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**Art Investments in Wealth Management –
possible Applications of DLT**

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Abstract

Title: Art Investments in Wealth Management – possible Applications of DLT

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During volatile investment markets, investors look for alternative asset classes to outperform or hedge risks. Simultaneously, notable artworks like Gustav Klimt's "A Lady with a Fan" are attaining unprecedented valuations. An increasing number of wealth managers in the German market are now considering advisory services for art investment and management.

This dissertation examines whether (1) demand among high and ultra-high-net-worth individuals for art investments is increasing, whether (2) the art market offers optimization potential for investor portfolios, (3) what potential Distributed Ledger Technology (DLT) offers for investing and managing art.

The application of management theory aims to contextualize the strategic trajectories of wealth managers and their assimilation of innovative concepts like DLT. Complemented by secondary research, semi-structured expert interviews provide deeper insights into DLT, art, and wealth management. Quantitative analysis further enhances the research, comparing art's performance to conventional asset classes like the stock market, gold, and private markets like private equity or venture capital.

Porter's Five Forces Analysis and Scenario Planning provide information on the current market and competitive situation, which leads to the assumption that the art market and therefore the investment opportunities will also increase. Conversely, the qualitative as well as quantitative analysis provides only limited evidence of the potential of art as well as the adaptation of DLT. Although the adaptation of DLT in the art industry is still limited and art as an asset class is rather unlikely to outperform, various approaches are offered to achieve Competitive Advantage with a holistic offering in wealth management.

Keywords: art, investment, Distributed-Ledger-Technology (DLT), wealth management, innovation, competitive advantage, future of industries

Sumário

Título: Investimentos artísticos na gestão de patrimônio - possíveis aplicações de DLT

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Em mercados de investimento voláteis, investidores buscam ativos alternativos para melhorar retornos e minimizar riscos, enquanto obras de arte notáveis, como "Uma Dama com um Leque" de Gustav Klimt, geram receitas recordes, levando gestores de patrimônio alemães a considerar serviços de consultoria em arte. Essa dissertação avalia se (1) a procura por investimentos em arte entre indivíduos de alto e ultra-alto patrimônio líquido está aumentando, (2) se o mercado de arte pode otimizar as carteiras de investidores e (3) qual é o potencial da Tecnologia de Livro Razão Distribuído (DLT) para investir e gerenciar arte.

A aplicação da teoria de gestão visa contextualizar as estratégias dos gestores de patrimônio e assimilar conceitos inovadores como o DLT. Pesquisas secundárias e entrevistas com especialistas fornecem insights sobre DLT, arte e gestão de patrimônio. A análise quantitativa compara o desempenho da arte com ativos como o mercado de ações, ouro e mercados privados, como private equity e venture capital.

A análise das Cinco Forças de Porter e do Planejamento de Cenários oferece informações sobre o mercado atual e a concorrência, indicando o potencial de crescimento no mercado de arte e nas oportunidades de investimento. No entanto, a análise qualitativa e quantitativa apresenta evidências limitadas do potencial da arte e da adoção do DLT. Embora a adaptação do DLT na indústria de arte seja limitada e a arte como classe de ativos improvável de superar as alternativas, são propostas abordagens para alcançar vantagem competitiva com uma oferta holística em gestão de patrimônio.

Palavras-chave: arte, investimento, Distributed-Ledger-Technology (DLT), gestão de patrimônio, inovação, vantagem competitiva, futuro da indústria

Table of Content

Abstract	I
Sumário	II
Table of Content	III
List of Figures	V
List of Tables	V
List of Abbreviations:	VI
1. Introduction	1
2. Literature Review	2
2.1 Art market and Complexities	2
2.2 Global Art Market	3
2.3 Art Investments and further Trends in Wealth Management	5
2.4 Art Investments as a Diversification Strategy	6
2.4.1 Art Acquisition in inefficient Markets	8
2.5 Increased Competition within the Wealth Management Market	10
2.6 New Technologies supporting the Management of Art Investments	12
2.7 Distributed Ledger Technology and Use Cases	13
2.8 Relevant Management Theory	15
3. Methodology	18
3.1 Qualitative Data Collection	18
3.2 Qualitative Data Analysis	20
3.3 Quantitative Data Analysis	21
4. Findings	23
4.1 Quantitative Performance Analysis	23
4.2 Description of the Interview Findings	26
4.3 Porter’s Five Forces Industry Analysis	31
4.4 Scenario Planning and External Factors	34
5. Interpretation and Discussion	38
5.1 Triangulation	38
5.2 Competitive Advantage	40
5.2.1 Competitive Advantage through active Art Portfolio Management	40
5.2.2 Competitive Advantage through Collaboration	42
5.2.3 Competitive Advantage through Ecosystem Platform	43
5.3 Competitive Strategies in the Context of Management Theory	45
6. Conclusion	47
6.1 General Conclusion	47
	III

6.2	Limitations	48
6.3	Further Research	49
	References List	50
	Appendix	i

List of Figures

<i>Figure 1: Do you think that art and collectibles should be part of a wealth management offering?</i>	1
<i>Figure 2: Sales in the Global Art Market 2009-2021</i>	4
<i>Figure 3: A Lady with a Fan</i>	4
<i>Figure 4: What do you consider the strongest arguments for including collectibles in wealth management?</i>	5
<i>Figure 5: Share of investors moving over 20% of funds</i>	10
<i>Figure 6: Reasons investors switched providers</i>	11
<i>Figure 7: Key areas where online art business and new technology can make an impact</i>	12
<i>Figure 8: Innovation Diffusion</i>	17
<i>Figure 9: Research Areas of Art Investments for Wealth Management</i>	18
<i>Figure 10: Returns by Asset Classes (as of Q2 2022)</i>	24
<i>Figure 11: Exemplary Core-Satellite-Portfolio</i>	25
<i>Figure 12: Outlook on the Art Market</i>	26
<i>Figure 13: Everyday: The First 5000 Days (Beeple, 2021)</i>	28
<i>Figure 14: Main Challenges of Art Investment</i>	29
<i>Figure 15: Probabilities of Uncertainties</i>	37
<i>Figure 16: Probabilities of Uncertainties including Least Surprising Scenario</i>	38
<i>Figure 17: Art Ecosystem of a German Wealth Manager</i>	43

List of Tables

<i>Table 1: Returns, volatility, and correlation of the price indices</i>	7
<i>Table 2: DLT Use Cases</i>	14
<i>Table 3: Expert overview including position and field</i>	19
<i>Table 4: Guide for Expert Interviews</i>	20
<i>Table 5: Notes on Indices (Artnet)</i>	22
<i>Table 6: Art Indices and Asset Proxies (Artnet; As of Q2 2022)</i>	23
<i>Table 7: Horizon IRRs by strategy (as of Q2 2020)</i>	24
<i>Table 8: Stakeholder for Scenario Planning</i>	34
<i>Table 9: Trends and uncertainties effecting the art investment industry for German WM</i>	34
<i>Table 10: Correlation matrix for uncertainties</i>	35

<i>Table 11: Learning scenarios</i>	36
<i>Table 12: Least-Surprising Scenario</i>	37
<i>Table 13: Triangulation of Research</i>	39
<i>Table 14: Functionalities of a potential 'all-in-one' art app</i>	44
<i>Table 15: Comparing strategies to gain Competitive Advantage in context of Management Theory</i>	46

List of Abbreviations:

API:	Application programming interface
CA:	Competitive Advantage
CAGR:	Compound annual growth rate
CAPM:	Capital Asset Pricing Model
CC:	Core Competencies
DC:	Dynamic Capabilities
DI:	Disruptive Innovation
DLT:	Distributed ledger technology
EAGR:	Equivalent annual growth rate
ETF:	Exchange-Traded Fund
FMA:	First Mover Advantage
HNWI:	High-net-worth individuals
IDT:	Innovation Diffusion Theory
IRR:	Internal rate of return
KPI:	Key performance indicator
MBV:	Market-based view
NFT:	Non-fungible token
RBV:	Resource-based view
RSS:	Really simple syndication
SMA:	Second Mover Advantage
UHNWI:	Ultra-high-net-worth individuals
WM:	Wealth management

1. Introduction

In recent years (2019-2023), private and institutional investors have experienced increasing volatility in stock markets due to various factors such as COVID-19, inflation, and supply chain disruptions affecting company earnings. The MSCI World Index recorded a decline of -7.82% with 21.04% volatility during this period (MSCI World Index, n.d.). Investors have sought more opportunities outside the traditional Markowitz model of stocks and bonds to generate outperformance, thereby expanding the scope of diversification (Markowitz, 1952). Alternative investments, including art, have gained prominence in this context, with art sales reaching record-breaking levels and the emergence of new art investment funds. As a result, art has become a popular choice for high-net-worth individuals (HNWI) and ultra-high-net-worth individuals (UHNWI).

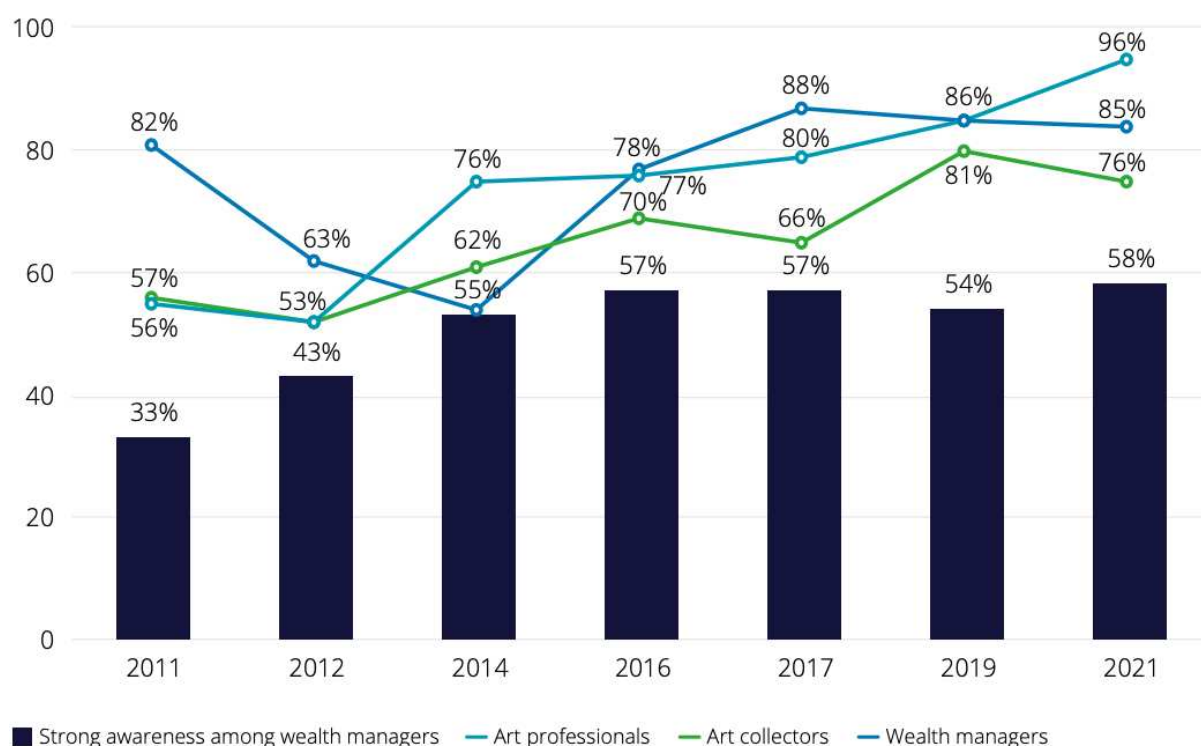


Figure 1: Do you think that art and collectibles should be part of a wealth management offering? (“Art Finance Report 2021,” 2022)

Although there is rising demand for art investments, most wealth managers tend not to offer them. Compared to conventional investments, art involves a different set of skills and knowledge, and the art market is sometimes regarded as being opaque and complex (Coslor, 2016). It is challenging for investors to assess the true value of art and to anticipate future returns due to the subjective nature of art and lack of transparency in

the art market. Furthermore, unlike other investment types, there is no standardized regulatory framework for art investments. This can make it difficult for wealth managers to ensure that clients are protected from fraud or other forms of financial misconduct.

Distributed Ledger Technology (DLT), also known as Blockchain, offers use cases to support the management of art investments. This dissertation explores the potential of art investments in wealth management in combination with DLT and tries to answer the following research question:

- Do art investment services offer competitive advantages for German wealth managers?

Quantitative analysis will allow us to evaluate the potential of art investments in terms of diversification and performance. The possible use of art investments within wealth management and potential use cases via DLT are examined with a qualitative approach.

2. Literature Review

In this Chapter we analyze characteristics of the art market and examine wealth management with a focus on consumer characteristics and future trends. Furthermore, the functionalities of DLTs and their possible applications for art investments will be addressed. The information gathered will be contextualized via strategic management theory.

2.1 Art market and Complexities

Given the complexity of the topic, this work focusses on real art and excludes digital art as well as non-fungible tokens (NFTs) based on digital art. It is important to note that certain factors applicable to the stock and bond markets cannot be assumed for the art market. Valuations for the latter exhibit broader spreads and less transparency. The price of an art piece is determined by the amount a buyer is willing to pay (Goetzmann et al., 2011) thus classifying art assets as "hard-to-value assets level two" (Central Bank, 2019).

While previous price data and comparables contribute to valuation, comprehensive analysis is essential for understanding diverse types of informational price inputs (Coslor, 2016). Research on fair value accounting reveals the considerable challenges involved in valuing markets with heterogeneous assets and limited comparables, even for experts in the field (Bromwich, n.d.). Transparency, defined as the ability to discover market prices, supply and

demand, and other trading characteristics, are required for market efficiency and fairness (J. Law & J. Smullen, 2008). The benefits of transparency are absent when there are information asymmetries, where buyers lack readily available market information, such as price data or "blue book" values, and when sellers possess a significant advantage concerning product attributes.

Valuing art, as a hard-to-value asset, is frequently subject to sociological and behavioral variables. Valuations pertain to how economic and cultural actors assign value to objects, while evaluation requires the measurement and comparison of value (Lamont, 2012). Lamont identifies the sub-processes of valuation as categorization, legitimization, and (e)valuation, underscoring. Other studies approach valuation as a matter of taste (Hennion, 2004), which, in turn, is influenced by collective perspectives (Hennion, 2015). Consequently, it is widely accepted that art prices often defy conventional rules and can be driven by social dynamics and herd biases.

Similar observations can be made regarding stocks; however, stocks still possess clear key performance indicators (KPIs) for comparison, and the value of equities is expected to align with a company's earnings.

2.2 Global Art Market

Restrictions on business operations, travel, and events collectively led to a 22% decline in sales, amounting to \$50.3 billion in 2020 due to the pandemic. In response to the crisis, art dealers and auction houses implemented substantial digital strategies to sustain sales. These measures effectively mitigated some of the adverse consequences, ensuring that the art market performed considerably better than certain industries heavily reliant on travel and events (McAndrew, 2022). The global art market rebounded in 2021 after experiencing its worst recession in ten years in 2020, with total sales of artwork and antiques by dealers and auction houses reaching an estimated \$65.1 billion. In comparison to 2020, sales experienced a notable increase of 29%, surpassing pre-2019 pandemic levels.

