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Evaluating Wealth Management Firms Using Grey Relational Analysis: A Comparative Study

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ABSTRACT

Wealth management is a comprehensive financial service designed to meet the needs of high-net-worth individuals (HNWIs) or families by managing their assets and achieving long-term financial goals. It integrates various financial disciplines, including investment management, estate planning, tax strategies, retirement planning, and risk management, under a holistic approach. A wealth manager serves as a trusted advisor, offering personalized financial solutions tailored to the client's financial objectives, risk tolerance, and life circumstances. Services can include portfolio diversification, succession planning, and philanthropic strategies to preserve and grow wealth across generations. Wealth management emphasizes proactive financial planning to address both current needs and future uncertainties. It also considers non-financial aspects, such as lifestyle planning and legacy building, making it a vital service for clients seeking a strategic, all-encompassing approach to securing and enhancing their financial well-being.

***Research significance**: The significance of research in wealth management lies in its ability to optimize financial strategies and improve decision-making for clients. Research enables wealth managers to analyze market trends, assess risk factors, and develop personalized solutions tailored to individual financial goals. It ensures informed investment strategies, efficient tax planning, and effective risk mitigation. research helps identify innovative financial products and emerging opportunities, keeping wealth management practices adaptive to economic and regulatory changes. By integrating data-driven insights, wealth managers can enhance portfolio performance, maximize wealth preservation, and address the evolving needs of clients, ultimately ensuring long-term financial stability and growth.*

***Methodology**: Grey Relational Analysis (GRA) is a method used to investigate the relationship between many factors, particularly when data may be limited or unclear. It assesses the patterns of similarity or difference between variables to determine the degree of association between them. In complex systems like engineering, finance, and management, GRA enables decision-makers to identify key players, prioritize actions, and improve processes. By transforming qualitative and quantitative data into grey numbers, GRA tackles ambiguities and provides insightful information for decision-making, problem-solving, and performance enhancement in a variety of fields, enabling more informed and effective decision-making techniques.*

***Alternative**: Morgan Stanley Wealth Management, UBS Global Wealth Management, Merrill Lynch Wealth Management, Goldman Sachs Private Wealth Management, J.P. Morgan Private Bank, Charles Schwab Wealth Management, Vanguard Personal Advisor Services, Fidelity Wealth Management.Evaluation preference: AUM (Trillions USD), Client Satisfaction, Investment Product Diversification, Avg. Management Fee (%), Min. Investment (Million USD).Results: From the result it is seen that Vanguard Personal Advisor Services is got the first rank whereas is the J.P. Morgan Private Bank is having the lowest rank.*

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Introduction

The financial management industry, contrasting AI-powered options with conventional services. For customers with complex needs, traditional wealth management depends on individualized financial planning, professional guidance, and human engagement. Nevertheless, these services are often expensive and not scalable. AI-powered wealth management, on the other hand, makes use of sophisticated algorithms and data analysis to provide scalable, effective, and reasonably priced services that are available to a larger spectrum of customers. Notwithstanding these advantages, questions remain over the level of personalization and the reliance on data in AI solutions. the optimum strategy would be a hybrid model that incorporates the advantages of both conventional and AI-based approaches. This model would combine the effectiveness of AI with the individualized attention and knowledgeable advice that customers value. [1]The financial markets and economy of Taiwan have changed significantly. Consumer banking, corporate banking, wealth management (WM), and investment banking are the four primary divisions of the banking industry.

The WM industry must be actively promoted in order to produce risk-free returns. In order to support this, banks have adopted management strategies that increase their competitiveness and WM services' organizational structure has been upgraded. Finding a reliable way to evaluate WM banking's performance has become crucial given the environment's competitiveness. However, aside from legal concerns, regulators and industry associations frequently ignore important aspects that could impact WM banks' competitiveness when assessing them. The balanced scorecard is a useful instrument for strategic management and performance evaluation in many businesses. [2]A specialty of investment management targeted at wealthy individuals and families is private wealth management. It offers a more advanced approach than the financial planning of the 1980s and covers both complex personal financial planning and taxable investment management. The word private highlights the close-knit, consultative relationship that successful wealth managers build with their customers. Private wealth management offers customized solutions for customers' intricate investing needs, in contrast to institutional money management or asset management, which primarily concentrate on a uniform investment mandate for all investors (such as mutual funds).

