be bought or sold based on several predefined indicators. In practice, ValueFormula uses a more volatile strategy than ValuePortfolio (Oude Nijhuis, Personal communication, June 6, 2018). The customer gets a quarterly report on the developments of the shares in the portfolio ("Abonnement overzicht," n.d.).

4.2.1.2 Pain Relievers

Beterinbeleggen.nl can relieve the insecurities customers have in buying shares. The services that are offered give insight in value investing. With the provided information, a customer can be more confident of success in value investing. Next to relieving from insecurity, Beterinbeleggen.nl relieves the inconvenience that customers experience when they analyse. Analysing companies is much work for an individual. Beterinbeleggen.nl relieves this pain and can save the customer much valuable time. Getting a lousy return on investment is a customer pain that is relieved by Beterinbeleggen.nl. However, the shares that are analysed are not guaranteed to live up to their expectations since the stock market can be hard to predict. Still, the pain of customers is relieved because overall, the strategy Beterinbeleggen.nl employs seems to be successful ("Resultaten," n.d.).

4.2.1.3 Gain Creators

The free e-book creates gain for customers because it gives valuable information on value investing. Because all services are online, customers can always look at analyses. They do not have to go to an ‘offline' advisor for advice. The advice is always available. Next to that, the weekly emails bring updates on the stock market without the customer making an effort to get updated. Most gain is created by the information that customers get periodically. With the information they get, a customer can decide to invest with the trust that shares are likely to be profitable. Aside from that, the positive results from investing in the ‘right’ shares are gains that are partly created by Beterinbeleggen.nl.

4.3 Doelbeleggen

4.3.1 *Value Map*

4.3.1.1 Products and Services

Doelbeleggen offers a full online service to their customers. The used technology can be defined as a robo-advisory system. The first service is an advice on the feasibility of the investment goal of a customer, called Doelmeter. Doelbeleggen asks their customers for a specific goal and their financial situation to be able to give an advice. Next service is the investment advice. Doelbeleggen does advice of an optimal mix of stocks, bonds, real estate and liquidities for the customer portfolio. When a customer agrees to this, Doelbeleggen will buy these advised assets for the customer. Customers receive a personal login to a

portfolio dashboard. This dashboard provides an overview of the stocks and their developments. The software of Doelbeleggen continually evaluates if the portfolio is still optimal for the customer demands. The optimal mix can change, or the value of the stocks can go below a threshold given by the customer. In this case, Doelbeleggen sells and buys stocks to create a new balance ("Hoe werkt het?," n.d.).

4.3.1.2 Pain Relievers

Because Doelbeleggen operates online, a barrier to customers is taken away. Customers do not have to go to an office at a specific time; they can always ask for advice. Customers might feel insecure about their investments. The Doelmeter gives real-time advice on the feasibility of the investment, which can take away the insecure feeling. With the Doelmeter, a customer can assess the risks of not getting their job done better, i.e., a customer can know how much money they will miss out on if they decide not to invest. Customers most likely have little knowledge of trading. The significant amount of information on the internet makes it hard for customers to get to know how they buy stocks and bonds. Doelbeleggen can remove this confusion and insecurity by doing the trading for the customer. Next to that, the dashboard that Doelbeleggen provides helps to inform the customer. The dashboard and the possibility to provide a certain threshold for selling stocks can take away the feeling of not being in control.

4.3.1.3 Gain Creators

Customers benefit from the online service that Doelbeleggen offers. A customer can always ask advice or check the performance of investments. The Doelmeter provides real-time advice on the best portfolio mix and gives the customers the opportunity to weigh different options considering their investment. If the optimal mix changes, Doelbeleggen will act and buy and sell parts from the portfolio. The advice on the optimal mix creates gain for the customer because it provides a tailor-made portfolio that balances risk and returns proportional to the customers' risk aversion. Lastly, the dashboard creates customer gain because it gives information to the customer in an understandable and straightforward way. The customer does not need to be an expert to understand the performance of their investment.