Prior to the exogenous shock of a global pandemic, growth of the global art market could be described as 'slow but steady' within the last decade. From 2009 until 2021 the volume of sales increased from 39.5 million USD to 65.1 million USD, which resulted in an increase in value from \$31.0 billion to \$36.7 billion.

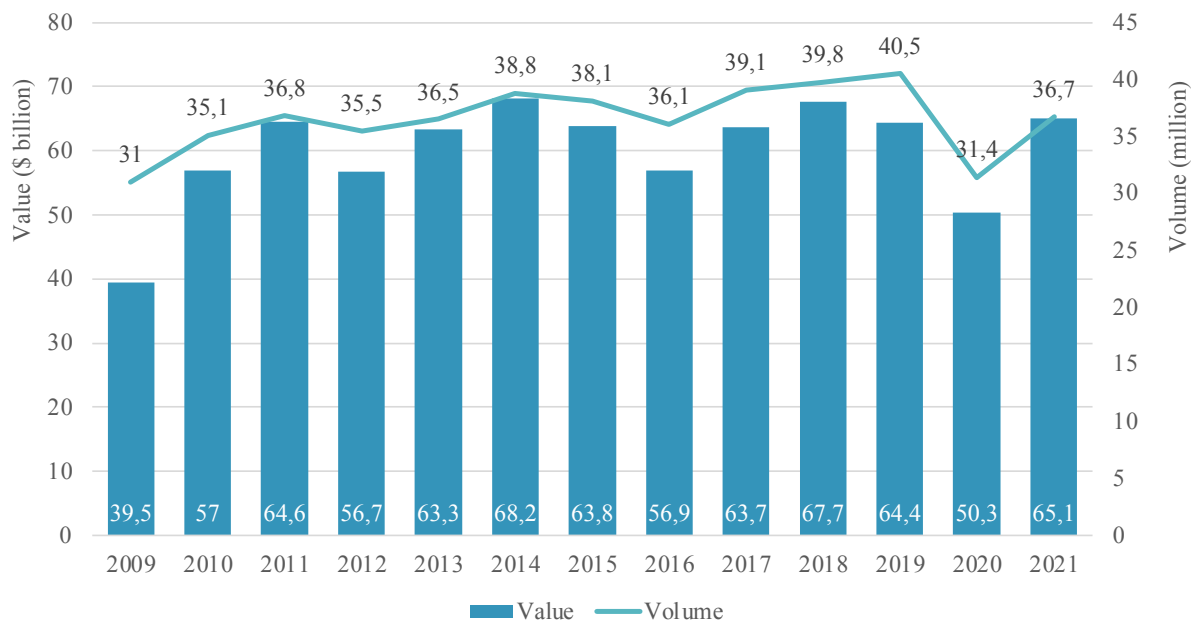


Figure 2: Sales in the Global Art Market 2009-2021 (Arts Economics, 2022)

Furthermore, other positive financial headlines keep being published since Covid19. Christie's, for example, has set record sales of \$8.4bn in 2022, citing "single-owner collections (...) and Asian millennials" as drivers (Shaw, 2022).

They also recently reported the highest public sale of an artwork in Europe. The artwork "A Lady with a Fan" by Austrian artist Gustav Klimt sold for approximately \$108.4mn (including fees) through Christie's in June (Reyburn, 2023).

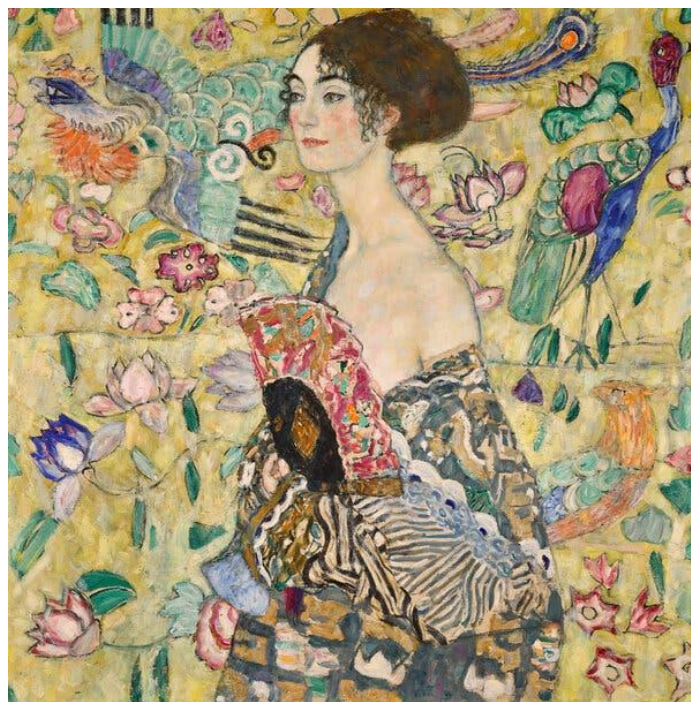


Figure 3: A Lady with a Fan (Gustav Klimt, 1918)

2.3 Art Investments and further Trends in Wealth Management

Art has long been a popular form of investment for collectors and investors alike, seeking to profit from the appreciation of artworks. Deloitte Luxembourg and ArtTactic asked wealth managers the reasons why art (and collectibles) is offered or should be offered in wealth management (see Figure 4).

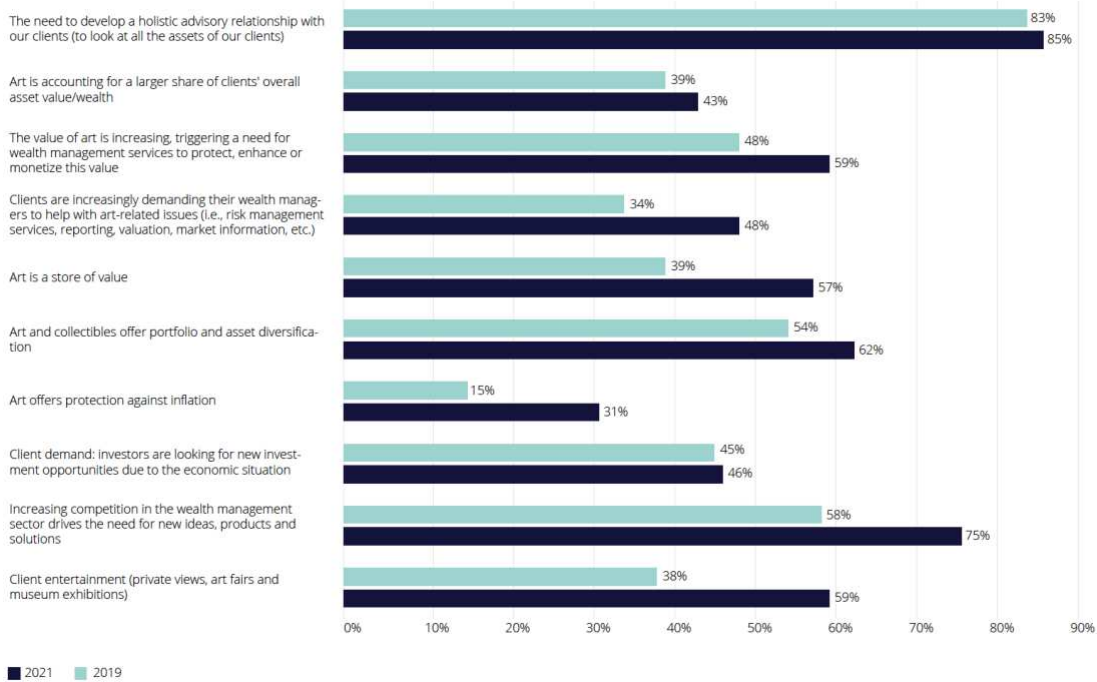


Figure 4: What do you consider the strongest arguments for including collectibles in wealth management? (“Art Finance Report 2021,” 2022)

The graph presents results between 2019 and 2021, shedding light on market trends. Notably, all statements gained popularity in 2021, suggesting a general increase in the significance of art investments within wealth management. The most prominent arguments are "the need to develop a holistic advisory relationship with our clients" and the greater demand for product innovation due to heightened competition, both standing at 85% and 75%, respectively, in 2021. The argument related to increased competition was only articulated by 58% of wealth managers in 2019, experiencing the largest surge. This underlying factor will be further explored in this study.

The third strongest argument pertains to the portfolio and asset diversification benefits offered by art and collectibles, with 62% in 2021 and 54% in 2019. It can be assumed that the higher demand is associated with increased stock market volatility observed between 2019 and 2021. Additionally, two other points warrant mention: "Art is a store of value" garnered acceptance from 57% of respondents, while "Art offers protection against inflation" received 31% support.

Given that maintaining relatively stable asset prices aligns with the objectives of stable monetary policy, which is undermined by inflation, the interconnection between these points is strongly linked. Accordingly, it is consistent that both issues have gained significant support in the volatile and inflationary years from 2019 to 2021, with 18% and 16% growth, respectively

2.4 Art Investments as a Diversification Strategy

The question of whether art investments can optimize a traditional portfolio remains a subject of debate among economists and financial experts. On one side, proponents of art investing argue that adding art to a traditional investment portfolio can provide diversification benefits and potentially increase returns. Portfolio optimization, as defined by Harry Markowitz (1952), involves the efficient allocation of investments across multiple assets rather than focusing on a single asset with the highest return. Simply diversifying risk across different asset classes is not sufficient; the correlation between assets must also be considered. When the correlation coefficient is close, or equal, to zero, there is no correlation in terms of return and volatility between the two assets, resulting in the diversification effect (Wagner & Lau, 1971). Experts argue that art exhibits a low correlation with other asset classes, such as stocks and bonds, making it a valuable diversification tool that helps reduce overall portfolio risk (Charlin & Cifuentes, 2017).

A research team introduced a novel method for estimating returns on illiquid assets using a repeat-sales regression estimation. This methodological contribution allows us to compare price indices with other markets, particularly those characterized by greater liquidity and more frequent trading, to assess correlation. The team developed a monthly art market index and sub-indices for impressionist, modern, post-war, and contemporary artworks based on recurrent sales with a monthly frequency. This approach combines their previous work (F. Y. R. P. Bocart & Hafner, 2015) with a dynamic space model (Aruoba et al., 2009)

For each sub-index, the 50 artists whose artworks achieved the highest prices at auction between January 2002 and September 2017 were selected. Artnet A.G. provided information about art and categorized artists based on price movement. These 200 painters contributed to the sale of 49,641 items worth \$43.9 billion at auctions. From January 2002 to September 2017, a total of 3,059 works of art by these artists were sold multiple times for a combined value of \$6.9 billion, including transaction expenses and buyer's premiums.

To estimate the price evolution of each art category, several liquid assets were chosen, including the S&P 500 index, the iShares U.S. consumer goods ETF, the iShares U.S. real estate ETF, the iShares 20+ years Treasury ETF, the spot price of gold bullion, the West Texas crude Intermediate spot price, an equally-weighted basket of art-related companies (Sotheby's, artnet A.G., artprice S.A., and Collector Universe Inc.), and an equally-weighted basket of furniture-related companies (F. Bocart et al., 2020). The results are presented in Table 1.

Table 1: Returns, volatility, and correlation of the price indices (F. Bocart et al., 2020)

	S&P 500	Gold	Art Co	Real Estate ETF	Luxury Co	Furniture Co	Global Art Index	Contemporary Art Index	Post-War Art Index	Modern Art Index	Impressionist Art Index
Annualized returns	0.08	0.10	0.20	0.10	0.17	0.09	0.04	0.06	0.06	0.02	0.00
Annualized volatility	0.14	0.18	0.33	0.23	0.24	0.26	0.10	0.11	0.14	0.10	0.12
Sharpe Ratio	0.56	0.53	0.62	0.43	0.71	0.36	0.37	0.52	0.46	0.16	0.02
Correlations											
S&P 500	1.00	-0.14	0.46	0.74	0.63	0.63	0.22	0.00	0.18	0.12	-0.22
Gold		1.00	0.01	-0.14	-0.02	-0.03	-0.22	0.02	0.07	-0.24	-0.03
Art Co			1.00	0.39	0.38	0.27	0.25	0.12	0.15	0.19	0.14
Real Estate				1.00	0.51	0.56	0.15	-0.03	0.07	0.10	-0.07
Luxury Co					1.00	0.44	0.12	-0.14	0.08	0.07	0.01
Furniture Co						1.00	0.08	0.07	0.15	0.07	-0.11
Art Indices											
Global							1.00	0.34	0.62	0.61	0.34
Contemporary								1.00	0.13	0.27	0.15
Post-War									1.00	0.09	0.07
Modern										1.00	0.21

When comparing the return and risk as well as the resulting Sharpe Ratio (The Economic Times, 2023) of the respective asset classes, it is noticeable that global art performs worse than the S&P500, gold and real estate, and companies in the art and luxury sectors. However, the Contemporary and Post-War art proxies achieve comparatively high Sharpe Ratios of 0.52 and 0.46, respectively, offering a better risk-return ratio than the real estate proxy (0.43) and comparable values with the S&P500 (0.56) and gold (0.53).

In the context of diversification in traditional wealth management, the correlation coefficients between the art proxies and the S&P 500, gold, and real estate are particularly relevant, as these assets are commonly used in portfolio management. The global art market displays very low correlation coefficients with the S&P 500 (0.22), gold (-0.22), and real estate (0.15).

Among the traditional asset classes, only gold shows a stronger negative coefficient with the S&P 500 (-0.14). The sub-proxies for Contemporary art, Post-War art, Modern art, and Impressionist art display even lower coefficients with the stock market proxy, with values of 0.00, 0.18, 0.12, and -0.00, respectively.

Therefore, based on this dataset, it can be concluded that although the global art market does not outperform the stock market, it offers significant diversification potential. Additionally, the Contemporary and Post-War art categories demonstrate a favorable risk-return profile.

Other comparative studies that primarily focused on returns, yielded less favorable results for the art asset class. John Stein compared prices from U.S. and U.K. auction houses from 1946 to 1968 with nominal stock returns over the same period, finding that the art proxy achieved a nominal return of 10.5% compared to 14.3% for stocks (Stein, 1977). In contrast, Baumhol examined the sales of 640 works between 1652 and 1961, which yielded an annualized return of 3.97%, slightly lower than risk-free assets and significantly worse than the stock market (Baumol, 1985). A more recent study from 2009 found similar results for the years 1950 to 1999, indicating that art returns were lower than those of the S&P 500 and the Dow Jones Industrial Average, but with higher volatility (Mandel, 2009).

2.4.1 Art Acquisition in inefficient Markets

To assess performance of the art market, it is necessary to consider various market characteristics. These include the prevalence of asymmetric information, the impossibility of short selling, the inelastic supply of art, and the presence of irrational collectors who disregard financial valuation. Furthermore, compared to conventional financial markets, transaction costs are higher in the art market, typically ranging between 6% and 15%. Auction houses may also impose minimum holding terms that restrict the resale of certain artworks for a specified period of time (Frey & Eichenberger, 1995). These characteristics indicate the inefficiency of the art market.

