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DennisRenee Metzler

Georg-August-Universität Göttingen, Germany, dennis.metzler@uni-goettingen.de

Nicole Neuss

Georg-August-Universität Göttingen, Germany, nicole.neuss@uni-goettingen.de

Albert Torno

Georg-August-Universität Göttingen, Germany, albert.torno@uni-goettingen.de

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The Digitization of Investment Management – An Analysis of Robo-Advisor Business Models

Dennis Renee Metzler¹, Nicole Neuss¹, and Albert Torno¹

¹ University of Goettingen, Chair of Electronic Finance and Digital Markets,
Goettingen, Germany
{dennis.metzler, nicole.neuss, albert.torno}@uni-goettingen.de

Abstract. The emergence of so-called Robo-Advisors (RAs) is disrupting the financial services industry. RAs are algorithm-based systems that digitize and automate the investment advisory process including portfolio recommendation, risk diversification, portfolio rebalancing, and portfolio monitoring. Scientific research in this field is still in its infancy and lacks a comprehensive understanding of the underlying business model (BM) of RAs to comprehensively understand the RA business and to further identify their potential to disrupt the financial services industry. Therefore, in this article, we conduct a multiple case study across the fifteen biggest US-based RAs to explain the basic characteristics and special features of RA BMs. Thereby, we distinguish between pure algorithm-based RAs and hybrid RAs with dedicated human oversight. Through an in-depth analysis of publicly available qualitative data, we contribute to the existing research by unleashing significant elements that underline the power of RAs to disrupt the financial services industry.

Keywords: Robo-Advisory, FinTech, Business Model Analysis, Digitalization, Qualitative Research

1 Introduction

The financial services industry is changing. Especially an ongoing digitalization leads to a shift in this traditional industry. Increasing technological developments and an increasing digitalized society, lead to a need for more digital and innovative solutions within the financial services industry [1]. This disruption particularly concerns the wealth and asset management sector. Customers increasingly demand more cost-efficient, easy-to-use, and continuously available services [2], [3]. As a reaction to these changing requirements, financial services firms introduce Robo-Advisors (RAs), which are defined as “*automated investment platforms that use quantitative algorithms to manage investors’ portfolios and are accessible to customers online*” [4]. Thereby, a RA is a digital investment advisor that takes over the role of a human investment advisor or amplifies the service through a hybrid human-machine cooperation. The RA replaces manual processes, such as customer profile identification, asset allocation, and portfolio rebalancing, with algorithms [4], [5]. Existing research on RAs primarily deals with the underlying processes [5], the differences between human advisors and RAs

[6], [7], the design of RAs [5], [8], and the performance of RAs [9], [10]. Thereby, literature only partially refers to the underlying business model (BM) of RAs and, in most cases, only refers to the value proposition or the key activities of these businesses [5], [11]. Consequently, there is a lack of research regarding a comprehensive understanding of the underlying BM of RAs, including basic characteristics and special features. This paper aims to address this research gap by analyzing the BM of large US-based RAs. The underlying research question is as follows: *How can Robo-Advisor business models be characterized and what are major similarities and differences?*

To answer this research question, we conducted a multiple case study across various US-based RA providers and analyzed their underlying BMs. Our main database comprises the RAs' websites, whitepapers, and ADV forms. The data was analyzed rigorously by a qualitative content analysis approach. In our results, we differentiate between the BM of hybrid and pure RAs and discuss their similarities and differences.

This paper is structured as follows: Starting with the theoretical foundations, we introduce RAs and BMs as the main theoretical concepts for our study. Second, we explain the methodological foundation of our study. Third, we present our findings about RA BMs. Fourth, in the context of a discussion, limitations of the study as well as implications for research and practice are presented. Finally, the conclusion summarizes the most important findings of our study.

2 Theoretical Foundations

The financial services industry undergoes a substantial disruption triggered by the emergence of FinTechs. The term FinTech describes the technology-based design and delivery of products and services within the financial services industry [1], [12]. FinTechs are usually relatively new firms with innovative products and services operating at the intersection of financial products and services and information technology [13]. With innovative BMs, FinTechs try to close the gap between outdated offerings of traditional financial services firms and new customer demands [14]. Eickhoff et al. [13] found that nine different archetypes of FinTech BMs exist – one of these is represented by RAs. In contrast to general research on FinTechs, research on RAs in specific is still in its infancy and literature in this field is relatively rare.

A RA is defined as an “*automated investment platform that uses quantitative algorithms to manage investors' portfolios and is accessible to customers online*” [4]. Beketov et al. [4] identified five main processes carried out by RAs: (1) investor profile identification, (2) asset allocation, (3) implementation of investment strategies, (4) portfolio rebalancing, and (5) performance review and reporting. Further, Beketov et al. [4] highlight several competitive advantages of RAs compared to traditional human portfolio management: (1) lower costs, (2) better customization opportunities, (3) a more transparent workflow, and (4) lower minimum investment sums.