4.4 Semmie

4.4.1 *Value Map*

4.4.1.1 Products and Services

Like Doelbeleggen, Semmie offers a full online experience to customers. Semmie asks questions about the risk a customer wants to take and expectations on the investment. Based on this information, Semmie provides the customer with an optimal portfolio consisting of stocks and bonds. Semmie opens a bank account at BinckBank for the customer and buys the shares. A customer can monitor the investments with a dashboard on the Semmie website. Although Doelbeleggen and Semmie offer a similar service, there are some differences between their products and services. Semmie does not have a real-time instrument like the Doelmeter, so the portfolio is not balanced continuously. However, Semmie does seem to offer more personal contact by providing advice to existing customers and providing a 7-days per week service to answer questions ("Beleggen met Semmie," n.d.).

4.4.1.2 Pain Relievers

Customers do not have the barrier to go to an office; they can get advice at any place, any time. Semmie takes away the insecurity and confusion of the customer by providing a full-service; advice as well as buying stocks and bonds for the customer. The risks of investing are displayed and can be monitored by the customer. The dashboard takes away the customers insecurity of not knowing how their investments are performing. Next to that, the dashboard simplifies the information, taking away the confusion of significant and sophisticated analyses of portfolio performance. Customers might feel that a robo-advisor cannot give them genuinely personal advice (ESAs, 2015). By providing human interaction next to the robo-advice Semmie can remove the feeling a customer might have that he or she is not important to the company.

4.4.1.3 Gain Creators

Semmie creates customer gain by providing an online service that is always available to customers while at the same time providing personal advice that is almost always available to customers. This combination of fast and flexible service and human interaction display the strength of Semmie. The dashboard gives the customer a monitoring function, which makes them feel in control. The simplified dashboard makes it easy for customers to grasp the performance of their investments. The dashboard, low starting amount and clear information removes the barriers for the customer to start investing.

4.5 Beleggingsmatch

4.5.1 *Value Map*

4.5.1.1 Products and Services

Just like Beterinbeleggen.nl, Beleggingsmatch offers their services based on a freemium model. Beleggingsmatch provides free advice on two types of markets; wealth management and brokers. The recommendation is tailor-made to the customer. The customers receive a report with the three brokers or wealth managers that fit best to them. In the report, information is provided on costs, ratings, yield, etc. It is possible for customers to search for a broker or wealth manager to find a report, without use of the robo-advisor. Next to that, a customer can get a free e-book about choosing the best wealth manager. Next to this basic service, Beleggingsmatch offers “advies op maat”, which is a service that offers a more detailed tailor-made report to customers, this service is also free. If a customer doubts if wealth management is the best for him or her or that investing is a better option, a simple survey can be done to discover what fits best. Lastly, Beleggingsmatch offers paid full support to customers; they advise a customer personally and contact the party in which a customer wants to invest ("Zo werkt Beleggingsmatch," n.d.).

4.5.1.2 Pain Relievers

Beleggingsmatch is an information company; they can relieve customer pains by providing information. Customer pains associated with information can be that information is overwhelming or too complicated. Information can also be too scattered; customers might have to search for a long time to make a thorough analysis themselves. These are the kind of pains that Beleggingsmatch relives by providing information and advice on one central place. The recommendation is tailored by a robo-advisor and presented clearly in a report. With the information that Beleggingsmatch delivers, the barrier for customers to start investing becomes smaller. However, Beleggingsmatch does not offer a full-service like Doelbeleggen or Semmie.

4.5.1.3 Gain Creators

Customer gains are created by offering a quick overview that is tailored to a customer. Customers can compare wealth managers or brokers and pick the right one for them. Next to that, a customer can get an even more customised experience by using the "advies op maat” service. Customers also gain from the free e-book that helps them to choose a wealth manager. Lastly, a customer can get guidance in contacting a party in which they

Table 2. Comparison of case companies.

Company	Main Product/Service	Relieved pains	Experienced gains	Customer group
Beterinbeleggen.nl	Company analyses	Insecurity about investment, inconvenience of finding information, chance of failure	Online service, being updated, higher profits, free e-book,	Baby boomers
Doelbeleggen	Investment advice and service	Insecurity about investments, confusion caused by complex stock market, not feeling in control of own investments	Online service, automatic balancing of portfolio, tailor-made solution, simplified information on own investments	Baby boomers/Generation X
Semmie	Investment advice and service	Insecurity about investments, confusion caused by complex stock market, not feeling in control of own investments, not trusting solely on robo-advice	Online service, automatic balancing of portfolio, tailor-made solution, simplified information on own investments, low starting fee	Generation Y
Beleggingsmatch	Advice on broker/wealth manager choice	Too complex information, inconvenience of finding information	Online service, tailored advice, free e-book, guidance with big investments	Baby boomers/Generation X

want to invest. This option is for more serious investors with more resources than the average client.