Another source of inefficiency, particularly in auction markets, is highlighted by David et al., (2013). Sellers establish sometimes undisclosed reserve prices below which no transaction can take place. If a transaction does not occur, no price is recorded, and this information is not incorporated into the index. The reserve-price mechanism has compressed the price spread, leading to upward bias in observed prices. Therefore, relying solely on realized prices is insufficient for generating unbiased forecasts of future prices. The inherent inefficiency

of auction prices stems from sellers setting minimum transaction prices for artworks, effectively creating a monopoly.

As bidding is the sole determinant of hammer prices, there is no upper limit. Consequently, the current trading system in the art industry perpetuates market inefficiency. It is important to note that the auction mechanism itself does not distort prices; rather, the distortion arises from unreported missing sales and undisclosed reserve prices. These factors provide informational advantages to insiders within the market, typically auction houses. In an efficient market where buyers and sellers can have confidence in actual prices and buyers and sellers engage in price discovery, the need for reserve prices would become unnecessary, and equilibrium prices would accurately reflect the true value of art. However, the current operation of art auctions incorporates a detrimental cycle of inefficiencies.

This emphasizes the significance of having a strong network and expertise, while also creating opportunities for active art portfolio management. In more efficient markets, such as the stock market, active asset managers still find opportunities to outperform the market based on information asymmetries, analytical skills, etc. (Kremnitzer, 2012). In this context, it is crucial to consider Jensen's Alpha (1968) which builds upon the Capital Asset Pricing Model (CAPM) developed by Sharpe (1964) and Treynor (1961). When evaluating an investment manager's performance, investors need to consider both the portfolio's risk and total return to determine whether the investment's return justifies the associated risk.

$$\text{Alpha} = R(i) - (R(f) + B \times (R(m) - R(f)))$$

where:

R(i) = the realized return of the portfolio or investment

R(m) = the realized return of the appropriate market index

R(f) = the risk-free rate of return for the time period

B = the beta of the portfolio of investment with respect to the chosen market index

In the context of wealth management, simply matching the performance of the stock market is inadequate and does not justify fees being paid to a money manager. The expectation is that an advisor will outperform the systematic return of the market and generate alpha. To conduct a quantitative analysis, other illiquid and inefficient markets like venture capital and private equity will be used as benchmarks.

2.5 Increased Competition within the Wealth Management Market

As outlined in section 2.2, survey results indicated that 75% of wealth managers interviewed attributed the growing competition in the wealth management industry as a driving force behind the demand for new ideas, products, and solutions. This represents a significant increase compared to the previous survey, where only 58% of respondents identified competition as a factor influencing offering art investments. Examining another study in the field of wealth management provides insights into potential reasons behind the putative rise in competition, which could be attributed to decreased customer retention and less loyalty to existing relationships.

Between mid-2020 and mid-2021, a considerable proportion of investors, approximately one-third of the total surveyed, switched wealth management providers. Among investors with a net worth exceeding one billion, this percentage was even higher at 55%. Furthermore, 44% of investors expressed intentions to reallocate over 20% of their portfolios within the next two years (refer to Figure 5). These decisions were motivated by factors such as improved performance (53%) and a wider range of available products (42%), as illustrated in Figure 6 (Lewis & Celi, 2022).

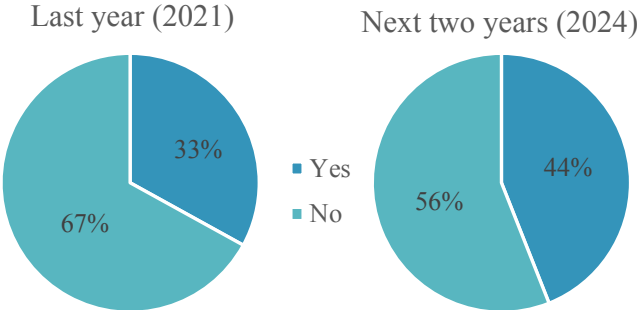


Figure 5: Share of investors moving over 20% of funds (Lewis & Celi, 2022)

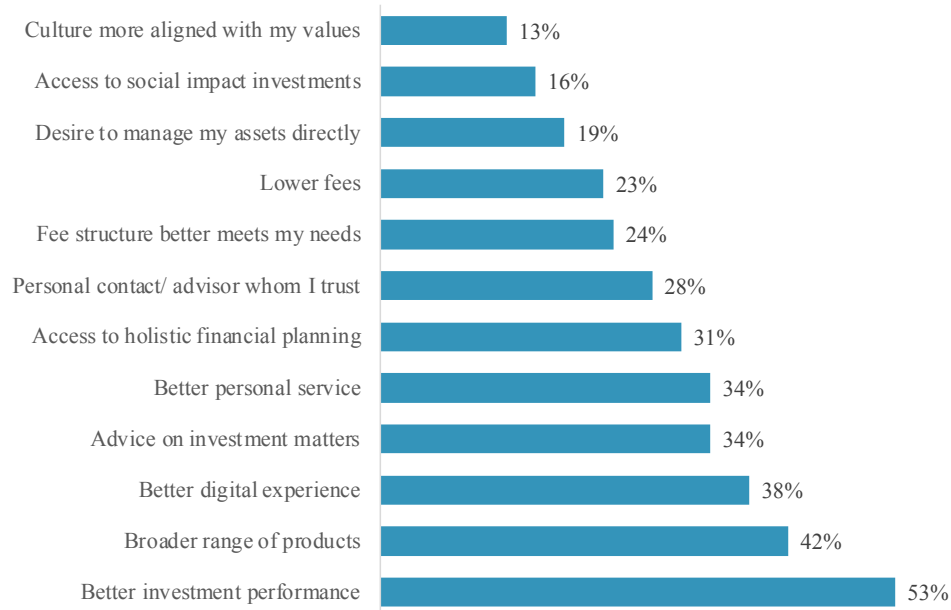


Figure 6: Reasons investors switched providers (Lewis & Celi, 2022)

When examining customer loyalty, another survey in 2016 of a different demographic provides further insights. The findings revealed that 35% of millennials expressed willingness to transfer assets to continue working with a specific financial advisor, irrespective of the firm, whereas only 12% of baby boomers shared the same notion. Among ultra-high-net-worth (UHNW) millennials, loyalty towards advisors was particularly pronounced, with a gradual decline observed as wealth categories decreased. Although millennials demonstrated higher loyalty than anticipated, only 9% of UHNW baby boomers (and 26% of mass affluent millennials) indicated a strong inclination to concentrate their assets in fewer organizations. One plausible explanation is that UHNW millennials display a greater tendency to consolidate wealth management services and maintain robust relationships with trusted advisors, compared to other segments (Perlingiere Tom et al., 2016).

Simultaneously, younger investor groups show a stronger affinity for art. More than one-third of Gen Z collectors allocated over 30% of their wealth to art, surpassing the typical allocations of millennials (27%) and Gen X (24%). This underscores the significant role that art plays in the early stages of wealth portfolios for some young collectors, likely influenced by their age, life stage, and the gradual accumulation of assets over time. Furthermore, it highlights the potential importance of this sector as younger collectors progressively expand their art collections (“Art Finance Report 2021,” 2022).

2.6 New Technologies supporting the Management of Art Investments

As previously mentioned, there is a growing interest among wealth managers and investors in art investments. However, the art market is known for its complexity and lack of transparency. Experts in the art and wealth management domains are increasingly recognizing the potential of technology to address these issues. In the Artfinance Report 2021, Deloitte Luxembourg and ArtTactic conducted a study to determine which technologies would have the most significant impact. According to wealth managers (consisting of 80 interviewees), the most relevant technologies identified in the 2021 study were collection management tools, blockchain technology, and DNA technology for artworks, with approval rates of 53%, 52%, and 51% respectively. Notably, the approval rate for blockchain technology has nearly tripled from 18% in 2019 (“Art Finance Report 2021,” 2022). When considering areas in which these new technologies are transforming the art market, enhancing provenance and traceability, increasing transparency, and providing information and education received the highest ratings from wealth managers, collectors, and art professionals.

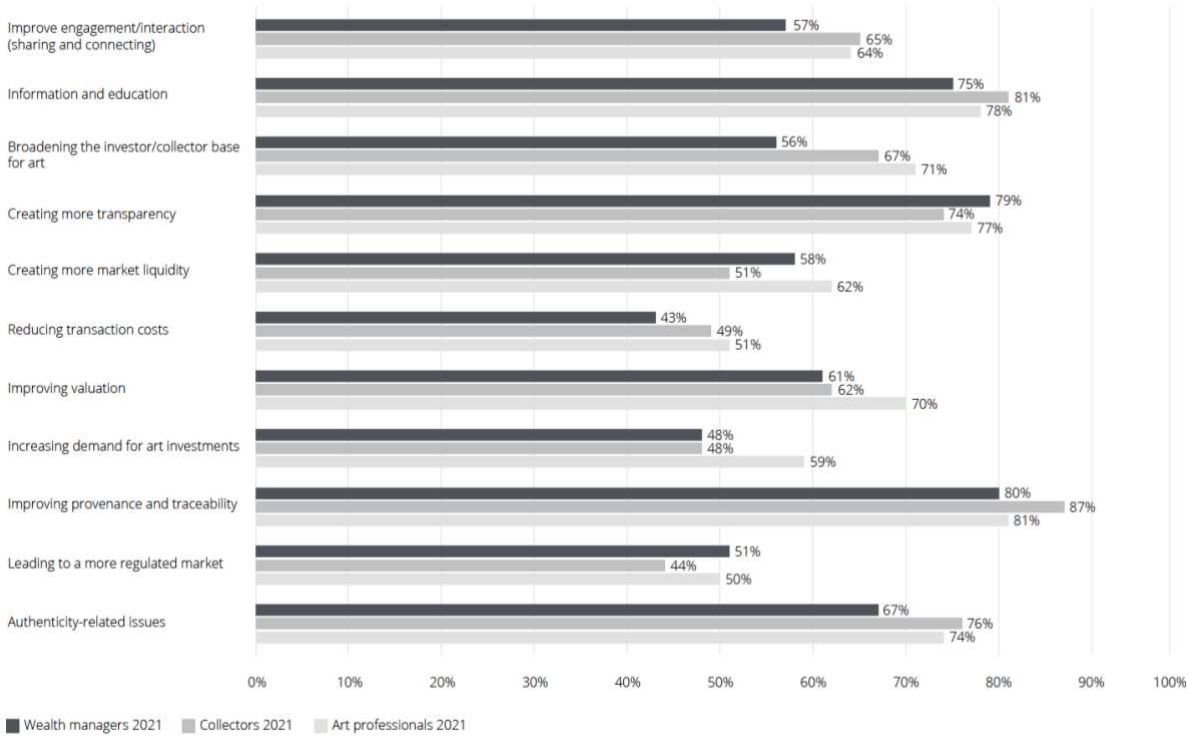


Figure 7: Key areas where online art business and new technology can make an impact (“Art Finance Report 2021,” 2022)

To remain within the scope of this work, we will focus on use cases of DLTs, also known as blockchain, for the management of art investments and disregard the potential of collection management technology.

2.7 Distributed Ledger Technology and Use Cases

Blockchain and Distributed Ledger Technology (DLT) are two interconnected concepts that have gained significant attention in recent years due to their potential to revolutionize various industries. Both terms do not have a universally agreed-upon definition. Blockchain, initially known for its association with Bitcoin, is a type of DLT that serves as a decentralized and secure database for recording transactions. On the other hand, DLT refers to a broader category of technology that has been defined as “distributed, shared, encrypted database that serves as an irreversible and incorruptible repository of information.” (Wright & De Filippi, 2015)

Blockchain, as a specific type of DLT, is a distributed and encrypted database that ensures the integrity and immutability of stored information. It consists of chronologically arranged bundles of transactions known as blocks. The technology operates on a network of nodes, where each participant has access to the complete history of transactions, making it transparent and resilient to tampering (Kakavand et al., 2017).

On the other hand, DLTs encompass a broader range of systems that share the fundamental principle of distributed validation and storage. Unlike traditional centralized ledgers, DLTs do not rely on a single authority to maintain the records. Instead, a network of nodes collectively maintains the ledger and validates transactions. This decentralized nature ensures higher security, reduced vulnerability to single points of failure, and increased trust among participants (Bank et al., 2016). DLTs could enable direct clearing and settlement of securities and cash transfers between users, potentially bypassing intermediaries like banks. This decentralization could lead to faster and more cost-effective transactions (Robleh et al., 2014).

In Table 2, we will name and describe several use cases in which the usage of DLT supported the management of art investments. These use cases will be evaluated by expert interviews and further management frameworks.

Table 2: DLT Use Cases

	Description	Current use-case
Fractional Ownership	DLT can enable fractional ownership of art, where multiple investors can own a percentage of an artwork. This allows more people to invest in art, potentially increasing liquidity and reducing the minimum investment amount required to participate (Georgina Adam, 2019).	In 2021, Artemundi and Sygnum Bank collaborated to tokenize Picasso's picture <i>Fillette au béret</i> . It was the first time that a regulated bank broadcast ownership rights in a Picasso or any other work of art into the public blockchain, allowing investors to buy and trade "shares" in the artwork known as Art Security Tokens (ASTs) (Sygnum Bank and Artemundi Tokenize a Picasso on the Blockchain, 2021).
Transparency & Authenticity	DLT can be used to create a tamper-proof record of art ownership and provenance, which can enhance transparency and reduce risks of art fraud. Investors can have more confidence in the authenticity of the artwork they are investing in, which can increase demand and value (“Art Finance Report 2021,” 2022).	Verisart is a "platform to certify and verify collectibles and artworks using the Bitcoin blockchain." They offer a free service that makes it simple for artists to create permanent certifications of authenticity. To enhance provenance and prevent fraud, the solution combines museum accreditation requirements, distributed ledger technology, and picture recognition. They also partner with one of Germany’s most renowned galleries, ‘Galerie König’ (ALICJA KWADE’S DEBUT NFT, 2020).
Smart Contracts	DLT can enable smart contracts, which are self-executing contracts where the terms of the agreement are directly written into code. This can automate several aspects of art investment, such as the distribution of dividends, and make the investment process more efficient (Felipe Marquette de Sousa, 2022).	Arcual offers smart contracts with embedded resale terms. With renowned Galleries like Sabrina Amrani, they implemented fully customizable resale royalties and sales terms and conditions. Payment is fully automated on chain (<i>Arcual – Rebalancing the Art Market</i> , 2023).
Royalty Payments	DLT can enable tracking of royalty payments to artists, ensuring that they receive a fair share of the value of their artworks when resold in the secondary market (Zetzsche et al., 2021).	The NFT marketplace SuperRare offers royalty payments for artists, as well as for collectors, to support visionary collectors (see Appendix x). “The first collector of a qualifying artwork will receive a 1% transaction royalty, paid from the SuperRare network fee, upon completion of the first secondary market transaction to which they are no longer a direct participant (mint sale +2). This royalty will decay by 50% for each subsequent transaction until

Overall, DLT has the potential to make art investments more accessible, transparent, and efficient, potentially increasing participation and value in the art market.

2.8 Relevant Management Theory

Global wealth managers are in charge of about US\$112 trillion in client assets (as of 2021) (BCG, 2022), and 56% of the clients are willing to shift at least 20% of their assets within the next two years (Lewis & Celi, 2022). For companies prepared to make strategic investments to provide a superior customer experience, this represents around \$12.5 billion worldwide asset-under-management opportunity, while others may find themselves at risk of losing a sizable amount of their current business. Offering a more holistic advisory approach, including art investments and smart art management solutions, might prepare a modern wealth manager for a dynamic and competitive landscape.

