



Technological Change in Wealth Management- The development of a conceptual CRM model for the HNWI client interaction under the consideration of AI

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Technological Change in Wealth Management
**The development of a conceptual CRM model for the HNWI client
interaction under the consideration of AI**

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March 2025

Technological Change in Wealth Management

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March 2025

Abstract

The constantly developing landscape of financial technology significantly shapes the financial sector and how cooperation and individuals interact with each other in a financial setting. While the developments incrementally unfold, the magnitude of their impact is difficult to comprehend and not addressed in wealth management. Many of today's management models, which are used in academia and business alike, fall short of incorporating the latest developments and are on the brink of becoming outdated or obsolete in the eye of artificial developments. One particular field of interest within financial services, is the wealth management area.

The development in this specific field is of particular interest, as it is a human-driven field of finance in which the human aspect (relationship and trust) plays a crucial role in the client interaction. Several models exist which conceptually address the client relationship management, to grasp their complexity. These commonly used models become increasingly impacted and jeopardized by artificial intelligence which impacts the composition of their factors leading to incomplete and outdated models.

This doctoral study addresses the issue by analyzing existing models, extracting the factors which hold their validity despite technological developments and incorporating new factors. Thus, proposing a contemporary and conceptual client relationship model (CRM) model enhanced by AI factors.

Thereby, this research broadens the understanding of the current developments in the wealth management sector and identifies key areas of development. It offers a conceptual and contemporary CRM model factoring in AI considerations to enable practitioners and academics alike to identify areas of developments and foster a better understanding of the interconnection between the factors in the client interaction. Thereby it provides considerations on AI and uncovers the increasing interconnectivity of CRM factor models.

Icelandic

Hið síbreytilega landslag fjártækninnar hefur veruleg áhrif á fjármálageirann og hvernig samstarfsaðilar og einstaklingar eiga samskipti sín á milli í fjármálalegu samhengi. Þó svo að þróunin birtist smám saman, er erfitt að átta sig á umfangi áhrifa hennar og það er oft ekki tekið á henni í auðlindastýringu. Margir af þeim stjórnunarlíkönum sem nú eru notaðir, bæði í fræðasamfélaginu og í viðskiptum, ná ekki að innleiða nýjustu þróunina og eru í hættu á að verða úreltir eða óþarfir í ljósi framfara í gervigreind. Eitt ákveðið svið innan fjármálaþjónustu sem er sérstaklega áhugavert er auðlindastýringargeirinn.

Þróunin á þessu sviði er sérstaklega áhugaverð þar sem þetta er mannmiðað svið fjármála þar sem mannlegi þátturinn (samskipti og traust) gegnir lykilhlutverki í samskiptum við viðskiptavinum. Til eru nokkur líkön sem leitast við að greina flækjustig viðskiptavinastýringar hugmyndafræðilega. Þessi almennt notuðu líkön verða fyrir auknum áhrifum frá gervigreind, sem breytir samsetningu þátta þeirra og leiðir til ófullnægjandi og úreltari líkanga.

Rannsóknin tekur á þessu vandamáli með því að greina núverandi líkön, draga fram þá þætti sem halda gildi sínu þrátt fyrir tækniframfarir og innleiða nýja þætti. Þannig er veitt samtímalegt og hugmyndafræðilegt CRM-líkan (stjórnun viðskiptatengsla) bætt með þáttum gervigreindar. Gildismat þáttanna og áframhaldandi þróun og betrubætur á líkaninu byggja á sérfræðiþekkingu bæði fagaðila og fræðimanna. Rannsóknin leiddi í ljós að sumir þættir líkansins halda gildi sínu eða verða jafnvel mikilvægari með tímanum, þrátt fyrir að nýir þættir verði sífellt mikilvægari.

Með þessu eykur þessi rannsókn skilning á núverandi þróun í auðlindastýringargeiranum. Hún veitir hugmyndafræðilegt og samtímalegt CRM-líkan með tilliti til gervigreindarþátta til að auka skilning og veita leiðbeiningar fyrir bæði fagaðila og fræðasamfélagið.

Declaration

The undersigned hereby certify that they recommend to the School of Business and Economics at Reykjavík University for acceptance this Dissertation entitled **Technological Change in Wealth Management** submitted by **Fabian Zimmermann** in partial fulfillment of the requirements for the degree of **Doctor of Philosophy (Ph.D.) in Business Administration and Economics**.

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date

Fabian Zimmermann

Doctor of Philosophy

“The proper function of man is to live, not to exist. I shall not waste my days in trying to
prolong them. I shall use my time.”
— **John Griffith Chaney**

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Table of Contents

<i>Abstract.....</i>	<i>IV</i>
<i>Icelandic</i>	<i>V</i>
<i>Declaration.....</i>	<i>VI</i>
<i>Acknowledgements.....</i>	<i>VIII</i>
<i>List of abbreviations</i>	<i>13</i>
<i>List of tables</i>	<i>14</i>
<i>List of figures</i>	<i>15</i>
<i>Part I.....</i>	<i>16</i>
<i>1 Introduction.....</i>	<i>17</i>
1.1 Theoretical background & Literature Review.....	20
1.2 Research Problem	25
1.3 Research objective and question	27
<i>2 Methodology.....</i>	<i>31</i>
2.1 Research Philosophy.....	31
2.2 Research Design	33
2.3 Research instruments & approach.....	34
<i>3 Model Development and Validation</i>	<i>39</i>
3.1 Overview and visualization of the Initial Model.....	39
3.2 Model components	40
3.3 Expert Feedback & Refinement.....	45
<i>4 Conclusion.....</i>	<i>51</i>
4.1 Thesis contributions.....	52
4.2 Implications	53
4.3 Study limitations future research avenues	54
<i>References</i>	<i>57</i>
<i>Appendix I - Interview</i>	<i>68</i>
<i>Appendix II - Models</i>	<i>71</i>
Factor Comparison	75
CRM Factor Comparison Table	76
AI Factor Comparison Table.....	78

Part II	82
5 Publications.....	83
<i>I Publication – Transformation of Entrepreneurial Business Finance.....</i>	<i>84</i>
<i>1. Introduction</i>	<i>86</i>
<i>2. Entrepreneurial business finance–transformation of traditional funding methods.....</i>	<i>87</i>
2.1. Venture Capital Funds.....	87
2.2. Angel Investors.....	89
2.3. Crowdfunding	90
2.4. Bank Loans.....	92
<i>3. New ways of Entrepreneurial Business Finance</i>	<i>93</i>
3.1. Tokenisation of Business Value	93
3.2. Employee equity participation.....	95
<i>4. Conditions & Implications for Future Business Finance</i>	<i>97</i>
4.1. Regulatory constraints	97
4.2. Cyber Security.....	98
4.3. Legal recognition.....	98
<i>5. Conclusions.....</i>	<i>99</i>
<i>References</i>	<i>100</i>
<i>II Publication – The future of wealth management (published)</i>	<i>106</i>
1 Introduction.....	109
2 Background	110
2.1 FinTech.....	110
2.2 WealthTech.....	110
3 Method	111
3.1 Search Terms	111
3.2 Exclusion Criterion.....	112
3.2 Analysis	113
4. Results	113
4.1 Descriptive Analysis	113
5. Conclusion	122
References.....	124
<i>III Publication - Conceptual Framework for Assessing the Use of Artificial Intelligence in Asset Management (accepted)</i>	<i>130</i>
<i>Conceptual Framework for Assessing the Use of.....</i>	<i>131</i>

1 Introduction.....	133
2 Method.....	134
3 Literature background.....	135
3.1 Artificial intelligence.....	135
3.2 Big Data as an enabler of Artificial intelligence.....	135
3.3 AI in Asset management.....	136
4 Framework Factors	138
4.1 Clear intent (vision & intent).....	138
4.2 Data Management.....	138
4.2.1 Data Security	138
4.2.2 Data Quality.....	139
4.2.3 Data Transparency	139
4.3 Regulatory certainty	140
4.4 Effectiveness	141
4.4.1 Efficiency	141
4.4.2 Cost reduction.....	141
4.4.3 Enhanced Accuracy	141
4.5 Client	142
5 Conceptual Framework for AI in Asset Management	143
6 Conclusion.....	146
References	147
IV Publication - Contemporary CRM Model: Revision of CRM models and AI factor enhancement for the HNWI client segment. (Kappa)	155

List of abbreviations

AI	Artificial Intelligence
AuM	Asset under management
B2C	Business to consumer
CRM	Client relationship management
FinTech	Financial technology
HFT	High-frequency trading
HNWI	High net worth individuals
LLM	Large language model
NLG	Natural language generation
NLP	Natural language processing
UHNWI	Ultrahigh net worth individuals
WealthTech	Wealth management technology

List of tables

Table 1: Research approach based on <i>Saunders et al. (2019)</i>	31
Table 2: Interviewees and their backgrounds.	37
Table 3: Combined model factors, traditional & AI factors.	39
Table 4: Summary of model components.	40
Table 5: Comparison Matrix of CRM Models, based on <i>Khashab et al. (2013)</i>	76
Table 6: Comparison Matrix of AI models, adjusted from <i>Khashab et al. (2013)</i>	78
Table 7: Summary table of derived AI factors.	79
Table 8: Core organizational factors.	79

List of figures

Figure 1: Client Segmentation based on <i>Faus (2019)</i> , <i>Molynau and Omarini (2005)</i>	22
Figure 2: Research areas and focus. Produced by the author.	27
Figure 3: Interconnection between research questions, publications, and research aim. ..	28
Figure 4: Philosophical influences. Composed by the author.	32
Figure 5: Model design phases (<i>Reeves, 2006</i>). Composed by the author.	33
Figure 6: Method choice based on <i>Lunenfeld, (2003)</i>	34
Figure 7: Initial Revised HNWI CRM Model in the context of AI,.....	39
Figure 8: Revised CRM model.	47
Figure 9: Technology factors.....	48
Figure 10: New Services.....	48
Figure 11: Support Factors.	49
Figure 12: Core Client Factors.....	49
Figure 13: Summary table of CRM factors.	77
Figure 14: Factor Structure.....	80

Part I

1 Introduction

Technological development constantly shapes every corner of society impacting the interaction between market players and the way information is processed (*Saariluoma & Jokinen, 2015*). Its impact becomes especially apparent in the financial sector, where the abbreviation *FinTech* is constantly used to describe novel technologies dedicated to the financial sector.

One particular field of interest within financial services is the wealth management sector. The development in this specific field is of particular interest, as it used to be a human-driven field of finance in which the human aspect (relationship mgt. and tailored investment advice) plays a crucial role in the interaction (*Zhang et al., 2021*). Further interests on the financial sector especially wealth management originates out of its special nature within finance, whereby a huge amount of data needs to be processed, and failure often not only has a significant financial impact but also reputational one (*Peng et al., 2023*). In addition, as argued by *Baker and Filbeck, (2013)* the asset structure of wealth management clients is different to the ones of normal retail clients. This would be due to the various asset classes and income streams which this client segment possesses. Based on *Li-Huang (2017)* and *Solimano (2018)*, the more affluent client segment also has, due to the amount of assets also stronger power and influence over the services offered to them. Thus, making them a delicate group of clients to interact with. While technological change can be inflicted on retail clients - where standardization and automation in general follow the intention to save costs - the more affluent client segments follow a more complex approach where human interaction is paramount. A significant amount of literature exists dedicated to client relationship management. Authors such as *Guerola-Navarro et al. (2024)* and *Rababah et al. (2011)* conducted research on client relationship management focusing specifically on the retention of clients. Others such as *Ledro and Vinelli, (2022)* look at the organizational perspective of AI in customer relationship management (CRM). Despite how detailed the research is already; at the current stage there is no dedicated academic literature which addresses the need for the revision of client relationship models addressing the latest technological developments in the wealth management sector.

While most industry papers and the smaller amount of academic literature focus on the retail market, the wealth management segment is widely neglected. The reason for this might be, the lower visibility as well as the discretion of the entire industry. This leaves financial institutions (wealth and asset management companies such as family offices and boutique advisories) with the challenge to rely on traditional models which hold only limited or no validity with the emergence of technological novelties i.e. artificial intelligence. The existing CRM models' largely cover the retail market as well as the B2C interactions, while the HNWI customer relationship model is often neglected. In this unique setup, the discrepancies arise through the power differences; whereby the affluent client can demand based on his financial backing services, which would not be available to, e.g. retail clients. The development leads to uncertainty for client advisors regarding the use of AI tools and the maintenance of relevant human interaction. Furthermore, it is not entirely

clear how to incorporate AI to the benefit of the client without jeopardizing the interests of the financial institution itself. An entirely new CRM model is required to capture the demands of these very specialized and discrete client segments, aiming to provide the most client-oriented customer services. Thus, this specific client relationship setup is unique and requires different considerations than the widespread retail client market. This research takes up these complex narratives and addresses the latest developments not yet reflected in the literature and client relationship management models.

The overall aim of this research is to provide a revised conceptual CRM model integrating AI factors for the wealth management sector. The goal is to show changes in the CRM factor set-up and to provide an updated model which holds its validity under the consideration of technological developments. The research follows three main steps, first **identifying** the wider topic and its development, second, **assessing** the developments and their implications and third, **developing** a model based on the derived findings.

The starting point of this research builds the first research question of what technological novelties impact financial interactions and how they will be used. Thereby, enabling technologies such as big data and artificial intelligence became apparent drivers and enablers for technology adaption and new product developments. The second question investigates the topic further and asks how these technologies affect financial services in the wealth management sector. Thereby, the impact occurs alongside the wealth management process circle at different sections, the risk management and reporting, portfolio management, investment process, and particularly the client engagement.

The third question targets the assessment of how AI as an emerging financial technology can be evaluated in the context of wealth management. Thereby key areas are presented in a road map-like fashion, which require attention while implementing AI systems in a wealth management setting. The research builds upon these underlying questions and addresses the overall question of how the introduction of AI into the wealth management relationship management process impacts the interplay between the relationship manager and the client. Furthermore, it assesses what emerging factors enhance the CRM process.

The thesis is positioned in the field of managerial literature with a dedicated focus on the wealth management sector. Thereby, it contributes to uncovering the practical and academic phenomenon that existing CRM models might lose their validity and require substantial revision based on the rise of AI (*Arsenyan, et al. 2023; Oppioli, et al 2023*). The research thereby addresses several problems, contributing to a better understanding of CRM, fostering an understanding of the contemporary development of CRM models from a conceptual point of view. From a theoretical perspective, the model comprehends the current stage of CRM models, independently of their intended general use.

The following is structured in two parts: the introductory part and the publication part. The introductory part consists of four chapters, of which the first chapter includes the introduction and background of the topic, the working definitions and terminology as well as the research problem and aim. The second chapter focuses on the methodology, philosophy and approach chosen to develop the topic. It provides the philosophical

foundation and rationality to the chosen approach. In the third chapter the focus is on the conceptual model as a management tool and academic model to comprehend complex and disperse relations. Thereby discussing different CRM and AI models and their factors. It further concludes these models and derives factors for building a revised CRM model through the help of expert inputs. It develops into the fourth chapter where the findings and contributions are presented alongside the implications and limitations. Concluding, the limitations are presented as outlook and are aimed as suggestions for further research. The second part includes the cumulative publications and working papers addressing the underlying research questions which build the foundation for the overall research question and research aim. In addition, the second part includes additional material used over the course of the research process.

1.1 Theoretical background & Literature Review

The area this research builds upon is the financial sector with a special emphasis on the wealth management area. The following section starts with a literature review and a description of the terms used in this field in conjunction with technology. Thereby setting the frame for this research and the area it contributes too.

The theoretical foundation is embedded in the CRM theory with a special focus on the strategic CRM as *Frow and Payne (2009)* and the customer centric approach with the focus on power dynamics as in *Perez-Vega et al. (2021)* occurring between the client and institution. While the CRM theory suits as the guiding theory, the special focus on the customer centric theory is emphasized in the research to demonstrate the different power differences of affluent clients on their client relationship management process. As the topic comprises of dedicated terminology, the following describes the used expressions and their theoretical origination.

1.1.1 Customer/Client Relationship Management (CRM)

The scientific literature comprises of different views regarding CRM. Therefore, CRM models are developed from various angles. In *Chan (2005)* the attempt to provide a unified view of CRM approaches the topic from a data-driven perspective. It outlines an enterprise framework combining external and internal CRM views with a data-driven conceptual CRM view. In the research of *Payne and Frow (2005)*, they suggest that CRM could be viewed from three angles in a continuum model. Thereby, ranging from a more tactically defined view that focuses on specific implementation projects over a wider scope of CRM as technology to a strategic definition of CRM including CRM as a means to create value. The focus as in *Kim (2004)* or *Rahimi and Berman (2009)* is on the successful introduction of CRM models and to differentiate from competitors, aiming to provide a unique client experience. This research tilts more towards the strategically and broadly classified definition of CRM. Due to the introduction of AI models into CRM, this research assumes that the distinction between three postulated perspectives in *Payne and Frow (2005)* cannot be upheld anymore.

The management of clients, their product and service wishes, is a crucial managerial function. In research settings as well as in practical CRM management, models are applied to grasp the various streams and dimensions. Based on *Venkataramanen et al. (2024)* and *Perez-Vega et al. (2022)* CRM models include the initiation of client interaction, the building of relationships, and the structuring of the client management process. The complexity of human interaction and the self-constructed environment through these forms of interaction requires visualization and simplification to grasp the magnitude and interplay among them (*Verdonck et al. 2019*).

The creation of conceptual models thereby supports this understanding through its visual aid, which is important in the complex interaction between humans in a business setting. Throughout this research the term CRM is used to refer to a direct one-to-one relationship between a business and an end user. Therefore, for this research, a customer is considered

to be part of a rather broader client base that does not necessarily have a direct one-to-one relationship with the business and rather experiences universal treatment and standardized product offerings. Thus, the term client is more appropriate, as it fits more the interaction between an affluent individual and a client relationship manager. The word client will be used to characterize the unique relationship; thus, CRM will be considered for client relationship management. The general definition, which is also recognized in this research, are structural frameworks used to monitor the client interaction process and the customer life cycle (*Singh et al., 2020*). It aims to enhance, maintain and sustain the client relationship (*Guerola-Navarro et al., 2024; Rababah et al., 2011*). CRM consists of several aspects, including the collection of data and analysis to monitor the client lifecycle and to perform corrections if required. The amount of available CRM models is significant and varies between industry, sector and intended aim. Depending on the model's intent, either the strategic or operational component appears more dominant compared to the others (*Yerpude, et al., 2023*). Thereby the spectrum of CRM models ranges from strategic and conceptual management models to operational models for direct implementation purposes. Despite the large number of CRM models, most models comprise factors that are inherent. Therefore, it can be concluded that factors which appear more frequently among other models can be seen as ubiquitous and generally accepted.

Client Segmentation

Client segmentation in financial services often follows the approach of anticipating the clients' amount of free investible assets. As every financial institution has its own definition for the clustering of the clients, there is no universally agreed consensus about it. As in *Christodoulides, Wiedmann (2022); Solimano (2018) and Ljumovic and Knezevic (2015)* the client structure is broadly classified in groups for the purpose of easier organization, based on the wealth of the client. While the client categories as in Figure 1, are largely recognized, the amount which stipulates their clustering into one of them is not universally agreed on and depends on the financial institutions' own definition. In that broad hierarchical clustering, the retail client group is generally the largest group of clients in the market. It is made up of the working body of society with usually one main source of income. This group is followed by an affluent group with higher incomes or multiple income streams or inheritances, thus leading to a higher investment amount.

The clients' categories as wealth management clients starts with the third group referred to as high-net-worth individuals (*Le Fur, 2021*). This group mostly includes entrepreneurs, executives, doctors or heirs of larger asset volumes. As their asset structure is rather vast, they require bespoke solutions. Thus, making it the first client group in the wealth pyramid, which has presumably more influence on their financial services (*Solimano, 2018*). Thus, including but not limited to it, personalized relationship management to grasp the magnitude of dispersed assets and intended financial goals. Thereby, their connection with the client advisors is rather close in comparison to a more general and standardized connection in the retail or affluent market.

The last group which possesses even more power over their bespoke services are the ultra-high net-worth clients, which is only a small group of individuals with vast amounts of

investible assets. In terms of asset structure complexity and service impact, they have at least the same influence as the HNWI clients but could exceed the impact by far.

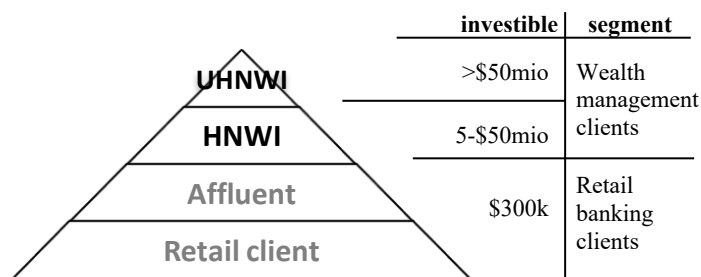


Figure 1: Client Segmentation based on *Faus (2019)*, *Molynau and Omarini (2005)*.

The client scope in this research focuses primarily on the HNWI client segment, as the first group in the pyramid where the single individual possesses influence over its services. Furthermore, it is indicated by closer relationship with their client advisors despite possible international differences in purchasing or legal power. The UHNWI clients build an entire group for themselves and only mark a fraction of the entire client pyramid. They build an edge case and are not considered explicitly in this research.

1.1.2 AI Models

The term Artificial Intelligence embodies several research fields and draws upon various applications. It is claimed to be coined in 1959 during a conference in Dartmouth, New Hampshire. Researchers at Dartmouth College discussed the possibility of developing artificial human-like intelligence (*Howar, 2019*). Due to *Tian et al. (2019)* AI research stretches from a scientific perspective among mathematics (stochastic), computer science (application), cognitive- and social science (human-like appearance) to enable the technology with human-like features. In this research, the focus is on the actual models which are perceivably useful for the financial sector and are impacting the CRM process. These comprise large language models (LLMs), deep learning, and unsupervised learning as well as generative models.

While the reason for the introduction of AI can vary from case to case, it is crucial to understand its capabilities and applicability. *Marinai et al. (2005)* argue that while predictive analytics models might be more significant for market data and investment purposes, computer vision and recognition patterns can be more important for documentation and contracting. Thus, an AI model depends on the actual tasks to be performed and cannot be, due to *Patil and Patil (2023)*, seen as a one-size-fits-all setup. Several AI models are of particular interest to the CRM model based on their capabilities and the factors they comprise (*see: Appendix II - Models*).

Machine Learning Models (ML)

Jain et al. (2000) describe AI machine learning models as a basis for data reasoning and to conclude from it. *Sarker (2021)* sees it rather as an umbrella term to describe automated learning capabilities that rely on algorithms. Thereby, these models would rely on the

inference of data, based on pattern recognition. Thus, *Jain et al. (2000)* state that these models can work independently and provide incremental, accurate learning outcomes depending on the introduced data. As *Jordan and Mitchel (2015)* describe it, the use cases for ML are vast and can also be used independently from the data format. *Montalt-Tordera et al. (2021)* argue further that this description only holds if the training data is consistent. Its learning capabilities include the analysis of structured and unstructured data. The learning process can thereby occur in three main ways: supervised, unsupervised and reinforced. According to *Kotsiantis and Pintelas (2007)*, the supervised learning process results in an expected outcome based on pre-defined datasets on which the model was trained. The model learns patterns based on the pre-delivered data and applies these patterns in a second step to the actual dataset. The unsupervised follows a similar approach. It differs, as it is not characterized by previous training data sets and expected outcome labels (*Kotsiantis & Pintelas (2007)*). Thus, it is unsupervised and used for data clustering of unstructured datasets. Due to *Alloghani et al. (2020)* its outcome is dependent on the patterns that are given in the unique input data set. The third is reinforced, characterized by an undefined learning approach, whereby no training data is given, and the model works on a trial-and-error basis as in a chess game to arrive at a result over time (*Puiutta & Veith, 2020*). *Tran et al. (2023)* state that for CRM these learning is especially useful for client segmentation and churn predictions. This enables learning from the analyzed data, which clients might be potential target clients, but also which already existing clients are at risk of leaving.

Deep Learning Models

Deep learning is understood as a subset of machine learning. *Wang et al. (2020)* describe it as a multi-layer learning design, based on an iterative learning process. *Patil and Rane, (2021)* take up that concept and describe it as a model comprising of neuronal networks and pattern recognition capabilities. For *Lieskovska et al. (2021)* its importance lies in the natural language processing via speech recognition and even more complex output generations, such as making logical decisions. Thus, making it useful for several use cases especially in the CRM process and client interaction.

Recommendation Systems

Due to *Koe et al. (2022)*, recommendation systems can select relevant content based on a user's preference as part of machine learning. Furthermore, *Khanal et al. (2020)* describes in their research that recommendation systems can provide tailored user experience and can draw upon pre-fed information or identify patterns on a free learning basis. Recommendation systems have several practical use cases and are widely used in e-commerce and social media. For wealth management, its capabilities provide the client with dedicated offerings for their financial needs. Thus, making it an exceptionally important feature when considering the automation of the advisory process. Thereby, allows to combine it in the context of a virtual advisor for the optimization of tailored recommendations. *Koe et al. (2022)* further conclude that recommendation systems can provide clients with dedicated content based on their established user profile and thereby enhancing advisory processes.

Natural Language Processing (NLP)

As described in *Khurana et al. (2023)* natural language processing (NLP) enables machines to understand and interpret human language. In their research, *Tyagi and Bhushan (2023)* further define the natural language generation (NLG) as an additional category to NLP which creates readable text outputs. Due to them, both NLP and NLG are combined and used in interactive translation tools, virtual assistants, and customer chatbots. In the wealth management setting, *Zhao et al. (2024)* proclaim its usability for capturing the client's intentions and risk preferences. In addition, it would allow the personalization of services and foster the client relationship through natural interaction; it increases client engagement and allows self-service (*Chaturvedi & Varma, 2023*).

Predictive Analytics Models

Predictive analytical models are due to *Kumar and Garg (2018)* based on historical data. Data is either collected through the client's past behaviour or collected data from outcomes of other client behaviour. *Anshari et al. (2019)* argue that this enables different types of personalization in the client interaction. With increasing individualization possibilities, especially HNWI, clients would benefit from a higher level of customization. *Broby (2022)* further postulates that predictive analytics reduces response time and increases potential efficiencies in client interaction and task execution. In their research, *Haleem et al., (2022)* argue for the importance of predictive AI models in making a prognosis about customer acquisition and possible customer retention. Thus, enabling companies to better resource planning and to execute possible countermeasures.

Sequential pattern mining model

Sequential pattern models, as described in *D'Arco et al. (2019)* and *Ernawati et al. (2021)* can be used for the analysis of re-occurring client behaviors and to derive a client journey at the development stage of the interaction with the client. In comparison to existing CRM models, introducing predictive analytics and the modelling of client stages enables the customization of client experiences. Based on the analysis of historical data, such as demographics and past transaction data, it is possible to provide demand forecasts and prognosis about the client's development stage as a customer (*Tueanrat, et al., 2021*).