4.6 Comparison of Case Companies

The analysis in the previous sections can be summarised in one table. With the help of table 2, the similarities and differences between the case companies can be easily spotted.

All case companies operate online only, with Semmie also explicitly focussing on communicating via telephone. Semmie and Doelbeleggen are similar companies. Doelbeleggen offers technology, the Doelmeter, that Semmie does not offer. In exchange, Semmie does provide more human interaction than Doelbeleggen offers. It appears that Doelbeleggen aims for a more traditional market segment, baby boomers and generation X, and Semmie for a younger market segment, generation Y. This difference shows in the way customers are addressed; Semmie actively uses social media to promote and communicate while Doelbeleggen is less active on social media but focusses more on mail contact. This is reflected by the use of social media per age group; approximately 80% of the Semmie customers are active on social media while only approximately 50% of the Doelbeleggen customers are active on social media (Pew Research, 2018). Since the companies are similar, similar pains are relieved, and gains are created for customers.

Although the four companies all offer different services, they relieve similar customer pains. Customers can feel insecure about investing, and the companies provide different remedies for this insecurity. Next to that, all companies help customers to save time and have less inconvenience. Doelbeleggen and Semmie provide a full experience from advice to investment and monitoring. Beterinbeleggen.nl and Beleggingsmatch only provide advice; they do not do the investing part for the customer. That may have to do with the market segment that Beterinbeleggen.nl and Beleggingsmatch target. Both companies focus more on giving detailed analyses to more experienced investors that already invest and have a broker.

The technology that the three robo-advisory companies employ is not complex. Most advice is based on simple databases and standardised information. The technology for robo-advisory is not always simple. Examples of more advanced robo-advisors are Wealthfront and Vetr.com, that use algorithms to give advice ("About Vetr," n.d.; "About wealthfront," n.d.).

5. ROBO-ADVISORY DESIGN FOR BETERINBELEGGEN.NL

In this section, first the requirements of the robo-advisor for Beterinbeleggen.nl will be described. Next, the new robo-advisor is described, and an incremental implementation plan is developed. Lastly, an incremental implementation roadmap is presented to guide the implementation process.

5.1 Solution Requirements

To expand the services and eventually increase the market share, it can be a good option for Beterinbeleggen.nl to target a new customer group. However, the current customer group is loyal and should not be neglected in the process of designing new services (Oude Nijhuis, Personal communication, June 6, 2018). Currently, Beterinbeleggen.nl serves one customer group, baby boomers, with one business model. To target a new customer group, a new business model will be needed. This model should be adapted to a narrow-defined customer group. The new service that Beterinbeleggen.nl will offer will need to fit the current services that are provided. Possibly the services of the current business model can be used in the services of the new business model, which will save time. The solution should relieve the customer pains and create the customer gains that were analysed in section four. It is not necessary to target all pains and gains; focussing may be critical to offering a good service (Osterwalder et al., 2014).

To relieve the customer pains and create the expected gains, the advice should be fast, detailed, and personalised. Customers expect good advice with a high chance of success. If the chances of success are lower, it should be explicitly stated. Since the

current focus of Beterinbeleggen.nl is on value investing, the new service should also stick to this strategy. The value investing philosophy may be a unique selling point.

Robo-advice may be the right practice to target the younger generation. However, advice from robo-advisors should be well-explained. As ESAs (2015) noted, a customer may not understand the advice that is given to them, which is a weakness of robo-advice. To overcome this weakness, the advice should be accompanied with enough and clear explanation on how the recommendation has been made. The new service should initially not be replacing the current services that Beterinbeleggen.nl offers, since this may scare away the existing customers. In the future, when the new service has been established, it may be possible to experiment if the service can be integrated with the current offering to baby boomers.

5.2 Solution Design

Based on the solution requirements, a design for a robo-advisor can be made. First a new tool for the current customer base can be added to add value. Based on this new tool, a robo-advisor can be implemented for a new customer group.

