Digitale Finanzberatung: Eine Taxonomie für Robo-Advisor Systeme

Bachelorarbeit

zur Erlangung des akademischen Grades „Bachelor of Science (B.Sc.)“ im Studiengang Wirtschaftsingenieur der Fakultät für Elektrotechnik und Informatik, Fakultät für Maschinenbau und der Wirtschaftswissenschaftlichen Fakultät der Leibniz Universität Hannover

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1. Introduction

The financial sector is constantly evolving. Even before information technology started to backup many processes, the banks and financial service providers had to handle a lot of conventional and digital information. Since then, the whole sector has gone through transformations not only in the automation of interaction between banks but also in the way they interact with their customers (Alt & Puschmann, 2016).

Digital evolution and new technologies had a very big impact in the field of wealth management particularly. Most banks and financial service providers offer services in the wealth management sector to their customers. This includes the development and distribution of financial products and risk management (Alt & Puschmann, 2016).

Briefly described, Robo-Advisory Systems can be defined as automated wealth and asset management platforms that use quantitative algorithms to manage the financial portfolios of private and institutional investors, providing an online access for their users. The term RAS covers a broad spectrum of digital, semi-automated or fully automated investment platforms and services. One common system of classification can be done in generations 1.0 to 4.0, representing the development of RAS (Deloitte, 2019).

There is big growth potential in the field of Robo-Advisory Systems. According to Deloitte (2019), these RAS will represent approximately 1 to 10% of all assets under management (AUM) worldwide until 2020; that corresponds with absolute values between 0.8 to 8.1 trillion USD. In the year 2017, this share was only 226 billion USD, and there were approximately 12 million users.

Originally, wealth management evolved from a traditional advisory system with a human advising the client, causing relatively high costs. The next innovation in the sector of wealth management were discount brokerages that offered no advisory, but gave customers the opportunity to manage their portfolios on their own thereby lowering the costs. Then, a new generation of online investment platforms lowered the costs even more but offered only minimal guidance for the customers. The next step in wealth management are the Robo-Advisory Systems (Epperson, Hedges, Singh, & Gabel, 2015). Guidance evolved from implementing human advisors towards hybrid models, where humans oversee the process and use technology to facilitate the process. Then, the next step of evolution will go from hybrid models to the fully digitized RAS eliminating the personal consultants completely (Cocca, 2016).

This concept of a Robo-Advisory process can also be projected to other business fields than financial guidance, in order to replace traditional customer guidance processes (Jung, Dorner, Glaser, & Morana, 2018).

1.1. Goals and Expected Results

Main goal of this thesis is providing an overview of the different types of Robo-Advisory Systems in order to analyze what differentiates them from the traditional wealth management instruments and to show the positive and negative aspects of Robo-Advisory Systems in the context of customer analysis, asset allocation, portfolio creation and portfolio management.

Furthermore, in this study, a taxonomy is developed in order to categorize the different types of Robo-Advisory Systems. The purpose of this taxonomy is showing the characteristic features of each type of Robo-Advisory System by describing their main aspects but also by showing which features may be missing; and by identifying possible research gaps.

These research goals lead to the following central research questions.

1.2. Research Questions

1. What are the dimensions of Robo-Advisory Systems?
2. Which characteristics of Robo-Advisory Systems can be identified by examining these dimensions?
3. What are the positive and negative aspects of Robo-Advisory Systems?

1.3. Methodology

1.3.1. Literature review

As a first step, a literature review is made in accordance with the guidelines of Webster and Watson (2002) in order to develop a systematic overview and taxonomy of the topic.

The identification of relevant literature was done by searching databases, allowing for a thorough overview of all relevant aspects and also of related topics. The following databases are used:

- EBSCO databases
- ACM Digital Library
- AIS eLibrary
- ScienceDirect (Elsevier)
- MIS Quarterly
- Wiley Online Library
- Springer

In a universal database search, one needs crucial search terms to explore the theoretical basis of the topic in a holistic way and to avoid missing relevant sources. The following search terms were used:

- roboadvisor
- robo advisor
- robo advice
- fintech
- digital/automated wealth management
- digital/automated investment management
- recommendation agent
- recommender system
- investment advisor
- wealth advisor

The structured approach of Webster and Watson (2002) includes several types of literature. The following elements were considered:

- Scientific articles and other contributions in journals and other publications
- Monographs and specialized books
- Chapters of anthologies and omnibus volumes
- Internet sources
- Other scientific commentaries and contributions

The sources found by using these structures and search terms are then prioritized according to their relevance and quality. The leading journals (rated by the Verband der Hochschullehrer für Betriebswirtschaft, VHB-JOURQUAL3, 2015) are examined by reading their abstracts, keywords and content. Citations of prior articles are also

considered for the literature review and the whole web of science is used in order to define the sources of interest. Duplicated articles found in multiple sources need to be deleted. By highlighting the relevant sources and eliminating less suitable ones, the number of articles is reduced step by step. Sources, which are sorted out in this process, are only used as additional literature but not in the study itself.