It entails a thorough, integrated approach that considers the client's entire financial status, including their complex tax profile, changing assets and obligations, and the impact of behavioral biases. Private wealth management stands out as a discipline that encompasses more than just asset management because of its all-encompassing approach. [3]Private wealth management has grown to be a very lucrative industry for banks and asset managers globally throughout the past ten years. The industry for wealth management is being driven by this asset growth, which gives wealth advisers additional chances to use new technology to draw in customers and boost revenue. Because of this, competition between wealth advising companies is getting more fierce, with an emphasis on bolstering current client connections and providing new technologies to increase advisor productivity. Although tax-planning tools are readily available in the private banking sector to evaluate the financial circumstances of high-net-worth individuals operating abroad or in different tax jurisdictions, financial simulation software frequently has major drawbacks and is unable to satisfy the demands of a sophisticated clientele. [4]This paradigm is in line with contemporary portfolio theory and is based on developments in behavioral economics and finance. We find a particular portfolio that is suited to the objectives of every investor using a simple geometric method. Our approach, which is more efficient than conventional approaches, calls on investors to express their objectives in detail. By using efficient portfolios, this innovative strategy can improve advisor-client communication and result in better financial advice that increases the likelihood that clients will meet their goals. Investors typically view "risk" as the possibility of not achieving their objectives, even though the financial sector, advisors, and scholars frequently describe it as the standard deviation of the portfolio. This distinction is significant because, for instance, lowering standard deviation risk in an underfunded portfolio may actually make investors more vulnerable to failing to meet their objectives. We contend that GBWM ought to take into account risk from both the investor's goals-based perspective and the conventional portfolio perspective. [5]The practice of modifying the portfolio management procedure to take into consideration different limitations pertaining to an investor's liabilities is known as asset-liability management, or ALM.

These techniques are especially made to incorporate an investor's particular time horizon, objectives, and limits into the portfolio building process. We feel that our model offers a significant step toward a fuller understanding of private wealth management, despite its simplification and lack of consideration for elements like taxes and mortality risk (which could be addressed in future study). The investor's particular limitations and objectives might be summed up in this variable. As opposed

to externally imposed obligations like those in pension funds, we define liabilities broadly in the context of private wealth management to encompass any self-imposed commitments or spending goals. An investor who plans to buy real estate in the future, for example, would have a "soft liability," or a future financial commitment that necessitates having money on hand

when needed. [6]Artificial intelligence is changing how people work in a number of industries, including communication, education, healthcare, travel, and now money management. AI-powered services have been integrated by numerous wealth management companies to offer clients investing advice whenever it is most convenient for them. These AI-powered services are impartial, transparent, affordable, and simple to use. Because these services are provided by machines, which are comparable to robots, they are called "robo-advisors."

the evolution, necessity, and promise of the robo-advisory paradigm in wealth management. Although robo-advisors are not widely used at the moment, they have a lot of potential for the future. Over time, they become more cost-effective by eliminating the need for human consultants, even though the early expenses may be high. Additionally, because robo-advisors use quantitative and systematic analysis, they offer better informed decision-making. The purpose of this essay is to investigate the possibilities of robo-advisors in wealth management, as well as their present situation and potential prospects. [7]One facet of financialization that has been extensively studied is the increasing integration of people's everyday life into the global financial system. The way that financial elites interact with financial services, however, has received less attention. This study examines the private wealth management industry, which has developed to serve this demographic, by combining research on retail financial systems and financial elites. It is maintained that comprehending financialization and its disparate geographic effects requires examining the development and composition of this new financial ecosystem, which is based on novel research on private wealth management companies. The next section looks at how studies on retail financial ecologies, financial consumption patterns, and financial elites might be combined to shed light on how these individuals relate to the provision of retail financial services. The growth of the private wealth management industry is then discussed, with special focus on the technologies developed to segment this industry based on income and geography. Organizational and regional differences in high net worth (HNW) retail financial ecologies are documented in the fourth and fifth parts, which include new empirical research on private wealth management ecologies in the UK. [8]It covers all facet of a person's financial actions, thus it goes beyond simply

offering investing advice. The rivalry for clients has been more fierce as more financial institutions are providing WM services. Despite a large body of literature on the subject, little study has been done on giving customers' considerations while selecting WM services priority, even though financial institutions must recognize and cater to their demands. The fall of Lehman Brothers, which marketed structured notes to investors that suffered large losses through financial businesses, was a severe blow to WM services' reputation after the 2008 financial crisis. Given the sharp fall in the WM business, it is particularly critical to determine the elements that prospective clients value most when choosing WM services. [9]Commercial banks in the People's Republic of China have been growing their wealth management services, which have grown quickly. Along with the diversity of products, earnings have also increased. More than 83 domestic and foreign banks raised RMB 4 trillion in 2009, more than 400% more than the previous year, in both local and foreign currencies for wealth management products. By the end of 2008, the total balance of wealth management products was RMB 823.3 billion. The China Banking Regulatory Commission (CBRC) reports that as of July 2009, the industry has over 4,100 wealth management products, over RMB 700 billion in invested money, and 2.3 million clients as of May 2009. The global financial crisis had a major effect on wealth and banking systems across the globe. In response, China published a Notice in April 2008 to tighten regulations on wealth management services provided by commercial banks, including policy clarification and inspections. According to the CBRC (2008), wealth management firms were becoming more risky, with certain banks being more vulnerable to damage to their reputation. A few banks saw significant losses and a rise in client complaints as a result of the financial crisis and the domestic capital market's instability. They were exposed to increased legal and reputational risks as a result. In July 2009, following the crisis, the CBRC inspected banks' wealth management products and found problems with risk disclosure and product design. [10]family's assets, whose worth varies over time, is commonly referred to as wealth management. money management is an academic field that focuses on how to efficiently create and maintain money, protect and keep it, and transfer it while getting ready for retirement and transitions. Islamic wealth management incorporates both portfolio management and Islamic financial planning. Individual requirements and concerns are addressed via financial planning, a part of wealth management. After looking through a number of academic publications, we can pinpoint the following fundamentals of Islamic wealth management: First, using riches to purge oneself of greed and develop one's faith while asking Allah for benefits. Secondly, meeting obligations to one's family. Third, fulfilling societal duties like paying taxes. Contributing to economic growth, increasing productivity and efficiency, and funding research and development are the fourth productive duty. Fifth, making voluntary contributions to societal goals like eradicating ignorance and poverty. [11]