Text classification model

In their research, *Khan, et al. (2010)* conclude that text classification models can analyze written documentation, i.e. client meeting notes, meeting and chat protocols. *Pacheco et al. (2018)* further state that this would allow the filtering of information based on client interaction. Furthermore, due to *Cunha et al. (2023)*, it would be possible to perform sentiment analysis based on text classifications. Therefore, it would allow the active adjustment of the client interaction and intensification of it if required.

1.2 Research Problem

With constant developments in technology also new challenges and problems occur in the way humans interact. The widespread emergence of AI and its use for interactional purposes also influences the client relationship. The views regarding the importance and relevance of human interaction in the client relationship are diverse. While AI offers efficiency (*Odonkor, et al., 2024*), data-driven insights (*Ntoutsis, et al., 2020*), and automation (*Himeur, et al., 2023*), authors like *Westermann et al. (2020)*, *Strauß (2021)* and *Glikson, Wolley (2020)* argue that despite its benefits in automation, the human interaction remains essential for building and maintaining trust, understanding nuanced client needs, and managing complex emotional and psychological aspects in wealth management.

Thus, a critical interplay occurs in the client relationship between human relationship managers and the client intensified through new technologies (*Swift, 2021*). To visualize these complex interactions between clients and the wider organization; client relationship management models (CRM) are used, structuring and organizing the various interconnecting synopsis (*Gebert et al., 2023*). Under consideration of emerging AI factors, several traditional CRM models become outdated and classical CRM approaches more refined.

The differentiation on how AI might be used will also depend on the client structure. While retail clients might experience more of the infliction of new ways of interacting with them, other client segments, such as the High Networth Individuals, possess far more influence over their services (*Li-Huang, 2017*) and can thereby shape how technological novelties are used in their services (*De Smet, Torkkeli, 2016*). As the affluent client segment differs from the retail client segment, the interaction between the financial advisors and the clients also varies (*Christodoulides & Wiedmann, 2022*). While the last decades of client interactions for the retail client segment were characterized by standardization and optimization, the affluent (HNWI) client segment still relies on the interaction between the advisor and the client. At that pivotal point between the client and their human relationship managers, the main challenge arises in the adoption of AI applications in the CRM process. Thereby, the introduction of AI occurs for different reasons. Especially the optimization of CRM and the utilization of AI applications to enhance client relationships play a crucial role. Furthermore, wealth managers are subject to multiple regulations and restrictions, especially in their client interaction whereby AI applications can be seen as support systems to ensure adherence to regulations and the monitoring of such (*Padmanaban, 2024; Kingston, 2017*). An additional factor plays the client demands, which includes the requests for tailored services and around-the-clock access. Thus, making it increasingly hard for human advisors to deliver just-in-time services. Another reason that should not be neglected is the curiosity of clients as well as the comparison to other competitors that might offer AI-supported processes. Above all, the intention of cost-cutting might be an additional aspect by reducing lengthy human process steps.

Therefore, the challenge will be to maintain a personal connection, establish trust, and increase service efficiency while introducing AI. As identified in *Königstorfer and Thalmann (2020)*, it remains unclear how AI can change customer-relationship

management (CRM) and how it will become part of a successful and modern CRM. Thus, the problem arises from the lack of understanding of how AI can be incorporated into a CRM strategy and the lack of scientific validation and best practices. Apart from the practical problems, conceptual challenges arise as there is a lack of academic literature on the topic due to its novelty.

While practitioners, e.g. consulting firms and industry agencies, have published significant amounts of descriptive papers on CRM, academic publications are rather scarce. The limited number of existing academic publications largely target other industries, such as consumer goods or focus purely on technology but leave out the HNWI financial service sector. Researchers mainly focus on the operations for which AI solutions could easily be implemented (*Lendro & Vinelli, 2022*). Furthermore, several research attempts target the problem on a general level, among them is the research gap mentioned by *Kavuri & Milne (2019)* about the uncertainty of “computation of artificial intelligence and large-scale data processing in finance”. Similar uncertainties are identified by *Lu et al. (2020)*, including the request for further research regarding the vulnerability of different financial services such as payment; personal finance and wealth management- to new technological developments. *Dhama (2021)* mentions the problem that the increasing complexity of the ecosystem, as well as increased client demands, requires the decision of which services and digital advancements should be offered on the market to stay afloat. In addition, as stated by *Broekhuizen et al. (2023)* and *Bock et al. (2020)*, there is a lack of empirical evidence about enabling factors, barriers, and potential challenges to be addressed. *Broekhuizen et al. (2023)* developed a framework for leveraging AI-enabled applications in open innovation. They address the AI mapping, coordinating, and controlling functions and combine them in a multi-dimensional matrix. Despite addressing the open innovation process, it is not aimed to include particular client management, leaving alone wealth management. In contrast, a more dedicated focus on CRM is researched in (*Ledro & Vinelli, 2022*). Their focus lies on the strategic impact of AI on CRM from a more organizational perspective and does not consider the direct face-to-face CRM relationship. In *Ledor (2023)*, the application of CRM in conjunction with AI is based on a literature review and a conducted case study. Its research emphasizes on the impacts of AI on CRM but does not investigate further which dedicated factors would be implemented into a new model. Despite the consensus that AI is transforming the client relationship, the academic literature lacks a fundamental analysis of how it would impact CRM factors alongside the entire customer life cycle process.

The crucial problem in the setting of wealth management originates from the use of management models which are not reflecting the latest technological developments.

To include respective impact factors, the existing management models require to be revised in the light of artificial intelligence and put to the test in a new environment. Due to this, the problem is not only of significant relevance for strategic management research but also for operational management as the unaddressed AI developments lead to neglect the client focus and interaction. To address these challenges, this research explores which AI factors should be included in a revised CRM model. The research draws upon several previous

studies which fit in the context of AI and CRM and its related fields covering the topic from a wealth management perspective in conjunction with the inherent complexity of the client body in that sector.

1.3 Research objective and question

This research aims to fill the gaps in two theoretical areas. The area of client relationship management and the field of financial technology with a special focus on emerging technologies i.e. artificial intelligence. The overall objective is to provide a conceptual CRM model integrating AI factors for the wealth management sector in the HNWI segment. Thus, providing a tool to enhance the client service process in financial service organizations from a conceptual perspective.

The emphasis is on the identification of the CRM factor set-up to provide an understanding which factors holds their validity under technological developments. Figure 2 illustrates the overlay between the client interaction and the field of technology i.e. AI. Thereby focusing on the conceptual aspects of client relationship management, considering the pivotal point in the interaction between the client and their human relationship managers.

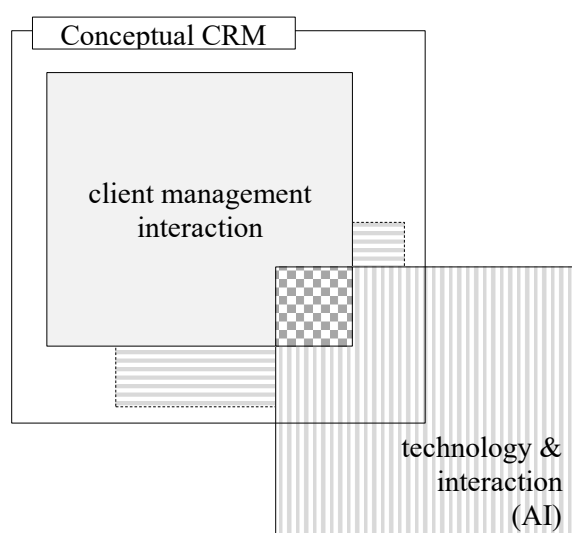


Figure 2: Research areas and focus. Produced by the author.

The development of the overall research question originated from several underlying questions addressed throughout the research. At the beginning stands the introductory question identifying what the technological novelties are and how they will be used. This preliminary step sets the frame for the research area and topic. The specific research question developing out of the previous one is narrowing down the scope by specifically questioning how new technologies impact the wealth management sector for private clients.

To formalises the multidimensional and cross-area nature of this research the following main research question (RQ) was formalised:

RQ: How is the introduction of AI into the wealth management relationship management process impacting the interplay between the relationship manager and the client and what are emerging factors to enhance the CRM process?

Its development originates out of three underlying research questions addressed in three consecutive publications.

RQ1: What are technological novelties impacting financial interactions, and how will they be used?

RQ2: How does FinTech effect the financial service in the wealth management sector for private wealth?

RQ3: How can AI as an emerging financial technology be evaluated in the context of wealth management?

The main research question is addressed based on the scientific results derived throughout the previous publications. It embeds the publications along the three dimensions; to **identify**, **assess**, and **develop**.

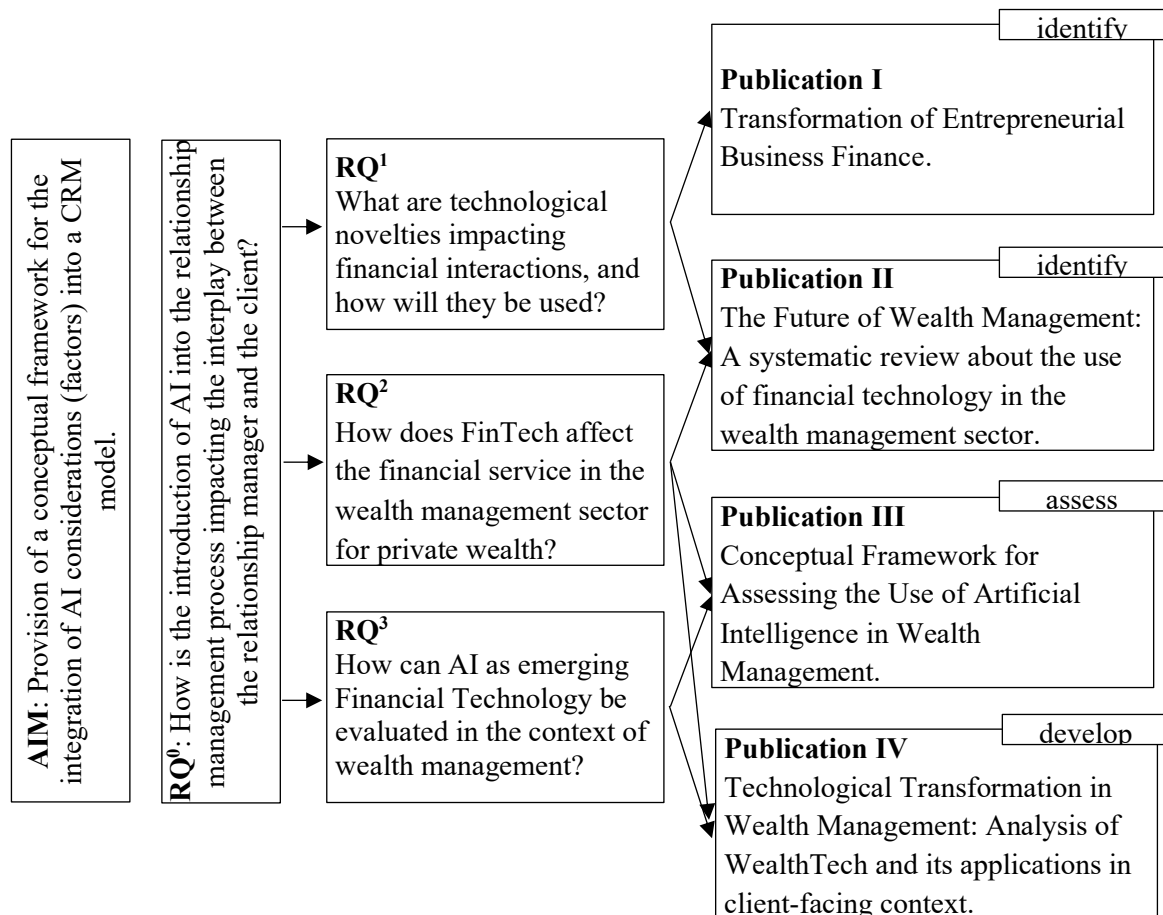


Figure 3: Interconnection between research questions, publications, and research aim.

The **first publication** generally identifies and assesses the new funding methods for business, thereby considering the novel technological aspects, identifying several new financing methods. It provides directions about the latest methods without any further deep dives on the technologies itself. It can be understood as a practical approach serving as an overview and practical guide. For the wider research context, it functions as a starting point providing an overview of the novelties and while setting the frame for the following deep dives on the topic.

The **second paper** published on the future of wealth management comprises a systematic literature review analyzing the prevailing topics of interest in the wealth management industry alongside the wealth management process. It provides an overview of the emerging technologies and their applications in the wealth management sector. The main topics identified cover new ways of technology, focusing on blockchain, big-data-analytics, AI & LL-models. Furthermore, it also uncovers risks and shortfalls in the current research. The findings include the non-readiness in the organizational setup to implement efficient AI models and the uncertainty on how to best utilize the new technology. Furthermore, it provides the associated limitations in the organizational setup when implementing technological novelties. Out of this research originates the focus on the client relationship in wealth management which comes under scrutiny in conjunction with new technological developments, especially the introduction of AI applications in the client-facing context.

The **third publication** develops a conceptual framework to assess the use of AI in Wealth/Asset management in a road map like fashion. It includes critical success factors and a dedicated focus on client engagement and experience. Moreover, it considers the potential shortcomings and associated risks in conjunction with client interaction. Thus, the review showed that client interaction appears to be one of the dominant areas impacted by technological developments. Especially, AI was identified to play a dominant role in the interaction between the client and the relationship manager. The research revealed that not only organizational change is required to adjust to the new market developments, but also the currently used frameworks and management models require adjustments, which face the risk of becoming impracticable due to technological novelties. Based on these findings, the pivotal point between the client advisor and the client was identified to become of substantial interest in the client's communication and interaction. While several CRM models were analyzed it became apparent that the existing models do not comprise any identifiable AI-related contributing factors.

As a result, the Kappa is intended to build the **fourth paper** comprising the research outcomes of the previous publications, addressing the identified gaps and combining the findings of the previous research questions. Thus, it offers a new conceptual CRM model, comprising universal CRM factors which hold their validity over time and new factors which are increasingly important in conjunction with artificial intelligence for the fostering of client interaction. Hence, it furthers the storyline through the literature review and the uncovering of the problems emerging from new technologies used within the HNWI client relationship management

To grasp how the phenomena is investigated and conceptualized, it is crucial to understand the underlying philosophical foundation. The following chapter describes the conducted research steps, the used methodology and outlines the research philosophy.

2 Methodology

This chapter presents the **research methodology** and **philosophy** of this study. It includes the **research design** this research is based on and outlines the applied **research strategy** arguing for the used approach. Furthermore, it consists of the research development carried out through the published papers and its wider development. Thereby this research follows a qualitative approach, including factor comparison of existing CRM models and the creation of a revised model. Whereby the rational is applied, that the existing models, hold valuable insights which remain constant despite changing circumstances. Furthermore, the justification for the use of industry experts, is given by the highly discreet nature of the research field, whereby public available information is limited and data difficult to acquire. The access to practitioners in the field of private wealth management thereby allows to add another level of justification for the conducted research and its validity in its sector. The consultation of industry experts further adds an additional level of expertise and feedback to the newly composed model and its relevance, allowing to incorporate valuable feedback while drawing upon their further suggestions. The research process as outlined in *Saunders, et al. (2019)* and can be summarized as followed:

Aspects	Element	Description
Philosophy	Pragmatism	Combines CRM factor comparison with expert insights into AI and CRM
Approach	Deductive	Derives factors from existing models and builds to compare them
Strategy	Mono Methods	qualitative data: semi structured interviews (expert insights)
Time Horizon	Cross Sectional	Follows the CRM model's performance and AI adaptation over time.
Technique & procedure	Data	Qualitative data (based on expert interviews) Analysis (thematic analysis)

Table 1: Research approach based on *Saunders et al. (2019)*

2.1 Research Philosophy

The research philosophy provides insights into the researcher's inner thinking and approach to a topic (*Fatonah et al., 2022*). It develops into the wider context of research and provides a philosophical approach to a topic independently of the research field (*Mir & Greenwood, 2021*). Thus, it shows how the creation of knowledge is perceived and understood. Several streams crucially impacted the philosophy and the way how new knowledge is created and perceived. Especially four factors shaped crucially to the research philosophy underlying

this research which are the researchers experience, the disciplinary background, the educational training and the nature of the research problem (see Figure 4).

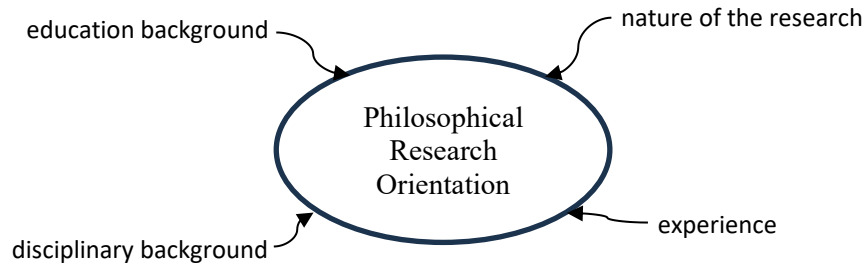


Figure 4: Philosophical influences. Composed by the author.

The philosophical paradigms of this research can be clustered into **epistemological** pragmatism, recognizing and investigating the underlying structures of human interaction in a real-world setting (Saliya, 2023; Chen et al., 2011). Thereby it follows an interrogative approach based on the observation of appearances, and their subsequent consequence in a real-world setting (Morgan, 2007). The philosophical pragmatism further manifest itself based on the combination of different methods used to answer the research questions (Mitchell, 2018).

Given the real-world nature of the research and the researchers intend to provide a practical tool; it strongly hints towards the **pragmatic** philosophical approach (Creswell, Poth, 2016). Thereby, the research seeks to further the knowledge in its discipline in which the research problem is embedded. From a practical point of view, the comparison of existing models and the validation through expert consultation, seeks to interpret and inquire how the practical underlying structure can be modified.

In addition, the knowledge creation as it is understood for this research is to be furthered through the recognition of existing pre-determined structures and their adjustment in instances of changing circumstances. Thus, the adjustments of existing models are seen as a feasible approach to further knowledge - as change is assumed to be inherent in the context of human interaction. The philosophical approach is thereby strongly shaped trough the researchers' own observations and practical experience as a project manager for investment projects in the private banking and wealth management sector.

Ontology as described by Deniz and Lincoln (2011) as the study of existence and being is concerned with the beliefs and the theory about the nature of reality. Described by Moon and Blackmann (2017) the reality manifestants itself through the interaction with the real-world problems. In this research the focus is on management models and the observable interactions between the organization and their clients. Thus, the ontological orientation is grounded in ontological constructivism, as the aimed target stage is the creation of a revised model. Concluding, the philosophical orientation and epistemological direction of this research is embedded in the researcher's field of expertise in the financial sector, in conjunction with a managerial approach towards client relationship management. In addition, the involvement of industry experts demonstrates the tendency towards

managerial aspects of the research defining the tendencies towards the epistemological pragmatism. Furthermore, the philosophical approach in this research acknowledges the realities of its time whereby new societal factors interplay with existing structures. This is in line with the assumptions made in in *Lagoarde-Segot (2015)* that; economical and societal changes demand the revision of management theories and finance. Thereby, influencing also the philosophical approach towards a research topic.

2.2 Research Design

This research is oriented on the design research approach as in *Collins et al. (2016)*, *Reeves (2006)* and *Bayazit, (2004)*. It is structured in several steps to develop the contemporary CRM model enabled through the design research approach. These steps are visualized in Figure 5 in alignment to the phases suggested in *Reeves (2006)*. The process starts with the first phase of the design research which includes a literature review identifying commonly used CRM models. It is followed by a cooperative analysis deriving factors which are consistent among the models and enriched with factors which are identified through the comparison of AI models.

In the second phase, the third process step includes the discussion and ranking of factors regarding their perceived importance for the wealth management sector.

The third phase introduces the actual prototyping of the model, combining the identified factors structuring them in an organizational order base on the model outlines of *Gartner and Buttle*. The prototyping of the model is followed by a validation step, carried out through expert interviews with practical and theoretical backgrounds in wealth management and technology. Concluding, in the last stage the interview findings are incorporated in the model design.

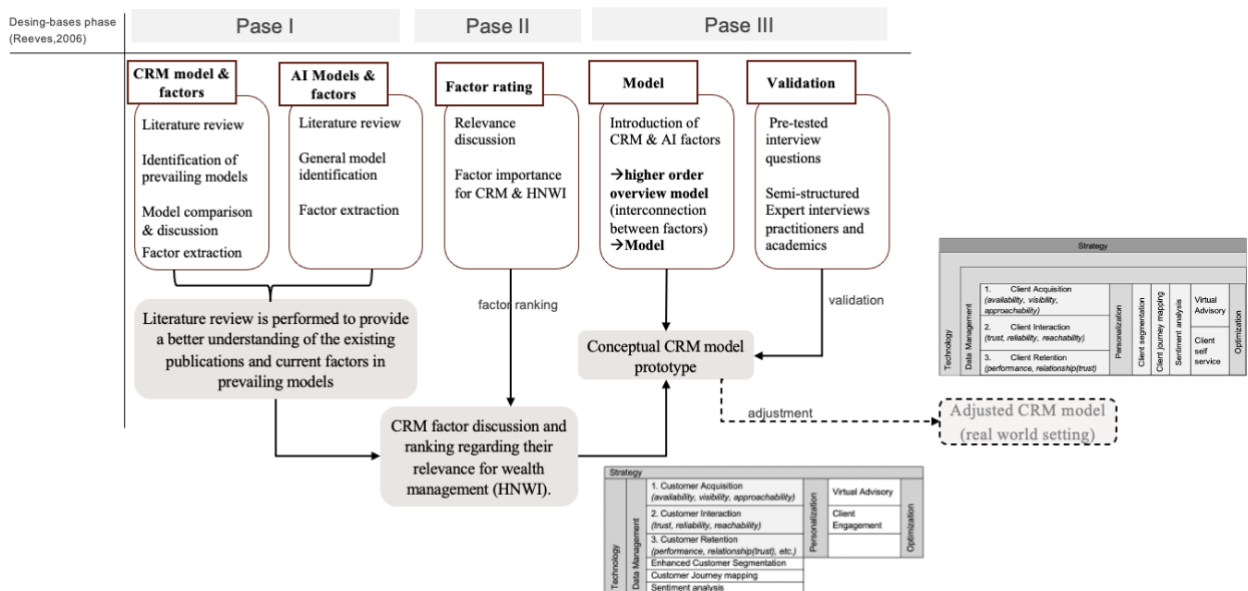


Figure 5: Model design phases (*Reeves, 2006*). Composed by the author.

The design research integrates seemingly into the approach of the previous publications

ensuring the addressing of the research gaps. It consequently follows the introduced process steps of identify, assess and develop. The rationale for the design research approach is moreover based on four main considerations.

The **first**, consideration for the approach, is the practical nature of the topic, whereby CRM models used by academic and practitioners alike are analyzed to demonstrate complex interactions. The rationale for the approach is therefore grounded in the nature of the topic, which, in its practical nature and complexity, embodies the issues described in *Collins et al. (2016)*. Thus, the **second** reason for the approach is the dualistic view on the mentioned practicability but also the introduction of theoretical elements, applied through rigor in form of its defined iterative process steps. **Third**, the design approach allows to involve practitioners into the creation process, incorporating their feedback in an iterative process ensuring the relevance of the created product, its practical usability and validity. **Fourth**, the approach allows to create a structural yet flexible model which can take on additional factors. Thereby allowing to incorporate additional factors in cases of changing circumstances.

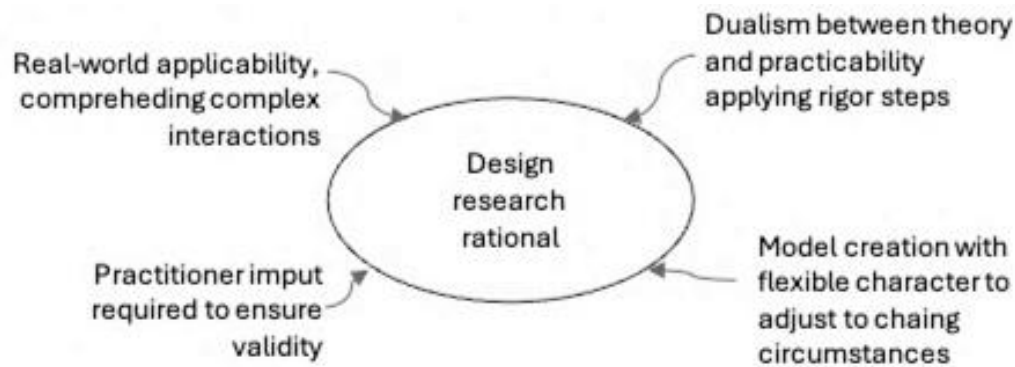


Figure 6: Method choice based on *Lunenfeld, (2003)*.

Furthermore, as described in *Collins et al. (2016)*, the nature of the research defines the need for approaches which study the real world and address theoretical questions in context. The design research enables the integration of additional validation methods. Thus, resulting in identifying the relevant models, deriving key factors, assessing them with the help of experts regarding their usefulness and as final step, developing a new model. *Bayazit (2004)* describes it as the research and investigation concerned with “the artificial”; human-made novelties and how they are directed in academia and business. Thus, their description aligns with the emergence of artificial intelligence in the financial service sector and its interplay in the client-facing context. In particular, the research carried out aims to provide a holistic picture on a conceptual level to grasp the magnitude of AI in customer relationship management.

2.3 Research instruments & approach

In accordance with the described research design, the subsequently steps were carried out, whereby the literature was consulted to identify existing models and analyze them regarding their comparative factors.

2.3.1 Model selection & comparison

The model selection is based on the overview of commonly used CRM models, provided in *Buttle and Makar (2019)*, *Bergeron (2004)* and *Swift (2001)*. In their publications, the authors, focus primarily on models with the objective of value creation and strategic development. The models building the basis for the factor derivation are:

IDIC model from *Peppers and Rogers (2016)*, QCI customer management model, described in *Woodcock et al. (2003)*, Five Process model by *Payne and Frow (2005)*, Desai Conceptual Model (*Desai et al. (2007)*), Forrester CRM Model described by *Brand, Petouhoff (2010)*, Gartner's Eight Building Blocks Model explained by *Radcliffe (2001)*, and Buttle's CRM Model (Value Chain) based on *Buttles (2001)*. Through this process, the models were compared against each other identifying similar components, including strategy, technology and client focusing factors. As the terminology varies from model to model, a harmonization of the terms is conducted through the clustering of similar terms and the consultation of the literature. The clustering of the factors is based on generalized terms and identified similarities, to harmonize them despite different wordings (*see: Appendix II - Models*).

The primary terms selected for the clustering are the strategy and management, organizational orientation, support and infrastructure, and the client focusing expression-allowing a thematical segregation of the diverse terms. While some factors can be easily classified e.g. the strategy factor remains constant, other factors like IT, infrastructure, etc. can only be harmonized by clustering them together under one universal term e.g. technology. This simplification allows to make an assumption of the universal components, coherent to the models. The first model draft is oriented on the Gartner model (*Radcliffe, 2001*) and Buttle's CRM model (*Buttles, 2001*). It combines the structure from Buttle's CRM model with the hierarchical order of the Gardner model, incorporating the derived factors from the CRM and AI models and discussing their validity at each stage.