This section presents various scholarly views on the adoption of new technologies and analyzes important insights from the literature regarding how the art investment landscape, along with its distributed ledger technology (DLT) aspect, will change. The theory of competitive advantage (CA), originally proposed by Michael Porter, suggests that succeeding in an industry requires two competitive axes from a business and management perspective (Porter, 1998; Furrer et al., 2008). Porter's market-based view (MBV) argues that an organization can achieve and maintain a competitive advantage over its rivals by positioning itself as either a cost leader or a differentiator in terms of value proposition (M. Porter, 1998). Several scholars have expanded upon the concept of CA. MBV has evolved into the Resource-Based View (RBV), as suggested by Barney (1991), which emphasizes the consideration of distinct and unique resources as sources of competitive advantage. RBV states that resources should be heterogeneous, immobile, valuable, rare, inimitable, and non-substitutable for a firm to achieve and sustain a competitive advantage. However, RBV has been criticized for its static perspective, leading to the emergence of the Dynamic Capabilities (DC) literature (Teece et al., 1997). DC refers to a firm's ability to adapt and change its resource base in a dynamic environment. Barreto (2010) further developed this theory, defining it as "a firm's potential to systematically solve problems, formed by its propensity to sense opportunities and threats, make timely and market-oriented decisions, and change its resource base."

The theories mentioned above represent a market-focused approach, which, in the context of this work, relates to the increasing demand for art investments that is currently inadequately addressed by wealth managers in Germany. Additionally, the concept of competitive advantage can also be examined from an innovation-driven perspective.

According to Porter (1985) and Christensen (1997), innovations can revolutionize entire industries, and even market leaders can lose their positions. Disruptive innovation (DI) is a concept related to early adopters, whereupon if the innovation outperforms established solutions, it expands and creates new markets, leading to a shift in the prevailing paradigm. Eventually, DI can become the mainstream solution, causing former market leaders to lose market share to disruptors. According to Christensen and the framework proposed by Schmidt and Druehl (2008), the potential of innovation can be classified into four categories: sustaining innovation, disruptive innovation, new market disruption, and low-end disruption.

In the wealth management industry, where trust and security are paramount, marketing strategies based on the First Mover Advantage (FMA) and the Second Mover Advantage (SMA) are worth considering. FMA (Lieberman & Montgomery, 1988) describes the advantage gained by a business that first introduces a product or service to the market. By being the first entrant, a company can establish significant brand awareness and customer loyalty, leveraging the benefits of the first-mover advantage. SMA (Hoppe, 2000), on the other hand, refers to the advantage gained by a business that enters the market later. A second mover can capitalize on its existing client base and utilize proven marketing techniques, benefiting from the experiences and successes of the first mover. In terms of innovation, the objective is to leverage market technology and assure investors that the project is a suitable investment. When considering art investments services in wealth management and the potential utilization of DLT technologies, it is crucial to carefully weigh the advantages gained from early entry against potential loss of trust associated with ironing out kinks related to initial rollouts. It should be noted that the services being potentially offered are highly homogeneous, making it challenging to achieve significant information advantage (Rasmusen & Yoon, 2012). Therefore, FMA offers greater potential for acquiring talent or establishing exclusive partnerships, while SMA provides more certainty, which is particularly relevant in a trust-based industry and when dealing with new technologies such as DLT.

Core Competencies (CC) by (Hamel & Prahalad, 1993) are the resources and capabilities that constitute strategic advantages of a firm, which must be defined, cultivated, and exploited for competitive success. The concept also applies to wealth managers entering the art advisory market as, ultimately, these strengths add value to the consumer. From a practical standpoint, nurturing core competencies and developing a business model around them is imperative, rather than excessively focusing on areas where the firm lacks expertise.

This does not imply that other competencies should be disregarded or neglected. Instead, the underlying principle of this concept is that companies should capitalize on their core strengths and strategically leverage these advantages. Therefore, it is important to compare the core competencies of wealth managers with the required competencies in art advisory.

Innovation Diffusion Theory (IDT) by Rogers (1983) represents a complementary notion that predicts how technological innovation is adopted. Innovation can be evaluated based on five criteria: compatibility, relative advantage, complexity, trialability, and observability. These criteria serve as the basis for users to accept or reject the innovation. Acceptance of the product or service leads to an improvement in quality, resulting in an S-curve progression of the innovation based on the axes of performance and time. The performance of the innovation either continues to improve or is eventually overtaken by a new technology (see Figure 8).

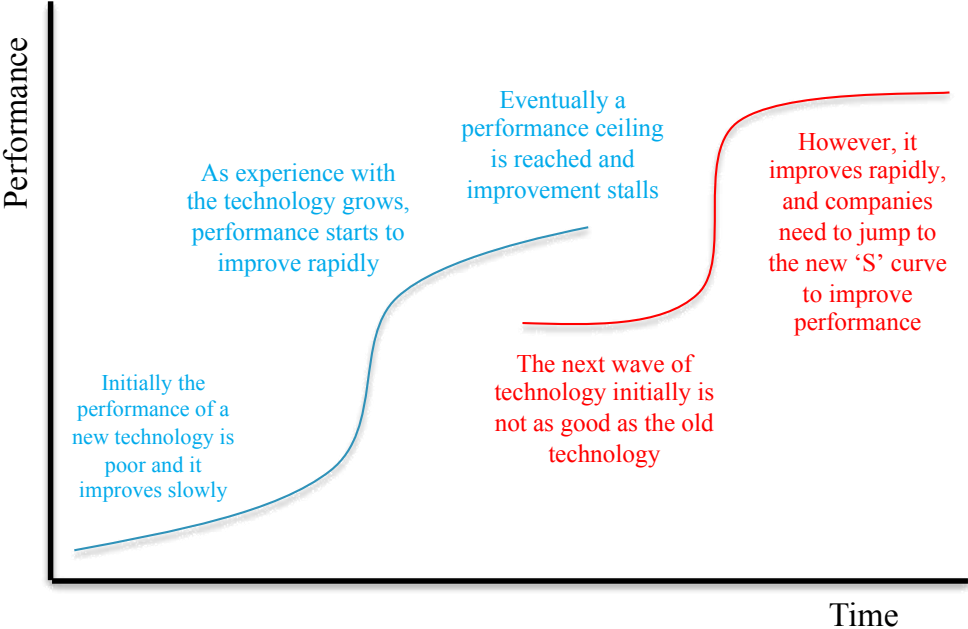


Figure 8: Innovation Diffusion (Rogers, 1983)

Thus, strategic management theory informs and allows us to assess the role of offering art investments for the wealth management sector and the role of DLT for the management of art investments.

3. Methodology

Our three research areas are defined in Figure 9.

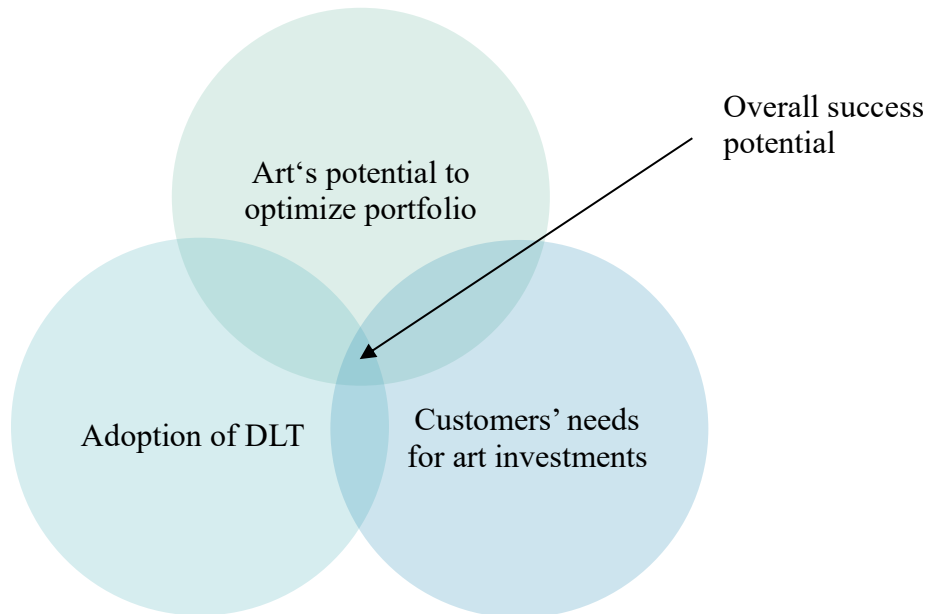


Figure 9: Research Areas of Art Investments for Wealth Management

To validate the conclusions drawn, we used a triangulation approach that combines qualitative and quantitative research findings. By integrating multiple viewpoints, we minimize flaws and mitigate biases that may arise from relying solely on a single technique (Jack & Raturi, 2006). The study encompasses insights from both consumers and experts regarding art investments in wealth management and explores potential use cases of distributed ledger technology (DLT). By leveraging both qualitative and quantitative approaches, data analysis is enhanced, leading to more accurate and robust conclusions (S Kaplan, 2015).

It is also crucial to acknowledge that uncertainty is a significant factor that limits predictability. Therefore, the selected methods were specifically chosen with uncertainty in mind. By examining the future from multiple perspectives, the aim was to provide a comprehensive qualitative depiction. Nonetheless, our projections should be regarded as estimates rather than definitive outcomes.

3.1 Qualitative Data Collection

Semi-structured interviews produced understandings and insights from professionals in the wealth management and art industries. Flexibility in the interviewing procedure encouraged comments that were outside of the interview's scope and tapped the expertise and judgments of the experts (Rowley, 2012). The semi-structured question sheet acted as a guide for the scope of the subject as well as discussing opinions.

This made it possible to communicate in a more flexible way to build on interviewee perceptions (Kallio et al., 2016). As a result, interviews can be more dynamic (Adams, 2015). To examine the thesis topic from various perspectives, variety of art investment industry and DLT specialists (see Table 3) were questioned.

Table 3: Expert overview including position and field

Identifier	Interviewee	Position	Field
Exp1	Luise Vad	Global Sales & Business Development – Hex Trust (Germany) & previously WM	Technological consulting
Exp2	Anonymous	Global Art & Finance Coordinator – Big4 consulting company (Luxembourg)	Management Consulting
Exp3	Matthias Batz	CEO Truffle Art Advisory (Germany)	Art Advisory
Exp4	David Riemer	Co-founder Arttrade.io (Germany)	Art Investment
Exp5	Paulo do Cardoso	Professor Catolica LSBE; DeFi, Blockchain (Portugal)	Academia
Exp6	Anonymous	Wealth Manager - top-three private Bank (Germany)	Wealth Management
Exp7	Anonymous	Head of Innovation – leading German Gallery	Art
Exp8	Anonymous	Curator Contemporary Art (Austria)	Art
Exp9	Anonymous	Wealth Manager – Investment Bank (Switzerland)	Wealth Management
Exp10	April Lee	Director Zart Family Office (Hong Kong/ Asia)	Art Investment Advisory

Since not all experts were equally experienced in the fields of art, investments or DLT, the interview guide was adapted for the group of experts. Accordingly, generic questions were answered by all experts as well as area-specific ones (see Table 4). The interviews were conducted via video call and spanned 30-40 minutes. They were recorded with consent as well as transcribed and/ or summarized.

Table 4: Guide for Expert Interviews

ID	Question	Scope for research area	Type
1	What is your outlook for the art market in 3 to 5 years?	Portfolio optimization	Ranking
2	What do you believe is the appeal of investing in art, and how do you think it compares to other investment opportunities?	Customer demand/ Portfolio optimization	Open
3	What do you believe is the appeal of investing in DLT-art, and how do you think it compares to other investment opportunities?	Customer demand/ Portfolio optimization	Open
4	In your opinion, what are the benefits of incorporating art investments in a wealth management portfolio?	Customer demand/ Portfolio optimization	Open
5	What are the main challenges that come with investing in art, and how wealth management professionals can overcome these challenges?	Customer demand	Open
6	Do you think that art investment advisory is sufficiently offered by wealth managers in the European market? If not, why?	Customer demand	Open
7	What is the most important use case of DLT/ blockchain for the management of art?	DLT adoption	Open
8	Fractional ownership of art: Do you see fractionalization via DLT superior than stock-listed artworks?	DLT adoption	Open

3.2 Qualitative Data Analysis

The transcribed interviews were summarized and analyzed with regard to the previously defined research areas. Due to the complexity and the uncertainties of whether art will be accepted as an investment in WM, it was important to include the dynamic conditions. Shoemakers' Scenario Planning (1991) is a strategic management tool that involves imagining various future scenarios to identify potential opportunities and threats, and develop appropriate strategies to mitigate risks and capitalize on opportunities. This approach is often used in uncertain and complex situations where traditional forecasting methods may not be effective.

The method allows us to analyze observations or 'trends' identified in the interviews and secondary research and to link them to complex uncertainties. This results in quantifiable future scenarios. The following steps are required:

1. Define the scope and objectives: Identify the key issues, uncertainties, and drivers that are relevant to the scenario planning exercise and define the scope and objectives of the study.
2. Develop scenarios: Create a set of plausible scenarios based on different assumptions and factors that may affect the future. This can use various tools and techniques, such as environmental scanning, trend analysis, and expert opinions.
3. Analyze the scenarios: Assess the potential impacts of each scenario on the organization, industry, and other relevant factors. Develop indicators, assessing the likelihood and severity of impacts, and identifying key vulnerabilities and opportunities.
4. Develop strategies: Based on the analysis, develop appropriate strategies and actions for each scenario. These should be flexible and adaptable, to enable the organization to respond to changes in the future.
5. Monitor and evaluate: Continuously monitor and evaluate the scenarios and strategies, and adjust them as needed based on new information and changing circumstances. This can help the organization to stay agile and responsive to emerging challenges and opportunities.

For the methodological analysis the first three steps are important, while the other two allow us to form management recommendations. According to Rigby & Gillies (2000), the systematic approach towards managing business uncertainty is perceived as a mean for organizations to move away from biased future expectations. This approach allows for a more thorough examination of strategic issues, leading to the development of a stronger competitive strategy.

3.3 Quantitative Data Analysis

Based on CAPM previously mentioned, it is not sufficient to compare the art market only with the asset classes gold or the stock market. Instead, we would like to compare the art asset class with other private markets. Due to lack of transparency or high costs of obtaining art indices, art indices (collected by Artnet) were provided confidentially. This includes the performance data of the Fine Art, Contemporary Art and Emerging Artists Index, each expressed in CAGR (Compound Annual Growth Rate) and also volatility, as well as correlation to the S&P500, MSCI World and to a gold proxy. In order to consider the risk-return ratio (Sharpe Ratio), the performance results are offset against the volatility. Further notes on the indices are displayed in Table 5.

Table 5: Notes on Indices (Artnet)

1. Artnet Indices are rebalanced annually, according to the top 100 performing artists, as defined by total sales over the previous 3 years.
2. Indices are composed of auction sales of paintings and works on paper produced by the top 100 performing artists in the category.
3. The art categories are defined as follows:

Art Category	Definition
Fine Art (Blue Chip)	All artists were considered for this category, excluding for schools, studios, anonymous, etc.
Contemporary	Works created by artists born between 1944 and 1975, excluding schools, studios, anonymous, etc., as well as single-nationality Chinese artists.
Ultra-Contemporary (Emerging)	Works created by artists born after 1975, excluding for schools, studios, anonymous, etc.