There are two kinds of approaches to a structured collection of literature corresponding to Webster and Watson (2002): on the one hand an author-based approach and on the other hand a concept-based one (see figure 1, table 1). In the author-based approach the focus rests on the author. In the concept-based approach, all relevant sources are assigned to different key concepts to generate a so-called concept matrix (see figure 1, table 2). According to Webster and Watson (2002), a systematic literature review must focus on the concepts rather than the authors.

Table 1. Approaches to Literature Reviews

Concept-centric	Author-centric
Concept X … [author A, author B, …] Concept Y … [author A, author C, …]	Author A … concept X, concept Y, … Author B … concept X, concept W, …

Table 2. Concept Matrix

Articles	Concepts				
	A	B	C	D	…
1		✖	✖		✖
2	✖	✖			
…			✖	✖	

Figure 1: Concept Matrix (modified according to Webster and Watson, 2002).

In order to categorize the relevant sources, six key concepts are created in the process of research in order to gather them in the concept matrix:

1. Analysis
2. Asset allocation
3. Portfolio creation
4. Portfolio management
5. General information on wealth management

6. Related to RAS[1]

Each piece of literature is examined whether it fits into these concepts and then is assigned to one or more categories. The evaluation of the literature takes the opinions of the authors into account when sources are allocated into the key concepts. This highlights the discrepancies between known facts and still unclear areas, which have to be explored in order to be able to develop a taxonomy.

Limitations of this kind of literature review can be drawn from the variable definitions and different opinions of authors. Generating key concepts, one must decide for one point of view to pursue.

The process of selection, reduction, prioritization and categorization of the sources was carried through in a concept-based way thereby narrowing down the number of sources to 35 pieces of scientific literature that can be regarded as the central pieces of information in this paper.

40 percent of the sources included in the concept matrix of this study are related to the concept of analysis, 26 percent of the sources included in the concept matrix are related to the concept of asset allocation, 17 percent of the sources included in the concept matrix are related to the concept of portfolio creation, 51 percent of the sources included in the concept matrix are related to the concept of portfolio management, 77 percent of the sources included in the concept matrix are related to the concept of general information, 71 percent of the sources included in the concept matrix are related to the concept of RAS. The complete concept-matrix including the percentages can be found in the appendix.

[1] The category “Related to RAS” shows the parallels and differences between the traditional wealth management systems and those using RAS.

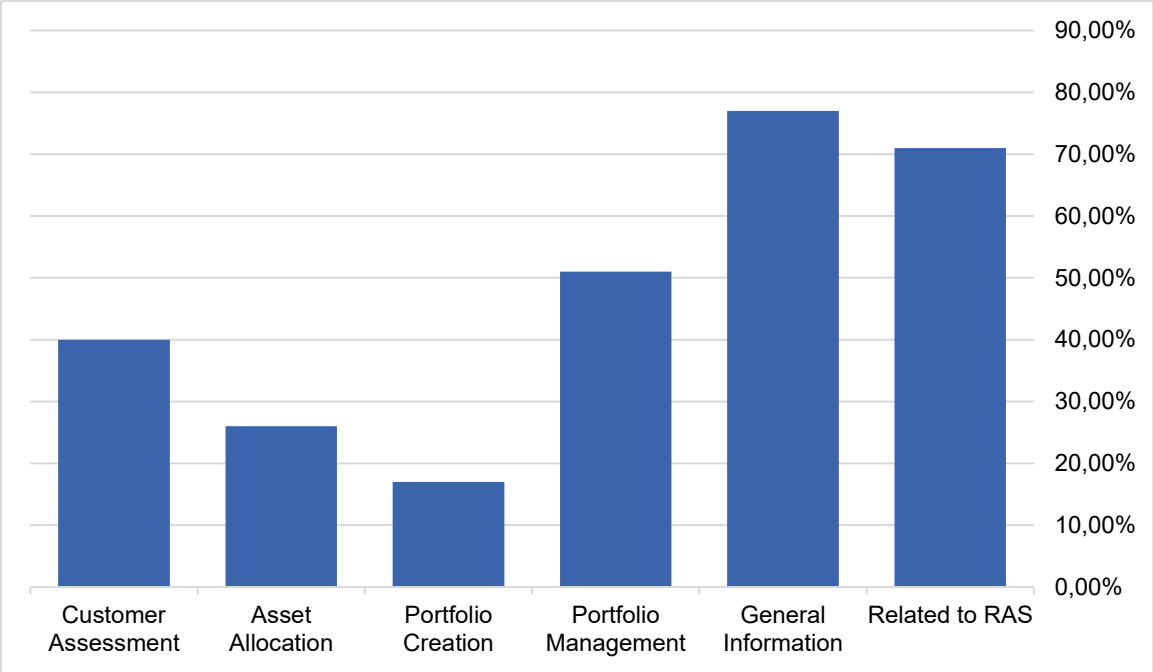

Figure 2: Percentages of the literature covering each concept (own illustration).