2.3.2 Expert Intervention

Following the introduction of the conceptual CRM model with AI factors, the fifth process step focusses on the validation and enhancement of the theoretically derived model design and parameters as outlined in the research methodology. Industry and academic experts were interviewed to provide their practical and theoretical validation and expertise.

As a very discrete field in financial services; the wealth management CRM for HNWI clients is a untransparent researched area where publicly available information and data are rather scarce. Given the novelty of the topic, capturing the practitioner's expertise and view was essential to validate the research topic and aim.

The interviews for the model validation and assessment were based on the semi-structured interview approach from *Miles and Huberman (1994)* allowing to collect qualitative data of a newly emerging topic. This resulted in an open question approach, contributing to a more exploratory interview setup, allowing to capture different aspects and views on the topic. Thereby, its aim was to validate the previously identified CRM factors and to reveal further factors which the model might not yet incorporate. Consequently, it followed largely a deductive approach for qualitative data collection based on *Huberman and Miles*

(2002).

The interviewee selection was conducted based on the several inclusion criteria (industry and sector expertise, work experience, seniority level, internationality) with a special emphasis on experts with a consulting background. Whereby the focus was to have theoretical and practical experts to provide their expertise from both angles. As a minimum criterion, all interviewees were required to have experience in the financial sector despite their main fields of expertise; to ensure that they have an understanding of the topic. Experts were thereby defined as “[...] *persons with specific knowledge who hold a certain status or exercise a function in decision-making processes in a particular field of action*” (Döringer, 2021, p. 267).

By this means, to qualify as experts, the participants are required to have a minimum of 10 years practical work experience in either academia, the financial- or technology sector whereby a combination of the different sectors was possible. The academic work experience was only considered for interviewees fulfilling a PhD as minimum educational standard. In addition, all interviewees were selected based on their seniority level; holding senior positions either in consultancy firms, universities, FinTech companies or financial institutions and have diverse international backgrounds (Swiss, Czech, Dutch, Italian, Russian, Austrian, UK). The interviewees were clustered in two groups dependent on their background. Interviewees with a significant academic background (PhD, MBA) and expertise in conceptual modeling based on their consultancy experience are clustered in the technological and more theoretical group. Interviewees with a stronger practical background and less academical and conceptual expertise (client-facing employees) with a focus rather on practical CRM were clustered in the practitioner group. The interviewees are categorized and labeled as in Table 2. The practical experts are indicated by P_E_1-3 and the theoretical experts are indicated by T_E_1-3. Interviews were conducted with an even number from these two groups to ensure a balance between practical the theoretical and practical validation.

	Background			
	Technology	Financial Services	Consulting	Academia (PhD)
Theoretical & conceptual assessment				
T_E_1: Senior Data & AI Strategist	✓	✓	✓	
T_E_2: Prof./Researcher CEO Asset Mgt. & CRM	✓	✓	✓	✓
T_E_3: AI Ethics Research	✓	✓	✓	✓

Practical assessment			
P_E_1: CEO Family Office HNWI clients		✓	
P_E_2: CEO Asset Mgt. Tech	✓	✓	
P_E_3: Director Head Funds	✓	✓	✓

Table 2: Interviewees and their backgrounds.

The interview questions were first tested with two interviewees in person, to validate the fluidity of the question flow and the used format. Based on the feedback and observation, the question order was adjusted, and the time frame was set to ensure the interviews duration between 45-60minutes. Afterwards, the interviews were conducted with the six selected interview partners. The interviews were either in person or online via videocall. As the interviewing of wealth managers and private bankers often require internal legal clarifications, the questions had been sent when demanded a week prior to the interview. Thereby the interview questions were arranged in thematical order in a questionnaire like fashion to ensure the interview flow (*Appendix I - Interview*).

As the interviews were semi-structured it was expected that answers might be lengthy and not every part of the answer would contribute directly to the question. Thus, the answers were manually transcribed in a non-verbatim fashion (*Poland, 2023*) to only present the relevant parts of the answers. In cases where the questions ware sent beforehand, and the interview answers were already pre-answered before the interview; the provided responses were validated in the personal interview and directly used without further adjustments. As the questions where structured in a questionnaire like format coherent to the research objective, the answers were already thematically ordered allowing an easier aggregation of the answers. Where quantification was possible, the inputs were counted and depicted in a pie chart.

The challenges as in every interview setting arises from the uncertainty about the availability of the interview partners. In financial services and especially in wealth management the availability of interview partners might not even be given for seemingly innocent topics due to privacy or reputational concerns. Also, for this research, two interviewees requested the questions before hand to clarify the extend and the information they can share. Thus, they had more time to prepare and added some bullet points of their answers already prior to the interview. This deviating precondition allowed for a smooth interview process and more detailed contribution but led to the possible limitation, that their answers might have been more filtered e.g. pre-approved and therefore biased in comparison to spontaneous answers. The understanding of comprehensive models, in particularly conceptual models requires in general some additional explanation. Since most of the interviewees worked at one point in their career in consulting companies, they stated to be familiar with conceptual models and required only short or no explanation. As the

interviewees are from two different areas, their answers differentiated in length and depth. Interviewees with a technical background answered the technical questions more extensively, while client-facing employees highlighted rather the practical client-facing aspects. This proves, that the selection of two interviewee groups ensured that the interviews covered equally technical and operational views.

3 Model Development and Validation

This part includes the developed CRM model, its incorporated components and overall structure. It comprises the key traditional and contemporary factors and provides a revised model for the CRM process in wealth management.

3.1 Overview and visualization of the Initial Model

The conceptual CRM model is based on the universal factors identified through the comparison of the prevailing and most used conceptual CRM models (*see: Appendix II - Models*). These factors are taken as base parameters and are enriched by novel AI factors to enhance the existing profile. In total, the new model comprises 13 factors in total.

Base CRM Factors	AI Factors
• Customer Interaction • Data Management • Technology • Strategy • Customer Acquisition • Customer Retention	• Optimization • Personalization • Client engagement via Self-service possibility • Enhanced Customer Segmentation • Customer journey Mapping • Sentiment Analysis • Virtual Advisory

Table 3: Combined model factors, traditional & AI factors.

Combining the base and novel factors results in the following conceptual client relationship model Figure 7. For a structural overview as in *Radcliffe, (2001) and Buttle, (2021)* the factors are combined to visualize the relationship between the identified factors and their importance in the overall model.

Strategy					
Technology	Data Management	Customer Acquisition <i>(availability, visibility, approachability)</i>	Personalization	Virtual Advisory	Optimization
		Customer Interaction <i>(trust, reliability, reachability)</i>		Client Engagement	
		Customer Retention <i>(performance, relationship(trust), etc.)</i>			
		Enhanced Customer Segmentation			
		Customer Journey mapping			
		Sentiment analysis			

Figure 7: Initial Revised HNWI CRM Model in the context of AI, based on the structure of Gartner & Buttle, (*Radcliffe, 2001; Buttle, 2021*).

While the base factors remain important, the newly introduced AI-related and influenced

factors are, in comparison, less pronounced. The reason for this deviation is that they are a support function and assist characters for the main base factors. This becomes apparent for the introduction of virtual advisory, which is rather seen as an additional support method than a stand-alone solution. In addition, sentiment analysis and customer journey mapping are on an equal level as the virtual advisor. Thus, they can also be considered as supporting factors in the relationship management process. The factors of technology and optimization, as well as enhanced customer segmentation, have a higher importance, as they are crucial success factors for efficient CRM. They are also of secondary importance when it comes to HNWI client relationship management. In contrast, acquisition, retention and customer strategy, together with personalization, are especially crucial for the relationship with HNWI clients as the clients and their assets are not just service receivers, but their assets are also the managed resource factors for financial service companies.

3.2 Model components

Based on the described outline in the methodology part and clustering of the factors, the model comprises of several components summarized in Table 4, completing the structure of the model.

Organizational factor	strategy
Guiding factors	technology, data management, optimization
Core factors	client acquisition, client interaction, client retention
Support factors	client segmentation, personalization, sentiment analysis
New factors	client engagement, journey mapping, virtual advisory

Table 4: Summary of model components.

Accordingly, a description of the factors their relevance and role in the model is outlined and discussed in the following.

Strategy

As with all the original models, the revised model also includes its overarching factor: the strategic orientation of the client management. As in *Frow and Payne, (2009)* and *Roberts et al. (2005)* the strategy defines the focus on how the market should be targeted and which specific clients and the long-term orientation of the entire client-serving process. The strategical orientation spreads in every aspect of the model, as it requires the definition of the technology strategy, the targeted clients and above all the market and service offering targeted (*Peppers and Rogers, 2016*). As in other models alike, it builds the grounding basis for every decision-making along the value chain and operational setup.

Technology – guiding factor

The enabling organizational factors are technology and the appropriate management of the data collected in the customer life cycle process. From a managerial perspective, technology is considered by many authors such as *Boon, et al. (2002)*, *Ocker and Mudambi, (2003)* as the underlying infrastructure for business interaction. While this still largely holds today, the technological aspect is more than just an infrastructural factor (*Sardana,*

Singhania, 2018). The technological factor comprises the entire strategic considerations from client interaction to sales pipeline to documentation and becomes increasingly important whereby the human interaction appears to become a more diminishing factor. Technology thereby also comprises not only of the CRM system but also of the enabling technology itself, e.g. AI and Big Data. It evolves into the wider context of enabling technology and developments further into the interactive aspect with clients and employees itself. Therefore, from a strategic point of view, it defines long-term development and even provides a potential competitive edge.

Data management – guiding factor

In conceptual models, data management or data in general is either seen as the enabling component of CRM for the wider operational decision-making or as the entire CRM process as it is made up by data alone. Data management as in *Grassi (2022)* is seen as a key aspect, if not the driving factor behind CRM. As described in *Chan (2005)* CRM data would originate out of two directions, the external CRM including sales aspects data such as call center and web-based data; and the internal CRM data originating out of information from logistics, the ERP system, and internal processing information. Authors such as *Matosas-López (2024)* and *Reddy et al. (2023)* describe it as the key source of information to formulate the operational target and derive KPIs. In conjunction with AI the distinction between pure data management and interaction between clients becomes increasingly interrelated.

In the revised model, data management as technology builds the second guiding factor in the model and impacts especially in conjunction with AI and the big data analytics capabilities the client-factors. Thus, in the model, it impacts entirely all the other base and AI related factors. As the technological factor, it is an enabling contributor for the conceptual CRM model. Data management starts at the beginning of a CRM life cycle (*Zimmermann & Durst, 2024*) and can define each step of it.

Customer Acquisition – Core factors

As for the other “client-centric factors”, customer acquisition is one of the base parameters present in numerous CRM models. Despite being a crucial point in the CRM model, on an operational basis, it is largely dependent on the market setting and offered services *Krájník and Fosztó (2023)*. In the HNWI sector, it is an especially crucial factor as the number of potential clients is small compared to the retail client segment. As services of different providers can be compared easily online, it is important for every financial service provider to identify and target the appropriate client group. While not a direct AI factor, the identification of target-relevant sales stories and appropriate client communication can be enhanced by AI. Thus, providing financial service providers with the possibility to develop target client-based sales materials and product offerings.

Client Interaction – Core factors

The client interaction builds the focal point in the entire relationship process and is the core subject of this research. While embedded in the revised CRM model, it builds the center part and incorporates components that are fundamental to a relationship. These

fundamental components are based on trust and reliability towards a wealth manager, relationship manager or investment advisor. While a human counterpart had traditionally executed these factors, they have increasingly become under the influence of artificial intelligence. Thereby, AI is seen as an enabler in the relationship. The enabling components originate from operational assistance in the documentation, preparation and summarization of contents. In addition, AI allows the creation of holistic client profiles and the easier understanding of relationships and the identification of potential insufficiencies. As AI contributes through the summary of its use case and capabilities to better client interaction, it is likely that the advisors still deliver the outcome of AI analysis and conclusions to the client. Thereby, AI contributes to the better preparation of client interaction, the collection of information, the drawing of conclusions and the delivery of solution attempts.

Customer Retention – Core factors

While attracting customers is key, keeping them and establishing a long-lasting relationship is especially crucial in HNWI client interaction. The relationship is highly dependent on the market competition (*Mujayana, 2020*); (*Hackenbrack & Hogan, 2005*) and intended to be long-lasting, as the development of trust takes time. With digital services and increasingly technologization, the distinction between competitors becomes less recognizable. Client retention is based on a mix of contributing factors such as service quality (*Larsson & Broström, 2022*), investment performance (*Baker & Ricciardi, 2014*) and human interaction factor and relationship (*Albérico, 2023*). The contributing AI factor allows the sentiment analysis and adjustment of interactions in case there are signs of the termination of a business relationship (*Taherdoost & Madanchian, 2023*). Customer retention thereby belongs to the traditional base factors which can be found in any other CRM model. Despite being a traditional CRM factor, AI can also indirectly contribute to client retention through sentiment analysis, better client segmentation and, therefore, a more tailored service offering.

Enhanced Customer Segmentation – development AI factors

The segmentation of clients is already a crucial point in customer acquisition. *Ganaire (2020)* and *Arjun et al. (2021)* argue that the identification of specific needs and client characteristics is essential for a company's success. Researchers such as *Tran et al. (2023)* and *Fares et al. (2023)* argue that AI allows enhanced client segmentation possibilities by identifying coherent patterns in the client data. Thereby allowing the provision of tailored product offerings and services to the client. Furthermore, it allows to identify towards which client groups more time should be allocated to develop the client further and intensify the client retention. The different client groups can be identified through pattern analytics. Thus, it allows the alignment of the different client groups with the intended customer strategy and allows the development of marketing strategies for the intended client groups.

Customer Journey mapping – development AI factors

The development of clients follows, in general, a path from the first client interaction to the offering of services and the development of a trusted relationship with an increasing

provision of services. While this description follows a more sales-driven view of customer journey mapping, there are also age and life-stage-related mappings of a client journey. For the provision of financial services, this means analyzing the client's financial needs at every stage in his life. Thus, entrepreneurs in a certain age category might have more similar requests and needs than an almost retiree who seeks succession services increasingly and thereby is at a different stage of the client journey. While this might be a simplification, it allows hints about a client's current stage and potential service demand. While the simplified age-related journey mapping might be a common way and aligns with the client segmentation, specified AI models allow the identification patterns, which might allow an analysis based on further parameters. These parameters could be increased trust and reliability in the financial advisor or a developed interest in new asset classes through an education process.

Client engagement via Self-service possibility

Plain processual services and tasks generally do not involve the client and, therefore, appear interchangeable and indistinguishable from the services other providers might offer. The client's engagement in the entire process can strengthen the client relationship and thereby contribute to client retention. The ability to make use of 24/7 available services and high degrees of customization are enabled through AI. This includes the creation of tax documentation or documentation in different languages. Furthermore, being able to manufacture documents easily, but also risk analysis, can engage especially the more tech-savvy younger generations. Furthermore, it allows clients to speed up processes by transferring their requests directly into the manufacturing of the requested services without having to pass an additional loop through the advisor who might just pass on the request. Thus, self-service possibilities allow to avoid bottlenecks in the process and thereby reduces reaction time.

Sentiment Analysis

Capturing and grasping the overall mood in the client relationship can strengthen the relationship and might create the awareness that the client is heard and correctly understood. AI models could detect irregularities and interpret the communication with the client (*Haleem, et al., 2022*). The sentiment analysis can at the first instance be understood as an important factor which helps organizations to understand the client situation and allows to take actions in case there might be irregularities (*Wankhade, et al, 2022*). The collection of information through verbal recordings, text sentiment or overall facial expressions contributes to the development of sentiment analysis. Thereby, data collection is strongly interlinked with the data management factor. The collection and interpretation of the sentiment allow for effective interaction in the client relationship and address needs and potential problems before they become imminent. Thus, countermeasures could be taken before a relationship becomes jeopardized. This factor is thereby indirectly related to the base factor of customer retention and has as its purpose to maintain a client relationship.

Virtual Advisory

The advisory process is human-induced and relies hugely on the client's trust in the advisor.

The client relationship in the HNWI client segments largely depends on the client-adviser relationship and its long-lasting development. Different attempts to alter the relationship through alternative advisor models have been introduced, e.g. a shared advisor model, to distribute responsibilities among client advisors and limit the client reliability on a single contact person. Introducing virtual advisors for simple service requests or as an assisting aide for a human advisor would allow a 24/7 service delivery. Thus, it can further strengthen the client-advisor relationship. Avatar-based advisors could be used to make the advisors resemble their human counterparts even more. Advantageous would be, that these advisor avatars could also be used long after the advisor left the financial service provider. Thus, the client could still interact with a familiar advisor in an online setting. As touchpoints are increasingly offered from a distance, the likeliness to introduce online advisors and avatar-based advisory models increases, and service delivery is allowed independent of time zones and opening hours.

Optimization

The constant development and adjustment in customer relationship management is one of the factors appearing frequently among models and is therefore considered a traditional base factor. Which spreads across all factors in a CRM model. The intention behind it is, to increase efficiency and delivery of services to the best abilities of an organization. Therefore, the optimization of every factor in the CRM model is a constant aim of in client management. While being a base factor in the model, AI allows through various use cases in the model to contribute to the adjustment and, therefore, optimization of the model itself. Nonetheless, (*Haleem, et al., 2022*) postulate, that through different AI models, a continuing optimization in the client interaction process can be reached through faster data analysis, dedicated tailored service offerings and especially a better get-to-know-your-client. Thereby, the optimization might also be in the interest of the financial advisor and the company they are representing, as it increases the efficiency and reduction of time spent on a task.

Personalization (no one-fits-all all approach anymore)

Personalization works in conjunction with client acquisition, retention, and interaction and can be understood as a key component of a virtual advisor and client engagement. As in larger financial service operations, processes are standardized, and, e.g., investment reports are generated only on a quarterly basis; the introduction of AI would allow the customization of such services to meet the client's demands and needs. While the customization and deviation from existing processes require traditionally extra effort, AI could work as an enabler for better personalization. This goes beyond the provision of documents in different languages and translation services. Thus, it would allow the provision of tailored savings or investment plans for clients. These increased personalization possibilities allow the delivery of client-specific services and thereby increase client interaction and retention towards a financial service provider.

Following the description of the components, the next chapter incorporates the expert opinions providing a critical assessment, allowing the further refinement of the model.

3.3 Expert Feedback & Refinement

The constant change of the financial market brings up also critiques on existing processes and emerging challenges. Prior to the evaluation of the created model and the validity of the components, interviewees were asked regarding their view on the current developments and the changing market environment for wealth management companies.

3.3.1 Critique on current HNWI CRM

The interviewees identified three main fundamental challenges which currently exist and should be considered when adjusting a CRM model.

All interviewees (P_E_1-3, T_E_1-3) mentioned **quality issues** either regarding data consistency and/or “up to date” client data. This would be due to several reasons: an old infrastructure with no possibility to efficiently track information as well as the organizational complexity due to the maintenance of several systems and to enter information into them. One notable mention was that information is tracked in different systems depending on the client group (retail, affluent...) without any further harmonization between the systems, even if the clients are moving into another client cluster. Interviewee P_E_2 emphasized, that the data layer is a crucial factor for every additional IT implementation and insufficiencies occur in many organizations, limiting new technological developments.

Secondly, P_E_3 hinted towards the insufficient knowledge of front employees regarding the feasibility of system adjustments. As HNWI clients are often having complex demands, front employees often would make promises towards the client, which, in their complexity, could not be reflected in the technical infrastructure of the organization. This could be as simple as presumably the simple adjustment of languages. The stronger collaboration between front and back-office employees would be crucial to maintain service quality. In addition, adequate technological training of front employees would be required.

As a third challenge, P_E_1 argued that the increasing regulatory burden would take up a significant amount of time. That problem was phrased differently by the other practitioners (P_E_2, P_E_3). Due to them the “non sales driven tasks” would increase and often require additional regulatory/legal attention. The increasing workload for non-direct business-related tasks, was further mentioned by P_E_1 which mentioned increasing regulatory burden for front and back-office operations within financial services.

3.3.2 Model discussion

Following the discussion of the current market situation and the challenges that arise, interviewees were asked to provide their feedback on the model. The selected experts include practitioners from both the technical and the practical backgrounds. Resulting in different comments regarding practicability and theoretical validity based on their different expertise and views on the topic, allowing to provide a holistic picture. Thereby, further allowing to provide an assessment and epistemological contribution in a real-world setting. From an AI perspective, the validation is done by AI practitioners & strategists who can provide an assessment of potential shortfalls and potential flaws from a theoretical perspective. The second validation angle is from a practical perspective and includes

experts dealing directly with clients. The feedback builds a basis for further discussions and reveals further open research points that are of potential interest.

The actual client-facing employee P_E_1 showed special interest in a functioning infrastructure where the increasing regulatory documentation could automatically be handled without accessing multiple systems. The interest in a revised CRM system comprising AI aspect came from more senior experts at a management level. T_E_2 stated, that using a conceptual model would allow the reduction of the organization's complexity to simplified factors that are easier to observe and handle. Identifying factors which are likely to have a significant impact in the future would allow to direct the emphasis on them. In addition, AI-enabled client self-service was mentioned as an important aspect which would have high-level attention as it serves from two main angles. First, it would allow for a reduced workload from the client-facing employee. Due to T_E_2 client advisors mentioned, that even rudimentary tasks would lead to significant time consumption based on various manual process steps, such as alignment with the client via different communication channels (phone, email, chat or f2f meeting) and the tracking of these interactions. Thereby, the cost reduction aspect and freeing of resources would be the main drivers from a management perspective, allowing the organization to streamline, making services cheaper and leading to better market competitiveness. Second, clients would exactly receive the service they demand through prompts. Furthermore, AI-generated legal document creation was named. T_E_2, noted, that the model could take on additional sub-factors if required, based on possible market changes or different client focus.

While "sentiment analysis" was seen as an interesting factor in understanding the entire client body, there was also a critique regarding its feasibility. P_E_3 argued that data protection laws (such as GDPR, FADP) would most likely prevent the use of such analysis or at least would lead to significant legal clarifications. Adjustments to the model were made based on the feedback from P_E_3 in the way, that the technological and data management factors are stretching among all the additional factors as based under the assumption of AI these factors build the enabling frame for data gathering and therefore impact all other factors. Thus, the model becomes increasingly interconnected through the level of data collection amongst all contributing factors.

Regarding the question of potential missing factors, the interviewee P_E_3, mentioned the adding of a potential client feedback factor. Whereby the other interviewees attributed the client feedback to the sentiment analysis factor. The technical experts T_E_1, and T_E_2 mentioned both in different wording, the adding of an oversight factor, which should consider ethical use of the models, as well as adhering to compliance standards and regulatory requirements. T_E_2 mentioned that this would often be part of a strategy layer and could be attributed to it.

Based on the feedback, governance oversight is added as additional layer in the model and builds the rather operational layer for the entire value chain of client advisory. T_E_3 mentioned that for the long-term view a roadmap function could be added. The interviewee correctly identified the need for the roadmap, which was conducted beforehand and is part of the second publication.

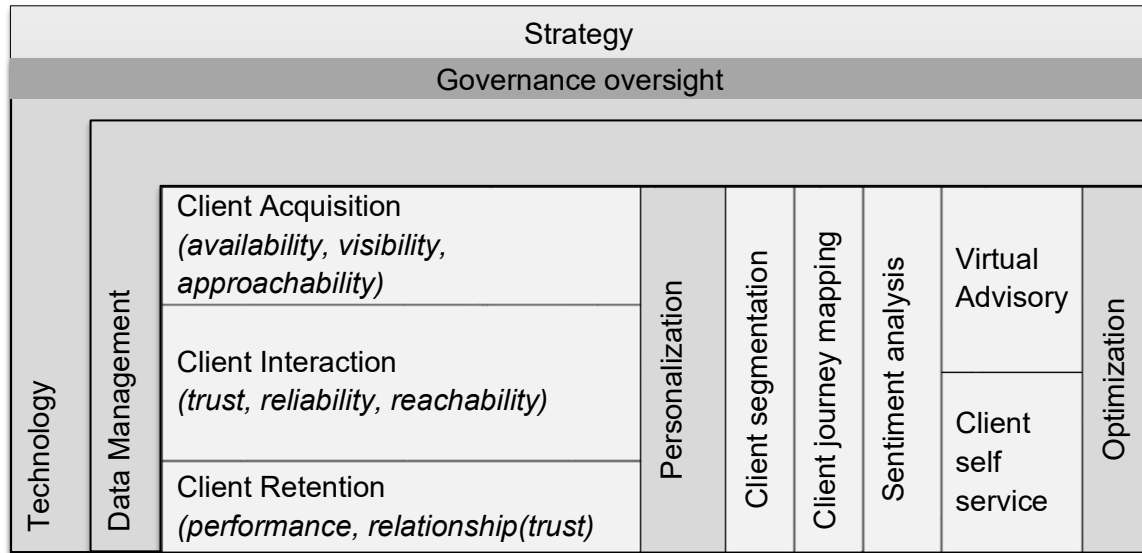


Figure 8: Revised CRM model.

The conceptual model's structure after the expert feedback appears slightly re-structured, whereby the support-factors are organized alongside the core client-factors. Thus, reflecting their importance for every stage of the client process. Furthermore, based on the feedback, technology and data management are structured around the entire factors, as they are aimed to impact every other factor due to AI being part of the technology.

3.3.3 Improvement of CRM for HNWI

As for technology and data management, mentioned in current CRM setup, P_E_3 noted that without the correct data basis, further technological developments would lead to misleading or wrong output. Furthermore, P_E_2 argued, that due the widespread data inconstancies in many financial institutions, the direct implementation of AI systems relying on client data would not be advised. The appropriate collection and data storage is crucial for the client interaction. As P_E_2 mentioned, without the correct input data, AI model training is useless and detrimental to an intended goal. Also, interviewee P_E_3 mentioned, that the correct collection and storage of data "the data household" is crucial to enable new AI systems.

Strategy					
Technology	Data Management	1. Customer Acquisition <i>(availability, visibility, approachability)</i>	Personalization	Virtual Advisory	Optimization
		2. Customer Interaction <i>(trust, reliability, reachability)</i>		Client Engagement	
		3. Customer Retention <i>(performance, relationship(trust), etc.)</i>			
		Enhanced Customer Segmentation			
		Customer Journey mapping			
		Sentiment analysis			

Figure 9: Technology factors.

Self-service is confirmed by the interviews to be among the main contributing AI factors. Both front and back-office employees acknowledged that client requests for rudimentary tasks should be AI enabled and handled independently from a relationship manager. Document compiling etc. was named by T_E_2. P_E_3 also named the self-service possibility for ESG reporting over the entire client portfolio and the self-service for the filing of different national require documentations. Furthermore, he named the **virtual advisory** could further incorporate as sub-factor the investment decision and derived investment suggestions from historical investment decisions. In addition, in the background checking the client's legal requirement fulfillment such as e.g. the product offerings based on the client domicile could be performed and instant feedback provided to the client, enhancing the experience. Furthermore, P_E_1, named the possibility to make instant suggestions for the adjustment of the portfolio to meet certain requirements e.g. the ESG score or an industry exposure.