In a further step, the Pitchbook database acts as a reference for the private markets. Here, the asset classes private equity, venture capital, private debt and fund of funds are considered as of quarter two 2022 (Wiek et al., 2023). The performance values are given as Internal Rate of Return (IRR), so we convert the CAGR of the art proxy into IRR.

IRR represents a more appropriate approach used by asset managers and the conversion allows us to directly compare the different asset classes. The conversion is performed as follows:

1. Calculate the equivalent annual growth rate (EAGR) for each time period using the following formula:

$$EAGR \text{ (for } n \text{ years)} = [(1 + \text{Return } Q1) * (1 + \text{Return } Q2) * \dots * (1 + \text{Return } Qn)]^{(1/n)} - 1$$

Where Return Qi represents the quarterly return for quarter "i," and "n" is the number of years.

2. Use the calculated EAGR values as the IRR guess for each time period. Create a column labeled "IRR Guess" and input the EAGR values.
3. In another column, use Excel's IRR function to calculate the IRR based on the guessed EAGR values (CFI Team, 2023)

Missing cash flows for the art market only allow for this rather imprecise measurement of IRR. This approach provides approximate IRR values and might not be perfect due to the nature of quarterly compounding and the limitations of simplifying quarterly returns into annual returns. Additionally, IRR calculations are sensitive to the initial guess values, so your results might vary based on the initial guesses used (Fuhrmann, 2021). All performance KPIs will be calculated as of quarter two 2022 with perspective of 1, 5 and 10 years backwards.

4. Findings

4.1 Quantitative Performance Analysis

The information provided by Artnet Indices shows similar results (see Table 6) to the research team that used the repeat-sales regression estimation model (refer to Chapter 2.4). Notably, the Emerging Artists category exhibits a noteworthy 12-month performance, boasting a 36% return after accounting for costs and fees. This places it as the second most robust class, trailing closely behind the US Real Estate market which boasts a 39% return. Evaluating the performance over longer timeframes - five, ten, and fifteen years (measured using Compound Annual Growth Rate - CAGR), the art proxies occasionally demonstrate competitiveness against the gold proxy or the Dax index. However, their returns are markedly inferior when compared to the S&P500, MSCI World, and US Real Estate proxy.

Nevertheless, correlation analysis suggests promising diversification prospects. Nearly all art indices exhibit lowest correlations in relation to other asset classes. Particularly noteworthy is the Emerging Artists Index, which maintains the lowest correlation levels with the S&P500 (0.61), MSCI World (0.69), US Real Estate (0.74), and DAX (0.58). Only the DAX index has a slightly lower correlation with the Gold Fixing Price (0.59) compared to the art proxies.

Table 6: Art Indices and Asset Proxies (Artnet; As of Q2 2022)

Indices Add-Ons								
Item	Fine Art	Contemporary Art	Emerging Artists	S&P 500	MSCI World	US Real Estate	Gold	DAX
12-month return	9%	9%	36%	27%	22%	39%	-3%	13%
5-year CAGR	2%	4%	7%	16%	15%	12%	10%	4%
10-year CAGR	0%	2%	3%	14%	13%	11%	2%	7%
15-year CAGR	4%	4%	4%	8%	7%	6%	7%	3%
Volatility	20%	16%	14%	15%	16%	19%	15%	20%
Corr. w/ S&P 500	0,63	0,72	0,61		0,99	0,95	0,68	0,85
Corr. w/ MSCI World	0,71	0,79	0,69	0,99		0,97	0,74	0,87
Corr. w/ US Real Estate	0,77	0,84	0,74	0,95	0,97		0,78	0,84
Corr. w/ Gold Fixing Price	0,88	0,87	0,91	0,68	0,74	0,78		0,59
Corr. w/ DAX	0,69	0,74	0,58	0,85	0,87	0,84	0,59	

When benchmarked against other private market categories such as venture capital, private equity, real estate, fund of funds, and private debt, the art indices exhibit comparatively lower performance, as indicated by their Internal Rate of Return (IRR). During the analyzed 12-month period, the Emerging Artists index emerged as the top performer across all asset classes, securing a notable 35.6% return. Fine Art and Contemporary Art yielded more favorable returns than Private Debt (3.5%) and Venture Capital (2.4%), achieving 9.3% and 9.4%, respectively. These returns were comparable to Private Equity (11.4%) and Fund of Funds (11.5%), and slightly trailed behind the return from Real Estate at 24.2%. However, when considering the five- and ten-year timeframes, the art proxies demonstrated lower performance than the mentioned asset classes. Notably, within the art proxies, emerging artists once again exhibited the strongest performance. For a detailed overview of these outcomes, refer to Table 7 and Figure 10.

Table 7: Horizon IRRs by strategy (as of Q2 2020)

	1-year	5-year	10-year
Private Equity	11,4%	19,9%	16,9%
Venture Capital	2,8%	22,8%	16,6%
Real Estate	24,2%	12,0%	12,9%
Funds of Funds	11,5%	19,1%	14,2%
Private Debt	3,5%	7,5%	8,8%
Fine Art	9,4%	2,2%	0,1%
Contemporary Art	9,3%	3,8%	2,7%
Emerging Artists	35,6%	5,2%	3,5%

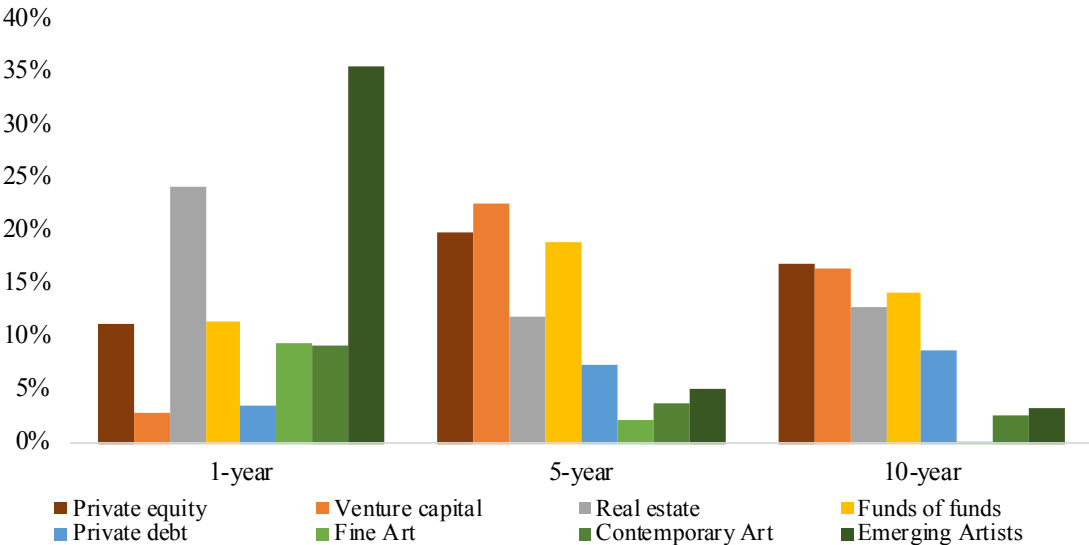


Figure 10: Returns by Asset Classes (as of Q2 2022)

Due to the limited data available, the results are not conclusive. It is recommended to conduct more comprehensive analysis of the correlations between art proxies and both the stock market and private markets. Utilizing a t-test would be advisable for this purpose. Particularly interesting would be the exploration of whether the other private markets also exhibit notably low correlation coefficients with the stock market or gold price.

Hence, the current findings indicate that, on average, the art market does not surpass other pertinent asset classes in terms of performance (Jensen's alpha). Nonetheless, the remarkable performance of the Emerging Artist Index, coupled with its low correlations to the traditional Markowitz asset classes, leaves opportunities open for the implementation of a core-satellite strategy. As per the principles of applied portfolio theory, this strategy involves constructing smaller portfolios that function as satellites to complement the broadly diversified core portfolio (such as the MSCI World). This core portfolio is primarily managed passively and comes with lower fees (Amenc et al., 2004). An illustrative asset allocation is shown in Figure 11.

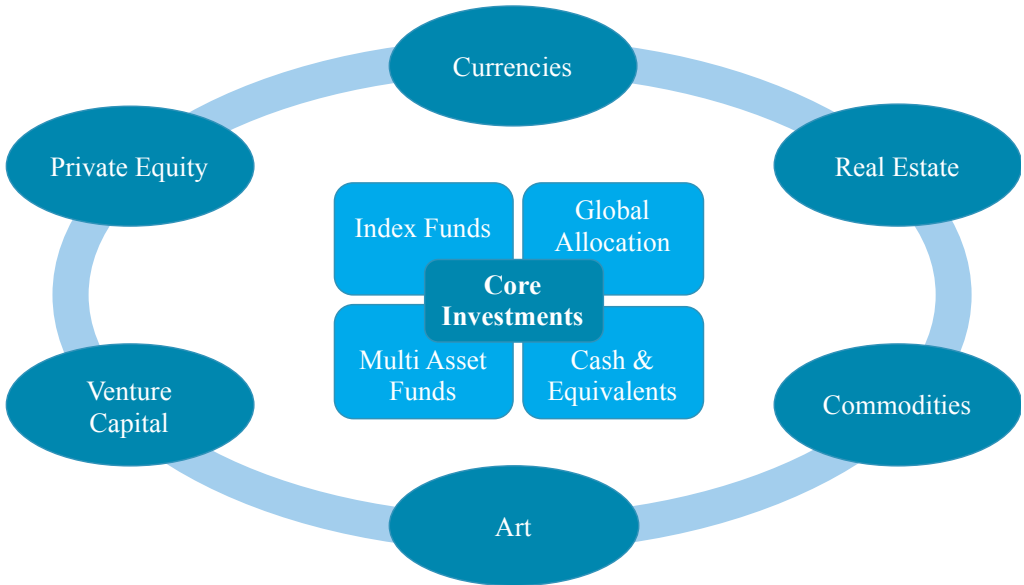


Figure 11: Exemplary Core-Satellite-Portfolio

Accordingly, investments are made in sectors or areas that are expected to outperform the core portfolio, such as private equity or venture capital. Alternatively, some satellites also act as risk hedges, such as commodities or currencies. With the low correlation to a potential core portfolio, the art market is generally more qualified for diversification. Nevertheless, strong performances can also be achieved in the art market with the right curation and an adequate valuation. In addition to buy-and-hold, various art players also drive-up prices themselves by lending the works to well-known galleries or museums.

4.2 Description of the Interview Findings

The first question of the interview guide focused on how the experts assessed the development of the global art market within the next five years. Seven experts were positive, two of them very positive. Two of the participants expected the market to stagnate, while one expert anticipated a slight decline. The results are illustrated in Figure 12.

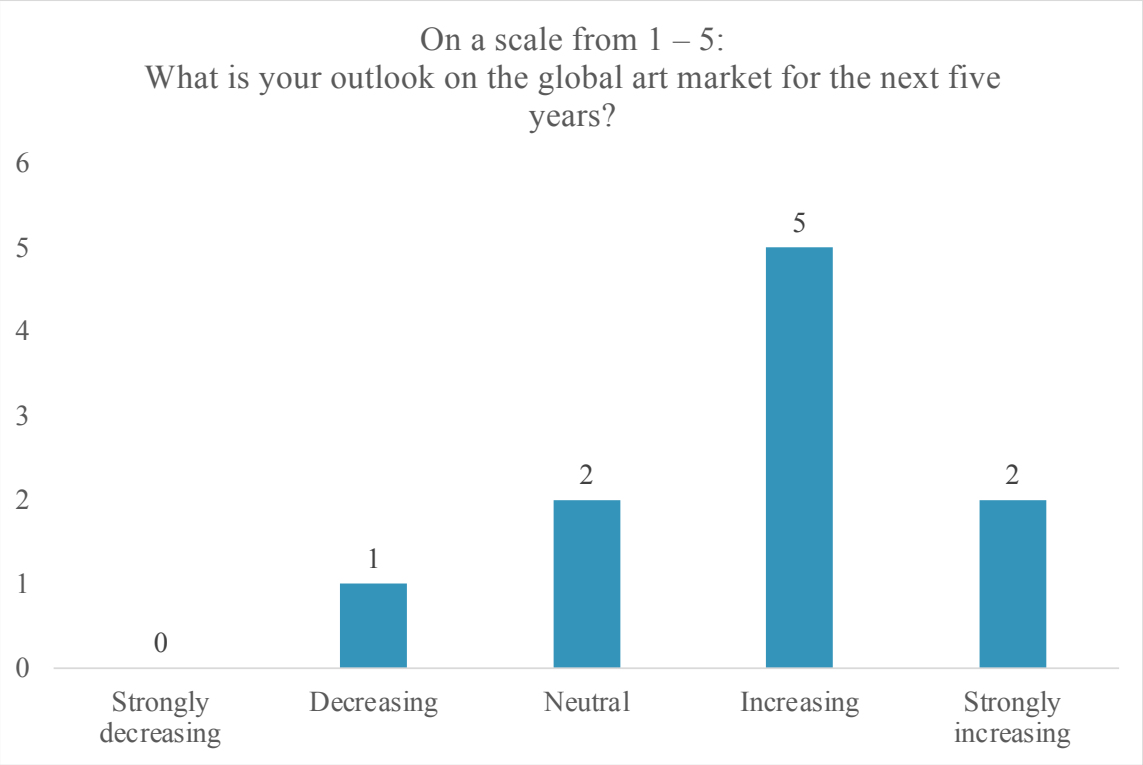


Figure 12: Outlook on the Art Market

According to the experts interviewed, investing in art offers several advantages compared to other investment opportunities (Question 2). The primary appeal lies in the balance it brings to individuals with analytical professions, such as entrepreneurs, investment bankers, and hedge fund managers (Exp1, Exp2, Exp7, Exp9).

Art allows them to incorporate creative thinking while still being connected to their analytical minds, providing a sense of balance in high-pressure professions (Exp1). Moreover, investing in art offers a unique opportunity to connect with a diverse group of people, including artists, gallery owners, and art historians, fostering creativity and expanding social circles.

Expert 1:

"The beauty of art is that it provides a wonderful balance and brings out the creative side, while still incorporating some analytical thinking."

On the contrary side, Exp2 stressed that the terms “investing” and “acquisition” have to be distinguished. It is a plus if art is sold again with a financial gain, but this tends not to be the intention of most acquirers. Expert 2 and Expert 8 highlighted that while the financial component is present when acquiring art, motivations for collecting art go beyond purely financial objectives, including emotion, passion, cultural aspiration, and ego.

Expert 10, who is a managing director of a Hong-Kong-based family office specialized in art investments also stressed the ‘ego-aspect’. For UHNWI in Asia, art is a significant factor to show social status.