Research on RAs increasingly distinguishes between pure RAs and hybrid RAs. The pure RA is characterized by a fully automated investment advisory process based on algorithms without any human interaction for the user. On the other hand, the hybrid RA combines these automated methods with additional human oversight in varying

degrees of severity [15-18]. Hybrid RAs, therefore, allow additional human interaction in the financial advisory process, which is mostly limited to a certain number of contacts and/or limited to interaction via internet or phone [17]. For example, this human interaction can be used to additionally discuss personal preferences with human advisors who have the authorization to override the algorithm-based portfolio allocation [18]. Whereas D'Acunto and Rossi [18] recommend pure RAs for the “millennial” generation and hybrid RAs for wealthier and older clients, Jung et al. [5] highlight a need for a human interaction component in RAs in general. According to Jung et al. [5], most investors have the need to have an additional human advisor and, therefore, argue for the implementation of hybrid RAs [15].

Since the delimitation between pure and hybrid RAs in reality is not quite clear, in this study, we classify a RA as hybrid if the financial advisory process for every single account (i.e., for standard and premium accounts) is enriched with the possibility of making use of additional human advice or if the RA offers premium accounts with additional human advice as their main value proposition. General, non-portfolio-specific advisory, however, is not a reason for classifying a RA as hybrid. Also, the human-based compilation of portfolios that the algorithm can choose from after assessing the customer’s preferences is not a reason for classifying a RA as hybrid.

Other existing research on RAs focusses on the underlying investment strategies and advantages and disadvantages. For example, D'Acunto et al. [19] investigated the effect of RA use on investor performance and trading behavior and indicate that investors with under-diversified portfolios increased their diversification through the use of RAs. Further, RA-supported investors realized a higher portfolio performance concerning market-adjusted trade returns and portfolio returns. However, investors with an already greatly diversified portfolio did not change their diversification through using RAs. Despite more trading activities, these investors did not realize a better performance. Finally, other research on RAs focuses on performance [10], design principles for the user interface [5], user interaction [20], and personalization issues [21].

The BM of a RA can be described as a digital BM. A BM, in general, can be defined as a blueprint that describes the basic principles of how an organization creates value and how this value is transferred to stakeholders [22]. In contrast, a digital BM is defined as “*a conceptual extension of business models and are delimited by the explicit use of digital technologies, data, and, in general, the extraction of potentials from digitization for business conduct*” [23]. A variety of frameworks explain the different elements of a BM. For example, Osterwalder and Pigneur [22] introduced the Business Model Canvas (BMC) dividing a BM into four BM pillars comprising nine BM elements: (1) value propositions (value propositions of products and/or services), (2) customer interface (customer relationships, customer segments, and channels), (3) infrastructure management (key activities, key resources, and key partners), and (4) financial aspects (cost structure and revenue streams). Since the BMC is an all-encompassing tool describing the business of firms, it is a well-accepted analytical framework appropriate to analyze des BM of RAs in this setting.

Overall, existing research agrees that RAs represent an important FinTech BM with increasing disruptive potential. However, existing literature lacks an in-depth analysis of RA BMs, including specific characteristics of each BM element.

3 Methodology

To shed light on the structure and design of RA BMs, we conducted an exploratory case study across a variety of US-based RA providers. Since this study deals with a contemporary phenomenon in a real-life context, where no control over behavioral events is required, the case study is an appropriate research method [24].

3.1 Data Collection

To get a comprehensive overview and to consider a large industry share, our analysis focuses on the 15 biggest US-based RAs with a minimum of one billion USD assets under management (AuM). The USA was chosen as geographical region since the biggest and most well-known RAs are located here. In all cases, AuM are limited to funds managed through RA programs. To find relevant RAs, we considered industry reports (e.g., [25], [26]) and online-based statistics [27]. For each case, we checked the RA’s website and other credible sources to validate our inclusion criteria and to decide whether it really is a RA. Further, according to the definitions in our theoretical background, for each RA we decided whether it is a pure or hybrid RA. In that regard, we classified a RA as hybrid if the financial advisory process for every single account (i.e., for standard and premium accounts) is enriched with the possibility of making use of additional human advice or if the RA offers premium accounts with additional human advice as their main value proposition. The final sample of RA providers can be obtained from **Table 1**.

Table 1. Overview of Analyzed Robo-Advisor Providers (sorted by AuM).