Strategy					
Technology	Data Management	4. Customer Acquisition <i>(availability, visibility, approachability)</i>	Personalization	Virtual Advisory	Optimization
		5. Customer Interaction <i>(trust, reliability, reachability)</i>		Client Engagement	
		6. Customer Retention <i>(performance, relationship(trust), etc.)</i>			
		Enhanced Customer Segmentation			
		Customer Journey mapping			
		Sentiment analysis			

Figure 10: New Services

For the theoretical contribution, T_E_2, mentioned that the **personalization** factor allows to dwell on further potential adjustments in KYC process. Thereby, AI enabled personalization could be used for the aggregation of different KYC information, both

fundamental and of qualitative nature. As example, a clients residence defines its product offering, but also different product needs. While a relationship manager would need to have sufficient knowledge, an AI system could aggregate the requirements and topic of interests for people from a certain jurisdiction.

Validation of support-factors

Due to the interviewees P_E_1 and P_E_3 especially the support-factors such as client data capturing and analysis are impacted by AI, with direct effects on the entire advisory process. P_E_1 and P_E_2 stated that these factors allow to enable the client advisor and are made feasible through AI. Without AI, the data analytics could not be performed in a reasonable amount of time, especially not for every client and on a regular basis.

Strategy					
Technology	Data Management	7. Customer Acquisition <i>(availability, visibility, approachability)</i>	Personalization	Virtual Advisory	Optimization
		8. Customer Interaction <i>(trust, reliability, reachability)</i>		Client Engagement	
		9. Customer Retention <i>(performance, relationship(trust), etc.)</i>			
		Enhanced Customer Segmentation			
		Customer Journey mapping			
		Sentiment analysis			

Figure 11: Support Factors.

Furthermore, due to T_E_2 especially the customer segmentation is crucial when dealing with a significant number of different clients. P_E_3 argued that based on different patterns clients could be easier identified and product offerings better tailored. The support-factors hold their validity in the model and become increasingly important was mentioned by P_E_1 who emphasized on the enablement of the relationship manager through these factors.

Core factors

T_E_2 named these factors the standard factors which cannot be missed in any CRM model and emphasized establishing trust in direct client interaction. P_E_1, saw the possibility that the identification of prospective clients could be made easier. Furthermore, it would potentially allow us to identify to what communication these clients respond to.

Strategy					
Technology	Data Management	Customer Acquisition <i>(availability, visibility, approachability)</i>	Personalization	Virtual Advisory	Optimization
		Customer Interaction <i>(trust, reliability, reachability)</i>		Client Engagement	
		Customer Retention <i>(performance, relationship(trust), etc.)</i>			
		Enhanced Customer Segmentation			
		Customer Journey mapping			
		Sentiment analysis			

The core factors are indirectly impacted at least in the HNW client management. The impact is given through the sentiment analysis in the process and indirectly through the enhancement of the support and new functionality factors.

4 Conclusion

This chapter presents the research findings, its contributions, the implications and the resulting recommendation's as well as the study limitations functioning as suggestions for further research avenues.

The aim of this doctoral study was to provide a contemporary view on wealth management in conjunction with novel technologies. Thereby it developed into the aim of providing a conceptual framework integrating existing models and their comparative factors with novel artificial intelligence (AI) considerations (factors) into a revised customer relationship management model (CRM). The Results were drawn from empirical findings gathered through semi structured expert interviews and the consultation of the academic literature combined with the practical customer relationship management models (CRM).

In its completeness the research revealed different new findings by addressing the underlying research questions. Several findings both practical and of academic nature had been made for each of the publications, contributing to the overall research. From a practical view it provides the condensed overview of current market developments functioning as guidance for practitioners. From an academic nature it contributes to the development of contemporary customer relationship management considering the latest technological developments. Alongside its publications this research reveals the following findings.

The study can be broadly concluded as followed:

- The first publication found and assessed new funding methods for businesses, revealing the underlying and enabling novel technologies fostering the understanding of how novel technologies impact the financial sector and its market actors.
- The wealth management circle is concerned with the client interaction the investment process and the constant adjustment of services based on the client's needs. New technological advancements especially impact the client interaction process and the way how information is gathered and interpreted.
- Despite the perceived advantages, the research revealed that also organizational readiness and the consideration of privacy risks and regulatory constraints is required and largely not clarified.
- The introduction of AI in wealth management follows certain critical success factors such as clear intent, regulatory certainty, effectiveness, data management and client considerations which are required to be assessed to define the scope and assess the organizational aim.

The research further revealed that the client interaction is a pivotal point of contact between an organization and the client which increasingly becomes automated and impacted by new technologies, altering the client interaction process. While several client relationship models exist, they do not comprise any novel technological considerations i.e. identifiable AI-related contributing factors. The comparative comparison between existing client relationship models revealed a set of factors which are universal among the existing models building a basis for an aggregated and revised model.

4.1 Thesis contributions

The overall research question regarding AI in the wealth management client interaction revealed that there are traditional base factors in CRM models which hold their importance despite the emergence of AI; these identified base factors are customer interaction, data management, technology, strategy, customer acquisition, and customer retention. While current models incorporate these factors in one way or another, they do not consider the latest developments. The thesis further revealed that there are new factors not yet addressed in CRM models for the HNWI client interaction, which gain increasing importance when introducing AI into the interaction process. These factors are optimization, personalization (no one-fits-all approach anymore), client engagement via self-service possibility, enhanced customer segmentation, customer journey mapping, sentiment analysis. It, unveiled, that the HNWI client segment differentiates from the retail client segment due to pull-demand for certain services.

From a theoretical perspective, the model comprehends the current stage of CRM models, independently of their intended general use. Thus, the model combines the essence of coherent factors in existing CRM models and contributes to a common understanding of universal factors. It further contributes to the development of client relationship management research by connecting the traditional CRM models with the AI factors and providing a revised and contemporary model. It particularly broadens the understanding for the interconnection between the classical client management theory and introduces artificial technologies as impacting factors in the traditional models. Thus, it contributes to the increasing field of business research in conjunction with technology particularly emphasizing on the development in client relationship management. Furthermore, the research combines the expert views on AI factor applicability in CRM contributing to the contemporary development of CRM models from a conceptual point of view.

From a practical perspective, the research contributes to a better understanding of the dedicated client demand for technological services in wealth management. Thereby, the identification of novel technologies and the introduction of new factors in conjunction with AI, furthers the knowledge of the dynamic development in CRM.

Through the identification and visualization of model factors, provides a set of quantifiable elements. Thus, contributing to one aspect of trustworthiness, the accountability and auditability of actions. The trustworthiness is furthermore introduced through the introduction and visualization of a governance and compliance layer to supervise and monitor these factors. It allows to identify possible departments responsible for the oversight.

It explains the inherent risk of adopting systems blindly without human judgment and a corrective narrative, which is crucial in human interaction with wealth management clients. Thus, the model enhances explainability through the composition and interplay of its contributing factors. In particular it allows for a better understanding of the complex interplay between the factors consequently allowing to foster informed decision-making processes in the client relationship management. Thus, enhancing the client relationship strategies and identification of critical development areas such as governance and regulatory impacts.

4.2 Implications

As every conceptual study, the question arises which conclusions can be drawn from a practical standpoint and what is the outcome for the greater practical economical applicability. While a conceptual model serves to foster the grounding understanding of a complex or disperse topic, it also allows to simplify the complexity to not get lost in the wider context. Thus, the question for the applicability in a practical setting of the conceptual model, is given through the epistemological understanding of the validity of the base factors and the increasing importance of new factors, influenced by AI. Thereby it enables practitioners to elaborate on the model and to derive potential actions for their client interaction. Through the fluidity of the model, it allows to expand the model of additional factors, adjusting the client interaction independently of the organizational setup.

From a theoretical point of view, the research revealed that not just CRM models considering the HNWI client segment are highly impacted by the latest technological developments, but management models in general. Thus, unveiling that even in current academic research the referencing of currently used management models, and leaning on them might be not adequate anymore. For academics this could mean, that currently accepted models which are drawn to don't hold their validity anymore. This is most likely the case for many more additional models apart from the looked at CRM models. It is recommended, that every reference to previous models, should be discussed and evaluated in the context of the current technological development and the changing human interactions and shifting organizational and processual setups it brings with it. Furthermore, this research suggests a stronger focus on contemporary developments and to pay attention to shifting research narratives, whereby interdisciplinary research experiences greater importance. Thus, requiring drawing upon findings of different research-disciplines to not miss out on the latest developments.

Further implications result out of the previous publications, demonstrating key considerations alongside the wealth management circle while unveiling areas of development and risks associated with technological novelties. Thereby, evaluating the organizational setup and associated benefits and risks. Furthermore, the conceptual framework for successful AI implementations furthers these key considerations and recommends the assessment of organizational readiness. Thus, advises that being at the forefront of technology adaption comprises risk and benefits, whereby the risk can outweigh the benefits. While considering the five proposed assessment criteria, and evaluating the organizational expertise, companies can circumvent costly miss investments acquire a better understanding of their organizational setup. To further investigate the composition of the factors over time, a longitudinal observation could be beneficial. Furthermore, the application and consideration of the conceptual model in related industries, could provide further insights how and if factors change along the horizontal value chain. Thus, providing additional insights if other service providers e.g. lawyers, tax consultants are equally impacted and require adjustments of their client relationship model.

4.3 Study limitations future research avenues

The evaluated and compared CRM models are widely agreed on in their composition and recognized by academics and practitioners alike. In consideration of numerous further CRM models, there are certainly some factors of other models which are not reflected. It needs to be mentioned, that despite their widespread acceptancy, these selected factors might build the essence of existing models however, with the extensive number of CRM models, they are far from being fully conclusive. The specific industry emphasis and focus on the wealth management, as well as the discussion of the factors and their relevance for the field, limit the number of missing factors. For further analysis, a more refined process could be to sequence and compare a larger number of CRM models to make an even more close prediction about the possible dominant factors. The research does not consider if the identified base parameters become less or more important in contrast to the new introduced AI factors. Thus, requiring further research if some of the existing factors might diminish overtime. There is the possibility, that less important factors might be superimposed by being part of new factors.

As the validation is carried out through interviews with practitioners in the wealth sector in Switzerland, their view might be different from the ones of practitioners in other jurisdictions. One specific instance could be Switzerland's traditional private banking orientation, whereby direct client contact is especially emphasized. This instance might have influenced the opinion of the interviewees. Thus, other countries with less advisory and relationship management focus, might favor other factors. The concept of trust between the advisor and a client is often part of the client relationship management for HNWI clients; as virtual assistants become increasingly introduced, it will potentially require a trusted relationship between a client and the AI system. With all these factors being subject to potentially several AI models and applications, the reliability and trust in the systems might become a crucial point for clients. As the model is to be considered a flexible one, it is capable of being adjusted if changing circumstances require it and can also take on additional factors.

For the base factor selection, existing models had been chosen and the involved terminology clustered to a more universal description. Thereby, it is not unlikely that some of these models will be re-vised and adjusted over time and potentially comprise of additional or different factors in the future. Testing of the CRM model in further cases to identify if all prospective factors are included and it is reliable to build a strategy and thereafter a roadmap for an operational client relationship interaction. One of the additional findings was, that there is no aggregated upon method to compare models with each other efficiently. This became apparent for the comparison of CRM models but also for management models itself. A method to compare and extract factors of existing management models, would be important to comprehend and conclude the large number of models and extract the essence of their factors.

The new model, regardless of taking on additional factors and potential further refinements could be used in management education. Through its holistic presentation, it allows to grasp the complexity of CRM in changing environments allowing to identify and analyze the interaction between factors. The model thereby, does not only suit the epistemological identification of potential implications, but could also be further understood as model,

enabling decision making emphasizing on the managerial setup in an organization.

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Appendix I - Interview

Interview Questions

Practical Questions

Academic		Area/ Field		Function		Years at Level	
Practitioner	X						

Starting questions

A. What are due to you the most important factors in the client relationship management (HNWI clients) and why?

B. What insufficiencies in the client interaction do you see, how could they be enhanced?

C. How could the client relationship be strengthened with technical methods?

D. How does AI impact from your point of view:

- Your interaction with your clients? (only for RMs, Advisors)
- the client relationship management (focus on HNWI)?

Model Questions

E. Have you used conceptual models in the client interaction process?

no ☐

yes ☐

Which ones, and why?

F. What insufficiencies have you encountered in these models (as far as you remember)?

G. Common interactions with clients

- How does your organization currently manage customer interactions across different channels (e.g., email, social media, phone)?
- What are the common forms of interaction you encounter in the industry, when dealing with (HNWI clients)?

H. How would you envision AI assisting in automating customer interactions?

I. From your point of view, hat are the current challenges in managing customer data, why do they occur?

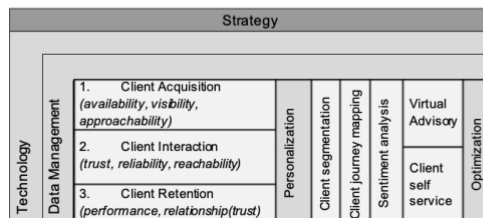
- within your CRM system?
- in general?

Framework – Questions

The following is a structural CRM model showing the interconnections between different factors and where AI has an assumed impact.



The second one is a conceptual CRM model including the above-shown factors but structured in a management model-like fashion (similar to the St. Galler Management Model). The focus of the model is the enhancement of client interaction.



1. From your point of view, is the model incorporating the main factors of an CRM model & including the important AI factors?

yes ☐

no ☐

Which ones are the most important and why?

Which factors would you add – AI and why?

Which factors would you add – CRM and why?

2. What conceptual changes would you change in the model and why?

3. How would you address the way customer interactions are managed with AI?

4. Can you explain from your point of view how AI enhance the mentioned factors in the proposed CRM model?

8. How might AI change the traditional approach to CRM personalization, and what potential benefits or risks do you see?

5. How might AI change the way customer acquisition is approached? (regarding predictive targeting and personalization)

9. From your point of view are AI-driven self-service functionalities considered essential in the new CRM framework? Please explain.
How do they impact the experience in the client interaction?

6. How could the new CRM model ensure customers loyalty over time?

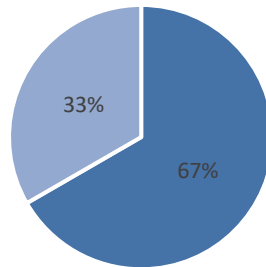
10. How/for what, would AI assisted self-services (24/7) be used by the clients?

7. What role could AI-driven optimization play in ensuring that CRM systems are adaptive to changing customer needs?

11. What key elements should the CRM framework incorporate and why?

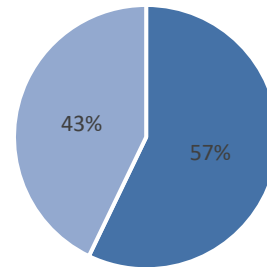
Interview evaluation

Academic Background



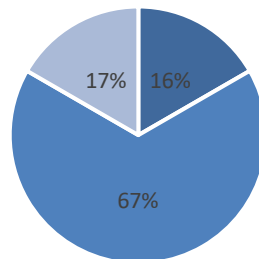
■ Msc ■ PhD

Sector Experience



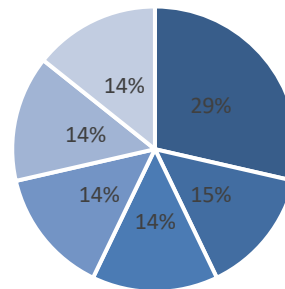
■ Consulting/IT ■ Banking

Work Experience



■ More than 5y experienc ■ More than 10y experier
■ More than 20y experience

Nationality



■ CH ■ AT ■ NL ■ UK ■ Czh ■ RU

Appendix II - Models

CRM Models

Several CRM models exist, which vary in the focus of their conceptual composition. Depending on their target stage, these models comprise different factors ranging from more marketing-driven aspects to gaining client attention and customer retention. Furthermore, the industry setup and the customer composition define the choice for one of these models and the inclusion or exclusion of factors. The following summarizes the main models, their differences and shortfalls and draws upon the similarities to build a contemporary CRM model comprising AI Factors.

IDIC Model (Identify, Differentiate, Interact, Customize)

The common IDIC model from *Peppers and Rogers (2016)* focuses on individualized client interaction. It comes closest to the understanding of clients and their needs in a wealth management setting. It comprises 4 main components: the identification of the clients the recognition of the customer as an individual with specific needs, the differentiation to competitors and the interaction. The differentiation of the clients is based on their values and specific needs. This is followed by the interaction and customization of the products, which are based on the client's preferences originating out of their values and specific needs. While the model appears logical and simple, it also has shortcomings. To implement all the steps in accordance with its intention, significant resources are required. Tracking and understanding a single client's needs takes up a significant amount of time and know-how (*Panda, 2021*). Apart from that, it requires the client's willingness to share openly values, beliefs and financial intentions. Therefore, skilled relationship managers are required to uncover the client's wishes and interpret the client's intentions.

Model factor Names	Universal factor names
Identify	Strategy, Customer Acquisition,
Differentiate values	Client Segmentation
Differentiate needs	Client Segmentation
interact	Client Interaction, Customer Retention
Customize	Client Segmentation
Demonstrating capabilities (Marketing)	Customer Acquisition
Company information about customer needs	Data Management, Strategy, Infrastructure (Technology)

QCI Model (Quality Competitive Index)

The QCI customer management model, as described by *Woodcock et al. (2003)*, also focuses on customer management. It incorporates the competitor consideration while emphasizing competitiveness. Therefore, the aim is rather on customer acquisition and retention while considering the surrounding market (*Zulyanti, Irawan, 2023*). The model aims to incorporate several aspects from the client's attention to their retention in conjunction with the business surrounding and the competitiveness. The general critique is

its overemphasis on processes and rigidity, making it less flexible in changing market environments. Consequently, this model can be described as difficult to adapt in fluid and dynamic market environments.

Model factor Names	Universal factor names
Customer Management Activity	
Acquisition	Client Acquisition, Customer management activity
Retention	Client retention, Customer management activity
Infrastructure	Infrastructure
People and Organization	Organizational Factor
Customer Experience	Customer Management
Analysis, Measurement	Data Management
External environment	Organizational Alignment,

Five-Process Model

According to *Payne and Frow (2005)*, the five processes consist of five key CRM processes. At first, stand the strategy development from two angles, the firm's strategy and the client's strategy. Thereby focusing on the aspects of "who we are" and "what we want". Connected are the two areas of value creation, one for the firm and one on the client side. To foster the value creation process, interaction with marketing channels is crucial to attracting clients and promoting the product. For the analysis and evaluation of the value creation and the effectiveness of processes as well as the performance, data collection and analysis are required and reflected in the model across all operational processes. The model has its complexity, making it difficult to set up in a real-world setting. The model itself is more oriented based on a customer structure (*Prior et al., 2024*) rather than a client structure. Therefore, it might not be suitable for a one-to-one client interaction. Its suitability appears to be more for a larger client base, such as for a retailer or mass market companies.

Model factor Names	Universal factor names
Strategy - Business & Customer	Strategy
Value Creation Customer: value proposition & assessment; organization: acquisition, retention	Value Proposition, Customer Acquisition, Customer Segmentation, Customer Development
Infrastructure interaction: physical vs virtual channels	Customer Experience, Technology, Customer Interaction
Performance Assessment Process (employees, shareholders, customers, costs)	Performance Measurement, Organizational Alignment
Performance monitoring (standards, quant & qual, KPIs)	Performance Measurement

Infrastructure internal: IT, tools & applications, analysis	Technology, Data Management,
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Desai Conceptual Model

The model from *Desai et al, (2007)* incorporates the factors of resources, social networks and market orientation as enabling input factors for dynamic CRM capabilities. Furthermore, it considers the utilization of technology to ensure data analysis and client interaction. In addition, it comprises performance metrics to monitor the effectiveness and potential adjustments of the client interaction (*Desai et al, 2007*). The model lacks data privacy factors, which might make it difficult to implement in a real-world setting. Furthermore, the consideration fallacies could occur due to the differentiation of short-term vs long-term goals.

Model factor Names	Universal factor names
CRM Technology	Technology
Performance (customer/ organization)	Performance Measurement
Knowledge management	Data Management
Industry control	Channel Management
Dynamic Capabilities	Value Proposition, Customer Interaction
Resource configurability	Value Proposition
Networking capability	Customer Segmentation, Customer Interaction
Market orientation	Strategy, Customer Acquisition, Customer Retention, Customer Development

Forrester CRM Model

In, *Brand, Petouhoff (2010)*, the focus of the model is dominantly on the marketing and sales aspects. It demonstrates the process from marketing to the sale process, and the feedback loops enabled through technology. Furthermore, in Forrester people and people management are included as an additional factor. Thereby the people factor comprises of KPIs for the measurement of a successful customer relationship (*Petouhoff, 2010*). The model requires an advanced technological infrastructure to ensure its functioning. Furthermore, the orientation on predominantly sales aspects makes it to a large extend a sales-marketing instrument rather than a CRM model with a client focused. Therefore, the model can be seen as a sales model for a larger customer base rather than a dedicated one-to-one client relationship. In addition, the publication is not written from an academic perspective; it belongs to the practical industry viewpoint rather than scientific literature.

Model factor Names	Universal factor names
Strategy (customer Strategy)	Strategy

Marketing	Customer Development, Channel Management Customer, Feedback Integration
sales	Value Proposition, Customer Experience
technology	Technology
Infrastructure	Value Proposition, Customer Experience
Data management	Data Management
Organization (People Management)	Organizational Alignment,

Gartner's Eight Building Blocks Model

Gartner 8 building blocks start with the vision followed by the strategy. It can be described as an orderly process structure where one layer follows another (*Radcliffe, 2001*). The entire model is oriented on a managerial approach whereby vision and strategy build the dominant layer of the model. Every of the building blocks is oriented on two dimensions, which are the enterprise and the custom (*Nelson, 2003*). It also addresses the technological aspects of architecture and infrastructure. The basis of the building blocks builds the metrics meant to be the measuring block for the above-introduced factors. The model, as contemporary as generic, provides clear guidance for the CRM process. As conceptual as it is, it lacks deeper descriptions of the building blocks. Technology is mentioned in the model. In *Nelson (2003)*, the model is emphasized to be a business strategy model whereby technology is seen as only a support factor but not a dominant role.

Model factor Names	Universal factor names
Vision & Strategy	Strategy
Customer Experience - Requirements - Expectations - Satisfaction	Customer Interaction, Customer Experience Value Proposition
Organizational - Structure & culture - Competencies, Customer understanding - Employee communications - Partners & suppliers	Customer Segmentation, Data Management Customer Acquisition, Customer Development, Channel Management,
Life cycle - Knowledge management	Organizational Alignment
Data Analysis, Infrastructure, Architecture	Technology, Organizational Alignment
Value Retention Loyalty Satisfaction	Customer Retention, Customer Feedback Integration

Buttles CRM Model (Value Chain)

The CRM model based on *Buttles (2001)* focuses on two dimensions: the customer and the profitability. The customer dimension comprises the relationship aspects such as intimacy as a form of closeness and uniqueness, as well as the development of the network, value proposition development and lifecycle management. The profitability dimension targets the firm-specific aspects such as the leadership data management and organization setup. This model comprises two general aspects that need to work together to deliver client services: the client's view and the firm's view in one model. As the model includes both dimensions, it covers the key aspects of a holistic CRM. The model's general problem originates from balancing customer centricity with the firm's profitability. While all the considered aspects are crucial, their active development might become difficult, and the organizational design in an existing organization might be difficult to change retro-prospectively.

Model factor Names	Universal factor names
Customer (analysis, intimacy)	Customer Segmentation
Network development	Customer Interaction, Performance Measurement
Value proposition & development	Value Proposition, Customer Development
Managing relationship	Customer Interaction
Culture & leadership	Internal Factor (strategy)
Procurement processes	Customer Retention
HR	Internal Factor
IT / Data management	Technology, Data Management,
Organizational design	Infrastructure

Factor Comparison

The underlying factors of these models can be investigated from two main angles. The technological one, such as decision tree structures, algorithms or computational power and the structural ones as predictive capabilities or originating base parameters from previous models. The reason for developing a new CRM model and using new AI factors is to solve the uncertainty around the existing models and concerns of outdatedness, as *Ledro (2023)* described. Deriving these factors out of existing AI models and applying them to the essence of existing models enhances potentially outdated CRM models and contributes to the furthering of knowledge in client relationship management. As these old models relied on human input factors and behavioral aspects such as culture, trust and know-how, they don't yet comprise independent AI systems and their input factors. While some of the base factors chosen for a revised CRM model might not be entirely new and appear in certain other CRM models, they are still crucial aspects of a new CRM model with AI-enabled features. The analysis of the previously reviewed AI models revealed 7 factors that bear potential significance for a new CRM model.

CRM Factor Comparison Table

The following table compares each of the models regarding their inherent factors and identifies which factors are dominantly presented among the CRM models.

FACTOR	<i>Strategy</i>	<i>Technology</i>	<i>Data Management</i>	<i>Customer Interaction</i>	<i>Customer Acquisition</i>	<i>Customer Retention</i>	<i>Customer Segmentation</i>	<i>Customer Experience</i>	<i>Customer Development</i>	<i>Value Proposition</i>	<i>Performance Measurement</i>	<i>Organizational Alignment</i>	<i>Channel Management</i>	<i>Customer Feedback Integration</i>
MODEL														
<i>IDIC Model (Peppers & Rogers)</i>	✓	✓	✓	✓	✓	✓	✓							
<i>QCI Model (QCi Consulting Group)</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
<i>Payne's Five-Process Model (Adrian Payne)</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
<i>Buttle's CRM Value Chain Model (Francis Buttle)</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
<i>Gartner's 8 Building Blocks</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Desai's Model</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
<i>Forrester's Model</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
COUNT	7	7	7	7	7	7	7	6	6	6	6	1	4	3

Table 5: Comparison Matrix of CRM Models, based on *Khashab et al. (2013)*.

The comparison of the models reveals that there are factors which appear constant among the models presented in *Buttle and Makar (2019)*. These factors can be seen as universal and are summarized in Figure 13.

Derived universal CRM factors			
Strategy	Technology	Data management	
Customer interaction	Customer acquisition	Customer retention	Customer segmentation

Figure 13: Summary table of CRM factors.

AI Factor Comparison Table

As for the CRM model comparison, the same comparative factor clustering is chosen, whereby the AI models do not comprise of factors as in the CRM model but rather comprise of contributing factors allowing certain services and procedures.

MODEL FACTOR	<i>NLP</i>	<i>Recommendation Systems</i>	<i>Chatbots/Virtual Assistants</i>	<i>ML</i>	<i>Predictive Analytics</i>	<i>Computer Vision</i>	<i>Deep Learning</i>	<i>Voice Recognition</i>	<i>Sentiment Analysis</i>	<i>Personalization Engines</i>	<i>Text Classification Model</i>
<i>Sentiment Analysis</i>	✓								✓		✓
<i>Personalization</i>		✓								✓	
<i>Virtual Advisory</i>			✓								
<i>Client Engagement via Self-service</i>			✓					✓			
<i>Enhanced Customer Segmentation</i>				✓							
<i>Optimization</i>				✓							
<i>Customer Acquisition</i>					✓						
<i>Customer Retention</i>					✓						
<i>Customer Interaction</i>						✓					
<i>Customer Journey Mapping</i>							✓				

Table 6: Comparison Matrix of AI models, adjusted from *Khashab et al. (2013)*.