Figure 1.

It can be difficult to handle the intricacies of wealth management, particularly when there are numerous investments, goals, and stakeholders to consider. However, keeping and increasing substantial wealth is a high-stakes game for high-net-worth individuals managing a team of advisors or family office executives managing a family's finances. Developing and adhering to a long-term strategy is essential to streamlining the procedure and improving wealth management effectiveness. a guide for creating an annual money management calendar and a thorough family wealth strategy. Families and family office executives may discover that implementing these tactics enhances decision-making and lowers the possibility of mistakes. Additionally, arranging money and working with financial consultants can make it easier to evaluate a family's financial situation, assist in establishing long-term goals, and gauge how well their investment strategies are working.

[12]Even with limited financial resources, we provide a dynamic programming technique that maximizes investor outcomes across several, possibly incompatible goals (such home improvements, college tuition, or retirement income maintenance). In contrast to the widely utilized Monte Carlo simulations in reaching each objective and choosing the right investment portfolio. Even with several goals that cover various or overlapping time periods and may be all-or-nothing or permit partial fulfillment, this method may be computed rapidly. It also determines the likelihood of reaching each objective (completely or partially) in the best-case scenario, allowing the investor to make sure the algorithm fits their goals. [13]Long-term wealth preservation and growth for clients is WM's main goal. Although these services have long been provided by financial institutions in North America and Europe, emerging market companies have only recently started to offer WM services. Understanding the elements influencing clients' decisions is essential to persuading them to use WM services. In order to determine these parameters, researchers employed the AHP decision model. Customers who are presently using or are thinking about utilizing WM services were surveyed to see how important these factors and alternatives are in relation to one another. The results indicate that customers place the most value on service quality, which is followed by product offerings and the company's reputation. HNWIs are particularly worried about the risks connected to the products that WM service providers offer, according to additional research based on customer characteristics.

Therefore, WM services should concentrate on developing products with lower risk and acceptable returns in order to draw in HNWIs. [14]Drawing from our own ethnographic study on philanthropy and wealth management as well as views from wealth managers and philanthropy advisers, Since it aims to defend the ultra-wealthy's enormous wealth accumulation, we propose that advocating family charity as a "succession planning strategy" is a reflection of philanthrocapitalism. However, we see the rhetoric of philanthrocapitalism being redirected inward, concentrating on elite family dynamics and attempts to persuade younger generations to embrace the shared objective of maintaining family wealth, within the activities of wealth managers and philanthropic advisers. It should be noted that we are not suggesting that succession planning is a top priority for philanthropic elites. During our investigation, we came across philanthropists who were obviously motivated to address societal concerns and fight poverty. Understanding the seeming contradiction between pursuing these objectives and utilizing philanthropy to promote inheritance is our issue.[15]The need for comprehensive family wealth management (FWM) services has increased including the rise in wealthy families, significant wealth transfer across generations, unstable financial markets, frequent changes in tax rules, and the complexity of planning and transactions. Nonetheless, the majority of recent advancements in advisory systems concentrate on the investment or financial facets. Furthermore, current systems lack proactive/reactive skills, rich interactions, adaptability, and autonomy in problem-solving. For FWM systems, a novel Web-service-agent-based design is suggested. The distributed, dynamic, and complex nature of FWM processes is managed by agent technology, whilst Web-service approaches enhance interoperability and scalability in networked business environments. This approach combines Web services with agent technology to offer a more complete, flexible, independent, and intelligent solution for FWM. A prototype system is also shown to illustrate the benefits of the proposed Web-service-agent-based FWM architecture and its commercial value. [16]International economic activity had a sharp decline as a result of the global financial crisis, which started in the middle of 2007 and lasted into 2008. Prominent economists believe that this financial crisis is the worst since the Great Depression. The financial and economic elements associated with the U.S. subprime mortgage crisis and the ensuing worldwide financial turmoil, which caused serious economic difficulties in numerous nations, have been the subject of numerous studies. During the global financial crisis, for example, Aloui et al. (2011) looked into the degree of the extreme dependency and contagion effects between emerging markets and the U.S. market. Chudik and Fratzscher (2011) also examined and contrasted the ways in which a decline in risk appetite and tighter liquidity conditions contributed to the worldwide crisis. These research focused on financial risk, regulatory consequences, and how government policies affect financial markets. Building on these findings, the current study aims to investigate the financial crisis by developing a more comprehensive framework for assessing financial performance in the wealth management (WM) banking sector in Taiwan. It accomplishes this by focusing on the financial market architecture and performance metrics following the crisis. [17]