The new service could be implemented incrementally. The new tool for baby boomers is a simple search option to search for companies that were previously analysed. This tool is similar to the search function that Beleggingsmatch offers to their customers aside from their robo-advisor. The company reports made for ValueSelections, ValuePortfolio and ValueFormula can be used for this search option. The reports will need to be changed to be less time-bound. Later the new tool can help to make the implementation of a robo-advisor easier since company reports have already been optimised, a database of companies has been created, and the website has already been prepared for a new service.

Another addition to the service for baby boomers can be dashboards with real-time information about companies. The dashboards can be similar to those of Doelbeleggen, which uses dashboards to inform customers about the performance of their shares. These dashboards display performance indicators for companies that are live updated. Examples of performance indicators are exchange rate, intrinsic value and yield. The addition of dashboards and performance indicators can aid to easier implementation of the proposed robo-advisor because the robo-advisor will need live-data to give advice.

After these new tools for baby boomers have been added, Beterinbeleggen.nl could focus on setting up a robo-advisor. The new robo-advisor can use the technology and data of the new tools for baby boomers to do advice. Since part of the technology for the robo-advisor has already been implemented, implementation can be done faster and cheaper. The robo-advisor can initially be implemented as a completely new service. The new tool for millennials should ask the customer questions about capital and return. The aim of the questions is to know how much a customer wants to invest and what the investments goals are. The backend of the tool should contain a database with companies, which is already implemented for the search option for baby boomers. This database should be continuously updated with new data of performance indicators for a company. At first, the number of companies in the database is limited to the companies that are currently in the ValuePortfolio and ValueFormula portfolios and ValueSelections analyses. In the future, when more companies are added, possibly more questions will need to be asked to make a detailed profile of the customer and provide personalised advice. An example for expansion of the service can be advice on how a customer should divide investments between shares, bonds or savings. Beterinbeleggen.nl will need to find key indicators that may change the advice. E.g., when the intrinsic value of a company increases, this should automatically be noted and should change the advice to customers.

After the customer answered the questions, the robo-advisor gives an overview of companies that are most suited to the investment goals of the customer. This overview is similar to the overview that Beleggingsmatch gives as advice to customers. When a customer clicks on a company, a full report about the company can be reviewed. These reports are like the reports of ValueSelections. It should be apparent to the customer why certain shares are advised to him or her and how the advice changes when the customer fills in different answers. Payment structures for the new tools are relevant to the profitability of the service but go beyond the scope of this research.

The most important customer pains, analysed with the Value Proposition Canvas, can be relieved with the new tools. The dashboard with live data can reduce complexity by giving a limited overview of the most important performance indicators. The search option for company reports gives customers more insight and control over the information. The overview of companies that is given by the search option and the robo-advisor reduces complexity and confusion, by limiting information and the number of companies that are displayed (Schwartz, 2004). The questions that are asked can enable personalised advice, which positively influences the confidence of the customer about the advice and the customer loyalty (Hyken, 2017).

Later, when the robo-advisor is successfully implemented for millennials, the tool can also be added as an extension to the current service for baby boomers.

5.3 Incremental Robo-Advisory Innovation Roadmap

Although roadmaps are often graphic displays, this roadmap will be elaborated in text only. A technology roadmap presents a planning of activities in a chronological order (Phaal, 2004). The implementation was purposely designed incrementally since this is simpler and cheaper. Incremental implementation gives the possibility to offer new services to customers without the implementation wholly done (Lotfi, Sarkis, & Semple, 1998). The innovation roadmap divides work in five phases. Every phase incrementally builds on the next, so that value is added at every phase. When a phase is finished, the technology or tools that are developed can be implemented directly. This way technology and tools already deliver value without the robo-advisor completed (Lotfi et al., 1998).

Phase 1: Improve user-friendliness of company reports and make reports less time-bound.

Phase 2: Introduce live performance indicators to company reports and dashboards that display live stock information.

Phase 3: Implement a company search function to the current service.

Phase 4: Build a new website or sub-site with a robo-advisor that asks questions and based on answers and the performance indicators supplies an advice of companies to invest in. Customers can click on company reports of the advised companies.

Phase 5: After the initial implementation the robo-advisor can be rolled out to the current customer and be implemented on the current website.