The factors for the AI models as in Table 7 are derived factors impacted by AI and therefore altering the interactional process. The following explores their meaning and narrative in relation to the literature.

Derived factors impacted by AI			
Optimization	Personalization (no one-fits-all approach anymore)	Client engagement (self-service possibility)	Enhanced Customer Segmentation
Customer journey Mapping	Sentiment Analysis	Virtual Advisory	

Table 7: Summary table of derived AI factors.

As the focus of this CRM model is oriented on the client interaction, most of the factors are aimed to be attributed to suit directly the client's interest. Thereby, certain AI factors can be attributed more towards the organizational or firm's view as they aim to enhance the efficiency, and cost reduction, which is not immanently benefiting the client.

The visualization shows that the traditional factors build an organizational frame as in the Gartner model (*Radcliffe, 2001*) and remains consistent in its core components. Thus, showing that the factors identified through the model comparison are cornerstones for customer relationship management.

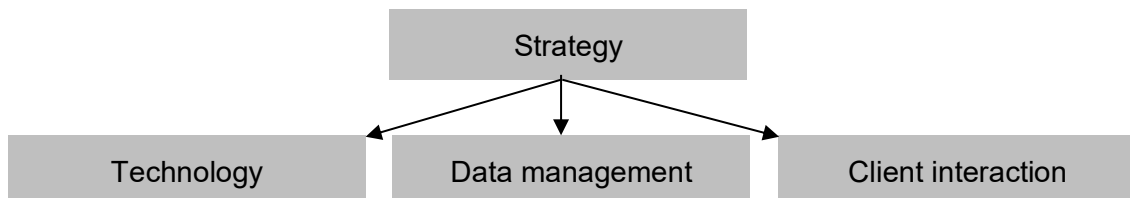


Table 8: Core organizational factors

The enhanced structure shows through the adding of the additional factors how the components play into each other and where AI factors play a contributing part. AI plays a crucial factor, especially in client journey mapping, sentiment analysis, and the potential virtual advisory assistance.

Proposed Structural CRM model comprising AI Factors

Structural clustering of the identified factors based on Buttle's CRM model and hierarchical order of the Gardner model.

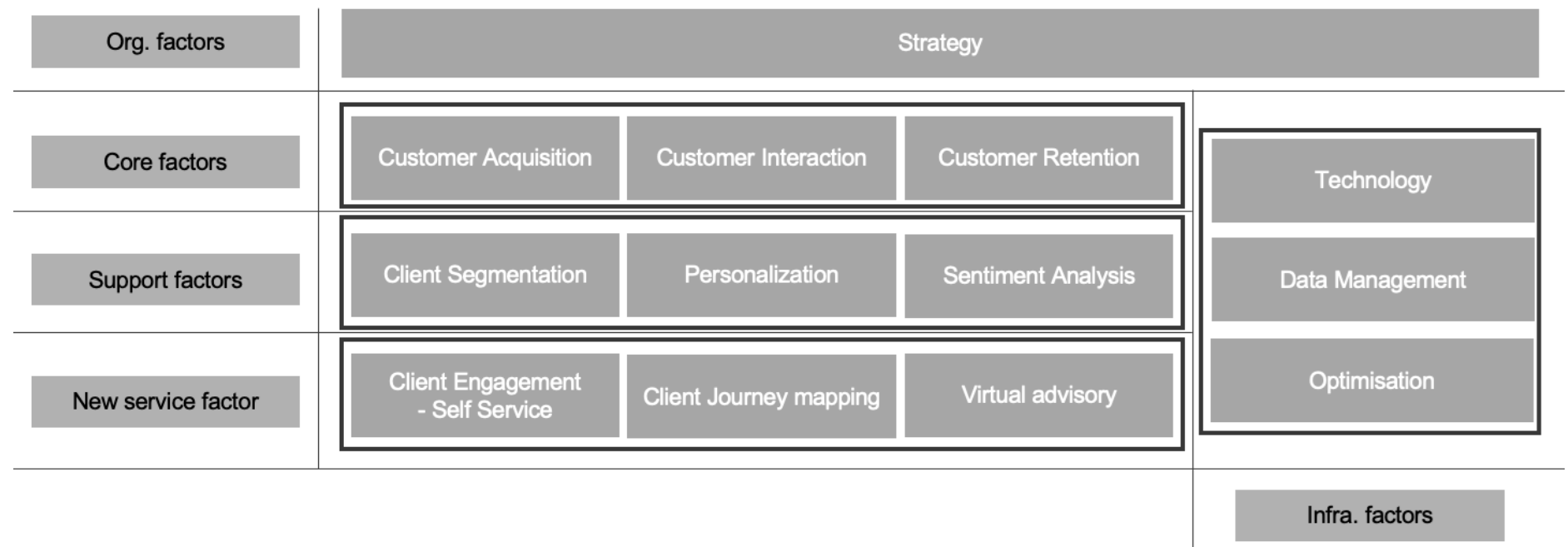


Figure 14: Factor Structure.

Structural clustering of the identified factors based on (Buttle, 2001) model and hierarchical order of the Gardner model (Radcliffe, 2001)

Part II

5 Publications

This thesis consists of 4 Publications of which one is a book chapter. While the three main publications are in the wealth management context, the book chapter touches on general financing methods in business. The core publications build the three peer-reviewed articles, starting with a systematic literature review about the current financial technologies applied to the wealth management sector. Derived from that originates the second paper, a conceptual framework to assess the use of AI in Wealth & Asset Management. Defining the topic further the third paper identifies the impacts of AI on the brink between the client and the human financial advisor. Thereby developing a new CRM strategy including AI-factors from a client-based-view. Furthermore, the entire process establishes a roadmap for the implementation of AI models into the CRM process.

Publication I	Publication II	Publication III	Publication IV
Broad view of novel tech developments in financial services	Literature Review validation and identification of relevant topic in a wealth management setting	AI identification and starting point for the high-level framework development with a general focus on Wealth & asset management companies	Focus on one dedicated identified aspect; in the previous papers --> AI factors in the CRM Model

Table I: research & publication approach.

Publication I – Transformation of Entrepreneurial Business Finance. *(published)*

Zimmermann, F. (2024). Transformation of Entrepreneurial Business Finance. In DIGITAL TRANSFORMATION FOR ENTREPRENEURSHIP (pp. 151-173).

Publication II – The Future of Wealth Management: A systematic review about the use of financial technology in the wealth management sector. *(published)*

Zimmermann, F. Durst S., (2024). The Future of Wealth Management: A systematic review about the use of financial technology in the wealth management sector. In JOURNAL OF SUSTAINABLE MANAGEMENT.

Publication III – Conceptual Framework for Assessing the Use of Artificial Intelligence in Wealth Management. *(accepted)*

Zimmermann, F., Coimbra M., Durst S., (tbd). Conceptual Framework for Assessing the Use of Artificial Intelligence in Wealth Management. In FINTECH AND ARTIFICIAL INTELLIGENCE IN FINANCE.

Publication IV – Technological Transformation in Wealth Management: The development of a conceptual CRM model for the HNWI client interaction under the consideration of AI. *(Kappa)*

Zimmermann, F., Durst S. (2024). Contemporary CRM Model: Revision of CRM models and AI factor enhancement for the HNWI client segment.

I Publication – Transformation of Entrepreneurial Business Finance

(published)

Zimmermann, F. (2024). Transformation of Entrepreneurial Business Finance. In DIGITAL TRANSFORMATION FOR ENTREPRENEURSHIP (pp. 151-173).

Transformation of Entrepreneurial Business Finance

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The future of entrepreneurial business finance is strongly connected with technological developments and the manufacturing of new investment products. New technologies make it easier to collect investor money and invest it collectively in profitable business ideas. The technological transformation not only makes the pooling of funds easier but also reduces processing and transaction costs.

In the future, private retail investors will be able to invest in assets which had been inaccessible to them, and which had traditionally been only suitable for professional investors, e.g., venture capital funds. For business finance, this trend means that by allowing a much larger group of retail investors to invest in collective funds, more liquidity will be able to be provided to businesses. Lately, the emergence of the platform economy and the introduction of peer-to-peer validation of transactions have made it easier to process funds, as well as make it faster and cheaper for companies and investors. Furthermore, the emerging trend of tokenising ownership rights allows a cost-efficient and legally backed way to create liquidity for entrepreneurial ventures.

This chapter aims to provide a condensed overview of the most common funding methods and the changes they undergo. Furthermore, this chapter seeks to shed light on new forms of funding. Entrepreneurs will get familiar with recent emerging trends in business finance and learn about the latest terminology.

Each of the funding methods is described in the three following steps:

- a) a short description of the funding method
- b) the recent developments the method undergoes
- c) the essential aspects entrepreneurs need to consider

In addition, each section concludes with a summary including the names of exemplary service providers and the links to further readings for each funding method. At the end of this chapter, the advantages and potential shortcomings of new funding methods will be highlighted.

As conclusion, a summary table will provide an indication of which funding method might be most suitable for which entrepreneurial venture.

1. Introduction

Technology changes every corner of our society. Thus, it also impacts the economy and the business players within it. In industries and sectors in which transformational processes can lead to better performance, i.e., faster processing of data, elimination of failure, and reduction of costs -companies will adopt these new technologies to have a competitive edge or to stay relevant (Prause, 2019). Especially in the business sector, transformational processes are often triggered by new technologies becoming an industry standard and revolutionizing the market (Veldhoven and Vanthienen, 2022; Praveen et al., 2022).

On the contrary, central market participants, such as banks, regulators, and infrastructure providers, are not very keen on change and are rare among the first adapters of new technologies. However, as they are on the brink of business interactions, they significantly impact industries' transformation (Toufaily et al., 2021). Every business will, at one point, interact with at least one of these market players in one way or another. New regulations, emerging market participants and the development of new technologies shape how these institutions interact with their clients on the market (Bradley et al., 2021). For entrepreneurs, choosing the proper environment is crucial to the business's success and getting access to funding. The financial service sector is important for entrepreneurs, which faces a vast transformational process. Thus, shaping the way how entrepreneurs acquire financing for their businesses. The different financing methods for business are traditionally described by the lifecycle approach, which indicates which form of financing to use at each development stage of the company (Wilson, 2013). Wilson (2013) links in his study the growth phases of a business venture with the available funding methods, most likely required for each phase. However, as the business world is changing fast and new emerging companies often jump lifecycle stages, the traditional approach only sometimes holds. Furthermore, new technologies change the complexity and access to funding (Lasak, 2022). Thereby, the differences between the funding methods are blurring away.

2. Entrepreneurial business finance–transformation of traditional funding methods

Finance is one of the crucial factors for any successful business undertaking (Garg and Shivam, 2017). Without financial support, it is merely impossible for any business to grow or sometimes even to start. Even if the entrepreneurial venture started as a hobby or side-side hustle, at one point, the entrepreneur would need to face the question of how to finance the production or its employees. Therefore, the above-all reason for all business financing is to obtain funds to finance or maintain a business undertaking and to grow it further to bolster profits. (Ronchini et al., 2021). Especially for entrepreneurial undertakings, the appropriate analysis of the required funds is essential to provide banks and potential investors with the necessary information about the intended scope of financing (Alizadeh and Rahmati, 2022). Thereby, investors and banks can evaluate the growth of the entrepreneurial undertaking and the prospective financial return of the investments for them (Salomon, 2018).

The following section provides an overview of the most common business finance methods, which will be described in this chapter, as well as their specifications, and the transformational process they undergo (Rao et al., 2021).

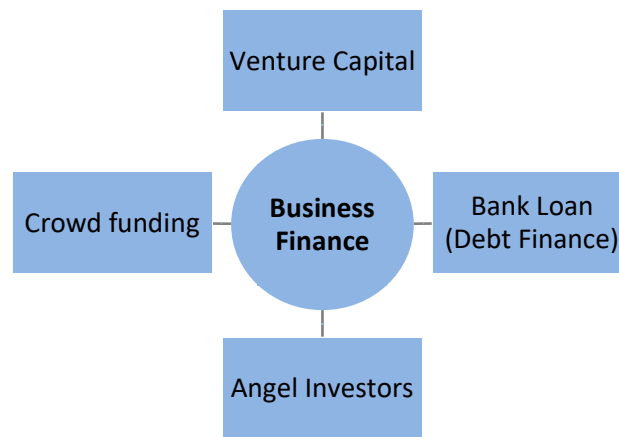


Figure II: overview of most common funding methods.

2.1. Venture Capital Funds

One commonly known form of early-stage investment in the business finance context is venture capital funding (VC). Venture capital funds generally invest in several private companies - named portfolio companies- which are expected to grow over time (Metrick and Yasuda, 2021). The venture capital funds aim to develop these companies and successful sale or listing in an initial public offering (IPO) on a stock exchange (Metrick and Yasuda, 2021). VC funds seldom invest in already established companies and specifically intend to profit from the business growth of an emerging venture. However, the variety of VC funds investing in entrepreneurial ventures is significant, as private and institutional investors constantly search to invest in profitable new ventures. Venture capital funds thereby pool the funds of cooperations or affluent individuals to generate returns for them. The VC fund is thereby tasked to perform the market screening and evaluation of the entrepreneurial ventures (Bollazzi et al., 2019). This form of investment used to be exclusively for more prominent investors, such as institutional investors and affluent private investors. However, recently private investors became able to participate in joined VC

investments (Lin and Nestarcova, 2019). Through lower required investment amounts, referred to as “ticket size”, the entrance barriers become smaller, allowing even more investors to participate in the funding activity (Hornuf and Schvienbacher, 2018).

The pooled funds are generally provided as equity or cash investment to young early-stage entrepreneurial ventures (Gompers and Lerner, 2001)

The reasons for this new trend of VC funding are lower entrance barriers (transaction costs) and the creation of new participation schemes with significantly lower ticket sizes (Bonini and Capizzi, 2019). The reduction of these barriers and the onboarding of numerous smaller investors result from constantly shrinking transaction- and monitoring costs. Thus, lower costs directly result from the digital transformation process occurring in the financial service sector. Ongoing standardisation and automation of processes also enable a significantly larger group of smaller investors (Gibson, 2019) to participate in VC activities. With an increasing platform economy and decreasing costs (Diamond et al., 2019), collective investment undertakings have become more accessible. This trend will likely continue and even intensify while fostering financial inclusion (Gurumurthy et al., 2018). The increasing accessibility of VC funds (Willman et al., 2021) and the growing interest of retail investors will continue to enable access to VC funding.

Businesses aiming to acquire VC funding should be able to explain their business model extensively. As VC funds are interested in the growth potential, the following minimum information should be prepared beforehand:

- a) The product, its usability and its importance for customers
- b) potential market share, market competitors and market growth
- c) existing revenues & potential profits
- d) a financial plan of required funding and its intent to be used

Platforms such as ¹*Stableton*, ²*Companisto* or ³*Titanbay* allow retail investors to participate in venture capital investments. As an entrepreneur, it is easiest to identify these platform providers, contact the investment team directly, and pitch the business idea. However, as there is no defined way how to acquire VC funding, it can get difficult to get in contact with corresponding funds. Hence, VC funds often invest internationally and follow their own investment policies by identifying their investment targets directly (Devigne, et al., 2018). Despite the increasing number of VC funds - making it easier to access funding- entrepreneurs should carefully evaluate the VC fund as it can significantly impact the business. Entrepreneurs seeking VC funding should connect with more than just one venture capital firm to test the different offers. Above all, the entrepreneur should also check which other companies the VC firm is collaborating with, especially if it has connections to potential competitors.

¹<https://www.stableton.com/>

²<https://www.companisto.com/en>

³<https://www.titanbay.com/>

2.2. Angel Investors

In comparison to VC funding - which is institutionalised collective financial gatherings - the angel investor acts as a single person who often has significant excess funds (Edwards, 2021). That form of business financing is widely known through TV shows like the *Shark Tank* or *Dragons Dean*. The professional angel investor generally conducts a more diligent process with a deeper financial analysis and evaluation of the business model (Forrester, 2019). The advantage of angel investors is that they are often entrepreneurs and have grown an extensive network which can help bring the business forward (Morrisette, 2007). In addition, their experiences and knowledge can strongly contribute to the business's success. Furthermore, their potential credibility could add a competitive edge when negotiating business deals or attracting further investors. However, as conditions for their financial involvement, angel investors often demand a large stake in the new business; some even require more considerable influence within the company (Broughman, 2018).

Compared to other business funding methods, angel investments are less prone to digital transformation as the whole process is mainly human-based (Dang, 2021). The sourcing and analysis of prospective companies might be easier for the investor as general technological advancements allow easier access. However, the process has not undergone a substantial transformational shift and is still human based. The recent development occurring is that more and more private individuals are looking for new investment opportunities in times of negative interest rates. Therefore, more and more angel investors were introduced to the market, making it easier for the entrepreneur to find a potential investor (Sohl, 2021).

Entrepreneurs looking for angel investor funding have the possibility to approach angel investors directly via their webpages such as ¹*AngelListe*, ²*Enterprise-Ireland* or the more global angel investor platforms such as ³*500Global* or ⁴*SFC Capital*. The traditional networking event and investor panel discussions are still the go-to approach to engaging directly with angel investors. However, on a local level, regional business associations or chambers of commerce often offer services to find investors (Ratinho and Mitsopoulos, 2021). Some industry organisations, such as the *German chamber of commerce* (DIHK), have even set up platforms such as ⁵*INVEST* or ⁶*Investor Networks* like from the French *Chambre de commerce et d'industrie* (CCI) at which entrepreneurs can interact with each other and have the possibility to match investors.

¹<https://www.angellist.com/>

²<https://www.enterprise-ireland.com/en/>

³<https://500.co/>

⁴<https://sfccapital.com/>

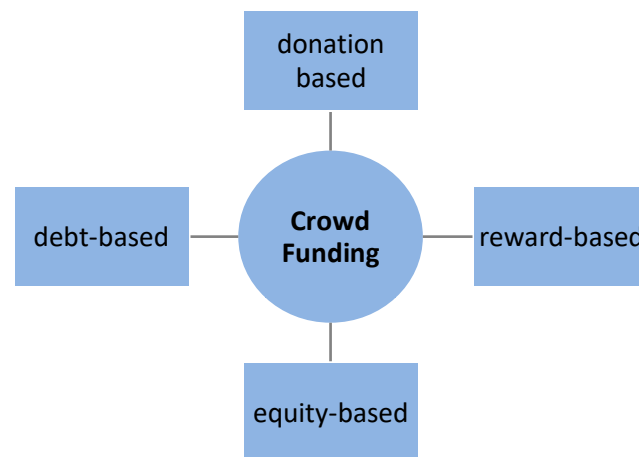
⁵https://www.bmwk.de/Navigation/DE/InvestDB/INVEST-DB_Liste/investdb.html

⁶<https://www.ccifrance-international.org/notre-reseau/les-cci-fi.html>

2.3. Crowdfunding

Crowdfunding plays a crucial role in collective financing, as it pools the funds of various investors (Paola et al., 2019). Enabled through online funding pages, this form of business financing is steadily growing. Compared to VC funds and Angel investors, the crowdfunding investor does not necessarily receive ownership rights in the company. Thus, this form of funding can be used when bank financing becomes difficult, and a bank loan might not be an option (Miglo, 2022).

In fact, crowdfunding can occur in different ways, such as donation-based, reward-based, debt-based and equity-based.



III:

Figure
Forms of

crowdfunding, produced by the author, adapted from (Gibson, 2019), Salido-Andres et al., 2021).

In the *donation-based* crowdfunding process, the altruistic approach is at the centre of the funding process and is not intended to be an immediate financial investment. This is particularly interesting for emerging business ventures with a kind of altruistic business model (Nakagawa et al., 2022). This method of funding can be found among social entrepreneurs (Salido-Andres et al., 2021), whereby the business activity follows a greater good. Furthermore, businesses with a lack of a profit profile, a difficult-to-understand business model, or just insufficient credit score could profit from that kind of funding. In the *reward-based* approach, investors typically receive goods or services from the company and are mentioned as “first-funders” of the business but don’t necessarily receive paybacks for their financial contributions (Sewaid and Cestona, 2021).

The *debt-based* is similar to a bank loan. However, to make the investment lucrative for an investor, the interest being paid is usually required to be higher than the interest on a savings account (Gibson, 2019). Furthermore, considering the risk of never receiving the initial investment, an investor would require a significantly higher interest than a “risk-free interest rate” on their bank account. This requires the entrepreneur to achieve the required interest payments through his business activities (Miglo, 2021). Entrepreneurs are therefore required to carefully assess the duration, amount and interest required to be paid compared to other funding methods. These forms of crowdfunding are for businesses that need some financial backing but are

unwilling to hand over ownership rights.

On the contrary, *equity-based* (Bade and Walther, 2021) crowdfunding is nearly indistinguishable from the developing venture capitalism platforms. As in venture capital investments, equity-based crowdfunding allows investors to obtain ownership rights. The difference is that VC funding is often “big-money” (Taboga, 2022) and collected through institutionalised collective assets (Chemmanur et al., 2021).

The example of equity-based crowdfunding demonstrates that the technological transformation and reduction of barriers directly affect the liberalisation of funding methods. The borders between the different forms fade away as the new platform economies liberate the market and make the funding by institutional investors indistinguishable from one of private investors. The continuing development of the platform economy can thereby be seen as a vital enabler for small businesses to obtain funds. The use of crowdfunding is still increasing (Clauss et al, 2020), and the effective use of social media could further bolster its development. Thereby, social media aims to attract specifically the mass market retail investor.

For entrepreneurs, this means that through the emergence of platforms like ¹*Kickstarter*, ²*Patreon*, ³*Go-Fund-Me* or ⁴*Indiegogo* makes it nowadays easier to get access to collective funding possibilities. Some platforms allow sharing the link to the funding projects directly via WhatsApp with friends and family. This trend of investments from accredited & non-accredited private investors (Bonini, Capizz, 2019) will become more common and provide easier funding access for the entrepreneur. Despite crowd-funding platforms being an easy form of funding, the amount that can be raised is often low. This makes it a non-suitable form for more mature companies with higher funding needs. However, entrepreneurs should carefully evaluate from whom they are obtaining funding and what they need to offer in return.

¹<https://www.kickstarter.com/?ref=nav>

²<https://www.patreon.com/>

³<https://www.gofundme.com/>

⁴<https://www.indiegogo.com/>

2.4. Bank Loans

Regarding the classical financing methods, bank loans are considered the traditional financing method for entrepreneurs (Zhang et al., 2020). Depending on the amount, it can get increasingly challenging to acquire the intended amount of funding. As the bank requires substantial documentation, an assessment of the company, and business development (Witzen, 2022), higher amounts above the standard consumer credit limit might take up some significant evaluation time. All the necessary information, from deposited securities to the business plan and cash flow statement, needs to be available and checked.

In the future, the development of collaborative data sharing will intensify between market players and significantly increase the processing time while minimising the evaluation costs per loan (Temelkov, 2022). As banks, insurance companies, regulators and other financial institutions work closer together, sharing client data (Eybers, Setsabi, 2021) will lead to a more transparent client profile and allow financial institutions to process data and loans faster. However, banks are not the only player in the market of loans anymore; new Fintech firms have already entered the market and started to provide loans to smaller businesses (Berg et al., 2021) or act as a liaison by providing loan broker services (Knewton and Rosenbaum, 2020). With increasing competition within European countries, it is possible to receive bank loans from financial institutions in other EU countries with potentially more favourable rates and lower requirements (Patty and Schoenmaker, 2021). The online accessibility of these loans, paired with comparably easy proof of creditworthiness, allows European entrepreneurs to size funding opportunities in other EU countries (Baba et al., 2020). However, the transformation from a single jurisdiction approach and loan acquiring towards a multi-jurisdictional approach is for more developed businesses or business models with a decentralised focus.

The rise of neo-banks specialising in different fields of finance allows businesses to receive loans through these new market players (Temelkov, 2022). Some neo-banks offering business loans are *Aion-Bank*¹, *Novo Bank*² or *Bluevine*³. As these loans are only available up to a certain amount, they are not suitable for financing large investments. However, businesses will profit from more accessible loans and potentially better rates than at their local bank.

With neo-banks on the rise and often operating internationally, entrepreneurs can expect faster access to smaller loans. As an additional option to get the best rates and suitable conditions; loan brokers are an excellent go-to option. Their commission is usually paid by the banks/financial institutions; the entrepreneur making the request needs typically not to pay for the request. These brokers provide easy-to-compare offerings from financial institutions, saving the entrepreneur time.

¹<https://www.aion.eu/be-en/business>

²<https://www.bluevine.com/>

³<https://www.novo.co>

3. New ways of Entrepreneurial Business Finance

The emergence of Financial Technology (FinTech) has led to a tremendous shift in how banks and companies conduct business. The Financial Stability Board defines FinTech as “technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services” (Rupeika and Thalassionos, 2020). Thereby, it has led to more accessible capital and financing for private persons and companies alike (Dorfleitner and Braun, 2019). In addition, FinTech connects clients with access funds to clients with financial needs and substantially reduces transactional barriers. The following provides a condensed overview of the emerging trends in business financing and the transformational shift it will undergo in the future (Stulz, 2019). One of the main trends - which is extensively developed and fostered by financial institutions - is to improve the validation time of client data (Elghaish et al., 2020). Thus, blockchain technology plays a crucial role by significantly changing the financing market for banks and businesses alike.

3.1. Tokenisation of Business Value

Blockchain technology, widely known through cryptocurrencies, has been around for nearly a decade (Rao et al., 2022). However, the use cases for business activities have become more apparent and mature in recent years. The use of blockchain has grown increasingly important for validating transactions and contracts (Serrano, 2022). In comparison to initial coin offerings (ICOs), often created for tech products (Jinghan and Gomaa, 2019), the token sale represents a financial product. This development aims to significantly speed up the processing of funds through more accessible securities validation. This also reduces the human labour's extensive evaluation of client data, as the technical validation of a blockchain replaces this.

Tokenisation

The source of business funding which is starting to become increasingly important for financial institutions, is to make non-bankable assets bankable. This means that traditionally illiquid assets (collectables, art, etc., and company values) are made bankable, i.e., making them tradable and therefore building the foundation to raise liquidity (Barbureau, 2022).

The Tokenization of assets can thereby be seen as a new form of collateralisation and financing (Harvey et al., 2021). The practical process works as follows:

1. A company/entrepreneur possesses a valuable asset which is not easy to liquidate
2. Tokenisation provider
 - a. evaluates the authenticity of the assets
 - b. Decision on how much money should be raised for the asset
 - c. Manufacturing of Blockchain bases ownership token
3. Issuer, offering ownership/profit tokens to potential buyers via the banks/financial institutions network
 - a. Tokens/ownership rights are usually insured by either the bank or another third party.
4. Financial Service Provider (traditionally a Bank) allows the trading of the tokens via their platform amongst their clients or openly for everyone.
5. Clients buying the tokens can freely sell them to other eligible buyers.