RA	Type	Robo-Advisor Provider	Parent Company	AuM in bn. USD	Clients in k
RA1	Hybrid	Vanguard Advisers	Vanguard Group	> 270.00	> 1,000.00
RA2	Hybrid	Edelman Online	Edelman Financial Engines	> 250.00	>1,000.00
RA3	Hybrid	Merril Edge Guided Investing	Merrill Lynch	> 200.00	> 2,500.00
RA4	Pure	Schwab Intelligent Portfolios	Charles Schwab & Co.	> 60.00	> 400.00
RA5	Pure	Betterment	-	> 25.00	> 616.00
RA6	Pure	TD Ameritrade Essential Portfolios	TD Ameritrade Holding	> 20.00	Unknown
RA7	Pure	Wealthfront Advisers	Wealthfront	> 15.00	> 278.00
RA8	Hybrid	Personal Capital Advisors	Personal Capital Corp.	> 15.00	> 27.00
RA9	Pure	Bloom	-	> 5.00	> 24.00
RA10	Hybrid	E*Trade Adaptive Portfolio	E*Trade Bank	> 4.00	Unknown
RA11	Pure	M1 Finance	-	> 3.00	> 500.00
RA12	Pure	Acorns Advisers	Acorns Grow	> 3.00	> 5,400.00
RA13	Hybrid	FutureAdvisor	BlackRock	> 1.70	> 24.00
RA14	Hybrid	SigFig Wealth Management	Nvest	> 1.40	> 26.00
RA15	Hybrid	Ellevest	-	> 1.00	> 80.00

In some cases, the parent companies are large US investment management companies (e.g., RA1; RA4; RA6; RA13). The remaining RAs are either subsidiaries of smaller companies with a focus on RA (e.g., RA7; RA8; RA12; RA10) or are completely independent (e.g., RA5; RA15). Whereas seven RAs can be classified as pure RAs, the other eight are hybrid RAs.

We used publicly available information of documents provided by the RA providers themselves. This includes the official websites, published whitepapers, annual reports, and ADV forms. We chose these data sources as they represent the main communication channels of all analyzed RAs.

3.2 Data Analysis

We analyzed the collected data with a qualitative content analysis approach by Mayring [28]. We chose deductive category application to categorize and organize the collected data. Therefore, the categorization of the collected data is driven by an external concept – in our case the BMC introduced by Osterwalder and Pigneur [22]. After implementing the categorization, we analyzed the collected data in two major steps. First, for every RA, we highlighted every statement within the dataset associated with its BM and linked each statement to at least one suitable BM element. This resulted in the illustration of the BM for each RA. Within the next step, the results of each RA were compared to all other RAs. This helped to get a cross-case overview and to strengthen our findings with regard to replication logic.

Whereas the characteristics of most BM elements are nearly similar across all RAs, we found that some major differences exist between pure and hybrid RAs. Therefore, in our results we distinguish between the BM of pure RAs and hybrid RAs. Using a dual coder approach, the first researcher coded all available documents. Afterward, another researcher verified all codes by checking all documents and the associated codes. As proposed by Mayring [28], we questioned and revised the categorization after coding half of the data. Lastly, we finalized the coding based on discussions within the author team. During the whole coding process, we used the criteria construct validity, internal validity, external validity, and reliability to ensure the rigor of our study [29].

4 Findings

In the following, we present the main findings of our study. First, in **Figure 1**, we present the four BM pillars including its nine elements separately for hybrid and pure RAs. The illustrated BMs represent cross-case results. The italicized and underlined bullet points in the BM elements represent special features of pure resp. hybrid RAs. Afterward, we present the most relevant cross-case results, as well as outstanding case-specific findings and differences between pure and hybrid RAs, divided into the different elements of the BMC. Finally, we also present some rather subordinated findings which are not shown in **Figure 1**.

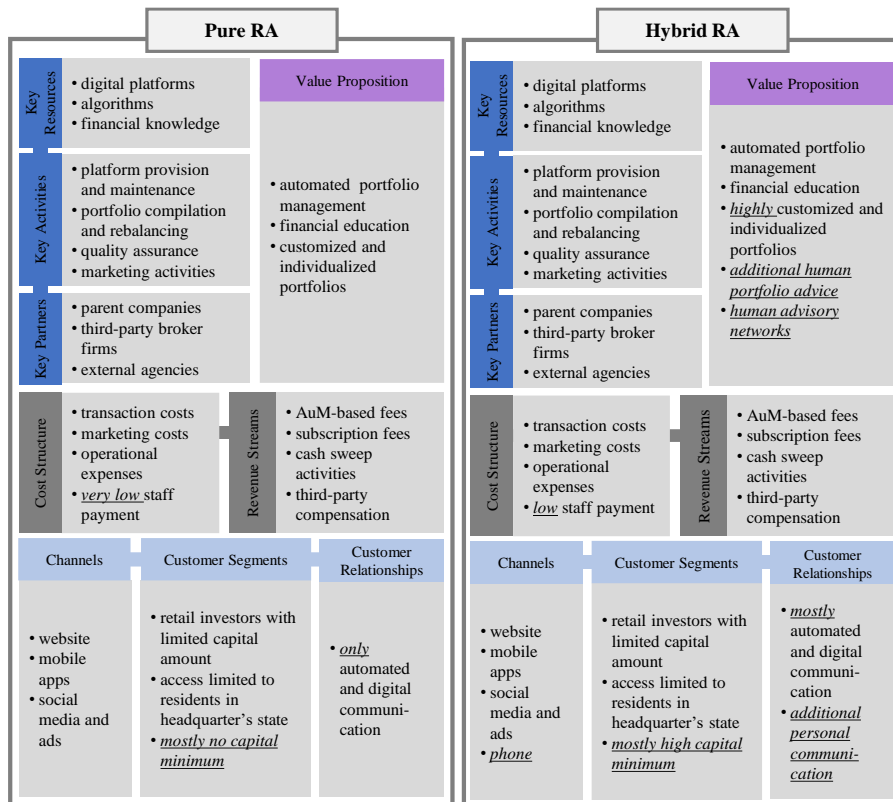


Figure 1. RA Business Model Elements for Pure and Hybrid RAs.