Compared to DLT-based art (Question 3), seven out of ten experts shared the opinion that NFTs were a trend pushed by the herd behavior of younger generations. The missing secondary market and high volatility limit its attractiveness as an asset. Expert 1 highlighted that further distinction is necessary. A ‘cryptopunk’ or a ‘bored ape’ does not attract serious acquisitions, but tech-centered artists like Mike Winkelmann, also known as Beeple, creates works which also attract established investors. ‘Everydays: The First 5000 Days’ is a collage of political illustration, scenes and digital designs, which he posted throughout every day of the creation process. This digital piece sold at Christie’s for \$69 million (Hodge Max, 2022; Reyburn, 2021)

Expert 1:

“This (artwork) ‘Everydays: The First 5000 Days’, if you look at the concept behind it, how he did it, creating this image every day and turning it into a big picture, that is a form of artistic drive. And you can see this creativity in many NFT artists who also come from this direction, those who really utilize technologies and don’t just put digital art on a USB stick.”

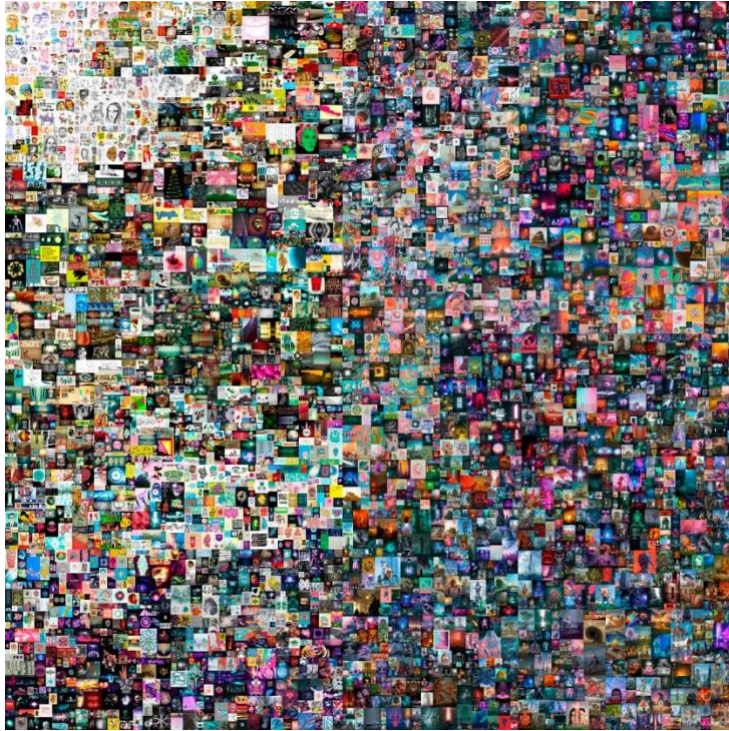


Figure 13: *Everydays: The First 5000 Days* (Beeple, 2021)

Incorporating art investments in wealth management portfolios provides various benefits (Question 4), according to the participants. Four experts mentioned that art serves as an engaging conversation starter, fostering client relationships as well as having the ability to create customer loyalty. Regarding client relationships, Expert 4 stated that exclusive art exhibitions are an effective networking tool in the wealth management sector.

Expert 4:

“We have already done an event (private exhibition where investors purchased fractionalized artwork via security token) with an asset manager in Düsseldorf twice. And he (the wealth manager) has very few chances, especially with a limited budget, to make such successful events where so many people register. Because otherwise you have to invite to a polo tournament and you can cut off 20,000 euros.”

His argument was supported by Expert 1 and Expert 3, who agreed that wealth managers often invite clients to art fairs like Art Basel.

When asked about the main challenges that come along with investing in art, most experts agreed on the due diligence process, including valuation and pricing. The management of artwork also causes major risks; namely the insurance and storage for safety and tax evasion. The results are displayed in Figure 14.

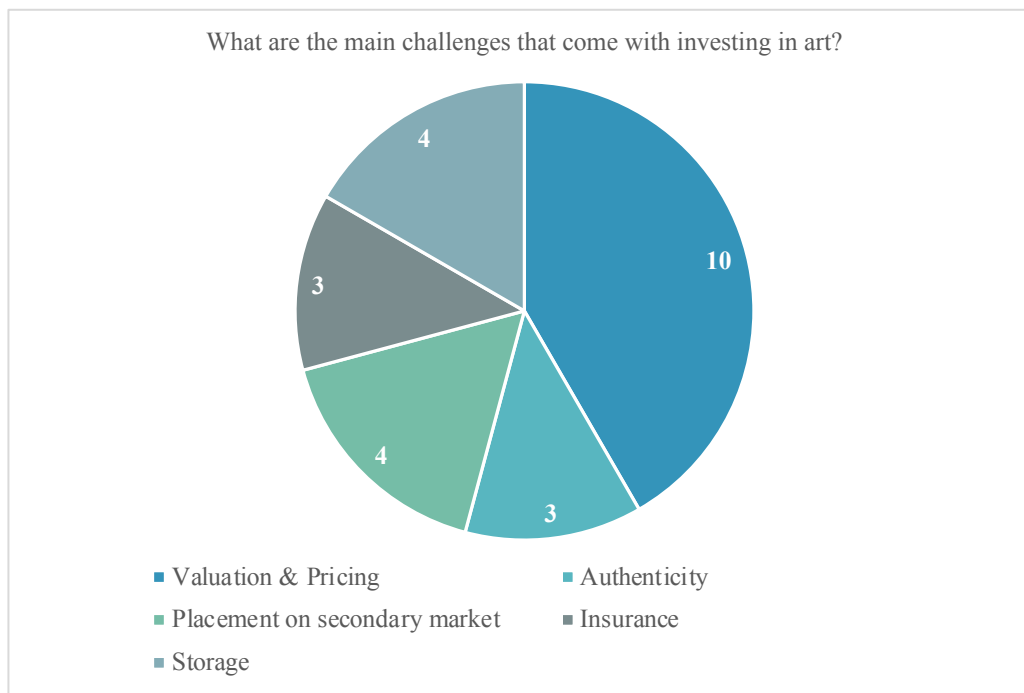


Figure 14: Main Challenges of Art Investment

To overcome these challenges, most experts mentioned cooperation with highly specialized art advisors.

The consensus among the experts was that art investment advisory is not extensively offered by wealth managers in the European market (Question 6), mostly due to the complexity of the art market and the need for specialized expertise. Three experts mentioned that German wealth managers lack the necessary expertise in-house and may prefer to collaborate with external art advisory services to avoid risk and challenges, including access to collectors, proper staging of artworks, and potential conflicts of interest. Two experts cited limited revenue opportunities associated with art investments compared to other areas of banking as the primary reason.

Expert 8:

“I think it's simply not the core business.

And it doesn't generate much revenue compared to other areas of the bank.”

Opinions varied widely on possible use cases of DLT for managing art or for art investments (Question 7). Most experts agreed about the potential of the technology for provenance of artwork, authenticity, royalty payments or for fractionalization.

However, six experts also pointed out that the application has not yet arrived in high-profile art and wealth management. One expert stated that the use cases would facilitate transparency and access to art, but that this is not wished by renowned galleries and auction houses as well as major collectors. They profit from the lack of transparency and the barriers to market entry and want to keep the field exclusive. Another expert said that a certain appeal is also lost through increased transparency.

*“Sometimes I use the phrase ‘selling dreams.’ If I know my artwork hung somewhere else in a major collector's place, it has a great meaning. It makes you feel special.
Do we always want or necessarily need everything to be confirmed in black and white? (...)
Do we want to know exactly where everything has been? Yes, if it turns out that it was at collector's house. But what if the artwork was just placed in storage the whole time?
Yeah, maybe not so great.”*

In addition, four experts confidentially stated that they believe that neither top galleries, nor renowned art consultants really understand the subject of DLT and its use cases.

Going further into the fractionalization of artworks the experts were asked whether they viewed fractionalization via security tokens or artworks which are stock-listed and investable via traditional shares as superior (Question 8). Expert 4, the co-founder of arttrade (an investment-platform for fractionalized contemporary art), stated that both procedures are similar and argues that the high costs and limited liquidity associated with IPOed art make it less appealing. He adds that the primary use case for democratization via stock-listing would be for very expensive artworks (>100 million EUR) and that these are very limited. Experts 1, 3, 5 and 8 generally shared this opinion, but they perceived stock-listed artworks as more appealing for conservative investors since they are enlisted in an established infrastructure. As a result, six experts mentioned the missing regulatory framework and the not yet existing secondary market as major disadvantages for offering fractionalization of artworks in the wealth management sector. Expert 3 agreed with this and questioned adequate pricing of the purchasable artwork:

“It all sounds great, for Gerhard Richter or blue-chip artists, but you always have to know whether the price is adequate. If it is such a great price, then I would buy 100% of the tokens as an arbitrage trader. (...) Other topic: what is the holding period? It's not fixed and these are very practical issues. What happens if it is only 90 percent sold?

How do I deal with the loss, or how do I get any money back at all?”

Overall, while there were reservations and practical challenges associated with fractional ownership of art via DLT, some experts believed it has the potential to revolutionize the art market by increasing access and liquidity. However, regulatory frameworks and unanswered questions need to be addressed before widespread adoption can occur.

On this topic, Experts 3 and 7 recommended the use of club deals in wealth management. Club deals allow participants to pool resources and jointly invest in high-quality artworks that may be out of reach for individual collectors. By combining financial strength, they can gain access to rare and prestigious pieces that might not be available in the open market. Spreading costs among multiple participants, each family can contribute a more manageable amount while still benefiting from co-ownership. An additional advantage is the joined expertise; wealthy families involved in club deals often bring diverse expertise and knowledge to the table. Collaborating with like-minded individuals who have a passion for art can foster a rich environment for exchanging insights, opinions, and perspectives. This can enhance decision-making processes and lead to more informed acquisitions. Wealth managers could work as intermediaries who bring like-minded individuals or families together and refer experts.

4.3 Porter’s Five Forces Industry Analysis

As previously stated, German wealth management is currently experiencing rising demand for alternative investments, driven by volatile stock markets, high inflation, and higher interest rates. This trend has led to numerous new providers offering innovative solutions in art management and art investments. Concurrently, German private banks and wealth managers are starting to embrace art investment solutions, presenting an opportunity for forward-thinking wealth managers to establish a competitive edge in this evolving market. Porter's Five Forces framework (2008) is useful for understanding market dynamics and to identify positioning.

Given the broad scope of the wealth management and art advisory sectors in Germany, this study specifically focuses on competition in art investment and management services for HNWI and UHNWI. Our conclusions apply insights gained from the expert interviews and the literature review.

1. Threat of new entrants: MODERATE

The German wealth management market is subject to extensive regulations, and the high levels of consumer trust and advisor reputation serve as significant barriers to entry. While establishing a comprehensive wealth management advisory service may prove challenging, new players such as established art advisors or new art investment platforms might seek joint ventures or cooperation with established wealth managers.

2. Bargaining power of suppliers: MODERATE

Established galleries, auction houses, and renowned artists wield significant bargaining power due to their reputations in the art market. However, pricing of assets like art, which are difficult to value, ultimately rests with the buyers. In an auction situation, the price setter is the second highest bidder. Hence, unrealistic monopolistic pricing is unlikely. Collaboration with respected wealth management firms offers unique opportunities to access a wealthy and exclusive customer base.

3. Bargaining power of buyers: HIGH

German HNWI and UHNWI enjoy a wide range of choices when it comes to art investing and general wealth management services. Declining customer loyalty, coupled with a growing demand for a comprehensive advisory approach, grant buyers strong bargaining power. Other wealth managers, established art houses, and innovative art investment platforms compete in this regard.

4. Threat of substitutes: HIGH

Traditional direct investments in art, primarily facilitated by auction houses and galleries, as well as innovative fractionalized investments through distributed ledger technology (DLT) or listed art shares, serve as direct substitutes. While the latter are still relatively new, no superior solution has emerged thus far. A further challenge is that valuations of DLT art works have declined from their period of initial hype. Other private markets and alternative investments, such as private equity, venture capital, real

estate, collectibles (E.g., wine, vintage cars, watches, coins, stamps, etc.) and their associated advisory services, also represent secondary substitutes.

5. Industry rivalry: HIGH

The conventional German wealth management market is experiencing significant competitive rivalry. However, market uncertainties, the presence of new innovative players, and emerging investment opportunities have intensified the competition. Consequently, more firms are targeting affluent investors.

Overall, the German wealth management market considerable challenges and opportunities due to the growing demand for art investments. The absence of in-house expertise in reporting, valuation, accounting, and the identification of promising investments means that no dominant market leader has yet emerged in Germany. Nevertheless, a wealth manager does not necessarily need to offer the best service but should incorporate art investment within their portfolio to provide a comprehensive advisory approach. Advisors who can provide art investment opportunities or possess a relevant network can differentiate themselves from competitors and gain a competitive advantage by addressing the needs of their clients.

4.4 Scenario Planning and External Factors

To assess future scenarios of art as an investment asset in WM the following stakeholders (Table 8) play a major role. Table 9 shows trends and uncertainties identified in the market based on the interviews and literature research, as well based on Porter's Five Forces analysis.

Table 8: Stakeholder for Scenario Planning

No.	Stakeholder
ST1	Investors (HNWI; UHNWI; private)
ST2	Wealth Manager
ST3	Entrepreneurs/ Innovators
ST4	Art advisor (auction houses, galleries etc.)
ST5	Private market funds (VC; PE; Hedge Funds)
ST6	Regulators
ST7	Central banks (FED; ECB)
ST8	Russia
ST9	Ukraine

Table 9: Trends and uncertainties effecting the art investment industry for German WM

Knowledge status	No.	Trend/ Uncertainty	Outcome: Positive (+); Negative (-)
Trend	T1	The art market will grow.	Positive (+)
Trend	T2	HNWI and UHNWI are increasingly interested in investing in art.	Positive (+)
Trend	T3	Wealth managers recognize diversification potential for 'traditional' portfolios via art investments.	Positive (+)
Trend	T4	Generation baby boomer prefer direct investment in art or fractional investment via stock-listed art.	Neutral (0)
Trend	T5	Generation millennials are indifferent towards frictional art investments via DLT or stock-listed art.	Positive (+)
Trend	T5	German WMs do not offer a holistic art investment advisory service.	Negative (-)
Trend	T6	Besides the investment approach, new technologies and DLT offer relevant use cases for the management of art.	Positive (+)
Uncertainty	U1	Will the war in the Ukraine continue and further geopolitics stay unstable?	Positive (+)
Uncertainty	U2	Will the leading central banks keep high interest rates due to high inflation?	Positive (+)
Uncertainty	U3	Will regulators clarify the taxation and auditing of digital assets?	Positive (+)
Uncertainty	U4	Will stock market returns remain moderate?	Positive (+)
Uncertainty	U5	Will trust and money flows into new German venture capital funds remain low?	Positive (+)

The correlation matrix is illustrated by Table 10 and shows a positive correlation for most uncertainties, while U3 is uncorrelated to all other uncertainties. According to Shoemaker, Table 11 shows the three scenarios ‘Optimistic’, ‘Base-line’ and ‘Adverse’, while the ‘Least-Surprising Scenario’ can be seen in Table 8.