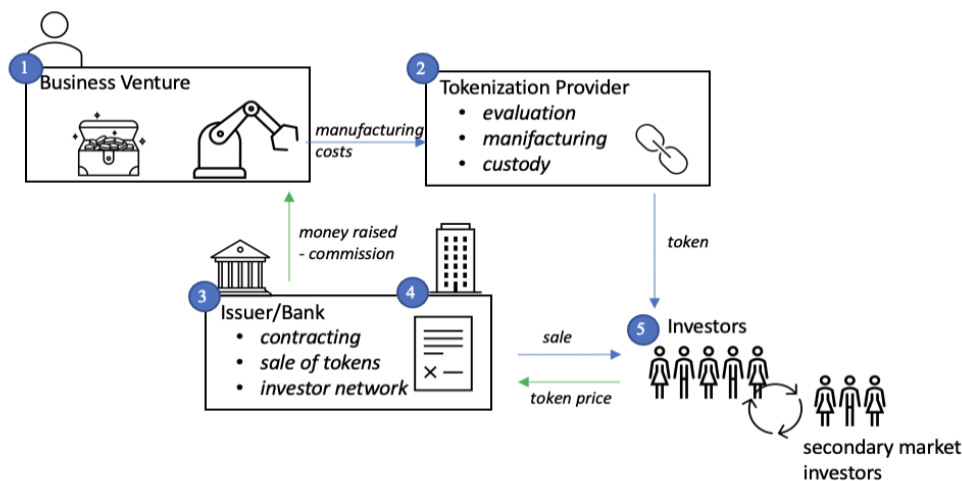


Figure 4: Process of tokenising business value
produced by the author, adapted from (Lacity and Traiblaier, 2022, Momtaz et al., 2019).

Lately, the focus in financing has shifted towards asset classes which can have a significant value but are not easily tradable (Romero-Catro, 2022). Examples of these kinds of assets, e.g., collectibles such as art, cars, wine, or even intellectual properties like patents or copyrights (Heines et al., 2021). These assets might already exist in the possession of the entrepreneur or the company itself but are hard to be assessed, as the banks would require specific expertise to evaluate these assets. This new form of collateralizing assets and using them for finance purposes, would also allows retail investors to participate in funding activities. Thereby, collateralization through tokenization contributes to the democratisation of entrepreneurial finance (Fisch and Meoli, 2022).

For banks, it is risky to provide loans based on collateral with a not easily assessable value. In order to overcome this uncertainty, financial institutions will start by tokenising these assets and offer it bundled with other asset classes to investors. By providing these ownership tokens to clients, the financial institution can observe how much money was raised in the process (Hargrave et al., 2019). This observed interest in the token and the paid price will allow the financial service to provide, e.g., the bank to assess how much these non-bankable assets are worth (Ackermann et al., 2020). This allows the bank to estimate which loan offering they could provide to the venture in the future.

However, for business finance, this means that assets already in the company's possession can be collateralised and priced reasonably. Thereby, companies will be able to raise business funding easier in the future. The largest tokenisation providers offering their services are ¹*tZERO*, based in the United States, ²*Polymath*, operating out of Canada and Berlin bases ³*Bitbond*. As this form of funding emerged more recently, businesses should not only rely on this form of funding alone but rather make use of a mixed funding approach.

¹<https://www.tzero.com/>

²<https://polymath.network/>

³<https://www.bitbond.com/>

3.2. Employee equity participation

Compared to traditional business financing methods, such as bank loans and VC funding, a new business finance trend is emerging. New emerging entrepreneurial ventures increasingly provide the possibility for their employees to participate directly or indirectly in the company (Sun and Xiaolan, 2019).

In the **direct process**, the new emerging venture collects investment capital from its employees and participates directly in the company's success. This so-called contribution capital is similar to a loan, which is granted to the company and can be individually agreed upon. There is usually a minimum duration, and the maximum duration is limited to the employee's exit but can vary from contract to contract. Depending on the agreement, contribution capital can receive either interest payments (Khatavkar, 2018), direct profit participation, or no payments at all. This form of funding can traditionally be found in law firms or consultancy firms, whereby newly appointed partners must provide a financial contribution to obtain their partner status. This new funding trend is especially used in companies where the C-Level employees are more senior or have the sufficient financial backing to provide such loans.

In the **indirect process**, the company provides the possibility to deduct a certain amount from the salary or even as part of the compensation package, which will be transferred into ownership rights (Morales, 2021). Thereby, the company does not need to pay a full salary and can use the freed-up resources for their business finance. Ownership participation plans retain cash outflow (Turner, 2018) into ownership rights and therefore delayed cash outflow. The money which would have been traditionally paid to the employees can be reinvested. Thereby not only the company might profit from it, but also the employees. As the company continues to grow and expand, so do its participation shares (Arbaugh, 2004).

This transformation from pure “work-for-money” employment towards a “work-and-participate” development helps companies to increase the ownership feeling of their workforce and thereby increase productivity (Derek, 2018). The process of engaging employees financially at the company can be complicated. New ventures especially face the difficulty of reasonably pricing the participation rights of the company (Le Guyader and Meyer, 2021). The ownership rights or profit rights at the company need to have a certain value in order to make employees buy into it. However, some startups demonstrated that even sole participation possibilities are accepted by employees (Menke and Buxton, 2010). Thus, for some companies, the promise of a prospering future with potentially lucrative growth might sometimes be the only form of compensation they can offer, which is often the case for start-up companies (Menke and Buxton, 2010). This is often due to their low liquidity within the company and the difficulty of competing with regular market salaries. In some jurisdictions, this form of compensation needs significant legal clarification.

Therefore, this form of compensation is made easier through third-party providers who take care of the appropriate amount of participation, the legal and regulatory limits and the custody of the employee's participation rights. For established companies, the more professional providers such as ¹*EquatePlus* from *Computershare*, ²*globalshares* or ³*shareworks* are used to make employees participate in stock buy programs. But also, for smaller ventures, there are affordable employee-participation-plan providers such as ⁴*equiniti*.

¹<https://www.computershare.com/uk/business/employee-share-plans/equateplus>

²<https://www.globalshares.com/uk/all-employee-share-plans/>

³<https://www.shareworks.com/>

⁴<https://equiniti.com/us/services/equity-compensation-services/>

4. Conditions & Implications for Future Business Finance

For entrepreneurs, the development in the field of financing can be a blessing but also a burden when dealing with it. The new emerging financing trends require the necessary legal recognition. In the case of employee participation schemes and loan granting, the process is generally very simple, and third-party companies make participation easier and deal with the necessary paperwork and legal implications. However, in terms of tokenisation of assets, it becomes increasingly complex, as, in many jurisdictions, the transfer of digital ownership is not fully recognised by law. In jurisdictions like Germany and France, a notary would still be required in order to confirm the transfer of ownership rights. Thereby, the process is not much different from acquiring traditional ownership participation in a company. As the technology becomes more recognised, the processes become leaner and more accessible.

4.1. Regulatory constraints

The above-all requirement for businesses to engage in new forms of business finance is regulatory reliability (Hendrikse et al., 2020). Without the regulatory and legal recognition of new funding methods, the entrepreneur risks losing the business funding but also faces the risk of being held liable for damages (Kramer and Meier, 2019). Especially blockchain used to be a grey field for ownership rights and enforcement of such. However, more countries have passed new laws and regulations connected to the blockchain. The European Union^{1,2} published several frameworks for the use of blockchain for businesses providing the latest technology with legal backing (Boreiko et al., 2019). However, an innovative funding method should only be used if the entrepreneur or one of the employees has sufficient knowledge about it or at least can make use of a knowledgeable third party.

¹<https://www.europarl.europa.eu/news/en/search?searchQuery=blockchain>

²https://blogs.ec.europa.eu/eupolicylab/files/2017/04/Blockchain4EU_Kickoff-announcement.pdf

4.2. Cyber Security

Despite the benefits the new platform economy and technological novelties hold for businesses, it also has security implications for them (Cutolo and Kenney, 2021). Traditional business finance methods are getting more and more digitalised and platform-based. While blockchain technology is considered relatively safe from cybersecurity threats, continuing news about hacked platform providers regularly leads to uncertainty in the market. The entire platform economy, with client data sharing and several entrance points, bears a significant cybersecurity risk. Businesses should be aware that these risks can substantially threaten their businesses (Corallo and Lazo, 2020). New entrepreneurial ventures should consider that these threats can occur and take precautions to circumvent them wherever possible. The use of new financing channels should be assessed carefully, and potential risks should be anticipated. However, collaborating only with legitimate business partners that have the required security measures and insurance policies in place if such threats occur can eliminate the risk for businesses already significantly.

4.3. Legal recognition

Like regulatory constraints, legal recognition is crucial for new technologies. Despite the recognition from supranational authorities like the European Commission, legal uncertainty remains (Boreiko and Navroop, 2018). As of now, the judicial experience regarding ownership or profit rights, which are token based, is relatively low (Fairfield, 2022). Thus, not many courts have yet rulings which could show how token rights are enforced in case of legal proceedings. This becomes even more apparent when dealing across borders. Businesses seeking business finance possibilities through these new channels are advised to get professional support and perform their funding activities in countries where the intended form of financing has legal backing.

5. Conclusions

Despite traditional business financing methods remaining in place, technological advancements will significantly transform the way how fast and efficiently entrepreneurial ventures can obtain their funding. The business finance market contently transforms from a single stand-alone financial provider market to a more collaborative and data-driven environment. As funding providers increasingly interact with other financial service providers (e.g., insurance, banks) as well as other data providers (e.g., rating agencies and regulators), the market will become more transparent.

Thus, it will make it easier to single out bad business practices and favour well-thought business ideas. The shift to a holistic platform economy will allow the faster processing of entrepreneurial funding to the most promising ventures. Blockchain and its use for data validation will additionally lead to more instantaneous information processing and cost reduction due to the elimination of labour-intensive processes such as notary and certification services. While the new platform bases services hold enormous potential for business finance, it also poses a cyber security risk as well as the risk of being too dependent on third-party providers.

The following overview summarises the discussed funding method. It provides a subjective view of which funding might be most suitable for which company. The table considers the life-cycle funding approach from Wilson (2013). As the business model of companies can differ substantially, and some companies might be more traditional while others are more technologically advanced- the company types are further divided into “general” and “tech”. Thus, aiming to provide an indication which funding methods could be suitable while taking in consideration the technological stage of the company.

Funding Type Company Type	Venture Capital	Angel Investor	Crowd Funding	Bank Loan	Business Token	Employee Participation
Small/Start-up (general)			X	X		
Small/Start-up (tech)		X			X	X
Medium Size (general)	X	X		X		
Medium Size (tech)					X	X
Large Size (general)	(X)			X		X
Large Size (tech)	(X)			X		X

Table 1: Suitability of funding methods by company size; adapted from Wilson (2013), produced by the author.

With the current developments and advantages emerging for business finance, it is up to the entrepreneur to carefully evaluate which form of funding is most beneficial for the business. While access to funding became easier, sourcing for the right option became more difficult through the abundance of new possibilities.

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II Publication – The future of wealth management (published)

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The Future of Wealth Management: A systematic review about the use of financial technology in the wealth management sector

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Abstract

Fintech is widely used as an umbrella term for various areas within the financial service sector. The research field of financial technology is vast and ranges from practical business model innovations to sophisticated technical coding and programming research.

Although a growing body of research looks at the general impact of financial technology (fintech) on the financial services sector, there is a lack of deep insight into the actual impact of technologies on the wealth management sector. This study aims to synthesize the dispersed literature about financial technology and provide a thorough perspective on the various research perspectives related to financial technology and its development and progression over time. Thereby fostering an understanding of its applicability within the wealth management sector. Furthermore, it aims to show the impacts of technological change alongside the wealth management process to illustrate the effects on each process step. Thereby putting in context the current stage of knowledge while providing the basis for further research regarding wealth management technology (WealthTech).

The research is based on a two-step approach: (i) a systematic literature review including 173 articles published in Web of Science between 2019 and 2024. Secondly, (ii) a bibliographic map generated via VSOviewer to summarize the different fintech applicability in wealth management. Being still at an early stage within the financial technology research, the study suggests that the current research in WealthTech can be grouped into four main research areas: The automation of client interaction through AI chatbots and avatars while collecting significant client data, Provision of tailored financial advice through Big Data analytics from various data sources; Investment portfolio automation based on Rob-advisors; and Just-in-time reporting of financial statements for clients and authorities alike. Above all, holistic risk management through the use of Big Data, AI, and the interconnection with external data sources.

While this paper is written, new technologies and use cases are emerging at a fast pace. Thus, making it a current snapshot of the research stage in 2024. The dedicated focus on the applicability of financial technology in wealth management limits the available literature significantly. In addition, the novelty of the topic and the focus on review articles leads to neglect potentially relevant grey literature publications. By understanding the current literature, practitioners can better grasp the latest developments and anticipate the potential of technology to improve the wealth management process. Thus, the review aims to guide practitioners when evaluating and implementing new technology solutions for their wealth management needs. Furthermore, it shows the insufficiencies and unaddressed gaps for which further research is needed in order to be of practical use. This review synthesizes the prevailing state of wealth tech research and

establishes a trajectory of its research development. As such, it comprises the most recent development and guides academics and practitioners alike while drawing upon the latest stage of research.

Keywords – Financial technology, Fintech, Wealth Management, WealthTech,

Paper type – Literature Review

Article history: Received 23 February 2024

1 Introduction

Financial technology (Fintech) has become a widely used term to describe any technology used in finance (*Al Sartawi et al. 2022*). Thereby it is also used in finance research to describe technology-enabled innovation in financial services {...} (*Rupeika & Thalassionos, 2020*). Its rise is strongly linked to standardisation and automation, as it is perceived to make processes less error-prone, faster, more secure and above all; cheaper (*Ashta & Hermann, 2021*). Thus, fintech can eradicate insufficiencies from unstandardised and labour-intensive processes (*Matousek & Xiang, 2021*). With these new technologies emerging, also new market players arise and move into the financial industry while shaping and disrupting it significantly (*Chiu, 2016*). Inevitably the financial service sector undergoes a significant transformational shift. *Alt, et al. (2018)* assert in their research, that FinTech will transform the entire industry in the years to come. Thereby, reducing traditional jobs while even creating new job profiles, whereby technological knowledge will play a significant role in the labour market (*Ashta and Hermann, 2021*). Furthermore, as the industry changes, so do the interactions between the market players and their clients. While banks relied on a dense branch network just a decade ago, most direct client services nowadays moved online (*Carbó-Valverde et al. 2020; Zhou et al. 2020*).

For existing market players, this rapid development is difficult to grasp and increasingly challenging to navigate as indicated by *Elsaid (2023)*. To recognize the key trends and to identify potential challenges and opportunities, wealth and asset managers are required to have fundamental know-how about the new technologies. Despite the ever-growing field of financial technology publications, which includes very specialised and highly technology-introduced publications, it becomes increasingly challenging to comprehend its developments. While a significant amount of literature deals with financial technology's impact on the entire financial industry (*Thakker, Japee, 2023; Elsaid, 2021*), very little literature provides detailed applicability for the wealth management sector. Most of the research covers financial technology in general for the entire financial industry. Even studies conducting systematic literature reviews, such as in *Verma et al. (2022)*, *Ghandour (2021)* and *Giglio (2021)* provide a very broad picture. However, their research dominantly covers the entire financial industry and falls short in addressing specific fields in finances e.g. the highly specialized wealth management sector. This present study in contrary to the above named ones, addresses the problem for wealth management companies of missing out on the latest developments. Using a systematic literature review this study ensures that the latest developments are addressed and synthesized. Thereby, it identifies relevant Fintech publications, specifically relevant for the wealth management sector and summarizes them into a conceptual framework alongside the wealth management process. In addition, it identifies the potential impact of the identified technologies on wealth management businesses and derives potential trends, implications and research gaps. It serves as a guide for practitioners with valuable and condensed insight on the latest research trends; allowing them to make more informed decisions. Furthermore, this review acts as a starting point for further research by uncovering unaddressed research gaps.

2 Background

The market for financial technology is moving rapidly and shows an ever-growing importance in the financial industry (*Branzoli and Supino, 2020; Zavolokina et al. 2016*). While the term FinTech is widely used and often used as a synonym for every technical development in the financial service sector, it needs to be defined and explained at first and set in contrast to WealthTech. While FinTech is used to generalise every technological enhancement in finance, the research develops and becomes more sophisticated and defined in each of its sub-fields.

2.1 FinTech

As the abbreviation of Financial Technology, FinTech is described widely by numerous authors in different ways. The use of technology in the financial industry is, according to *Taherdoost (2023)*, the main driver of revolutionising the financial sector. Financial technology drives innovation in the financial services industry and enables new business models, products, and services (*Jarvis & Han, 2021*). Fintech has enabled wealth management firms to increase operational efficiency (*Varma et al. 2022*), reduce costs (*Agarwal & Chua, 2020*), and provide personalised financial advice (*Malladi et al. 2021*). Thereby the underlying technologies such as artificial intelligence (AI) and machine learning (ML) are used to automate financial processes and analyse data more quickly and accurately (*Wasserbacher and Spindler, 2022*).

Financial Technology (FinTech) has led to new ways financial institutions conduct business and interact with clients (*Gomber et al. 2017; Pollari, 2016*). Another definition – which should function as the working definition for this paper- comes from the financial stability board. It defines FinTech as a “technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services” (*Rupeika and Thalassionos, p.3 2020*). Even this definition is not concluding, as the technologies subjected to FinTech are not named explicitly. However, for this research, we generalise and consider any technological novelties in account which can be used to change existing processes in the financial sector. These technological novelties could be AI, Big Data etc. but are not limited to those. As the research in FinTech intensifies, new terminologies are introduced constantly.

2.2 WealthTech

In general, wealth management is a practice that helps individuals or families achieve their financial aims and utilise their existing financial resources (*Dew et al. 2022*). Thereby it aims to help them make informed financial decisions to reach the defined financial goals (*Brayman et al. 2017*). Thereby, wealth management is a comprehensive approach to managing individuals' financial resources and comprises, but is not limited to, the following processes: financial planning (*Duska, 2022*), investment management, tax planning (*Horan, Adler, 2009*), estate planning (*Jennings et al. 2011*), risk management, retirement planning (*Madhani, 2009*), insurance planning (*Jennings et al. 2011*), and cash flow as well as debt management (*Maude, 2010*). Thus, it is similar to corporate finance management but focuses instead on private individuals and families. With the emergence of new technologies, these processes can be structured in different ways and potentially made more efficient in terms of time spent on several tasks and cost reduction. To understand finance and technology in conjunction with wealth management, these terms must be defined to set the frame of this paper. The term FinTech can include a wide range of technologies, such as cloud computing, blockchain technology, robot

advisers, artificial intelligence, and machine learning (*Varma et al. 2022; Hendershott et al. 2021; Cai, 2018*). It is utilised in the wealth management industry to increase wealth management service - efficiency, cost-effectiveness, and transparency (*Sonawane, Motwani, 2023; Cao et al. 2021*). To automate portfolio management and offer customers individualised investment advice, robo-advisors, for instance, make use of pre-defined algorithms. In order to increase the security and transparency of transactions, blockchain technology is leveraged, while artificial intelligence and machine learning are used to offer clients customised recommendations and guidance. *Dziawgo (2021, p.146)* describes WealthTech as “Technological developments and services created to transform existing investing solutions (wealth management, trading) across all asset classes”.

In *Schueffel (2016)*, FinTech is described as a new field within the financial industry that improves financial services using technology. Applying this definition to the sub-sector of FinTech (here WealthTech), the description for WealthTech, therefore, is “the improvement of wealth management services by making use of technology”.

With the emergence of new technological advancements, more tailored research becomes increasingly important to address the latest trends and make the best use of the available technologies in every area of the financial sector. Wealth management firms must be prepared and adapt to the changing landscape as these technologies become more widespread. The systematic review of the literature provides a condensed analysis of the current research stage and uncovers potential benefits and inconsistencies within the wealth management sector. While from a practical perspective, cost-saving and efficiency reasons are prevailing, from a research perspective, this systematic review contributes to the ever-growing specialisation within the financial sector. It applies FinTech research to the more granular wealth management sector.

3 Method

This systematic literature review explores the current research stage regarding financial technology and wealth management. It comprises of primarily academic sources from peer-reviewed journals. Industry publications are used to add the latest practical view on the topic, which might not yet be included in the latest review articles. The review draws upon the techniques outlined in *Lacey et al. (2021)* and *vom Brocke (2015)*, including a bibliographic map to identify additional themes and links among them as in *Tamala et al. (2022)*. To grasp the latest trends, the focus will be primarily on articles published in the last five years due to the topic's novelty. Therefore, only literature published from 01.01.2019 to the first quarter of 2024 in the academic database Web-of-Science is considered in the analysis.

3.1 Search Terms

The search terms used include “wealth management”, “fintech”, “digital wealth management”, and “AI in wealth management”. The search terms are specifically used to identify the research conducted regarding technology in the wealth management sector. An exception is the search term “AI in wealth management”, which is used to consider the latest AI developments fostered by the emergency of ChatGpt & large language modes. This study will then analyse the

literature to identify common themes and trends of technological applicability in wealth management. The following search term combinations were used to tailor the search results:

TS=(“Wealth management” and “Technology” or “FinTech” or “Financial Technology” or Wealth management and Technology*)

3.2 Exclusion Criterion

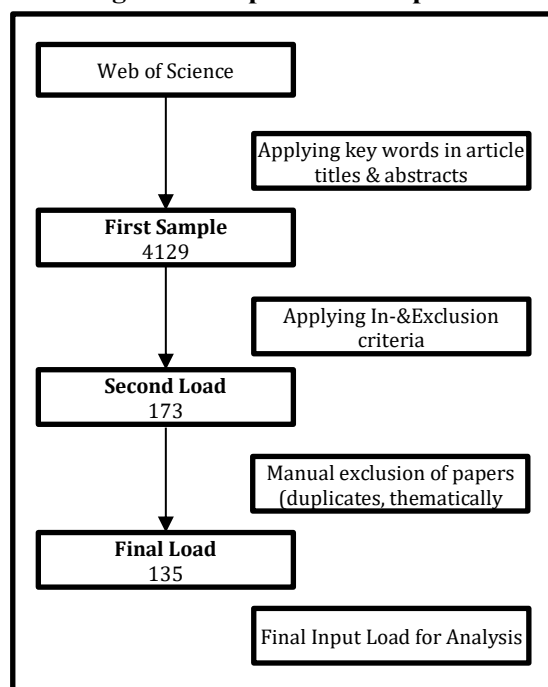
Based on the novelty of financial technology in the wealth management sector, the actual number of academic works is relatively small. Thus, making it necessary to widen the search term while applying elimination criterion to further narrow down the extended results. To grasp the latest stage of research all articles older than 5years are excluded. The chosen literature comprises predominantly of reviewed articles to maintain a high standard of the research quality.

Table 1 - Criteria selection

Inclusion criteria	Exclusion criteria
English texts	Non-English texts
Peer-reviewed	Non-peer reviewed
Papers in the last 5 years (01.01.2019-2024 (today))	Papers before 2019
Paper Type: article, review article, early access article	other

Without the elimination criterion, the search result comprised 4129 articles. The exclusion of non-peer-reviewed articles significantly reduced the number of results, thus eliminating also early-stage articles with interesting findings. To fully comprehend the stage of research, these documents were re-added to the literature review.

Figure 1 - Paper selection process



The chosen selection process, as outlined in Figure I, reduced the number of publications significantly. After the application of the inclusion and exclusion criterion, only 173 remained. The manual exclusion of all non-relevant articles and the addition of wrongly excluded articles led to the total of 135 articles.

3.2 Analysis

The literature analysis comprises the total number of publications per year, the geographic distribution, the Journals publishing the papers and the used theories and methods.

The number of publications per year provides an indicator of the growing interest in the topic and further provides a hint about the maturity stage of the research. Thus, allowing to demonstrate an interest in the topic and its growing importance. The geographic distribution of the publications allows to derive the growth markets interested in the topic. The applied theories and methods provide insights into the conducted research. It furthermore allows to identify flaws in the research, which could open up the discussion and lead to more profound studies fostering further research.

4. Results

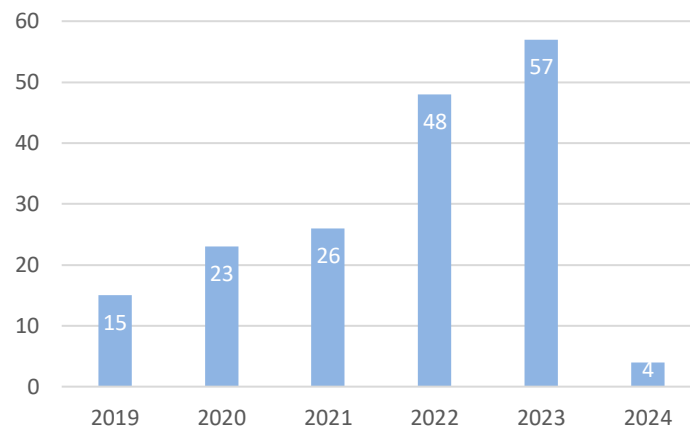
This section outlines the findings of this study by referring to the four objectives researched in this systematic review. It starts with the general analysis including the increasing number of publications in that field, their geographical distribution, journals in which they are published, and the applied theories and methods used in these papers. In the second step, these research areas are analysed, providing insights into the most recent developments in each field. The section concludes with technology's impact on the wealth management sector, providing a controversial outlook that serves as a gate to further research in each of the corresponding fields. Thus, contributing to drawing upon the summary of this systematic literature review.

4.1 Descriptive Analysis

4.1.1 Number of Publications

Despite being still at the lower end of all FinTech publications, WealthTech research increasingly gets more traction. The number of publications in the last four years tripled as shown in Figure 2.

Figure 2 - Number of Articles published in the period 2019-2024 covering Wealth Management and Technology

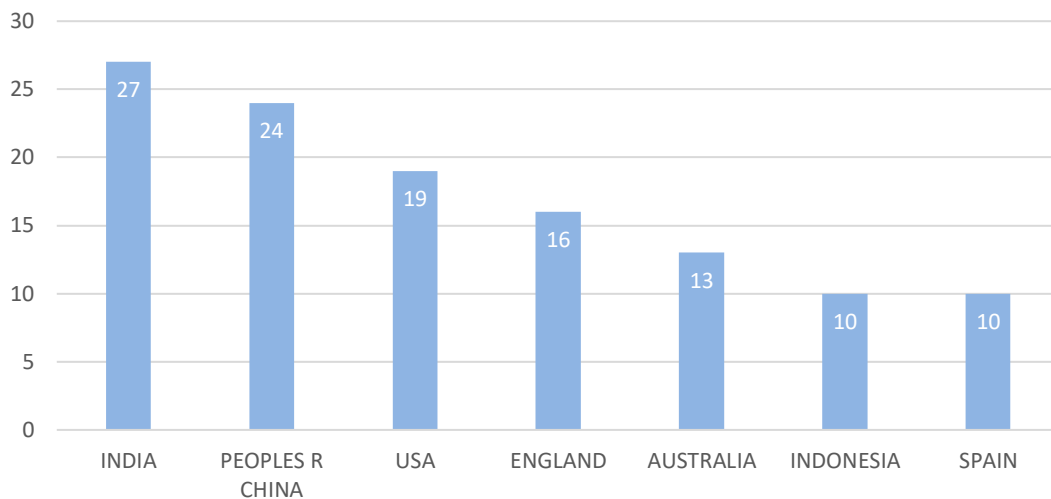


The number of articles concerning wealth management and technology increased over the course of the last 5 years as revealed in Figure 2. It shows that in 2019 the number of publications in the field was only fifteen, and the number of research papers increased significantly to 57 in 2023. The increase in the number of publications can be explained by different aspects e.g. the intensified research, which does not only cover FinTech in general but also gets more detailed; additionally including categories such as AI, Blockchain, and Metaverse. Furthermore, the increasing industry awareness and the constant digitalisation push bolstered during the COVID-19 pandemic might positively impact the number of research (*Naz et al. 2022*). Despite the increasing number of scientific papers, the literature about financial technology in conjunction with wealth management is rather small. The figure also reveals that the research of Wealth-Tech appears to be at an early stage with great potential for more research to come.