The literature review serves as basis for the next step. These six key concepts are needed to define the dimensions and characteristics for the taxonomy of Robo-Advisory Systems.

1.3.2. Development of the taxonomy

In order to develop the taxonomy, the framework of Nickerson, Varshney and Munterman (2013) is used. According to Nickerson et al. (2013) a taxonomy consists of a set of dimensions with each dimension having its own subset of characteristics. One dimension must consist of at least two characteristics. Each object classified according to the taxonomy must have exactly one characteristic of each dimension, not more or less. Table 1 shows an example of a taxonomy.

	D1		D2			D3			
	C1	C2	C1	C2	C3	C1	C2	C3	C4
Object 1	x				x				x
Object 2		x	x			x			
Object 3	x			x			x		

Table 1: Example for a Taxonomy (own illustration); D: Dimension; C: Characteristic.

Nickerson et al. (2013) illustrate this with the following formula:

$$T = \{D_i, i = 1, \dots., n | D_i = \{C_{ij}, j = 1, \dots, k_i; k_i \geq 2\};$$

$$T: Taxonomy; D_i: Dimension;\ C_{ij}: Characteristic;\ k_i: Number\ of\ Characteristics$$

To avoid building a taxonomy using an ad-hoc-approach with only intuitive and no systematic criteria, Nickerson et al. describe two viable approaches, which should be used for the creation of a taxonomy instead: empirical-to-conceptual or conceptual-to-empirical (see figure 3). Since key concepts are already developed in the process of the systematic literature review, they can be used for the building of a taxonomy. Therefore, the conceptual-to-empirical approach will be used.

First, a meta-characteristic must be set for the taxonomy, meaning the aim and function of the taxonomy must be defined. In this case the meta-characteristic chosen is the level of automation of RAS and the associated usage by the clients of those systems.

Second, an ending condition must be determined, since this process is iterative, meaning constantly repeating with each time applying it to the result of the previous stage. Without an ending condition the development of a taxonomy would be an infinite process. In this case the ending condition chosen is the evaluation and possible implementation of all six concepts found in the literature review and furthermore a case study to show the usage of the taxonomy and if necessary, to revise the taxonomy. The literature review and the findings thereof are used for the conceptualization of the dimensions and characteristics for the taxonomy. Furthermore, a case study of the Robo-Advisory Service Scalable will be conducted. Scalable will serve as object to examine for these dimensions and characteristics. When the ending conditions are met the creation of the taxonomy will be finished.