Description: In my role as a Senior Software Engineer at Northern Trust, I steered the development and implementation of Saphyre's patented AI technology to streamline operational support from pre-trade through post-trade in line with Northern Trust's Whole Office strategy. The overarching goal of this project was to achieve the automation of the account opening process for investment manager clients of Northern Trust's Investment Operations Outsourcing (IOO) business.The project encompassed a wide range of objectives, such as integrating Northern Trust's internal applications with an API call to Saphyre's AI Initiative, validating the account creation processes and maintaining the client accounts. I lead the efforts for training

Saphyre's AI Models with Northern Trust client investments interests and available investments options restricted to the client based on the historical and projected revenue.One of the key challenges we faced was training Saphyre's AI Model with the available investments. To train the AI model with several investment options, consolidated investment options were gathered under the client's investment genres and the same was validated after API Integration. Since Saphyre is a third-party application call from Northern Trust's Global Fund Services (NTGFS), a fallback mechanism was developed to alert Northern Trust about the downtime of the Saphyre and handle the error gracefully without collapsing the integrated internal application.

Throughout the project's duration, my responsibilities included:

Design Saphyre's Integration with NTWM (Northern Trust Wealth Management): I designed the end-to-end architecture of Northern Trust's Global Fund Services (NTGFS) integration with an API call to Saphyre's AI Initiative.

Implementation of AWS: The integrating application was hosted on AWS and the Saphyre's API was whitelisted on the hosting AWS server.

Coordinating efforts: Since Saphyre is a third-party application, there were massive communication and coordination efforts, monitoring and Error handling mechanisms.

Technical leadership: Segmenting the requirements and identifying the technical prerequisites at wealth management application level.

Defining Quality Assurance Strategy: Validated the account creation process based on the client requirements using Lambda test.

Security enhancements: Securely transport Client PI to Saphyre's API over an encrypted http call to create the account and correct any vulnerabilities in the process.

Materials & Methods:

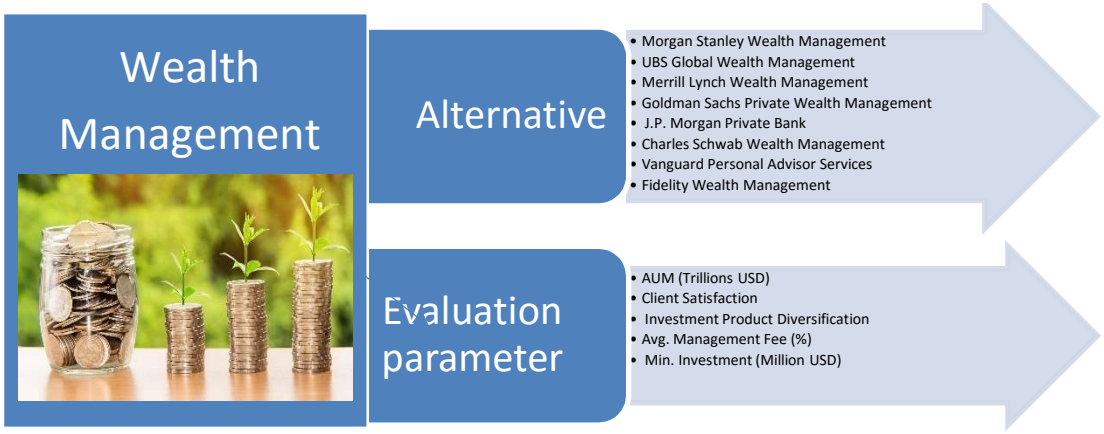

Figure 2. Materials

Alternative

1. **Morgan Stanley Wealth Management**

A major player in wealth management, Morgan Stanley is a multinational provider of financial services. The company provides a wide range of services, such as financial planning, estate planning, tax optimization, investment consulting, and philanthropic guidance. Morgan Stanley Wealth Management serves a broad spectrum of customers, including institutions and wealthy individuals. A wide range of investment products, such as stocks, fixed-income securities, alternative investments, and private equity, are utilized by its advisors. The company is also well-known for its cutting-edge solutions, which enable clients to monitor their investments in real-time and include digital platforms and financial planning software.