Table 10: Correlation matrix for uncertainties

	UN1	UN2	UN3	UN4	UN5
UN1	X	++	0	+	+
UN2	X	X	0	++	+
UN3	X	X	X	0	0
UN4	X	X	X	X	+
UN5	X	X	X	X	X

Table 11: Learning scenarios

Scenario Type	Scenario Name	Description
Optimistic	Increasing demand in private markets	<p>There is no peaceful and constructive solution in sight in the Ukraine war (U1). At the same time, the conflict between China and Taiwan is intensifying. The tense geopolitical situation continues, as do high interest rates (U2). Due to the uncertainties and high investment costs, international corporations are continuing to cut costs, with the result that the stock market is in a highly volatile bear market (U4). The low liquidity of the market leads to the fact that German VC funds, especially in the later-stage area, have challenges procuring exits at favorable valuations. (U5).</p> <p>Wealthy investors feel the uncertainty and focus on asset diversification via alternative investments and high cash reserves. This favors investments in collectibles such as art and especially private equity and hedge funds.</p>
Base-line	Modular and niche adoption	<p>The Ukraine war will not end soon, but the situation will not escalate further (U1). Investments in renewable energies and the restrictive monetary policy ensures that inflation remains moderate (around 4%) and that the central banks do not raise the key interest rate further (U2). Big corporations stop their layoffs but do not start investing intensively again (U4). The stock market moves sideways and investors focus on value shares and bond investments. Art remains interesting for wealthy investors, but primarily via direct investments or stock-listed art. In the last-mentioned field, more providers are creating interesting investment opportunities. Lack of regulations for digital assets as well as volatile prices for cryptocurrencies ensure that fractional investments in collectibles via DLT are rather uninteresting for wealth management (U3).</p>
Adverse	Refocus on art as cultural assets	<p>The Ukraine war is settled peacefully, with Russia annexing small areas of Ukraine but committing to disarmament treaties and compensation to Ukraine in return. The U.S. assures Taiwan further support and Taiwan also negotiates free trade agreements and contracts with China for the supply of semiconductors (U1). The global supply of energy and semiconductors is restored. The restrictive monetary policy of the past 18 months lead to an inflation rate of about 1-2%. In response, the central banks lower the key interest rate again (U2). Increasing market liquidity leads to a bull market and to investments in private markets such as VC, PE and real estate (U4 + U5). Acquisitions of art are made by wealthy investors, but primarily for cultural reasons rather than as an investment strategy. Wealth managers thus tend to focus on providing art experts for investors and strategic collaborations with VC and PE funds.</p>

In Figure 15, the profiles of Learning Scenarios were displayed by the likelihood of "yes" responses.

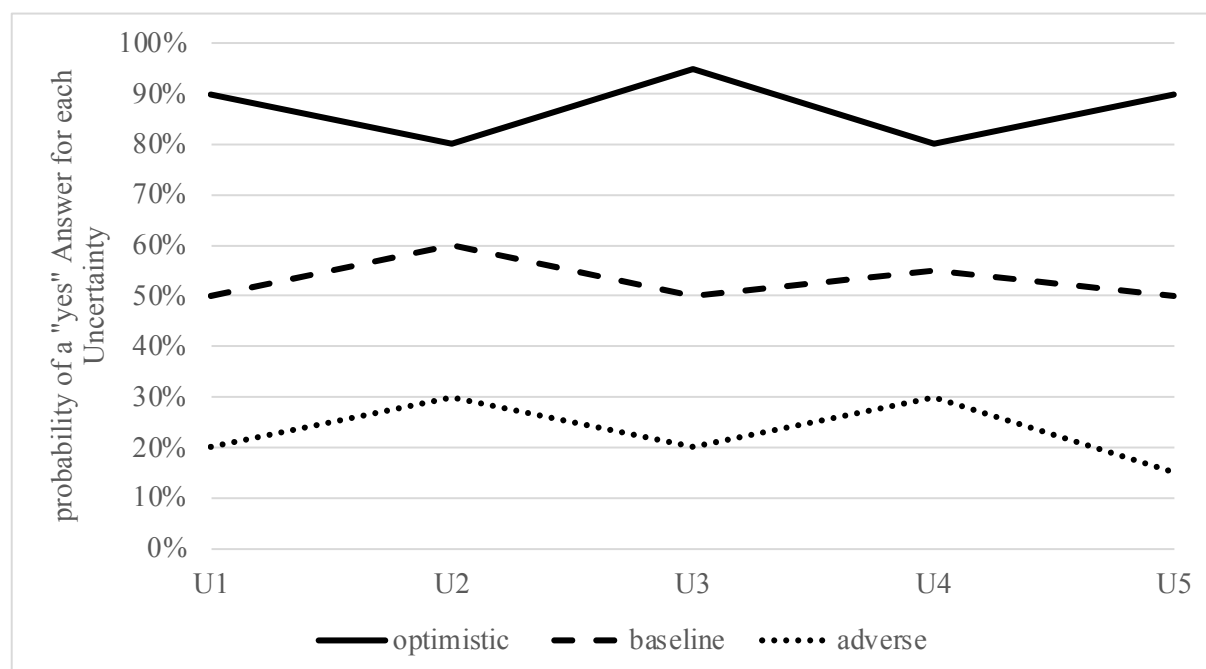


Figure 15: Probabilities of Uncertainties

A Least-Surprising Scenario that takes into account all trends and uncertainties with regard to the adoption of art investments in WM has now been developed based on the Learning Scenarios (Table 12). Thereby, the overview of the learning scenarios and their likelihood of “yes” responses from Figure 15 was extrapolated from the Least Surprising Scenario in Figure 16.

Table 12: Least-Surprising Scenario

Least-Surprising Scenario

The outcome of the ongoing war in Ukraine (U1) is unlikely to be determined within the coming year. Persistent high energy costs and supply shortages, particularly in the semiconductor sector, are expected to sustain elevated inflation, settling around three to five percent. Consequently, central banks will likely be unable to decrease the key interest rate (U2). However, substantial hikes in interest rates are improbable, and the key lending rate could be constrained at 5% (with the ECB key rate at 3.5% as of March 2023). This would lead to a stabilization in stock prices rather than triggering a new market surge, as investors adjust to the altered interest rate environment. Simultaneously, major technology companies are poised to achieve improved financial results once again, as evident from Q1 2023. The performance of prominent indices like the S&P500 and MSCI World is anticipated to move sideways with a slight upward trajectory (U4). Despite this, a strong preference for portfolio diversification remains, while the expanding art market (T1) continues to attract interest from High-Net-Worth Individuals (HNWIs) and Ultra-High-Net-Worth Individuals (UHNWIs) (T2). Nevertheless, the art market, as well as active direct investments for clients, still presents complexities and risks that dissuade wealth managers (T5). Instead, wealth managers are channeling their efforts into collaborations with experts and integrating art management solutions. This might involve incorporating authentication services and reliable art valuations into their portfolio management software (T6).

In the domain of fractionalized art investments, an increasing number of providers are entering the market, with no clear leader established yet. A preference between fractionalized investments through Distributed Ledger Technology (DLT) or stock-listed art has not yet emerged. While most investors recognize that fractionalization via security tokens is more cost-effective and offers advantages in terms of artwork authentication and provenance, uncertainties stemming from cryptocurrency price volatility, coupled with the absence of robust regulations on digital assets (U3), contribute to apprehension, particularly among older generations (T4 & T5). Other collectibles seem to evoke less interest.

The German startup and venture capital (VC) landscape is still grappling with challenges. Although price valuations are stabilizing, opportunities for exits through Initial Public Offerings (IPOs), Special Purpose Acquisition Companies (SPACs), or Mergers and Acquisitions (M&A) remain constrained. Venture capitalists can identify promising investments, but some of their portfolio companies may still carry overvalued valuations from previous fund cycles. Consequently, projected fund returns may not be attainable, and the attractiveness of later-stage VC investments could undergo temporary decline (U6). In contrast, the private equity market retains its appeal, while uncertainties persist regarding real estate investments. Although market prices are showing signs of moderation, rising financing and construction costs are factors to consider.

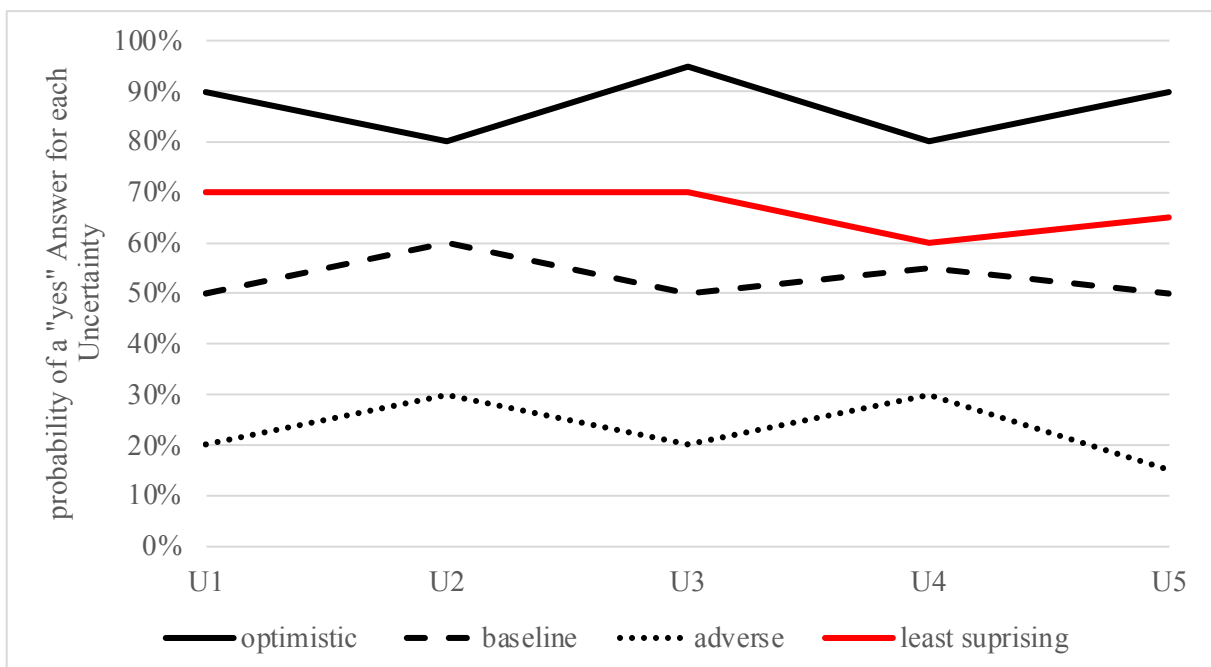


Figure 16: Probabilities of Uncertainties including Least Surprising Scenario

5. Interpretation and Discussion

5.1 Triangulation

1. the potential of art to optimize 'classic' portfolio strategies,
2. the adoption of DLT for art investment management,
3. the client demand for art investments in wealth management

Table 13: Triangulation of Research

Scope	Portfolio Optimization	Demand for Art Investments	DLT Adoption
Objective	Determine if art investments have the potential to optimize classic portfolios.	Determine if HNWI and UHNWI of the German market are interested in art investments.	Determine if the art industry or the WM industry is already adapting DLT use cases for investing and management of art.
Theoretical basis	Markowitz; CAPM; Core-Satellite Portfolio	/	IDT; First & second mover advantage; DC
Research Design	Quantitative analysis	Qualitative analysis	Qualitative analysis
Data Source	Secondary research; Company data; Expert interviews	Secondary research; Expert interviews	Secondary research; Expert interviews
Results	Art as a global asset class is not able to compete with a globally diversified equity portfolio or private markets such as PE or VC. However, different epochs such as contemporary or modern art show interesting performance potential. Moreover, the correlation of art to 'traditional' asset classes is low, contributing great potential for risk diversification.	Interest of wealthy people in art increases very strongly. Generation Z in particular, as well as investors from Asia, are allocating more capital to art. This observation has also been observed by German wealth managers, so they are preparing to offer more art advisory services. However, the motivation is not always the investment idea, but often the interest in art itself.	The results were very divided. Overall, it can be stated that there are already a variety of options on the art market for technical solutions (via DLT) for the investment and management of art. In the investment area via tokenization, the options are still partly too early-phased to address wealthy investors. For the management of art, it was hinted that many large art players are missing out on DLT potential, both consciously and unconsciously.
Additional insights gained	In addition to investing broadly in various works of art or art that appeals to subjective taste, there are various family offices that help investors build collections and also actively manage them. Like the Hong Kong based FO, artworks are actively lent to museums so that they increase in price. Alternatively, they rent them out to corporates or commercial exhibitions to generate a return on investment. Thereby, the value and prospective sale will be actively influenced.	Following the example of arttrade, art is a great way to organize customer events at WM. The reception is excellent and, at the same time, the costs are relatively low if these works of art have been purchased via club deals or exclusive tokens.	Various experts argue that the major art players deliberately do not adapt various DLT use cases. Transparency could harm the pricing monopoly and the mystic appeal of who already owned certain artworks.
Conclusion	Art is not expected to become the new superior asset class. Costs are too high, pricing too intransparent, and returns on average too low.	Demand for art is increasing for HNWI and UHNWI, yet holistic advisory services are not yet offered by WM. The competitive environment for	Recognition and implementation of DLT use-cases has been largely absent from major players as well as blue-chip art. Various

5.2 Competitive Advantage

Based on the literature review and expert interviews, it is evident that art holds considerable appeal as an asset for affluent investors. During periods of market volatility, a service provider can establish a competitive edge through an effective go-to-market strategy. However, the WM sector and its providers heavily rely on client trust (Miranda & Klement, 2009). Consequently, an inadequate strategy or advice leading to underperforming art investments can have detrimental effects on the entire company.

If a WM firm possesses the confidence to leverage the first-mover advantage, it is crucial to develop a comprehensive strategy.

Lieberman & Montgomery (1988) identify competencies such as "technological leadership, preemptive asset acquisition, and buyer switching costs" alongside the factor of "luck." In the subsequent sections, we will outline three strategies for attaining a competitive advantage through art investment offerings.

5.2.1 Competitive Advantage through active Art Portfolio Management

According to the interviews and the market research, there is no player on the German WM market that offers a fully integrated investment advisory service. Such a service could be organized along the example of the Zart Family Offices. As described by Expert 10, they offer the ability to develop their own collections, management of collections, as well as sale of works. A comprehensive service offering includes the following steps:

1. Curating and evaluating the artworks
2. Authentication of artworks
3. Advice on storage and insurance
4. Lending to museums and private exhibitions
5. Purchase and sale of artworks

Particularly, point 4 presents an intriguing opportunity for customers in the German WM market. If the artworks within a collection are deemed 'museum-worthy', or gains museum provenance, the overall value of the work increases. However, this necessitates expertise in curating and evaluating artworks, as well as a strong network with museums and established institutions in the art industry. If a WM provider is capable of offering such an in-house service and successfully establishes esteemed collections for clients, it would undoubtedly serve as a USP within the market.

The emotional connection that collectors develop with works of art is also likely to positively influence their response to other services offered (referred to as the "halo effect" - Leuthesser et al., 1995). This would enable the provider to exploit switching costs for clients compared to competitors and unlock cross-selling potential (Farrell & Shapiro, 1988).

A report on collectibles for 2022, prepared by UBS and Deloitte Private (Hechler-Fayd'herbe & Picinati di Torcello, 2022), highlights various trends in the industry. This insight effectively illustrates the complexities and requisite competencies involved.