6. DISCUSSION AND CONCLUSION

6.1 Constructing a Robo-Advisory Framework

6.1.1 *Categorising Robo-Advisors*

This paper set out to explore how traditional investment advisors can improve their competitive position using robo-advisory systems. The effects of robo-advisory systems on value creation and value propositions were analysed with the Value Proposition Canvas.

The definition of robo-advisory systems was kept purposely broad since there is no consensus on one definition of robo-advisors. This disagreement may have to do with the low number of papers that is available about robo-advisors and the young age of the concept. Just like business models, robo-advisory is a concept that has been developed and implemented by practitioners but has not been fully developed in academics yet. The ambiguity of the robo-advisory concept may be a threat to future research. If there is no consensus on the definition of a robo-advisor, research can disperse. As it is for the business model concept, it is crucial to find agreement.

Baden-Fuller and Morgan (2010) and Christoph Zott et al. (2011) showed how categorising literature in silos of interest and modes of usage can help to clarify the business model concept. Categorising elements of a concept can help to distinguish different types.

Since this research was focussed on value creation and value propositions, the categories for the robo-advisory concept are based on these elements. With the Value Proposition Canvas, value propositions of robo-advisory companies were analysed from two perspectives; the customer and the company. From the customer perspective, a clear difference in types of customers was discovered. In practice, robo-advisory systems are marketed to different age groups. This segmentation does not mean that there is a clear difference between used technology. The case companies distinguished themselves by using different website layouts, without necessarily using different technology for different age groups. A better way to distinguish customer groups seems the current knowledge customers have about investing. There seems to be a difference between robo-advisory systems that are targeted at inexperienced or experienced investors. Which is confirmed by the Value Proposition Canvas analysis; the full-service that Semmie and Doelbeleggen offer is not offered by Beleggingsmatch because they have more experienced customers. Inexperienced investors need a simple service that can help them through the whole process, from advice to buying and monitoring shares (Accenture, 2017). With this full-service, customers only need to do minimal effort to invest. Experienced investors often have different demands. An experienced investor often already has got a broker and does not need the full-service; an experienced investor knows how to buy and monitor shares. Experienced investors want to receive expert advice to take away their uncertainty about specific investments. Next to that, they want to receive help to analyse the current stock market (Accenture, 2017).

The second category, derived from the company perspective of the Value proposition Canvas, divides robo-advisory systems based on the technology used for a robo-advisor. As became apparent from Value Proposition Canvas analysis, robo-advisors can be simple IT-tools which use standardised questions to give personal advice. However, the technology behind robo-advisory systems can be sophisticated too, using algorithms or mathematical models that use real-time data to analyse the stock market.

6.1.2 *Developing a Robo-Advisor Typology*

In this section, four types of robo-advisors are distinguished and explained.

The two categories that were distinguished, customer investing experience and robo-advisory technology complexity, can both range from low to high. By distinguishing between low and high levels of experience or complexity, a simple matrix can be developed with four different combinations. As, for instance, Kraljic (1983) showed with the portfolio purchasing model, a matrix can be a clear and structured way to show typologies.

The two categories, customer experience and complexity of the system, help to distinguish types of robo-advisors. Figure 2 displays four different types of robo-advisors based on the two categories. Next, the four types are further explained.

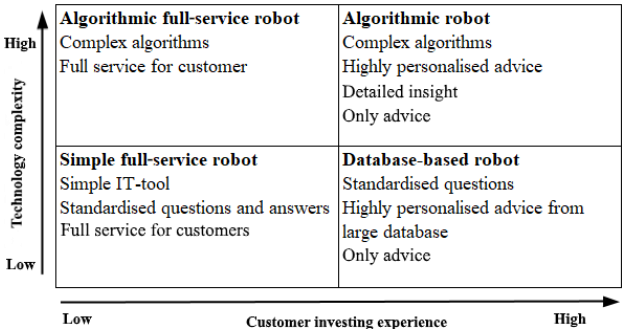

Figure 2. Robo-advisor matrix.

The simple full-service robo-advisor is a simple IT-tool which asks simple questions to inexperienced customers. The advice the customer gets is simple and not fully personalised. Probably the company only offers a limited number of choices. The customer does receive full-service. Full-service means that all aspects of the investing process are taken care of by the company, which takes away the effort from the customer. An example of a simple full-service robot is the robot that Semmie and Doelbeleggen use. As Osterwalder et al. (2014) notes, the fit between customer and company is most important for value proposition design. A fit is made by arranging the customer pains with pain relievers and customer gains with gain creators (Osterwalder et al., 2014). The simple full-service robot mainly relieves customer pains like confusion about the stock market. The robot is simple and limits information given to customers, next to that the customer only needs minimal knowledge about investing. The robot creates customer gains because it is a full-service and it is simple and fast; customers do not need to answer much questions.