2. UBS Global Wealth Management

With a vast network of advisers in major financial hubs across the globe, UBS Global Wealth Management is a top supplier of wealth management services. With an emphasis on individualized financial advising, retirement planning, tax and estate planning, and other areas, the firm provides customized services for individuals, families, and foundations. With solutions for handling multi-jurisdictional tax and legal concerns, UBS takes pride in its proficiency in international wealth management. Additionally, the firm provides access to exclusive investing options, specifically in hedge funds, private markets, and direct startup investments.

3. Merrill Lynch Wealth Management

Merrill Lynch Wealth Management, a branch of Bank of America, provides a variety of wealth management services to wealthy customers. The company provides estate planning, retirement planning, investment management, and personalized financial planning. Merrill Lynch is well known for offering in-depth analysis and insights into international markets, enabling customers to make wise investment choices. Merrill Lynch also provides digital tools that give customers a comprehensive picture of their financial situation by integrating account information. The firm's team-based approach to wealth management demonstrates its dedication to building personal relationships with its clients.

4. Goldman Sachs Private Wealth Management

Goldman Sachs Private Wealth Management is well known for its proficiency in providing services to extremely wealthy people and families. With access to the company's top-notch research, investment products, and private equity opportunities, Goldman Sachs provides advanced wealth management techniques, such as retirement planning, philanthropic advising, and estate and tax planning. Along with risk management, the firm specializes in custom investing solutions, frequently adjusting portfolios to match each client's particular financial objectives and risk tolerance. Goldman Sachs is able to provide unique chances that other wealth managers are not usually able to due to its significant presence in investment banking and international financial markets.

5. J.P. Morgan Private Bank

As a division of JPMorgan Chase, J.P. Morgan Private Bank offers UHNWIs individualized wealth management solutions. It provides a wide range of services, such as credit and financing solutions, tax strategies, estate planning, investment management, and philanthropic advice. J.P. Morgan is renowned for its capacity to offer all-encompassing strategies that take into account a client's whole financial environment. The company's global presence, which allows clients to access global markets and invest in a variety of assets like hedge funds and real estate, is a clear indication of its proficiency in private banking.

6. Charles Schwab Wealth Management

One of the top companies in the wealth management industry, Charles Schwab serves both wealthy customers and individual investors. The primary goals of Schwab Wealth Management are estate planning, retirement counseling, investment management, and comprehensive financial planning. The company provides access to a variety of investment options, such as index funds, exchange-traded funds (ETFs), and individual stocks, and places a strong emphasis on transparency and affordable investing. Schwab's wealth management division is a popular among clients who appreciate control and personalization in their financial planning because it offers strong online tools and resources as well.

7. Vanguard Personal Advisor Services

One of the biggest investment management companies in the world, Vanguard is renowned for its proficiency with index funds and emphasis on low-cost investing. Vanguard Personal Advisor Services offers clients personalized financial plans that are tailored to their individual objectives, including estate planning, retirement, and funding for school. The company's investing philosophy is based on passive investment strategies, especially low-cost index funds and exchange-traded funds (ETFs), which complement the long-term wealth-building objectives of its clients. With its clear fee schedule and focus on financial planning, Vanguard enables customers to collaborate with a group of financial advisors to develop a customized investment plan.

8. Fidelity Wealth Management

A well-known provider of financial services, Fidelity helps both people and institutions manage their resources. The company offers investment management, retirement planning, tax optimization, estate planning, and individualized financial consulting. To provide clients with individualized solutions, Fidelity Wealth Management combines technology and human advisors. Clients can access research and planning tools as well as track investments through its powerful digital platform. Additionally, Fidelity is renowned for its research and insights, especially for individuals looking to create diversified portfolios that strike a balance between risk and return.

Evaluation preference: AUM (Trillions USD), Client Satisfaction, Investment Product Diversification, Avg. Management Fee (%), Min. Investment (Million USD).

1. Assets Under Management (AUM)

One important indicator of a wealth management company's size and performance is its assets under management (AUM). The total market value of the financial assets that a company manages for its clients is referred to as AUM. This number is frequently used as a gauge of the company's standing in the market and financial stability. For large global wealth managers, AUM can be represented in trillions of US dollars (USD).Companies with AUMs in the trillions, such as UBS Global Wealth Management, J.P. Morgan Private Bank, and Goldman Sachs Private Wealth Management, for instance, demonstrate their broad clientele and capacity to draw sizable sums of money from institutional and high-net-worth individuals (HNWIs). A high AUM typically signifies that the firm has a strong reputation in the wealth management sector and is trusted by a diverse clientele. AUM by itself, however, does not always equate to better performance because it also depends on client connections, investment strategies, and service quality.