Value Propositions: RAs provide automated digital investment management services that can be offered solely automatically via investment algorithms (i.e., pure RA) or as a hybrid service (i.e., hybrid RA). In contrast to pure RAs, hybrid RAs rely on a digital infrastructure and investment algorithms, but offer additional human-based services across the whole investment advisory process (e.g., RA3; RA1; RA8). Especially hybrid RAs often offer premium subscriptions including permanent access to an additional human advisory network – mostly via chat or phone, which provides in-depth financial planning services, as well as additional advisory services (e.g., retirement planning or debt management) (RA3; RA14; RA15).

The investment management services of RAs primarily comprise portfolio management, permanent monitoring of accounts, trade execution, and periodic rebalancing (generally either monthly or quarterly). The periodic rebalancing at all RAs relies on algorithms to monitor the asset class weightings of the customer's portfolio and executes security transactions in case of deviations. All RAs provide dashboards (accessible via web or native mobile apps) displaying the current portfolio performance and forecasts. All RAs follow a passive portfolio management approach, primarily focusing on achieving the financial goal(s) set by the customer. Through detailed questionnaires identifying the customers' profiles, appropriate portfolios can be

individualized to match the customer-specific risk tolerance and investment goal(s) (e.g., RA8, RA11), even more through additional human advice in hybrid RAs (RA15).

Most RAs focus on cost-efficient passive investing strategies through concentrating on low-cost index funds. By focusing on algorithms instead of human advisors, RAs can offer their services at a lower price than traditional investment advisors which increases the customers return after costs (e.g., RA1; RA4; RA5). Many RAs further address the increasing demand for sustainable investment solutions (e.g., RA5; RA6; RA8; RA15). If required, RAs prioritize securities of companies that perform well under environmental, social, and governance criteria. For example, most RAs reduce exposure to firms or entire industries with bad environmental or social impacts (e.g., tobacco or petrol industry) by default, but at the same time sustaining the required liquidity and diversification of the portfolio.

Most RAs support tax loss harvesting, a method to reduce the taxable capital gains at the end of a financial year, by selling assets, which generated losses in the past (e.g., RA5, RA 8). Furthermore, some RAs aim to reduce the customer's capital gains taxes through allocating assets across differently taxed accounts (RA1; RA5; RA8; RA13).

Finally, some RAs pursue the goal of additionally improving the customers' financial education, i.e., their capability to understand financial phrases and interrelations, by providing glossaries and explanations of terms via digital channels (RA3; R10; RA12).

Key partners: Most RAs, both hybrid and pure, do not have the capabilities to provide their whole service portfolio by themselves. Therefore, these RAs establish partnerships with internal and external partners. In some RAs, the parent firms act as an internal partner providing crucial infrastructure, such as offices, financial knowledge, and digital services (e.g., RA1; RA4; RA5). Additionally, RAs primarily recommend assets issues by their parent firms to set up their customers' portfolios.

RAs partner with internal or external brokers to buy and sell securities. These brokers are company's affiliates (e.g., RA1; RA5; RA7; RA12), parent companies (e.g., RA4; RA6's), or external brokerage firms (e.g., RA8; RA13; RA14; RA15). Some RAs also partner with external banks that manage deposits and provide supporting services, such as debit cards or digital infrastructure (e.g., RA8; RA15). Finally, some RAs rely on external investment knowledge, which provides capital market assumptions, portfolio allocation recommendations, and due diligence execution (e.g., RA6; RA15). For example, RA15 collaborates with Morningstar Investment Management LLC to benefit from their risk and return prediction assessments to offer customers their tailored proposals.

To provide personal advisory services, a few RAs additionally cooperate with external financial agencies such as certified financial planners (e.g., RA5) or other agencies to work together on marketing campaigns, portfolio development, or research and development activities (e.g., RA5; RA8; RA15).