4.1.2 Geographic distribution

The geographic distribution is unsurprisingly represented by the largest economies and countries defined by a number of people and universities. India followed by the People's Republic of China has the most publications in the field, which might also be due to the significant wealth growth in these economies over the last years.

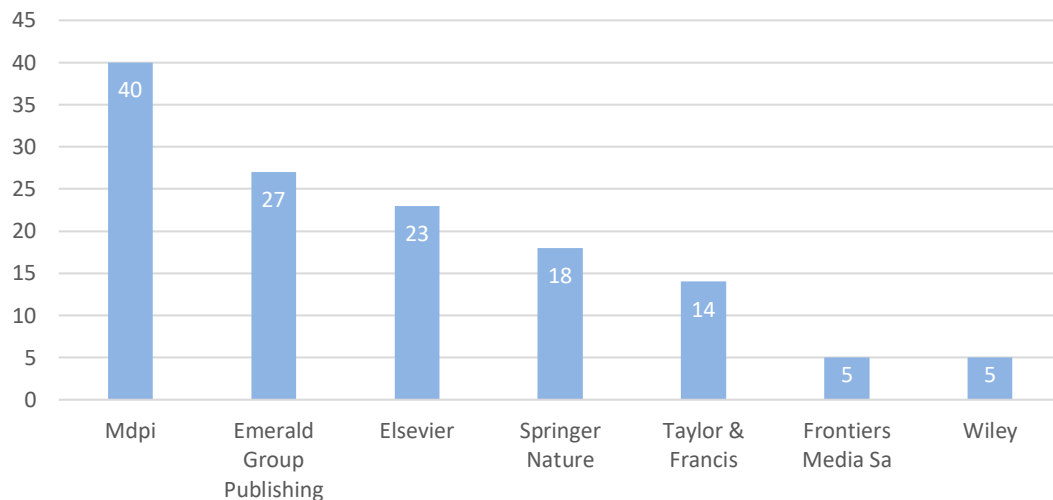
Graph 1 - Geographical distribution of the publications



4.1.3 Main Publishers & Journals

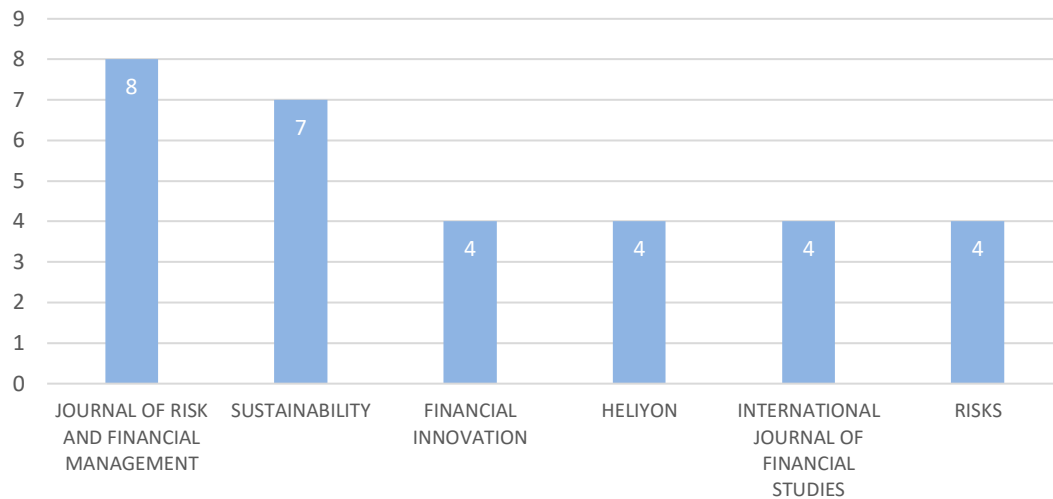
This systematic literature review attributed the analysed publications to 10 leading publishers. 24 were published in Mdpi, while 18 originated from Emerald Publishing, followed by 17 Elsevier and 10 Springer articles. Furthermore, also 4 articles each were published by Taylor & Francis, Frontiers Media and Wiley.

Graph 2 - Publishers covering the topic of Technology



The leading journals identified during the analysis are shown in Graph 3. The first three Journals belong all to Mdpi. They count for 8 publications in the Journal of Risk and Financial Management, 7 publications for SUSTAINABILITY and 4 publications in RISK. The reason for the dominance of Mdpi Journals among the first places might be that they allow an easier publication process. Furthermore, they are open-access, contributing to a more widespread access.

Graph 3 - Journals covering the topic of Technology and Finance



4.1.4 Research methods used in Wealth Tech Research

The analysed articles used different approaches in the research designs and methods. The methodological designs used in the WealthTech research at the current stage comprised primarily of two main research approaches (Table 2/3). Qualitative research methods appeared dominantly in the form of interviews. Quantitative research design appears not to be available on a widespread scale. The only exception is the combination of interview and survey data. The reason for that might be the novelty of the topic and the limited available longitude data at the current stage.

Table 2 - Research designs

Methodological design	Number	%
Qualitative	53	40
Quantitative	10	7
Mixed Method	72	53

As for the methods used for data collection, the findings show that the data collection is based on third-party information in 95% of the cases. This includes the reference of pre-conducted user acceptancy studies as in *Seiler and Fanenbruck (2021)* or *Takeda & Ito (2021)* and above all, literature reviews and bibliographic studies based on data from Web-of-science, Scopus or related databases as in *Ghandour, (2021)* and *Verma et al. (2022)*. The significant amount of review articles compared to qualitative and quantitative articles is recognisable and can be explained through different factors. These might be due to the topic's novelty, whereby actual first-hand data is limited, as well as the lack of longitudinal studies and historical data. Furthermore, the access to the discreet wealth management sector makes it difficult to acquire insights and data. This might be why most of the articles cover Fintech and its implications on a general level without putting it into context to actual areas within finance.

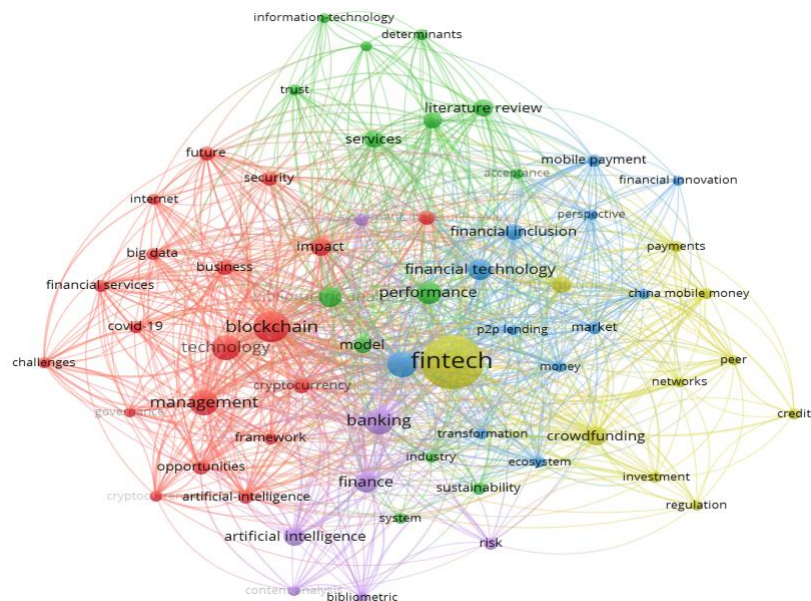
Data collection method	Frequency
Case Study	1
Interview	2
Survey	2
Questionnaire	2
Database	129

Note: differences occur due to multiple selection possibilities

4.1.1 Bibliometric Mapping

By using the bibliometric mapping of VOSviewer, key themes and trends are visualised, establishing the links between the main themes and their interrelations to other research fields & topics. The network structure in Figure 2, displays the result of the used search term for this review. Thus, it reveals additional keywords of related topics used in the analysed publications.

Figure 2 - Sub-themes Network Structure of Technology in Wealth Management Research



Source: produced with VOSviewer based on Web-of-Science data analysis.

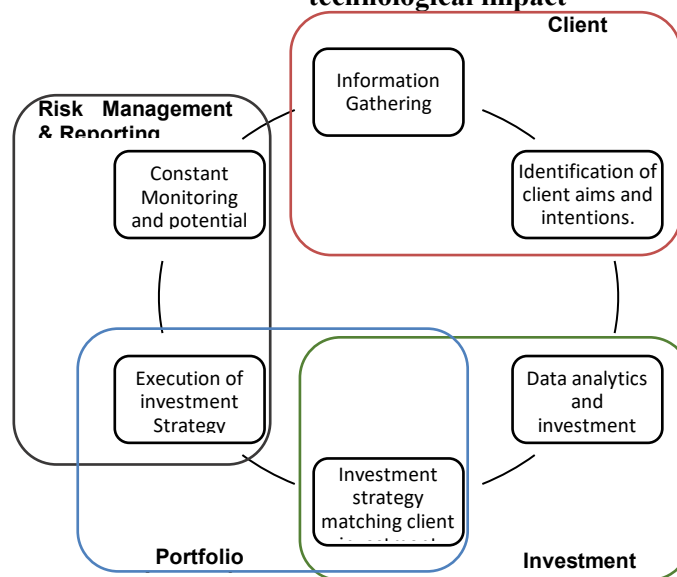
Fintech builds the key centre of the theme network structure functioning as the overarching umbrella Term. Thereby, the cluster reveal the technological topics around Fintech, namely blockchain, cryptocurrency, artificial-intelligence, mobile payments, and big data. Thus, it allows to identify the actual technologies that are currently of interest. Furthermore, it unveils topics which might be of additional interest in the research community. Such as, the security aspects around blockchain, its impact as well as the management of the technology and uses a cryptocurrency. Other clusters appear to be around the banking in general linking several aspects to it such as funding and payments. The bibliographic mapping in Figure 2 provides a hint about the actual technologies the current research is focusing on such as blockchain, AI,

cryptocurrencies – bitcoin. In addition, further topics relevant around financial technology such as management, information and sustainability are mentioned. Linking them to each step of the simplified wealth management process (Figure 3), provides an indication about which technology might be incorporated for each of the steps in the process. In essence it also hints towards processing steps which are more susceptible to these new technologies.

4.2 Research topics within the wealth-tech research (Framework)

As the VOSviewer analysis of the articles revealed, there are several topics which appear more frequently in the literature. These topics did not explicitly target wealth management in general but can be clustered instead in several sub-areas alongside the wealth management process. Thereby, the identified keywords can be clustered among topics focusing mainly on labour-intensive processes and the focal points between technology and human interaction. The research names several areas being significantly shaped alongside the simplified wealth management process through new technologies (Figure 3). These are technological-enabled automation (*Scherer, Lehner, 2023*) big-data analytics (*Nobanee, 2021*) i.e., data science, cloud sharing (*Singh, Kumar, 2014*) and storing, as well as artificial intelligence (*Bisht et al. 2022*).

Figure 3 – Framework of the wealth management process (WM) and its key areas of technological impact



Note: adjusted from Evensky, H., Horan, S. M., & Robinson, T. R. (2011).

Table 4 – Key literature topics and WM process

Client Interaction

Keywords: process automation, chatbots, virtual assistants, advisor access, information, performance, data collection

As financial service providers aim to provide the best service to the clients while also cutting costs, it is likely that over the next decade, the automation of client and advisor conversations will become more automated and less human-based (*Haberly et al. 2019*). Based on the collected data of the client - which can also be from third databases e.g., credit-scorings, insurance requests etc. – the client's potential needs can be assessed. The pre-collected data, such as the clients, age, its credit history, or amount of children, can influence the investment assessment (*Mogaji, Nguyen, 2022*). Thus, allowing to offer the most suitable products to the client, corresponding to its current investment situation and intended goals (*Königstorfer, Thalmann, 2020*). Furthermore, the introduction of augmented reality as a new form of client interactions is raised by several authors. *Chong, Keeling and de Ruyter (2021)* predicts using augmented realities as avatars, which can assist in client request handling.

Investment Advice

Keywords: networks, bigdata, AI

As the current research predicts, tailored investment advice will factor in various aspects, such as the risk tolerance of the client (*Tertilt, Scholz, 2018*) or the clients' financial needs. Furthermore, parameters which are already researched in other financing fields, such as the prediction of future cashflows in (*Moro et al. 2018*) prediction modes on life expectancy, spending habits (*Zheng et al. 2019*), (*Ranjan, Bupta, 2020*) and required funding can be put into the analysis to conduct tailored investment advice to the client. Thereby, using AI reduces manual labour, reduces costs and analysis time. This makes investment advisory processes cheaper and more accessible for a broader spectrum of clients (*Jarvis, Han, 2021*).

Portfolio Automation

Keywords: blockchain, bitcoin, cryptocurrency, AI

The integration of big data analytics allows the use of predictive models, which would take up significant time for a human portfolio manager to comprehend. Adding additional features, such as the automated market news analysis can significantly enhance the performance. *Ferreira et al. 2021* elaborate in their research on AI capabilities to evaluate emerging market information just in time when they are released to the market.

Risk Management & Reporting

Keywords: risk, security, information technology, impact, financial inclusion

Boreiko and Massarotti (2020) state that using new risk models or even several risk models combined can lead to a better overall risk assessment. The aggregation possibilities of scenario analysis, or sequential stress testing allows, due to *Janabi (2021)* a better understanding of the associated risk and their potential impacts. On the contrary, *Kurshan et al. (2020)* state that the widespread use of stress test models has yet to exist for AI. Furthermore, as stated by *Dvorski and Kovsca (2020)*, financial institutions can use different data sources for their risk reporting if the required standards are being met.

4.3 Discussion of the findings

4.3.1 Descriptive Analysis

Based on the findings in the descriptive analysis, it can be concluded that research specifically targeting technology advancements in wealth management is still at a very early stage. This is indicated by the rather small number of publications and its continuously growing number over the last few years. The large number of review articles and the reliance on third-party data indicates that the topic appears to be diffuse and not well-defined yet. Thereby, only the essence of the current research stage is delivered in this paper. More detailed research is required to provide a concise picture in which direction the trend of technological applications in wealth management is heading. The geographical distribution of the articles provides a hint in which countries the research is of growing importance. The domination of articles published in India and China indicates the significant importance of the topic in these countries. Thus, more research in these countries could be expected. However, as trends are shifting rapidly and research narratives can change quickly, regional trends and outlooks provide merely a hint then a reliable prediction. The limitation of this paper comes from the search terms which refer primarily to Wealth management and technology. As most of the current research is bundled under FinTech, some topics which could have been clustered under Wealth management research might had been neglected. Thus, leading to the potential need of extending the search terms and clustering existing FinTech research under more define categories.

4.3.2 Research Topics

The identified research topics are a snapshot of the current research trend which could change as the technology evolves. While the perceived advantages are widely addressed, the majority of research falls short addressing the risks and disadvantages.

The key research areas alongside the wealth management process circle - Client interaction, investment advice, portfolio automation and risk management – benefit hugely from technological advancements. As presented in the findings above, these advancements, such as automation, increased analysis and processing time, and interconnection through data sharing, make the whole wealth management process perceivable easier. However, as the underlying technology becomes more sophisticated, it also adds to an increasing complexity. While at one end the processes become easier, on the technological end, it becomes increasingly more difficult and harder to grasp. This development is widely neglected in academic research. Thus, research is required on system limitations and technological statutory stages. Furthermore, overreliance on technology could lead to missing out on the fundamentals and understanding the bigger picture. What is perceived nowadays as cutting-edge could change in the future. The continuing trend of automated processes could lead to a statutory stage. At one point, the revival of human interaction could become a competitive advantage again.

5. Conclusion

Compared to the widespread term FinTech and the under-it accumulated studies, WealthTech is only at an early stage of research within the financial technology research. As most of the research focuses on financial technology in general, not many papers conduct more profound research on the impact of technology on the sub-fields within the financial service sector. This might be due to the understanding that technological novelties, impact the entire industry and can be assumed to have a universal importance for all the sub-fields.

Wealth management & technology have become a crucial topic in recent years as demographic change impacts the future of an entire sector. This bibliographic shows that certain developments have significant importance for the wealth-management sector. The interaction with clients at any time has significant importance on how they perceive the service quality of the financial service provider. The 24/7 availability enabled through human like Chatbots, and avatars is predicted to become the state-of-the-art client interaction. At the same time, Big-Data analytics combined with AI will fundamentally change the data quality and potentially has a positive effect on the investment output. Collecting various data points from un-connected data-sources will lead to better prediction models and risk profiling of the clients as well as their investments. While the traditional financial advisor becomes less important, guidance through the abundance of new analysis methods and the interpretation of the generated output will become more critical. Thus, leading to the reduction of workforce and the significant cost-cutting in front areas of financial service providers. As AI models become more complex, increasingly sophisticated calculations and predictive models can be created. Thus, leading to more informed clients resulting in potentially better investment outcomes. While all these advancements can bring huge benefits regarding data quality and output generation, they can have negative social impacts. With increasing automation and the use of AI, it will become a matter of “who has the better technology” and predictive models. While services might become more cost-efficient initially, in the long run, it will be the question of who can afford the better systems and infrastructure. Thus, leading to questions on how to generate fair access to technology and how to provide inclusive services. In addition, cyber security aspects need to be addressed, and appropriate measures put in place to avoid exploiting private data. Above all, the acceptance by the user is the most crucial factor. As the latest research reveals, human-to-human interaction is still the preferred option when it comes to difficult and complex questions, as they cannot be performed by AI-powered and virtual advisors yet.

As this study comprises mainly of review articles, it neglects grey literature and working papers, which might include even more recent research. Furthermore, this review revealed a limited amount of quantitative research papers. This might be due to limited data access due to the topic's novelty but also based on the industry being discreet and not publicly sharing internal research data. Also, this review is limited to the publicly available informant and relies on third-party information. Thus, the current research exhibits several limitations which should be addressed in further research. At first, the non-existence of longitudinal studies allows only vague predictions about technology development in the wealth management sector. It should be addressed in user acceptance studies and performance analysis to identify the actual effectiveness and adaption rates. Furthermore, ecological, societal and ethical aspects might be of further research interest as on how to enable fair and general accessibility and affordability of technology.

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III Publication - Conceptual Framework for Assessing the Use of Artificial Intelligence in Asset Management (accepted)

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Conceptual Framework for Assessing the Use of Artificial Intelligence in Wealth & Asset Management

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Abstract

Purpose – This paper provides a conceptual framework, including factors to assess the readiness of AI in wealth and asset management companies. It aims to provide guidance for wealth & asset management companies regarding the use of artificial intelligence (AI) and key considerations when assessing usability. Furthermore, it should sensitize data-related issues and foster an understanding of implementation frameworks considering AI systems.

Design/methodology/approach – This paper is based on a critical analysis of the latest and prevailing literature regarding AI and its relevant enablers in conjunction with wealth & asset management. It builds upon the literature findings and proposes a theoretical framework comprising basic factors to consider when introducing AI in wealth and asset management companies

Findings – The factors influencing the AI adoption in wealth and asset management companies in this framework include clear intent, data management, regulatory certainty, efficiency enhancement & cost reduction, client experience and engagement. As the topic is novel, this paper concludes that carefully assessing recent technologies is crucial to avoid poor investment decisions. Furthermore, it highlights that a clearly outlined intent for AI implementations is of utmost importance to make the best use of the AI application. The adoption of AI further deepens one possibility to train an in-house AI solution or as opposed choosing already trained models, as dataset sources, quality, and training aspects of the AI workflow must also be considered.

Research limitations/implications – While this research provides valuable insights into the conceptual applicability of AI in wealth & asset management, the fast developments of AI technologies require a constant update of the framework. The rapid development could also lead to the potential neglect of AI topics, which might develop in the future. Thus, this paper cannot be seen as concluding and suggests further exploration of the identified factors and extending the framework to additional factors.

Practical Implications – It aims to provide guidance and enable firms to make educated decisions, functioning as a roadmap for the strategic adoption of AI to enhance competitiveness. It aims to clarify the current use cases of AI and reduce uncertainties and speculations about its practical capabilities and its ability to foster transparency. It delves into the role played by big data and the greater volumes of information as enablers of AI applied to wealth & asset management. Thereby, it provides a theoretical framework for AI implementation with base factors.

Originality/value – This paper provides a specifically tailored conceptual framework for using AI technology in wealth & asset management. It synthesizes insights while applying it to practical developments. It further fosters the theoretical understanding of base factors to be considered in AI implementations.

Keywords – artificial intelligence, big data, fintech, wealth & asset management, framework

Paper – Framework

JEL classification – G20, G29, F39, D31

1 Introduction

The financial industry has seen many developments and technological advancements, from pocket calculators to computers, leading to faster processing with consequences such as the elimination of trading floors and the automation of many processes (*Litzenberger, Gorelick, 2012*). Artificial intelligence (AI) in conjunction with big data, blockchain and quantum computing is reshaping the financial industry (*Rabah 2018*). AI spans various research fields (*Bibel, 2018*) and is therefore a cross-disciplinary topic; including social sciences, ethics, engineering, and computer science. In each of the disciplines, AI is playing a significant and growing role in society. Workforce capability enhancement (*Nurlia, et al., 2023*), faster information processing (*Seng, et.al., 2022*) and analysis (*Ranjan et al., 2020*) are key factors of AI, contributing to a disruption of society that is ongoing at the time of writing. However, still at an early stage of its development, its fast-paced evolution fosters some misconceptions which need to be addressed. Lack of a clear roadmap for AI adaptation leads to confusion and wrong expectations. While there are numerous studies such as *Cowls, et al., (2021)*; *Wamba, et al, (2021)* or *Kaushal, Mishra (2024)* that shed light on the potential applicability and benefits of AI, most of them lack the actual feasibility and reasoning for its adaptation in an actual business setting. The existing research regarding the use of AI stresses its innovative technological capabilities and perceived competitive advantages. While several studies such as *Kundi et al., (2023)*, *Wang et al., (2023)* or *Veitch, Alsos (2022)* mentioning that AI should be used carefully and only with human supervision when applying it in a business context, its perceived usefulness for asset management companies is still widely understated. In fact, hardly any of the existing research debates the usefulness of AI models in wealth & asset management companies. Moreover, smaller companies which do not adapt or adjust not quickly enough to incorporate AI applications could face competitiveness challenges (*Oldemeyer, et al., 2024*; *Borges et al., 2021*). While this rationale might hold eventually, AI adoption in companies is still at an early stage and being among the first movers might bring its disadvantages, such as implementing systems with limited use cases in the exiting organizational setup or unrealistic expectations (*Gupta et al., 2021*). Therefore, this article aims to provide a conceptual framework for AI implementations in wealth management, inducing a discussion of basic factors. It thereby takes into consideration the decision making of whether to adopt AI applications in a current business setting or to delay their implementation to a more statutory stage of development where the company developed a sharp vision of its intended use. This article stresses the importance of a profound capability- and requirement analysis within wealth & asset management companies to assess the need for investments in AI applications. Thus, this article argues that technological novelties such as AI applications are not always suitable for every company. In this article, five factors were considered to conceptualize the appropriateness of AI technology for asset management companies. These factors are definition by a clear intent for the use of AI; data management, including quality and transparency; regulatory certainty; efficiency enhancement & cost reduction; client experience and engagement. This article is structured as follows. It starts with the definition of AI and its various forms and a literature discussion to provide a holistic picture about the current stage of research. It is then put into context with finance and asset management, whereby the identified factors will be addressed. In the concluding section of this article, adoption criteria will be presented, offering insightful guidance by highlighting key considerations for the adoption of AI in asset management companies.

**ChatGPT is not generally seen as AI, as it is only a decision tree structure.*

2 Method

This paper makes use of the grounded theory methodology (GTM) as described in *Astalin (2013)* and *Jabareen (2009)* to develop a novel framework based on previously conducted framework attempts. This approach offers the advantage of considering already conducted research findings and building upon existing frameworks while incorporating novel aspects and considering not yet addressed factors. Furthermore, it allows to combine, and adjusted models based on the addressed research area. Thereby, allowing to extract factors which might be seen as universal and hold their validity also in other research fields. Thus, a novel framework based on GTM incorporates the knowledge of already conducted research and enables it to be develop further for other research areas. This approach is intentionally used in this paper, as frameworks for assessing the use of AI already exist in other research areas e.g. business administration, general management and financial services, but not particularly in the wealth and asset management area.

Thus, in a first step, a literature review as in *Paul et al., (2021)* was conducted in different search engines including web-of-science and Scopus by using the following key words: framework, AI, wealth and asset management and financial services. As the focus on wealth and asset management companies revealed only a small number of relevant findings, the broadened search term “financial services” was used. Thereby, universal base factors in existing frameworks were identified and discussed in the realm of the financial sector and under consideration of their usefulness in wealth & asset management.

In the second step, a conceptual framework analysis was conducted using the proclaimed approach form *Astalin (2013)* by deriving existing and universal factors from the prevailing literature. This allows to propose a new framework adjusted to the needs of wealth & asset management companies. For the visualization, the proposed framework is oriented on *Homström (2022)* and *Wirtz et al., (2020)* as it provides a clear visualization of the identified factors a mathematical spheres.

3 Literature background

The following defines the used terminology and names the basic components of AI. In addition, briefly describes the big data in conjunction with AI and its key necessity for a function AI operation.

3.1 Artificial intelligence

The term artificial Intelligence embodies several research fields and draws upon various applications. As argued in *Edelmann, et al., (2020)* from a scientific perspective, AI research stretches from mathematics (stochastic), computer science (application), cognitive- and social science (human-like appearance) to enable the technology with human-like features (*Tian et al., 2019*). The AI applications draw upon several other data modes and assemble technology bundles in order to make the front-end of the AI application appear intelligent (*Schmidt et al., 2021*). As argued by *Reddy and Fields, (2022)* as well as *Sarker, (2022)* AI significantly developed from simple rule-based models to highly specialized AI systems with sophisticated capabilities. These systems often comprise of a bundle of technological advancements such as big data, machine- and deep learning as well as natural language processing (NLP) (*Sarker, 2022*).

The appearance of AI applications can vary significantly as the applied models are subject to the use case they are intended to address (*Benhood, Golafshani, 2022*). While for AI used in human interaction natural language processing might be more crucial than other methods, assessing historical market data has a strong dependency on big data capabilities (*Javed Awan et al., 2021*). Based on the research from *Aldoseri, et al., (2023)* and *Brem et al., (2023)*, AI consists of several enabling components which depended on the applied use case are more or less important for an AI system. These components of AI are big data, machine learning, deep learning, cognitive computing, neural network, natural language processing, pattern recognition. These components are not conclusive and might be subject to changes as technology evolves. As AI applications develop, so do their underlying models. The latest versions of AI today can harness machine learning algorithms with self-generated codes (*Becker et al., 2023; Cao et al., 2023*) to update the underlying models. Thus, AI models have the potential of incorporating self-learning capabilities to enable continuous improvements. In conclusion, there are several relevant technologies which, brought together, form what is described as artificial intelligence (AI). Thus, AI can vary hugely depending on the use-case it is addressing. An understanding of its capabilities is crucial to making the appropriate decisions when incorporating it into a firm's infrastructure.