2. Client Satisfaction

A key indicator of a wealth management company's performance is client satisfaction. It shows how well the company satisfies the expectations of its customers in areas including communication, investment performance, individualized financial planning, and customer service. Surveys, evaluations, and client feedback are frequently used by wealth managers to gauge client happiness; long-term partnerships and client retention are positively

correlated with high satisfaction levels.Advisors at companies with high client satisfaction rates typically engage with clients on a regular basis, offering individualized guidance and customized investment plans. A pleasant client experience is also influenced by a high degree of transparency, clear communication, and prompt response to client questions. Client satisfaction is also often increased by businesses that make investments in strong digital platforms that let customers obtain financial advice and track investments in real time.

3. Investment Product Diversification

The variety of investment possibilities that a wealth management company provides to its customers is referred to as investment product diversity. By distributing investments over several asset classes, sectors, and regions, a diversified portfolio reduces risk. A wide range of financial products, such as stocks, bonds, mutual funds, exchange-traded funds (ETFs), private equity, real estate, hedge funds, and commodities, are often offered by top wealth managers.Businesses offering a wide range of products, such as UBS and Goldman Sachs Private Wealth Management, are able to provide highly customized investment strategies to fit the objectives, risk tolerance, and preferences of each individual customer. Businesses that provide fewer products, on the other hand, might not be as adaptable when it comes to building customized portfolios. High-net-worth clients, who could have particular preferences for alternative investments or international exposure, should pay particular attention to diversification. Additionally, UHNWIs looking for high-risk, high-reward prospects are drawn to companies that provide access to private markets, hedge funds, or direct investments in startups.

4. Average Management Fee (%)

The percentage of assets that wealth management companies charge to manage a client's portfolio is known as the average management fee. Depending on the kind of business, the complexity of the services, and the magnitude of the client's investment, fees might differ significantly. The fees that wealth managers charge are usually determined by the assets under management (AUM) and can vary from 0.25% to more than 1% annually. Because they provide individualized services and custom investment strategies, high-net-worth firms like Merrill Lynch Wealth Management and J.P. Morgan Private Bank frequently charge higher fees.Although individualized services and access to unique assets may justify a higher fee structure, it is crucial for clients to determine whether the quality of the services and the results outweigh the expense. More competitive fee structures may be offered by certain companies, especially those that concentrate on low-cost solutions, such as Vanguard or Charles Schwab. In order to keep customer expenses low, low-fee businesses could rely on more passive investment techniques like index funds and exchange-traded funds (ETFs).

5. Minimum Investment (Million USD)

The minimal amount a client must invest in order to be eligible for wealth management services from a firm is known as the minimum investment requirement. The minimum investment requirements for elite wealth management companies that serve UHNWIs can be significant, frequently beginning at $1 million or more. Because they offer complete financial planning, access to exclusive investment possibilities, and personalized services, firms such as J.P. Morgan Private Bank and Goldman Sachs Private Wealth Management frequently have high minimum investment limits.Because of their reduced costs and wider market emphasis, more accessible companies like Fidelity or Charles Schwab may have a lower minimum investment requirement. A client's service needs may also affect the minimum investment amount. A client utilizing a digital wealth management service or robo-advisor, for example, might have a lower minimum investment than one seeking individualized wealth management guidance.

Grey Relational Analysis (GRA) Method

A technique used to address issues related to data envelopment analysis in facility management is Grey Relational Analysis (GRA), also known as Gray Correlation Analysis. It is especially helpful when layout and dispatch rules are involved in the decision-making process. Sequential translation, the main method used to demonstrate GRA's practical use, is a step-by-step comparison of various performances. The first step in this process is associated formation, in which several performances are assessed one after the other. Correlation coefficients can then be calculated by comparing the gray values that reflect these performances to a reference row. Lastly, coefficients, reference sequences, and relative quality evaluations for every comparison sequence are used to link these gray values. [18]GRA can be used to optimize the characteristics of the drilling process, particularly the workpieces' surface roughness and burr height. This is accomplished by using an orthogonal sequence in the experimental design in conjunction with grey-related analysis. Several performance factors, such as surface hardness and burr height, can be identified and adjusted in compliance with pertinent standards by using grey analysis of machining parameters. It's important to highlight the paucity of published studies that use grey-related analysis to evaluate how cutting settings affect various performance metrics. [19]Since its introduction by Deng in 1989, researchers have extensively investigated gray relational analysis as a means of optimizing a variety of process characteristics. Applications include everything from shape analysis and die-sinking EDM machining to figuring out the best settings for yield stress and elongation in injection molding polycarbonate composites. In order to display and improve analysis results, particularly in turn functions, researchers frequently combine the Taguchi method with grey-related analysis. Grey relational analysis has shown useful in enhancing machining parameters through the optimization of processes such as final dry grinding for high purity graphite and extrusion for particle-reinforced materials. [20]Grey correlation analysis takes a weighted average technique and takes into account a number of variables in practical applications, especially when making decisions like ordering items. This approach compares data sets both locally and internationally at various levels. Its flexibility in adjusting different model parameters, which lowers the possibility of adverse system impacts, is one of its main advantages. This work presents a