Key Activities: All RAs provide a digital platform, including ongoing maintenance and development activities. Especially for pure RAs, this platform serves as a main source to obtain relevant information from customers and to recommend and compile suitable portfolios. RAs compile low-risk portfolios as well as high-risk portfolios, depending on the customer's need. The portfolios comprise of different asset

classes that can be categorized into company stocks, bonds, and alternative asset classes (e.g., real estate). RAs minimize risk through portfolio diversification across multiple asset classes. Each RA divides stock and bond categories into different subclasses and aims to achieve the appropriate weighting for every sub-asset class in accordance with the customer's financial goals and risk aversion. As ETFs are the investment vehicle of choice, another important activity is to ensure the ETFs' quality and compliance. RAs rank multiple ETFs regarding their performance related to a specific benchmark index (e.g., RA5). Since the main difference between the ETFs' performance and the benchmark index' performance are expenses associated with trading and managing the fund, RA5 chooses ETFs with the lowest "total annual cost of ownership" (i.e., the sum of the funds trading expenses). Additionally, most of the RAs also state that they are ensuring that the ETF exhibits sufficient liquidity (e.g., RA4).

Another key activity is the rebalancing process. To maintain the desired asset allocation over time, a continuous adaption of asset class weightings is needed. RAs therefore set limits within which a portfolio is allowed to deviate from the target asset allocation and are permanently monitoring for violations of such limits. If the algorithm (or investment personnel) realizes such a violation, it initiates the necessary transactions to rebalance the portfolio. These deviation limits may vary between different RAs. For example, RA1 rebalances a portfolio if it deviates more than 5% from the target allocation in any asset class, while RA5 sets the limit at 3%. We also found differences between rebalancing approaches in the frequency of reviewing the portfolio. While all pure RAs and the hybrid RA8 use automated algorithms to run the rebalancing mechanism, monitoring and transactions at RA1 are carried out by humans. This more time-consuming process at RA1 leads to a relatively low quarterly monitoring frequency, compared to RA4 and RA5, which monitor their customer's portfolio daily.

As part of the portfolio management process, most RAs undertake tax harvesting activities to reduce the customer's taxable capital gains and therefore tax bill (e.g., RA4; RA5; RA7). This includes tax loss harvesting activities (e.g., RA4; RA5; RA7) and the provision of other additional tax benefits through efficient asset allocation (e.g., RA1; RA5; RA8; RA13). In that regard, most RAs developed algorithms which monitor and rebalance automatically (e.g., RA5; RA7; RA13). Only some hybrid RAs use human labour for these tasks (e.g., RA3).

Another activity of the RA providers consists of marketing activities, usually carried out through different digital channels – without significant differences between pure and hybrid RAs. The specific channels used are discussed in the corresponding section "channels" below. Finally, although all RAs offer non-advisory-related customer support, this is a rather subordinated activity across all considered RAs.

Key Resources: One of the most important key resources for all RAs are their digital platforms and investment management algorithms. These algorithms analyze the customer's financial situation, develop customized financial plans, and recommend asset allocation. In addition, algorithms in many RAs carry out portfolio rebalancing and tax loss harvesting processes (e.g., RA4; RA5; RA7).

Both, pure and hybrid RAs embed financial knowledge, such as in-depth capital market knowledge, integrate well-known theories, such as modern portfolio theory [30], and use established simulation methods, such as Monte Carlo simulations [31]

(e.g., RA7; RA14). This financial knowledge is reflected in intelligent investment management algorithms as well as in well-educated personnel. Whereas in pure RAs, personnel is not directly involved in the service delivery to customers and therefore plays a rather subordinated role, hybrid RAs offer additional human investment advisory and asset allocation services. Therefore, human labour is more important in hybrid RAs (e.g., RA1; RA8). This also applies to pure RAs offering human advisory via premium subscriptions (e.g., RA4; RA5).

Customer Relationships: The relationship between customers and RAs differs significantly between pure and hybrid RAs. While pure RAs do not provide any additional human advisory services or only for premium customers that are paying higher service fees or invest a higher amount of capital (e.g., RA5), hybrid RAs provide this service for all customers (e.g., RA1; RA3). For example, the hybrid RA1 provides one constant personal advisor for customers with a very high amount of invested capital, whereas customers with less capital invested have changing personal advisors (e.g., RA1). Other hybrid RAs provide customer service independent of the amount of invested capital, either with a constant personal advisor or changing personal advisors (e.g., RA8).

Ensuring the customer's financial plan being up to date in the long run, RAs contact their customers once a year (e.g., RA1; RA4; RA5; RA6; RA14) or more frequently, e.g., once a quarter (e.g., RA6). This process is generally carried out by asking the client to fill out the initial online questionnaire again. For hybrid RAs, this process can also be carried out personally through the RA's staff.

To strengthen customer relationship and to attract new customers, some RAs have established referral programs offering discounts and remunerations to customers or third parties for attracting new customers (e.g., RA5, RA15).

Channels: All analyzed RAs aim at minimizing personnel effort in communication and sales channels and primarily use digital, mostly automated, communication channels. For pure RAs this includes websites, mobile apps, or social media (e.g., RA4; RA5; RA9). Hybrid RAs that offer human advisory services, also use telephone, e-mail, or video chats as additional, non-automated, channels (e.g., RA1; RA8; RA14; RA15).