Companies that offer a more complex technology to inexperienced customers use a robo-advisor that uses sophisticated algorithms, mathematical models or information from the internet to give personalised advice. Next to that, the company offers a full-service, so they also do the investing part for the customer. An example of an algorithmic full-service robot is Wealthfront. Wealthfront employs a robo-advisor that does a detailed assessment of the customer before advising specific stocks to buy. Next to that, Wealthfront acquires and manages the shares for the customer ("About wealthfront," n.d.). The customer of an algorithmic full-service robot is like the simple full-service robot, the customers have similar pains. However, to create more value, different gains are created. The difference in gains is mainly expressed in the analysis of the market and the advice. An algorithmic robot does a more complex analysis and is better able to give arguments for advice. Osterwalder et al. (2014) mention that a company can serve more than one customer with the same product or service, only the value proposition to customers will change (Osterwalder et al., 2014).

Possibly there are differences between customers of a simple full-service robot and an algorithmic robot. Customers that use the algorithmic robot may have more trust in algorithmic robots than customers that only trust a robot to choose between predefined portfolios which were composed by humans (Kerr et al., 2016).

A customer with more investing experience often needs a different type of service (Accenture, 2017). This type of customer does not only expect highly personalised and detailed advice, but also expects arguments for given advice (Accenture, 2017). Large databases with stock ratings and company evaluations which are regularly updated can be used to give personalised advice without needing complex technology. Robo-advisors need to ask more questions than the simple robo-advisor which are used for inexperienced customers to better personalise advice. Examples of questions that are only asked to experienced investors can be about investment preferences, how much money already was invested by the customer and in what business area the customer is interested. Examples of database-based robots are Beleggingsmatch and the new tool which was advised for Beterinbeleggen.nl. Value is created by delivering a simple service which is fast, while at the same time giving a well-reasoned advice. This is only possible when the company supplies the robo-advisor with enough information. Analysing the stock market and rating shares is still a human job. The database-based robot only uses the input of humans to do an advice. Value is created for the company because customer contact takes less time but can be more personalised. The expected gains of a customer are different than the expected gains of an inexperienced customer. For a different customer, a different value proposition and product or service is needed (Osterwalder et al., 2014). The experienced customer expects to get a well-reasoned advice, just giving advice is not enough because a more experienced investor has got the knowledge and skills to check if advice can be trusted (Accenture, 2017).

An algorithmic robot uses the same technology as an algorithmic full-service robot. However, the company does not offer any investing service apart from advice. The advice is highly personalised or gives a detailed insight of the stock market. An example of such a complex robo-advisor is Vetr.com. Vetr.com uses algorithms to provide star-ratings for stocks. These star-ratings are comprised of ratings provided by many individuals ("About Vetr," n.d.). Different from the database-based robot, this robot relies less on human analysis because the analysis is also done by the robot. This increases the complexity of the technology but decreases the effort for the company. The typical customer trusts robo-advice more and uses the tool as help for investment decisions (Kerr et al., 2016).

Value capture can provide more challenging to determine. Most analysed companies seem to be using a freemium model. The robo-advisor is offered for free, including the advice. Companies that target inexperienced customers then ask a fee for the rest of the service. For companies that provide a service for experienced customers, value capturing provides to be harder. Some companies only give limited free advice; more advice requires the customer to pay a fee. Other companies do not provide access to any information before payment.

6.1.3 *Theoretical and Practical Implications*

The findings of this research can be generalised and used for any research about robo-advisors. Since the matrix distinguishes typologies without being dependent on any other framework, like the Value proposition Canvas by Osterwalder et al. (2014), it can be used for a wide variety of research about robo-advisors. The matrix could add value to research about robo-advisors because it makes clear what type of robot is studied. The matrix can add value to business model research but could also be used to for research about customer behaviour, marketing, design and information technology.