domain-combination technique designed for the Grey correlation analysis model by using ordered pairings and connecting the generated domains. [21]Gray correlation analysis (GRA) is used by the Istanbul Stock Exchange (ISE) to rank the shares of companies that are part of the financial sector index. GRA is well known throughout the world for its capacity to preserve hierarchical systems while guaranteeing market comparability. All criteria are allocated evenly as decision parameters in order to maintain fairness. However, modifications could be required to preserve accuracy and equity when working with intricate decision models that entail weighing performance attributes across several hierarchical levels. [22]Gray correlation analysis (GRA), which is closely related to selection analysis, is essential for honing wastewater treatment alternatives. It excels at handling challenging circumstances, such as handling ambiguous or incomplete data. GRA is an essential part of gray system applications, particularly when dealing with complex relationships between multiple performance parameters. GRA skillfully manages interdependencies by maximizing the interactions between various aspects to improve overall effectiveness. [23]By using the Taguchi technique as a performance indicator for gray relative quality, gray relational analysis is applied to problems related to turning functions, offering a way to determine the best cutting settings. This methodology comprises a detailed investigation of cutting and turning parameter selection to evaluate machine performance during operational activities, followed by an initial evaluation of optimization utilizing the Taguchi method and gray relational analysis. [24]The process of adjusting electrode wear to a standardized gray level, known as correlation formation, in gray correlation analysis begins with a baseline of zero. The methodical approach of employing gray relational analysis to determine the best machining parameters is described, which eventually leads to the selection of the best machining parameters while accounting for a variety of performance factors. [25]As demonstrated by primary data, the advantages of using the Grey Relational Analysis (GRA) method are firmly rooted in the field of multi-attribute decision making (MADM), particularly in correlation analysis (GRA). The necessary calculations are straightforward and easy to comprehend. GRA is regarded as one of the most effective methods for facilitating managerial decision-making in corporate contexts.Gray relational analysis is used in the improvement of wire electrical discharge machining (WEDM) for processing reinforced materials in order to determine parameters related to different functional characteristics, including hardness throughout 203 particles, maximum surface area, and surface removal rate. This method takes into account shear stress as well as important variables including feed rate, depth of cut, cutting speed, and machining time. [26]

Step 1. Design of decision matrix and weight matrix

For a MCDM problem consisting of m alternatives and n criteria, let $D = x_{ij}$ be a decision matrix, where $x_{ij} \in R$

$$D = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \quad (1)$$

Step 2. Normalization of decision matrix

The normalization of two types of data i.e., better when higher type or better when lower is evaluated using equation 2 or 3respectively. After normalization the data ranges from 0 to 1.

$$M_{ij} = \frac{N_{ij} - \min(N_{ij})}{\max(N_{ij}) - \text{mi}\ \ (N_{ij})} \quad (2)$$

$$M_{ij} = \frac{\max(N_{ij}) - N_{ij}}{\max(N_{ij}) - \min(N_{ij})} \quad (3)$$

Where $i, j = 1,2,3, \cdots, n$

Step 3. $Deviation = the \max value\ after\ normalization - value\ of\ the\ current\ row$ (4)

Step 4. Calculation of Gray relation coefficient

$$C_{ij} = \frac{\Delta_{min} - \xi \Delta_{max}}{Current\ value \quad \Delta_{max}}, where\ \xi\ is\ distinguishing\ coefficient \quad (5)$$

Step 5. Calculation of Gray relation grade

It's the average of Gray relation coefficient.

Result And Discussion

Table 1. Wealth Management

	AUM (Trillions USD)	Client Satisfaction	Investment Product Diversification	Avg. Management Fee (%)	Min. Investment (Million USD)
Morgan Stanley Wealth Management	1.4	8.7	9.0	1.2	1.0
UBS Global Wealth Management	3.2	8.5	8.8	1.0	2.0
Merrill Lynch Wealth Management	2.8	8.3	8.5	1.4	1.5
Goldman Sachs Private Wealth Management	2.1	9.0	9.5	1.1	10.0
J.P. Morgan Private Bank	2.3	8.6	8.7	1.3	5.0
Charles Schwab Wealth Management	0.7	8.8	8.2	0.8	0.1
Vanguard Personal Advisor Services	1.6	8.9	8.4	0.3	0.1
Fidelity Wealth Management	1.2	8.4	8.1	0.9	0.1
zeta	0.5				