3.2 Big Data as an enabler of Artificial intelligence

Artificial Intelligence, as we know it today, has been made possible by increases in computational capability and manipulation of large volumes of information. It has been formalized as an academic field of study circa 1965 and went through periods of stagnation and growth, with one of the world's first chatbots, *Eliza*, debuting in 1960 (*Sharma et al., 2017*). The bridging of theory into observable practice has progressed in recent decades as more powerful hardware became available, such as for example single-instruction multiple-data (SIMD) hardware (e.g., GPUs) from companies like NVIDIA.

Being able to process large volumes of information does not constitute by itself a value proposition for those who would employ Artificial Intelligence, as there are many details that must be tuned. Artificial Intelligence applications and logic may be used for example as a black

box - accessing services provided via a *Software-as-a-Service (SaaS)* offered by an external entity. In this case, the information is fed into a system to obtain a desired output. The quality of such output may be measured in tune with the AI-supported task that is being fulfilled. For example, the performance of chat bots used for customer support may be measured with metrics such as response time to solve an issue or post-interaction user surveys. Different applications of AI, such as financial reporting and monitorization, will be subjected to other metrics of evaluation. Companies may also opt for developing their own internal AI solution for greater control of sensitive data that is critical to business processes. While this achieves finer granularity on the entire process from data collection to value extraction, it increases operational complexity. Opting through this route requires consideration on tasks of the AI workflow such as data collection, sanitization, and integration from multiple sources.

This requires considering the type of task that is to be satisfied by the actual AI implementation. And the type of AI model-building approach that is required as well as the tuning of the training algorithms (e.g., the configuration of hyperparameters). In this context of in-house training, the matter of computational capability also comes into play. Should the company wishing to develop its in-house AI solution also acquire the computational capabilities to store, define and train the models? Or should this functionality be delegated to external providers of computational power such as those offered by Amazon, Google, and Microsoft, to name a few? This again raises the issue of potentially sensitive data being handled.

3.3 AI in Asset management

The companies referred to as wealth & asset management companies can be defined e.g. as followed by the *Swiss financial market authority (2023)* “*Anyone who manages or is responsible for the safekeeping of assets held in collective investment schemes, or who represents foreign collective investment schemes [...], or manages the assets of occupational pension schemes on a commercial basis*”. Thus, wealth & asset managers are firms which pool assets from numerous investors in order to invest collectively. These companies thereby serve the single investors by bundling their assets to invest it into undertakings, which often require a minimum investment amount that is often too high for the single investor alone (*Welch, 2007*). *Alshaer, (2023)*; *Santoni de Sio, and Mecacci, (2021)* argue, that as the regulatory burden increases and the lack of skilled workforce intensifies, smaller firms must use technological advancements to assist them with daily tasks and procedures. To stay afloat or even gain a competitive edge in the market, authors such as *Nejad, et al, (2022)* and *Zavolokina, et al., (2016)* assert, that it is especially crucial for asset management firms to innovate and adapt to new market movements. In the financial service sector, AI applications are perceived to be usable for front-to-back-office tasks (*Fares et al., 2023*; *Coombs, Chopra, 2019*).

The use cases of AI applications can range from market screening (*Mer, et al., 2024*) and generation of model portfolios (*Gunja, Bhattacharyya, 2023*) to the actual trade execution (*Addy, et al., 2024*) Due to *Mitra (2011)* and *Cohen (2022)*, high-frequency trading programs (HFTs) paired with web crawlers have already been used in several financial institutions. *Zhou and Klev, (2019)* in addition postulate that with AI this form of algorithmic trading is capable to analyse data and execute trades in milliseconds. In the front office, natural language processing is claimed by *Olujimi, et al, (2023)* to find direct use in client communication. *Cardon, et al., (2023)* further claim, it would allow to collect and track client conversations and provides extracts of each client

meeting. Thus, giving companies with sophisticated AI models - which can incorporate pattern identification capabilities and predictive analytics - an advantage (*Attaran, Deb, 2018*). A similar development is claimed to occur in the back office. *Cao, (2022)* states, that AI applications can assist from compiling texts to extracting market or database information. Therefore, it would according to *Vesna, (2021)*; allow to assess risk data and highlight potential risk exposures through scenario analysis.

While the possible use-cases are vast and provide significant advantages such as cost reduction, faster data processing and analytics (*Ashta, Hermann, 2021*), it is also crucial to recognize the actual capabilities and difficulties it comes with. To assess if the implementation of an AI application is suitable, Asset Management companies should clarify certain questions from the beginning to avoid cost-intensive investments. Thus, we present the following framework which aims to address these key clarification points.

4 Framework Factors

4.1 Clear intent (vision & intent)

In light of technological advancements, it often becomes forgotten that these innovative technologies should be evaluated in conjunction with their intended use. Every new implementation follows similar procedures, it either starts with problems of the existing infrastructure or perceived significant enhancements through new applications (*Waziri, Yakasai, 2020; Kumar, Malik, 2012*). A clear vision about what should be achieved is crucial to avoid wasting resources. The replacement of more expensive and complex software often happens when the pre-defined end-of-life for software is approaching (*Sakthivel, 2023*). Thereby modern technology aims to replace or even to enhance the existing one. For every new implementation, it is required to clearly state its intent for the implementation and the extent of its scope. While the intent can be of a strategic or financial nature, the scope itself defines which areas, processes and tasks are subject to the new development.

While new advancements can be intriguingly interesting, its actual use case needs to be proven and tested. As argued by *Van Assen et al., (2020)* and *Slota et al., (2022)* there could be a hype around AI and its perceived usefulness at the current stage. Therefore, the intended use of the new application must be clear from the beginning before attributing significant development budgets to the perceived useful solution.

4.2 Data Management

4.2.1 Data Security

Data security is a crucial factor for every new application and existing software (*Bertino, 2016*). Especially for wealth & asset management companies, data security plays a pivotal role safeguarding client data (*Fang et al., 2017*). While AI is perceived to increase the security of existing networks, it also can become a security risk if misused.

According to (*Becue et al, 2021*) AI can protect against cyber threats by monitoring incoming attacks and learning from data patterns that can indicate such threats. This is based on the ability to analyze and draw conclusions from historical data. *Li, (2018)* and *Zaman et al., (2021)* claim that AI can also execute countermeasures against incoming threats and set up security protocols. Thus, the use of AI for data encryption allows to ensure that only authorized personnel can access sensitive data. *Taherdoost (2022)* further postulates that, for the purpose of data transfers, AI and encryption applications can contribute to the security of the IT infrastructure. However, as some of the software within a company may connect to entities in the outside world (e.g., other financial institutions or data providers), this poses a potential data security threat.

Based *Hoppner and Streatfeild (2023)* the scope of its use and development can range from operating only in a confined network system with no access points to the outside, up to a system with full access to external databases and even the internet. Thus, there is concern regarding the safekeeping of data (*Carmody, et al., 2021*). However, even when AI models might operate autonomously in a confined system, they still are an additional application adding to the complexity of a firm's ITs infrastructure. Only data which can be accessible outside of a firm should be fed into AI applications (*Hu et al., 2021; Zaman et al., 2021*) or which is non-sensitive. As such criteria are not defined for a variety of data such as client information or private financial

information, it is required to either anonymize the information or to not use it at all. Data security is, therefore, the crucial point when it comes to AI implementations especially in wealth & asset management companies. Thus, it might be likely that AI application use is extremely limited for some firms, or it cannot be used at all.

4.2.2 Data Quality

As the security of data is a crucial factor, so is the quality of the output produced. Due to *Zhang, Lu, (2021)* AI data analytical tools can handle large datasets and can extract information through pattern recognition models. As further confirmed by *Khanra et al., (2020)* deep learning and big data analytics can generate more accurate and transparent output. As the analysis of large datasets is complicated and would require significant manual validation time, it is crucial that the generated data out of AI is accurate and reliable (*Cheong, 2024*).

As argued by *Cao, (2022)* and *Cao. et al., (2024)* advanced accuracy is also crucial for the compiling of text and reports. The generation of market reports relies on the accuracy of its content. The AI application thereby makes use of natural language processing (NLP) to understand natural texts and human language. Furthermore, natural language generation (NLG) is used to structure the output and generate a readable output (*Xing et al., 2018*).

However, despite its fast processing, still some time needs to be dedicated for proof-reading and plausibility checking of the generated output (*Hall, Choo, 2022*). One crucial factor when it comes to data quality is bias-free output generation (*Ntoutsis et al., 2020*). An additional risk mentioned by *Ying, (2019)* is, that too much data input is observed to be detrimental as it can lead to overfitting and confusion of the applied model. The availability of greater volumes of information in this big data world is important, and so is the computational ability to process it. But discernment must accompany data curation, training of models and their testing. To ensure the generated output is transparent and flawless, machine learning models are required to be trained with accurate input data. As the saying goes, “garbage in, garbage out,” it is important to know what the appropriate input data is. For financial institutions, such as wealth & asset management companies, manual plausibility checks might still be required, especially for generated outputs which can have significant reputational or economic impact (*Maple et al., 2023*).

4.2.3 Data Transparency

As indicated by *Futia, Vetro (2020)*; *Hofmann et al., (2018)*; *Vilone, Longo (2021)* and *Dwivedi et al., (2023)* with a continuing collection of information and, therefore new data points, it might become increasingly difficult to comprehend the route course of AI-generated outputs. As AI technology is complex, its key functionality must be understood. This is crucial to assess how information was generated and what the potential shortcomings are (*Weber, Hinz, 2023*; *Meena et al., 2023*). Authors like *Schiff et al., 2022*, *Allam, Dhunny, (2019)* raise concerns, that the complexity of AI might lead to the blind adoption of applications, leading to a loss of control and understandability. Thereby, the single employee risks losing the “big picture” as well as losing an understanding of traditional processes (*Enholm et al., 2022*).

Whereby AI on the one hand adds to the complexity through its various capabilities and applicational use cases, on the other hand it also contributes to a better understanding of problems, through a more accurate assessment of big data and its structuring in an understandable way (*Zhai et al., 2021*). For the understanding and interpretation of data, AI applications rely on interpretable

machine learning models, explaining how conclusions are drawn using linear models or decision-trees (*Sahu et al., 2023; Nielsen, 2022*). Furthermore, *Salah et al., (2019)* assert that blockchain is another contributor to the transparency of AI-generated output. Thus, blockchain can ensure the origin and traceability of data (*Ilbiz, Durst, 2023*). Thereby, the combination of various technologies can help to make sense of difficult-to-comprehend data or fuzzy processes.

4.3 Regulatory certainty

As the regulations regarding the use of artificial intelligence depend from country to country, the regulatory landscape for each country a company operates in needs to be assessed. As described by *Georgiadis, Poels, (2021)* every implementation that involves the use of client data or bears financial and data security risks requires legal backing. With AI being still at an early stage, the regulatory landscape is rather limited and not fully developed. Therefore, AI applications might be subject to already existing regulations. As for data- and privacy protection, the regulatory landscape developed significantly with regulations such as GDPR or CCPA. However, industry-specific regulations can also additionally apply as e.g., for data security standards in the payment card industry (PCI) or accurate financial reporting requirements under Sarbanes-Oxley (SOX) (*Hamdani et al., 2021*). As mentioned by authors as *Meurisch, Mühlhäuser, (2021)*, *Addis and Kutar, (2018)* the new developments of AI leave companies either at risk of breaching existing regulations such as data protection legislation or even entirely lacking accountability for AI-performed actions when blindly making use of AI applications. However, if regulations exist, it is crucial to adhere to them or obtain the required licensing. Therefore, the AI application needs to fulfil the mandatory standards and have the appropriate recognition in an auditing process (*Falco et al., 2021*). Country-specific regulations should be considered especially when handing over sophisticated processes such as the investment process or client data handling to automated engines (*Buczynski et al., 2021*).

4.4 Effectiveness

4.4.1 Efficiency

According to (Bisht *et al.*, 2022) the time for each work step and process has already been reduced by faster technology, however it would still be possible to push the boundaries of reducing processing time even further. Tasks that still require human interaction are prone to be subjected to technological advancements or being automated. Due to Makridakis, (2017) This is especially the case for tasks by which humans are the limiting factor. In wealth & asset management companies, these are heavily manual tasks such as market screening, compiling of market reports and documentation, and analysis of large datasets (often via Excel, Matlab, or R) which bear a risk of human errors (Phoon, Koh, 2017; Singh, Kaur, 2017; Chorafas, 2011). Furthermore, studies such as Baviskar, *et al.*, (2021); (Dwivedi *et al.*, 2021) and Shin, *et al.*, (2022) reveal, that a significant amount of time is spent on rudimentary tasks such as formatting, filling out work plans, scheduling, and planning.

Through the introduction of big-data analytics, simple phrased requests can be handled efficiently by AI, which would otherwise take humans significantly longer to analyze. The screening capabilities would allow the identification of keywords efficiently and can reduce analysis and research time (Yugal, 2021). Big-data analytics enhances not only the analysis capabilities but also the ability to recognize patterns and allows the interlinking of potential causes of their occurrence. For generated output, AI applications can be used to validate the results by using multi-factor models, providing a holistic insight about potential shortcomings (Černevičienė, Kabašinskas, 2022). Despite its advantages Meyer, Oosthuizen (2023) and Abendi, (2022) argue, that through the continuously adding of new analysis possibilities a statutory stage could be reached in which over-perfectionism could slow down the entire processes.

4.4.2 Cost reduction

Due to Kokina and Blanchette (2019), AI offers the possibility to automate these labor-intensive processes. However, training is required to make appropriate use of the technology and even validate its generated outcome (Schöning, Pfisterer, 2023). Therefore, it is crucial to conduct a proper cost-benefit analysis. Despite implementation costs and required training, AI can foster over time a lower cost structure (Ashta, Herrmann, 2021). In addition, once certain tasks are set up correctly and are performed by AI, without interruption, they become less error-prone and thereby also reduce the costs for failure and correction costs (Mandala *et al.*, 2022). Thereby, the above-all perceived benefit of AI comes from the cost-saving aspect, as time-consuming or labor-intensive processes could be automated.

4.4.3 Enhanced Accuracy

While timesaving and cost reductions are some of the dominantly addressed reasons for the use of AI, its enhanced accuracy for rudimentary tasks is often neglected. As human creation of e.g., market reports might lack from time-to-time in-depth analysis, or investment reports might fail to provide a holistic picture. AI is capable of delivering continuous consistent outputs (Vandewinckele *et al.*, 2020). While this deviation might be insignificant for certain tasks, for other tasks, such as predictive models, it can have significant impacts overall. According to Zakaria *et al.* (2023) AI can overcome the “human-error” and contribute to more accurate and consistent outputs. Plausibility checks combined with big data analytics allow companies to generate better and more reliable output (Subudhi, 2019). Especially for big-data analysis,

technologically advanced applications can be more accurate and faster than the human data analyst (Bose *et al.*, 2023; Vassakis *et al.*, 2018). Thereby contributing to more efficiency by reducing manual feedback loops and cost-intensive troubleshooting.

4.5 Client

An assumption about AI addressed by several authors, is its client-interacting capabilities, which can replace the human call centers and support staff (Grassmann, Schermuly, 2021; Nasri *et al.*, 2021). This assumption about AI applications got intensified through the widespread emergence of ChatGPT and real-time chatbots, avatars or simply voice assistants (Rana, 2023; Dwivedi *et al.*, 2021).

For wealth & asset management companies, the use of automated client interaction can be beneficial, especially when dealing with rudimentary requests (Suta *et al.*, 2020). According to Luo *et al.* (2022) and Adamapoulou (2022) through AI, client interaction can largely be enhanced, and the user experience intensified.

While most wealth & asset management companies are low-staffed, forms of engagement which can reduce the manual workload add significant benefits (Darbyshire, 2024; Martens, Tolan, 2018). Thereby, these benefits can range from client meeting recordings as word-to-text protocol enabled through natural language processing, to direct client interactions when handling client orders. Furthermore, the automated suggestion of investment strategies and tailored investment advice is another possible positive way of incorporating AI. Additionally, benefits could also originate from automated portfolio monitoring and automated allocation.

While the use of AI applications can make a difference and lead to a competitive edge in client interaction, it also bears inherent disadvantages. As smaller asset managers benefit from close and direct client contact, the use of generic AI interactions can loosen the client relationship if not carefully implemented. As mentioned in Luo *et al.* (2022) especially more complex client requests which require human assistance will put the time consumption on the clients end while dealing with chatbots that might not lead quickly enough to the required answer. Furthermore, Vlasceanu *et al.* (2023) and Arman *et al.* (2023) mentioned, that a general challenge could be to generate a user experience which is distinguishable from competitors despite the generic AI interactions.

5 Conceptual Framework for AI in Asset Management

The proposed framework is based on the previous readiness framework attempts for AI implementations and combines it with wealth and asset management. Thereby, it draws on AI introduction frameworks by using their dominant components.

In particular, the proposed framework draws upon the previously conducted research from *Wirtz, et al., (2020)*; *Holmström (2022)*; *Wirtz et al., (2022)*; as well as *Brem et al., (2021)*; *Zhu et al., (2024)*; *Reim et al., (2020)*; *Zhou, et al., (2024)* *Nortje and Grobbelaar (2020)*. The derived factors above are indicators for the implementation of AI applications and are discussed in the realm of wealth & asset management. They provide guidance on whether the implementation of AI applications can be considered potentially beneficial for a wealth & asset management company. The following table summarizes these crucial indicators and addresses key considerations, as well as their applicability and widespread use cases.

Key Considerations	Acceptance Criteria	Unacceptance Criteria	Cases
Clear intent			
Clear intent (vision & intent)	Clear use case the AI application is used for	General curiosity with no immediate business reason	e.g., AI is used to generate annual market reports and investor statements
Data Management			
Data Security	Enhances or does not jeopardize existing data security	Sensitive data leakage unauthorized third-party access	e.g., client data is not accessible by unauthorized third parties.
Data Quality (Output reliability)	Increasing data quality or maintaining high quality	Wrong, incomplete, or biased data	e.g., better outcomes due to the elimination of wrong/misleading data
Data Transparency (explainability)	Explainable processes and proceedings	Uncertainty regarding decision making processes	e.g., AI decisions are explainable and comprehensive
Regulatory			
Regulatory certainty	Regulatory certainty regarding the use of AI systems is insured	No regulatory clarity of responsibilities and accountability	e.g., decisions taken by AI to execute trades are either the responsibility of software provider of the asset management company

Effectiveness			
Efficiency	Reduction of work steps, leaner process	No work step reduction, complexity increments, and more feedback looks are required	e.g., the use of AI chatbots reduced the client interaction work steps. 4 eye principle got eliminated as AI does the validation
Cost reduction	Foreseeable cost reductions	No amortization trough cost reduction	e.g., the implementation of AI in compiling investment outlook publications leads to cost reductions
Enhanced Accuracy	Maintaining output constancy, without variations	No change in analysis and manufacturing time	e.g., consistent output allowing precise decision-making
Client			
Client Experience	Client interaction can be automated / enhance	Client interaction becomes worse and too complex	e.g., client experience is enhanced through multiple touchpoints and 24/7 service possibility
Client Engagement	Client self-service possible	Client engagement becomes a regulatory and administrative burden	e.g., rudimentary client request such as guiding through documents, or the online banking platform are handled by AI

Table II Framework to test the usefulness of AI in Asset Management Companies

The proposed framework comprises the identified factors from the literature review and formulates acceptance criteria as described in table II. In contrary to the proposed model from *Wirtz et al., (2020)* the revised model exchanges challenges with the effectiveness of the AI as the challenges are part of the intersection between the five identified factors.

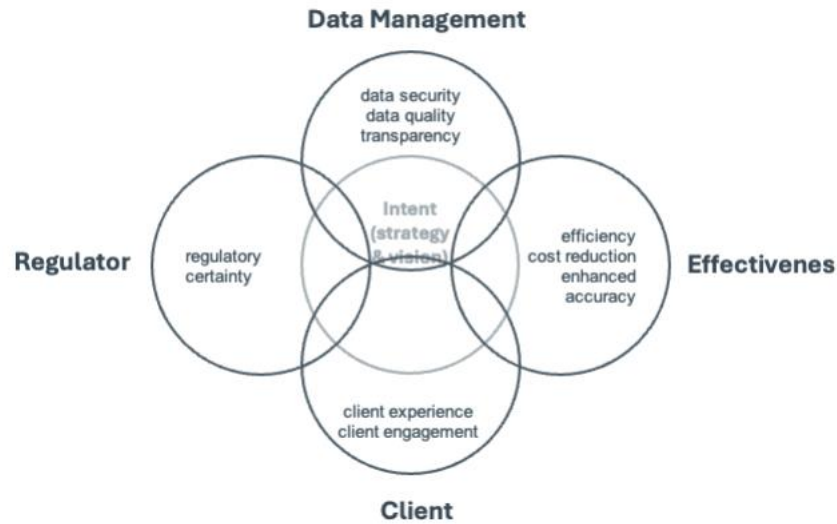


Figure I: Framework for the use of artificial intelligence (AI) in WAM. Adjusted from *Wirtz et al., (2020)*.

The proposed model puts the clear intended use of AI into the center of the framework, as it builds the starting point for assessing and making the decision for the use of AI from a strategic and operational point of view. Thus, it follows the general decision-making approach for technology implementations. More emphasis is on client interaction and experience as this factor is crucial in wealth and asset management. The framework furthermore, accentuates data management from a data quality and transparency perspective to ensure reliability of the generated output data. As mentioned, the challenges arise at the intersections between the factors.

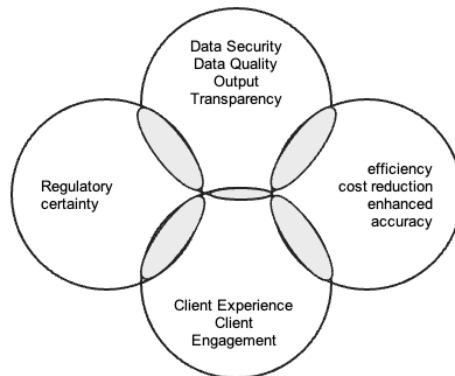


Figure II: Challenges and key considerations

Regulatory challenges could arise between the technological feasibility and the regulatory limitations for data use and storage and the client's sphere. Therefore, the above-mentioned country specific regulatory landscape might be a challenge for companies trying to make effective use of collected data. Thus, the difficulty could arise between the best utilization of available data and the regulatory limitations of storing and using them. Furthermore, challenges are also likely to arise between the data management and the effectiveness factor, whereby the quality of data and transparency needs to be ensured to allow efficient operation. Therefore, accuracy is also dependent on the collected client data, their consistency and transparency.

6 Conclusion

The current AI developments indicate high potential for its use in the financial sector. While some large financial institutions already make use of the technology, it is largely unused in smaller financial firms. In the years to come, it is perceived that its use will increase and become a daily tool among the workforces. Thereby, it might help wealth & asset management companies in daily tasks and enhance existing processes.

Despite its promising benefits, AI applications are still at an early development stage. Companies should not get exaggerated by the current developments and make quick decisions. While the potential use cases might be apparent and there might be a clear intent for what it should be used for; there is still uncertainty regarding data management and maintenance within smaller companies. To make full use of the technology, several input points, e.g., the internet, databases, third-party servers, might be required. As regulatory clarity is not given in every instance, there might be risks of potential legal breaches and security violations. Even in instances where regulatory clarity is given, data security and cyber security remain of crucial importance. Above all, the generated output must be transparent and reliable to be useful. The appropriate training of the workforce involved is therefore crucial. It is recommended that companies clarify the scope of AI applications first and narrow down their intended use cases and capabilities. Furthermore, clarity about the regulatory landscape and the enforcement of data protection regulations in the area the company is operating in is crucial to avoid legal breaches. While taking time and making a decisive decision, it should be recognized that there is also the possibility of a first-mover advantage by making use of innovative technology. Thereby, providing not only the above-mentioned benefits but also the creation of awareness being at the forefront of the technology among industry peers can have a positive market effect. As the AI market is growing, it is crucial for wealth and asset management companies to select the appropriate application. The decision for one AI application in comparison to another might be derived from the intended use of the AI application, as not every AI model fulfills all potential requirements. Furthermore, as costs and efficiency play a significant role when adapting AI applications, re-occurring costs for maintenance and training should be considered. Thus, setting up an amortization calculation is crucial to predict the cost efficiency and financial usefulness of an AI application.

To conclude this article, it needs to be mentioned that there might be firms' specific reasons why a different approach for the adoption of AI applications in wealth & asset management companies might be used. Attractive first-adopter trial implementations with low or even no costs, personal connections to an application provider or even the own expertise to develop or set up such an AI application could be reasons to deviate from a best practice approach. Thus, the ideas discussed in this paper and its proposed framework provide various controversies, opening the gates for further research and analysis regarding the appropriateness of AI applications. One suggestion is to assess the 5 proposed criteria in a case study set up to further investigate their usability in wealth & asset management companies. Furthermore, the criteria could also be further applied to companies of varied sizes or even financial institutions with different setups, such as banks, loan brokers, or financial market data providers. Thus, providing more clarity about the appropriate practices in each market.

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IV Publication - Contemporary CRM Model: Revision of CRM models and AI factor enhancement for the HNWI client segment. (Kappa)

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AI adjusted CRM model for the HNWI client interaction in financial institutions

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Abstract

Purpose – In this paper, the authors propose a new conceptual CRM framework for the interaction with HNWI clients in financial institutions under consideration of the development of AI and virtual reality. At first the authors define the key terms of AI, BigData, customer relationship management and conceptual framework. The conceptual framework aims to factor in the development of artificial intelligence and the impacts it has on the interaction with affluent clients in a wealth advisory setting. It challenges existing CRM models while emphasizing the new developments in automated human interaction. Thus, the framework aims to allow practitioners to identify insufficiencies in their current CRM setup and address them accordingly.

Design/methodology/approach – Preposition/Typology-based revision of existing CRM models and proposition of a contemporary conceptual framework for the interaction with HNWI clients in the private wealth management setting.

Findings – Coherent factors in existing CRM models which build the basis for a revised model. Identified areas of development which are prone to artificial intelligence enhancements in the client interaction process. Need for adjustment of the considered importance factors in existing CRM models and enhancement of them with the new factors out of AI models.

Research limitations/implications – The introduction of AI factors in CRM models for client interaction purposes of financial institutions might neglect the importance of existing base factors. Their importance could be even more important than before, which might be neglected due to the sole focus on emerging AI factors which might only have a marginal effect on existing CRM models, but due to their novelty become un-proportionally interesting to academics and practitioners.

Keywords – artificial intelligence, financial technology, wealth & asset management, conceptual framework, CRM, customer relationship management.

Paper – Conceptual framework

JEL classification – G20, G29, F39, D31



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