The proposed framework is a first effort to clarify the robo-advisory concept. Research about robo-advisors is in an early stage. The robo-advisory matrix can be used as a framework to guide future research about robo-advisors by making a clear distinction between types of robots. By being clear about the type of robot that is studies, research can become more clear and different studies can be better distinguished.

The Value Proposition Canvas by Osterwalder et al. (2014) was not perfectly adhered to for this research; the customer perspective and the company perspective were analysed apart from each other. Normally the canvas is used to design a value proposition to a customer. So, first the customer is analysed and then the company offerings are designed to fulfil the customer needs. To be used for analysis, the canvas can be adapted. The two parts of the framework can be taken apart from each other. The company offering is then separately analysed. Products and services can simply be listed and gain creators can be based on the product and services that are provided. Pain relievers are harder to analyse in this case, so they could be replaced with a component that helps to assess value capture mechanisms. This way, it is ensured that value capture is not neglected. The customer side of the canvas can stay the same, but customer pains may play a different role in the framework since the company side does not analyses pain relievers anymore. The role customer pains fulfil is more isolated in the framework. Customer pains can now be used to understand the customer better.

Next to the theoretical implications, the framework also has got implications to practice. Practitioners can use the framework to figure out what type of robo-advisor is best suited to their company and customers. Additionally, companies can assess more easily what is needed to shift to a different customer group. The incremental implementation roadmap presented in the action design research for Beterinbeleggen.nl can be applied to other companies. The roadmap presents a way to implement a robo-advisor in such a way that value is already created early in the process. It should be noted that the incremental implementation process is designed with Beterinbeleggen.nl in mind. Beterinbeleggen.nl already has done company analyses and made reports. A start-up company that did not create value before may needs a more direct roadmap without the incremental steps to be able to start capturing value as fast as possible.

6.2 Conclusion

Robo-advisory is a promising technology in Fintech that may have the ability to revolutionise the investment advice branch. Robo-advisors can give online, personal and detailed advice to customers. The customer gets better and faster service, and companies need to spend less time on customer contact.

For this study an incremental roadmap was made that can be used for traditional investment advisors to implement a robo-advisor. The roadmap was designed for implementation of a database-based robot by a traditional investment advisor. Next to the roadmap, a typology of robo-advisors was made. Four types of robo-advisors were distinguished; Simple full-service robots, Algorithmic full-service robots, Database-based robots and Algorithmic robots. These four types of robots can be distinguished on two areas. Firstly, the full-service robots are intended for inexperienced investors and the other robots are intended for experienced investors. It was found that these different customers demand a different service. Secondly, the robots can be distinguished on technology complexity.

Algorithmic robots are more complex and create value in a different way than more simple robots do.

7. LIMITATIONS

This research was focussed on exploring the robo-advisory concept. A comparative case study suits the explorative nature of the study. The companies are similar since they operate mainly on the Dutch market and are of same age. This similarity of case companies raises the internal validity and aids to the action design research. However, the external validity may be impacted by the analogy. Since only Dutch companies were studied, the results of the study may be hard to apply to international cases. Next to that, all companies used simple robo-advisors. The analogy of case companies makes it harder to generalise findings and makes generalised conclusions less reliable.

Next to limitations by the case study design, there are limitations to the findings because of the data collection method. Data collection has been done with the help of internet resources and for Beterinbeleggen.nl some semi-structured interviews. Although the resources on the internet are substantial, the reliability is hard to check. The information on the case companies may be erroneous which may have consequences for the reliability of the findings.

8. FURTHER RESEARCH

Future research about robo-advisor should try to specify the concept of robo-advisors further. This research was only a first effort to define robo-advisors better. Although research is limited now, robo-advisory could be interesting to study from the perspectives of customer behaviour, marketing, design and information technology.

The proposed robo-advisory matrix can be applied to future research. Possibly researchers can further specify the framework or expand the matrix. In this early stage of research, it would be favourable if researchers develop new categories that help to distinguish robo-advisors. With the new categories, the proposed matrix can be adapted to become more specific and detailed. New categories could distinguish value capture mechanisms better and try to incorporate design elements of robo-advisors in the typology.

9. ACKNOWLEDGEMENTS

I would like to express my gratitude to Björn Kijl for his supervision, feedback and support throughout the creation of this thesis.

Besides, I would like to thank my second supervisor Tamara Oukes for being part of my graduation committee.

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