As part of their marketing campaigns, RAs use several, mostly digital, communication channels to attract new customers. For example, RAs run paid blogger marketing campaigns (e.g., RA7), place ads through platforms like Google or Instagram (e.g., RA13), or have promotion programs with selected partners (RA15).

Customer Segments: All RAs primarily address retail investors with limited capital amount. Pure RAs primarily address individual retail investors with relatively low amounts of investment capital. This can be derived from a minimum required capital amount for individuals to open a portfolio, which usually ranges from \$0 to \$5,000 (e.g., RA9; RA11; RA12). On the other hand, especially hybrid RAs (but also some pure RAs, such as RA6) primarily focus on high-net-worth individuals and companies and require a high minimum amount of \$10,000 or more for opening a managed portfolio (e.g., RA6; RA8; RA13).

Some RAs also offer their services to employer-sponsored retirement plans, such as 401(k) accounts (e.g., RA1; RA5). Other RAs, in addition to their main business, act as sub-advisors for financial institutions. Thereby, they offer their own investment

advisory services to their customers but use a third party for supplying the necessary infrastructure (e.g., RA14). RA14 defines its addressed customer segment as financial institutions, investment advisers, banks, or broker-dealers. Some particular providers focus on specific segments, e.g., lifespan-adjusted retirement plans directed to women or options to create multiple accounts for kids' savings (RA12; RA15). Due to all analyzed RAs being based in the US, their offer is generally limited to US citizens with a US social security number (e.g., RA1; RA4; RA5).

Revenue Streams: RAs primarily generate revenue through a yearly (usually fixed) percentage fee of the daily average of the customer's AuM. This fee is charged monthly (RA7; RA8; RA12; RA14; RA15), quarterly (RA1; RA5; RA6), or depending on the customers' wish (RA13). The charged percentages vary across the different RAs. Furthermore, some RAs charge a fixed subscription fee for their services regardless of the AuM (RA5; RA6; RA7; RA13; RA14; RA15). Rather seldom is a one-time opening fee. For example, RA1 charges a one-time opening fee of \$1,000 for customers with AuM below \$50,000 and \$250 for customers with AuM above \$50,000. In general, it can be observed that pure RAs have lower fees than hybrid RAs, even though exceptions exist (e.g., RA6). Some RAs don't charge fees for their standard accounts and only generate revenue through premium accounts and other revenue streams (e.g., RA8; RA11).

Some RAs generate additional revenue through cash sweep methods. Thereby, the RAs transfer the free cash of their customer's portfolio to a partner bank that afterwards invests the received cash. The partner bank pays an interest rate to the RA and the RA gives a portion of this interest rate to the customer (e.g., RA4; RA5; RA8).

Finally, RAs generate revenue through third-party compensations. This, for example, includes remunerations for promotional campaigns (e.g., RA15; RA14) and the offering of administrative services to partners like individual financial advisors (e.g., RA5; RA13; RA14). Furthermore, RA5 and RA15 generate income for their partners through funds deposited in debit accounts and associated debit card fees for transactions and withdrawals. In the first case, these payments increase the profit of its affiliate and will therefore not be renumbered, while RA15 receives compensations from their partner for offering their debit card services to the RAs customers.

Cost Structure: In some RAs, transaction costs through buying and selling securities, charged by brokerage firms, are directly forwarded to customers (e.g., RA1; RA13; RA14). However, other RAs include the brokerage commissions in their wrap fee, meaning it is directly diminishing their final profit. Other high impact costs are marketing costs, primarily including referral compensations and marketing budgets (e.g., RA1; RA4; RA5). Other factors influencing the cost structure include, but are not limited to, operational expenses, such as renting buildings, maintaining digital infrastructure, general administration, and legal advice (e.g., RA4; RA6). Salary and bonus payments to staff accounts make another large share of the cost structure (e.g., RA5). However, through the high degree of automation in the advisory process, the personnel costs in all RAs are rather low compared to traditional human investment advisory. Since the pure RAs do not offer any additional human advise, the personnel costs in pure RAs are even lower (e.g., RA9; RA12) than in hybrid RAs.

5 Implications, Limitations, and Future Research

Our paper provides several important implications for research and practice. First, our paper offers a well-funded analysis of pure and hybrid RA BMs, extending the existing understanding of the RA phenomenon. Further, this analysis enables researchers to track future developments by comparing new BM-related findings with the results of this study. Such continuous re-evaluations are especially important in early developing businesses, as in the RA business. Since existing RAs are usually relatively young, their current success might only be temporary and not necessarily sustainable in the long run.

With our study, we can confirm existing research on RAs regarding the main processes carried out by RAs. Like Beketov et al. [4], we found that the main processes are investor profile identification, asset allocation, implementation of investment strategies, portfolio rebalancing, and performance review and reporting.