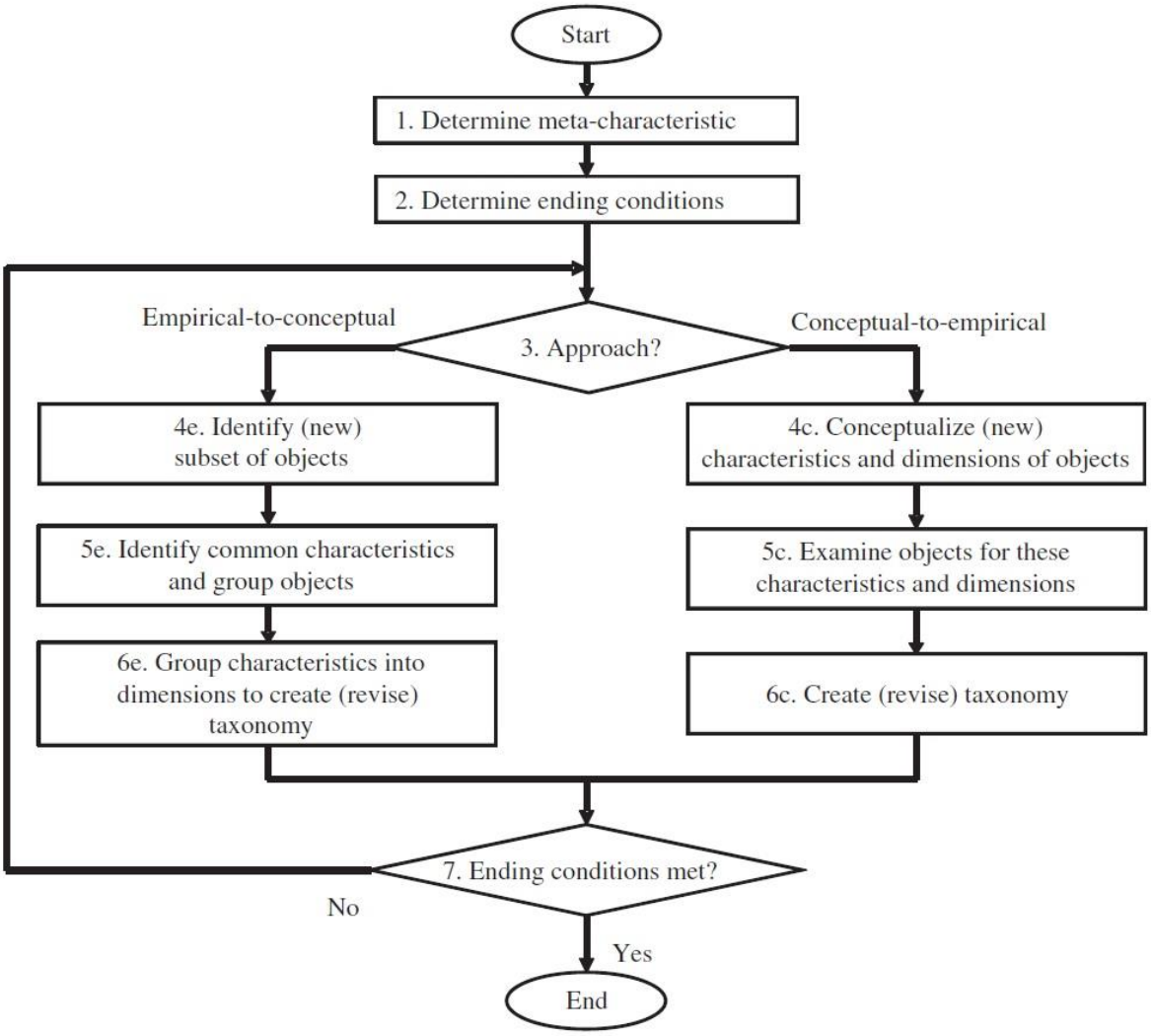

Figure 3: Taxonomy Development Process (Nickerson et al., 2013).

5. Conclusion and Outlook

The findings of this study are an expression of the current situation under the light of the development of wealth management over the past decades. At the moment, there are many very interesting developments mostly deriving from the new possibilities of modern IT technology and digitization. Generally, Robo-Advisory Systems are a future possibility in the world of investment (Leonhardt, 2018).

Robo-Advisory Systems are automated advisors for financial products, which emerge constantly across all aspects of the financial sector, such as investment and banking products as well as insurance policies (Baker & Dellaerf, 2018). The central issue is always which questions to ask and what results to expect (Leonhardt, 2019). Many Robo-Advisory firms spend a lot of energy in finding out which questions their customers would like to ask them (Woodyard & Grable, 2018).

The targets for future innovations concentrate on two fields: the first is performance enhancement and the second one is adaptation as marketing instruments for the acquisition of new investors. There will be an increase in competition because there will be various new players on the market all trying to offer innovative solutions. This leads to a technical progress that is positive for the whole industry. The future development and the growth of many Robo-Advisory Systems will depend on a variety of factors. The key question for future growth is how many and how wealthy investors are willing to get active in this field and use the tools of modern wealth management. Even if most investors recognize the advantages of new technologies and services many of them still want to remain in the driver´s seat by keeping control over their portfolio management processes, and keeping a human element guarding the whole system. In future years, there will be many new hybrid combinations of human and technical solutions coming along. All hybrid models will be evolving constantly, and are more than just a short-term trend. Currently, the users fear losing control in crises or situations of uncertainty, so they want some human elements to remain, in order to feel more secure (Deloitte, 2019).

Given the fact that there is still a gap between the technical possibilities of current Robo-Advisory Systems of generations 3.0 and 4.0 and the investors' expectations from these systems, further improvements can be expected in the near future (Deloitte, 2019).

The importance of gaining an adequate taxonomy for RAS covers several aspects. First of all, it covers the status quo and makes it possible to track developments. By means of this taxonomy a shift of characteristics can be measured. Additionally, a

taxonomy provides the opportunity to providers to compare their products to the market. So, the taxonomy can support the finding of unique selling points.

The development of the Robo-Advisory Systems is part of the general global digitization in many business fields and sectors and brings many advantages. It will be important to observe which impact human interaction will have in this context in the future.

Therefore, a future study concerned with the same topic is reasonable in order to evaluate the future situation, to compare current findings with future developments and to shift the focus of the taxonomy if necessary. The whole topic is very dynamic and, therefore, interesting for all kinds of industries and business sectors.