1. "We should see increased support for climate solutions: Many of the world's leading auction houses, galleries and museums reaffirmed their commitment to carbon neutrality."
2. "Interest in African artists will continue: 70% of experts surveyed in ArtTactic's Global Art Market Outlook 2022 expressed a positive view on the African art market."
3. "We are witnessing a continued shift to the East, with new art market hubs emerging in Asia such as Seoul, which has become the new destination for the Frieze Art Fair and numerous blue chip western galleries. Tokyo is also a possible contender, as the Japanese government is in the process of creating a more favorable tax regime for the art market."

Besides complexities, it is difficult to acquire relevant competencies. According to Expert 8, established persons from auction houses, galleries or art consultants are less willing to work directly for a private bank or a WM. In the opinion of some art experts, the values of WMs do not align with those of fine art, so renowned personalities could suffer a loss of reputation. Nonetheless, if a provider succeeds in offering such a service in-house, these forms of risk cannot be ruled out.

A possible increase in trust and cross-selling potential through high quality services can also be adversely effected if financial performance is not considered adequate by customers. This strategy can therefore be described as 'high risk – high return'.

5.2.2 Competitive Advantage through Collaboration

An alternative risk-averse approach to achieve CA could involve strategic collaborations. For instance, UBS is recognized as a prominent player in the European wealth management (WM) market for art advisory, benefiting from a vast network of experts. Expert 4 from arttrade.io is presently developing a similar business-to-business (B2B) use-case specifically for the German WM sector. Their current offering involves fractionalized investments in contemporary artworks through security tokens. To maintain low administrative costs and a limited number of shareholders, they intentionally set the minimum investment amount at 1,000 EUR. According to their own statements, this approach fosters a deeper emotional connection with the product. Furthermore, arttrade.io is actively partnering with private banks and WM firms in the German market to develop exclusive investment products. WM providers would be able to offer fractional investment opportunities in artworks curated and tokenized by arttrade.io. Consequently, the WM firms can host exclusive exhibitions showcasing the artworks, leveraging them as networking events. A survey conducted by the German Private Banking Magazine (2019) revealed that WM firms consider their own events to be one of the most crucial marketing tools alongside their websites.

Wealth manager Rocco Damm (n.d.) emphasizes the importance of exclusivity in events, exemplified by his invitation to customers for a dinner prepared by Michelin-star chef Mario Patis at his office. Hosting proprietary exhibitions, as suggested by arttrade.io, proves to be particularly efficient in this scenario, given the high interest in art and cultural events and the relatively low costs involved since the artworks are owned by clients.

Nevertheless, offering fractionalized investments through security tokens issued by a newly established startup does carry certain risks. The market for tokens lacks sufficient depth to support a robust secondary market, a concern voiced by multiple experts as well.

Alternatively, the WM could act as an intermediary to bring families interested in the arts together for a club deal. For example, the bank could regularly present families interested in art with artworks to purchase, introduce them to each other, and then in turn network them with their experts. The works acquired over time could be exhibited again by the bank to this exclusive circle at customer events.

5.2.3 Competitive Advantage through Ecosystem Platform

One other potential approach for delivering comprehensive art consulting services to clients is through establishing an art ecosystem. According to Moore's concept (1996), an ecosystem refers to an economic community that produces valuable goods and services for customers, who are themselves members of the ecosystem. It facilitates alignment of investments, pursuit of shared visions, and identifying mutually supportive roles. Drawing inspiration from current practices of wealth managers (WMs) and private banks that facilitate connections between art-interested clients and experts, WMs can develop a holistic platform that integrates art investment and art management. An illustrative structure for such an ecosystem is depicted in Figure 17.



Figure 17: Art Ecosystem of a German Wealth Manager

To provide a seamless experience, the platform can be presented to customers as an all-in-one app, offering access to various services. The level of integration among these services may vary significantly. For instance, arttrade.io, the aforementioned provider, could potentially achieve full integration. Within the application, WM customers could purchase fractionalized products from arttrade.

Depending on the marketing strategy, the arttrade service could be integrated as a white label solution, allowing customers to maintain the familiar look and feel of the WM app. To address the concerns of investors regarding fractionalized art through security tokens, an interface to a provider offering investments in stock-listed art could also be implemented. Additionally, the platform could facilitate direct investments in art by integrating with Christie's or Sotheby's marketplace and offering a contact form for established art advisors. Table 14 provides a sample recommendation of the services to be included in the platform.

Table 14: Functionalities of a potential 'all-in-one' art app

Use-case	Level of integration	Use-case	Exemplary Service Provider
Fractionalized investments	White label full-integration	The customer can invest in fractionalized artworks, while staying in the WM app. All functionalities of the service provider are integrated as a white label.	Via security token: Artrade.io Via stock-listing: Artex
Established advisors	Contact form	Listing several established art advisors including a small description of their vitae and expertise as well as contact data. Customers can reach out via the embedded contact form or the provided contact data.	German market: Tilman Kriesel Global market: McCaslin Art Advisory
Auction Houses & Galleries	In-app integration marketplaces	Enables the usage of the provider's marketplace with limited functionalities, but included in the WM app.	German market: Galerie König Global market: Christie's
Art News	RSS Feed	In the news feed the app collects via RSI connection several art news for the German and global market.	German market: Art Marketing ARLT Global market: The Art Newspaper
Valuation Services	Contact form	List of local and global valuation service providers with their respective information, expertise as well as a contact form and hyperlinks.	German market: Van Ham Kunstauktion Global market: Sotheby's
Documentation & Digitization of Collection	API-Integration or white label	Customer can record the acquisition details, provenance, location information, conditions. Generating and sharing a variety of reports, including insurance and financial reports, catalogues, QR codes, shipping labels, and inventory sheets.	Artwork Archive
Portfolio Management Software	API Integration	By embedding an interface between the portfolio management software and the app, users can see their art investments in relation to their overall portfolio.	FinaSoft

Compared to the foregoing strategies, this approach is more comprehensive and long-term in nature. The development of such a platform requires significant investment of time and resources. Careful consideration must be given to the selection of partner providers to avoid any potential damage to the WM's reputation. It is important to note that the collaborating companies operate under their own name, meaning that any underperformance of in-house advisory services (as in strategy 1) would have more severe consequences.

By adopting a modular platform, a WM is well-equipped to navigate a dynamic market environment and can easily connect or replace additional service providers in response to market changes; this enables the WM to secure additional competitive advantage through use of resources as dynamic capabilities (Barreto, 2010). In addition to meeting the demand for art investment, the platform also addresses the need among wealthy investors for enhanced digital advisory services. According to a survey (Lewis & Celi, 2022), 34% of interviewed investors cited this as a motivating factor for switching WM providers.

5.3 Competitive Strategies in the Context of Management Theory

The aforementioned strategies for German WM are to be contextualized within the framework of strategic management theory. Thereby, potential advantages of a first- or second-mover advantage are to be compared, as well as whether the respective strategy prepares a WM for dynamic market conditions (Dynamic Capabilities). In addition, the strategies are evaluated according to potential reputational risk and potential competitive advantage. Based on the previous parameters, we evaluate the strategy according to the required competencies and to which category of WM player such strategy might fit. The results can be seen in table 15:

Table 15: Comparing strategies to gain Competitive Advantage in context of Management Theory

	Strategy 1 Active art portfolio management	Strategy 2 Collaboration	Strategy 3 Art ecosystem platform
First-mover Advantage vs. Second-mover Advantage	FMA An active art portfolio management along the lines of the Hong Kong based FO, would constitute an FMA. The network can be built up at an early stage, and cooperation agreements with consultants can be concluded on an exclusive basis.	/ There are no effects for SMA or FMA for working exclusively with art experts who are recommended to clients. It is difficult to transfer a time advantage into better services, and predecessors tend to make only small mistakes that can be learned from. Offering exclusive artworks with service providers like arttrade can be a USP and at the same time the customer events from it offer great cross-selling potentials. However, existing risks such as the lack of secondary trading or adequate valuation when acquiring tokenized works leaves potential open for SMA.	FMA Such a platform would currently be unique on the German market and would represent a USP. The technical implementation does not favor SMA, since such platforms are generally known on the market and are relatively easy to design technically. However, the time needed for such a complex platform, from conception to budget approval to rollout, offers opportunities for strategic positioning on the market.
Dynamic Capabilities	Low to moderate With the orientation to build up the necessary competence in-house, the company is very much focusing on a strongly growing demand. This scenario is quite realistic, but the company is not very well prepared for an inverse scenario. In addition, experts are needed who can advise on all markets or epochs or, alternatively, one has to focus on the supposedly most promising ones.	Moderate to high By focusing on various external partners, the company is excellently prepared for dynamic market movements. For each epoch or target region (which change in the trend) one can recommend individual experts. For risk-averse and technology-savvy clients, you can work with arttrade. For more conservative art-loving investors, it is preferable to bring together like-minded clients and facilitate club deals.	High Through the implementation of a modular platform, a wealth manager gains the necessary tools to effectively maneuver within a constantly changing market landscape. This enables them to seamlessly integrate or substitute supplementary service providers in accordance with shifts in the market.
Potential reputation risk	High	Moderate	Moderate
Potential Competitive Advantage	High	Moderate to high	High
Core Competencies	Appropriate strategy for WM, which has been working with established art consultants for years. Possible application by large investment banks, which can broadly distribute all advisory offers and cross-subsidize services. Or alternatively very exclusive and niche boutique WM, where art is already part of the DNA for a long time.	Ideal strategy for WM who are rather primary bank for their customers and maintain good relationships. Well selected experts can be recommended without overestimating their own competencies.	Although the exact art consulting does not take place in-house, such a costly and elaborate platform goes beyond the core competency of a traditional WM. Such a platform would mostly suit an international investment bank, who can roll-out and adapt the platform for different local markets. Ideally a bank who is already working in the art advisory industry.
Potential WM to adapt Strategy	Bigger investment banks: Deutsche Bank Boutique WM: Merck Finck	All kinds of WM	UBS

6. Conclusion

6.1 General Conclusion

This research assessed if art investment services offer competitive advantages for German wealth managers. By using a multi-method approach analyzing the question from three different perspectives, we discovered several indicators suggesting offering a holistic art advisory approach can be a strategic value-add.

Secondary research as well as the expert interviews have highlighted that the demand for art is increasing. In addition to art as a status symbol or the calming effect of art, wealthy investors indicate that the financial aspects are also interesting - art as a risk hedge or art for portfolio diversification. Wealth managers in the German and European market have already noticed this shift. At the same time, there is increasing competitive pressure in the market, as clients are more willing to change their WM provider for a better product offering.

Quantitative analysis and the secondary research could not show that the global art market can really outperform traditional asset classes or private markets like PE or VC. Nevertheless, several art proxies show an outstanding low correlation to traditional asset classes. This reinforces the theory of risk hedging and portfolio diversification and thereby for the core-satellite-strategy. This observation as well as diverse approaches of active art portfolio management in combination with an inefficient market, suggest great performance potentials when working together with savvy experts of the market.

To assess the potential of DLT for art investment and management, we extracted various use cases from secondary research and had them reviewed by experts. While the literature and the first innovation drivers praise the technology for determining provenance of artwork, authenticity, royalty payments or for fractionalization, most experts state that the use cases have not yet arrived in high-end art. Transparency and authenticity, for example, would harm the major players. Firstly, the market would no longer be so dependent on their valuation services. In addition, with the increased transparency, a certain attraction to art would be lost, because one might know 'too exactly' where the work was circulating before. Fractionalized investment, on the other hand, seems to be an exciting topic. Providers such as arttrade.io have already tokenized works and held exclusive customer events with German WM. The access to art created as well as the potentials of these customer events are very promising, however most experts had major concerns regarding more administrative issues such as the lack of a secondary market, the holding period of the works or what happens if a work was not fully sold.

Based on the research as well as the opinion of the experts, such use cases will grow, however the product may still be too early-stage for such a conservative market.

Subsequently, three different strategies were developed as to how a WM can proceed in order to incorporate art into its advisory offering. The strategies are very different in terms of the necessary resources and risk positioning and accordingly relevant either for large investment banks or rather for WM boutiques. In conclusion, it can be stated that the demand for art by wealthy investors as well as the pressure on WM providers is increasing. Thus, a holistic advisory offering including art advisory can represent a competitive advantage. Whether this advisory service includes innovative concepts by means of security tokens or a pure referral to art advisors depends on the core competencies of the WM and the resulting potential product market fit.

6.2 Limitations

By employing a triangulated analysis of primary and secondary data, it was possible to capture a high-level overview of current market sentiment, encompassing trends, benefits, and risks. However, it is important to acknowledge that this research is subject to limitations.

Firstly, the trends and opinions of wealth managers (WM) and wealthy investors in the secondary research are derived from market reports provided by banks and consulting firms operating in the field. While these surveys offer access to a larger and often hard-to-reach sample group, it is important to consider the potential positivity bias (Hoorens, 2014) that may arise from research parties that offer art advisory or wealth management services.

Secondly, the sample group for the eleven expert interviews was relatively small for a cross-sectional study. Experts from the fields of art, wealth management, and technology were carefully selected to ensure a broad perspective on the topic. Among these experts, nine were from German-speaking countries, one was a wealth manager from Hong Kong, and one was a DLT expert from Portugal. While the additional expertise from Hong Kong provided valuable insights from a different market, it reduced the sample size for the German market.

Thirdly, there may be varying levels of understanding regarding key issues. It can be assumed that art consultants have more expertise in art than in wealth management and distributed ledger technology (DLT) experts. While the questions were tailored to each target group, generic questions were still posed.

Finally, conducting quantitative analysis based on real art market performance is challenging. Unlike the global stock market, which has widely accepted proxies such as MSCI World or S&P 500 indices, there are no universally recognized public proxies for the art market.

Artnet and Sotheby's offer several paid indices, but none are considered the standard. Therefore, our quantitative analysis relied on Artnet's calculated key performance indicators (KPIs), which were provided by one of the interviewees. Unfortunately, the given correlation coefficients could not be tested for significance using a T-test. Lastly, as previously discussed in scenario planning, art as an asset class is heavily influenced by macroeconomic factors.

6.3 Further Research

There are four distinct research areas that are relevant to consider. Art falls under the category of collectibles, which historically has received more attention compared to other assets such as jewelry, watches, and cars. However, in recent years, these other assets have gained importance, and it may be appropriate to conduct a deeper analysis to determine if they generate similar interest among high-net-worth investors.

Furthermore, this paper emphasizes the emergence of various providers offering fractionalized investments in art. Despite this, wealthy investors have been slow to adopt this due to factors such as lower exclusivity, regulatory uncertainties, etc. Hence, it would be interesting to explore these factors for lower-net-worth investors (net worth < 300,000 EUR).

Another significant research field pertains to new technologies. During this study, new use cases involving artificial intelligence (AI) and machine learning have been published and made accessible to the public. Considering the Innovation Diffusion Theory, investigating the potential of AI is of great interest. For instance, some teams are currently working on AI-based authentication solutions (Batycka, 2022) and using AI for stock market price predictions (Mintarya et al., 2023).

As mentioned, using indexes poses certain challenges since they often reflect the best sales figures of artworks, while losses in value are not adequately represented in the data set. Given that the art market is information-inefficient, it would be interesting to assess the track record of renowned art advisors in relation to broad art indices or art funds.

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Appendices

Appendix A: Fees SuperRare Marketplace