Whereas most BM elements are highly similar across different RAs, we found some major differences between pure and hybrid RAs. Concerning the BM element customer segments, pure RAs mostly do not have an account minimum, whereas hybrid RAs often have a relatively high minimum (e.g., 25,000 USD or even more), which confirms the statement of D'Acunto and Rossi [18] who recommend pure RAs for millennials and hybrid RAs for wealthier and older clients. Further, in contrast to hybrid RAs, the value proposition of pure RAs does not comprise additional human portfolio advice and human advisory networks. The customer relationships of pure RAs also do not include personal communication. On the other hand, this leads to a relatively lower amount of staff payments at pure RAs. Future research could build on these insights by diving deeper into BM differences of RAs by developing a taxonomy.

As stated by Jung et al. [5], investment banks are downsizing their services for retail customers because of too high administrative expenses for low investment amounts, which creates a vacuum in this customer field. Our analysis shows that RAs aim to penetrate especially this customer segment through offering advisory solutions, including a low minimum investment amount, convenient online interfaces, a goal-based approach, and several additional offers at a low price. A declining offering of conventional services and an increasing awareness towards financial technology on the demand-side poses significant future opportunities for RAs in the retail investor segment. In addition, RAs adapt quickly to industry developments, such as the trend towards passive portfolio management and sustainable investments [4].

Although customers increasingly prefer passive portfolio management instead of active portfolio management, human interaction is still important for customers [5]. Our analysis shows that some RAs lack behind in this field. Solely relying on algorithms and online questionnaires to identify customers' profiles and create financial plans can lead to portfolios that do not sufficiently reflect the customers' risk aversion and financial need. This can lead to unsatisfactory results in the long run. Jung et al. [5] proposed the solution of RAs, which still rely on human interactions in core processes. Our analysis shows that this solution has been adopted by hybrid RAs combining the efficiency of digital investment algorithms and the advantages of human advisors, for example, in the customer attraction and profiling stage. However, pure RAs still solely rely on investment algorithms and minimize human interactions.

Our results indicate that the features of RAs have the potential to lead to a strong increase in the use of digital and automated solutions in investment advice in the upcoming years. However, some competitive advantages of RAs are based on the fact that they are subsidiaries of large investment firms or banks. Established firms might therefore presumably continue to dominate this market, making it difficult for smaller RA providers or startups to enter the market. It can therefore be assumed that RA providers, that already are major players in the financial services industry, are using RAs as an additional channel to increase distribution of their own investment products.

Despite the careful design of our study, this paper is subject to some limitations. First, our sample of analyzed RAs is limited to the biggest US-based RAs. Our results can therefore only be generalized to large RAs in the USA. Future research could extend the research scope to other geographical regions, such as Europe and Asia, and/or to smaller RAs, e.g., from less established FinTech firms. The number of RAs can also be increased as part of future research. We only include publicly available documents of the RAs themselves, instead of additionally evaluating external data. This could result in biased findings. Therefore, future research could extend the database with external RA information, e.g., from industry reports. Further, because of our limited database, for some statements we cannot answer the “why” question. For example, although we can state that some RAs have a high account minimum which delimits their potential customer segments, we cannot answer why some RAs decide to do so. Since this is important for understanding their underlying BM, future research should also elaborate on this by expanding the database or even conduct interviews with experts in the field of RA. Since financial information is not available for all analyzed RAs, we also cannot give a statement regarding the financial profitability of RA BMs. Finally, we encourage scholars for future research concerning a detailed comparison of RA BMs and BMs of traditional asset and wealth management services as well as investment advisory services to gain further insights on the success of RA BMs now and in the future.

6 Conclusion

This paper aimed to evaluate the potential of RA BMs to disrupt the financial services industry. To approach this goal, we conducted an exploratory case study across the fifteen largest US-based RAs. Our in-depth analysis of publicly available documents of these RAs resulted in the illustration of exemplary BMs for pure and hybrid RAs. Further, we presented the most important similarities and differences between these BMs. Our results indicate that RAs with their digital BMs have the potential to change the landscape of traditional investment advisory. The provision of customized services at a relatively low price leads to an increasing competitive advantage against traditional wealth and asset management. However, our results also indicate that solely relying on algorithms instead of additionally draw on human-based services, does not fully comply with existing customer needs. Further, as many competitive advantages of most RAs are based on a strong partnership with the parent company, it is especially hard for pure RA start-ups to gain foothold in this market.

References

1. Gomber, P., Koch, J.-A., Siering, M.: Digital Finance and FinTech: Current Research and Future Research Directions. *Journal of Business Economics* 87(5), 537-580 (2017).
2. Mačijauskaitė, A.: Introduction to the Robo-Advisory in Sweden. In: Teigland, R., Siri, S., Larsson, A., Moreno Puertas, A., Ingram Bogusz, C. (eds.) *The Rise and Development of FinTech*, pp. 253-275. Routledge (2018).
3. Blaschke, J., Kriebel, J.: Robo Advisory Customer Groups: Who Requires Advice? *Die Unternehmung - Swiss Journal of Business Research and Practice* 75(3), 397-410 (2021).
4. Beketov, M., Lehmann, K., Wittke, M.: Robo Advisors: Quantitative Methods Inside the Robots. *Journal of Asset Management* 19(6), 363-370 (2018).
5. Jung, D., Dorner, V., Weinhardt, C., Pusmaz, H.: Designing a Robo-Advisor for Risk-averse, Low-budget Consumers. *Electronic Markets* 28(3), 367-380 (2018).
6. Britton, B.L., Atkinson, D.G.: An Investigation into the Significant Impacts of Automation in Asset Management. *Economics World* 5(5), 418-428 (2017).
7. Gold, N.A., Kursh, S.R.: Counterrevolutionaries in the Financial Services Industry: Teaching Disruption – A Case Study of Roboadvisors and Incumbent Responses. *Business Education Innovation Journal* 9(1), 139-146 (2017).
8. Brenner, L., Meyll, T.: Robo-Advisors: A Substitute for Human Financial Advice? *Journal of Behavioral and Experimental Finance* 25 (2020).
9. Puhle, M.: The Performance and Asset Allocation of German Robo-Advisors. *Society and Economy* 41(3), 331-351 (2019).
10. Torno, A., Schildmann, S.: What Do Robo-Advisors Recommend? An Analysis of Portfolio Structure, Performance and Risk. In: Clapham, B., Koch, J.-A. (eds.) *Enterprise Applications, Markets and Services in the Finance Industry. FinanceCom 2020. Lectures Notes in Business Information Processing*, Vol. 401. Springer (2020).
11. Coombs, C., Redman, A.: The Impact of Robo-Advice on Financial Advisers: A Qualitative Case Study. In: *UK Academy for Information Systems Conference Proceedings* (2018).
12. Puschmann, T.: Fintech. *Business & Information Systems Engineering* 59(1), 69-76 (2017).
13. Eickhoff, M., Muntermann, J., Weinrich, T.: What do FinTechs actually do? A Taxonomy of FinTech Business Models. In: *ICIS 2017 Proceedings*, pp. 1-19 (2017).
14. Vasiljeva, T., Lukanova, K.: Commercial Banks and Fintech Companies in the Digital Transformation: Challenges for the Future. *Journal of Business Management* 11 (2016).
15. Sironi, P.: *FinTech Innovation: From Robo-Advisors to Goal Based Investing and Gamification*. John Wiley & Sons (2016).
16. Strzelczyk, B.E.: Rise of the Machines: The Legal Implications for Investor Protection with the Rise of Robo-Advisors. *DePaul Business & Commercial Law Journal* 16(1), 54-86 (2017).
17. Abraham, F., Schmukler, S.L., Tessada, J.: Robo-Advisors: Investing Through Machines. *World Bank Research & Policy Briefs* 21 (2019).
18. D'Acunto, F., Rossi, A.G.: Robo-Advising. In: Rau, R., Wardrop, R., Zingales, L. (eds.) *The Palgrave Handbook of Technological Finance*, pp. 725-749. Palgrave Macmillan, Cham (2020).

19. D'Acunto, F., Prabhala, N., Rossi, A.G.: The Promises and Pitfalls of Robo-Advising. *The Review of Financial Studies* 32(5), 1983-2020 (2019).
20. Rühr, A., Berger, B., Hess, T.: Can I Control my Robo-Advisor? Trade-offs in Automation and User Control in (Digital) Investment Management. In: *AMCIS 2019 Proceedings* (2019).
21. Faloon, M., Scherer, B.: Individualization of Robo-Advice. *The Journal of Wealth Management* 20(1), 30-36 (2017).
22. Osterwalder, A., Pigneur, Y.: *Business Model Generation – A Handbook for Visionaries, Game Changers, and Challengers*. John Wiley and Sons (2010).
23. Guggenberger, T., Möller, F., Boualouch, K., Otto, B.: Towards a Unifying Understanding of Digital Business Models. In: *PACIS 2020 Proceedings* (2020).
24. Yin, R.: *Case Study Research*. SAGE Publications (2014).
25. *BackendBenchmarking: The Robo Report Second Quarter 2021*. BackendBenchmarking (2021).
26. Zavalova, S.: *FinTech Report 2021 - Personal Finance*. Statista (2021).
27. Statista: Robo-Advisors, <https://de.statista.com/outlook/dmo/fintech/personal-finance/robo-advisors>, (last accessed August 30, 2021).
28. Mayring, P.: *Qualitative Inhaltsanalyse – Grundlagen und Techniken*. Beltz, Weinheim (2015).
29. Campbell, D.T.: "Degrees of Freedom" and the Case Study. *Comparative Political Studies* 8(2), 178-193 (1975).
30. Markowitz, H.: The Utility of Wealth. *Journal of Political Economy* 60(2), 151-158 (1952).
31. Hertz, D.: Risk Analysis in Capital Investment. *Harvard Business Review* 42(1), 95-106 (1964).