The table provides a comparative analysis of leading wealth management firms based on five key metrics: Assets Under Management (AUM), client satisfaction, investment product diversification, average management fee, and minimum investment requirement. UBS Global Wealth Management leads in AUM with $3.2 trillion, followed by Merrill Lynch and J.P. Morgan. Goldman Sachs Private Wealth Management scores the highest in investment product diversification (9.5) but has the highest minimum investment requirement of $10 million, making it less accessible. Vanguard Personal Advisor Services offers the lowest management fee (0.3%) and one of the lowest minimum investment requirements ($0.1 million), making it an attractive choice for cost-conscious investors. Charles Schwab and Fidelity also have low minimum investments and fees, appealing to a broader client base. Client satisfaction scores are relatively high across the firms, with Goldman Sachs ranking the highest at 9.0. The firm labeled “Zeta” has an AUM of 0.5 trillion, but no additional data is provided, making its market position unclear. The analysis suggests that firms with lower fees and investment minimums cater to a broader audience, while those with higher thresholds target ultra-high-net-worth individuals with specialized services.

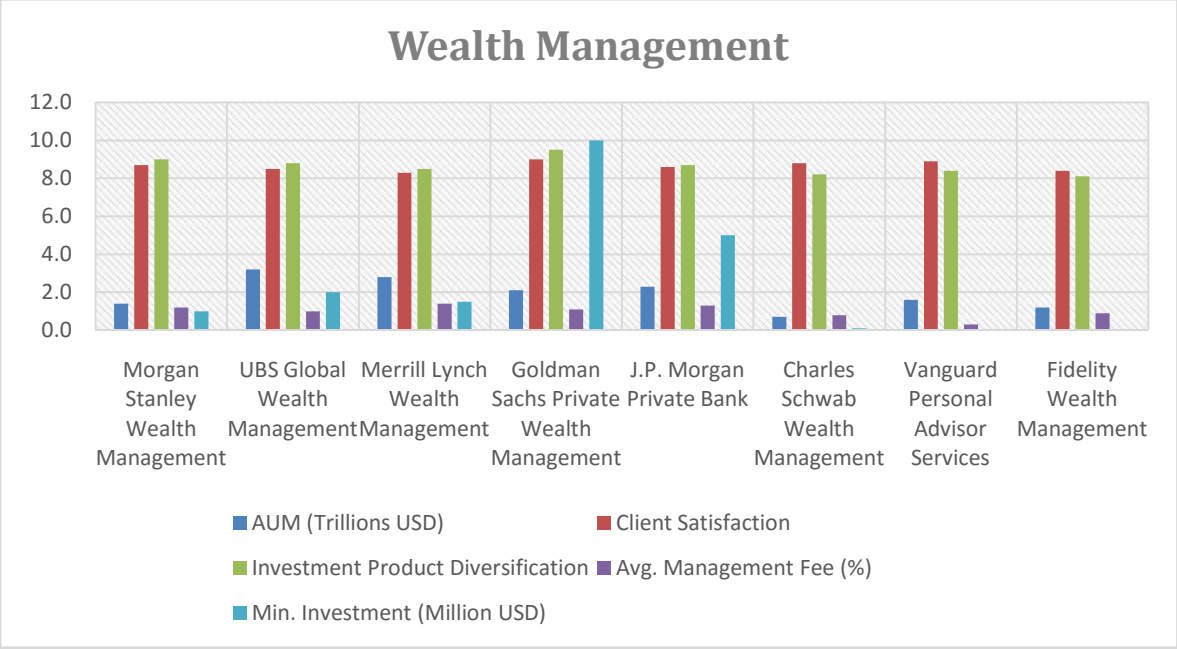

Figure 3. Wealth Management

The figure3 Wealth Management compares various financial firms based on multiple metrics, including Assets Under Management (AUM) in Trillions USD, Average Management Fee (%), Minimum Investment Requirement (Million USD), Client Satisfaction, and Investment Product Diversification. Each firm—such as Morgan Stanley, UBS, Merrill Lynch, Goldman Sachs, J.P. Morgan, Charles Schwab, Vanguard, and Fidelity—is assessed across these factors. AUM (Blue Bars): J.P. Morgan and Goldman Sachs exhibit the highest AUM, suggesting extensive financial management capabilities. Avg. Management Fee (Orange Bars): The fees remain relatively high across firms, indicating premium wealth management services. Min. Investment (Yellow Bars): Goldman Sachs and J.P. Morgan require the highest minimum investments, making them more exclusive. Client Satisfaction (Gray Bars): Client satisfaction is generally high, with most firms scoring around 8 or above. Investment Product Diversification (Gray Bars): Most firms show a strong diversification in investment products, reinforcing their comprehensive offerings. This chart provides insights into the strengths of each wealth management firm, helping investors choose based on their financial goals, fees, and satisfaction levels.

Table 2. Normalized Data

Normalized Data				
AUM (Trillions USD)	**Client Satisfaction**	**Investment Product Diversification**	**Avg. Management Fee (%)**	**Min. Investment (Million USD)**
0.2800	0.5714	0.6429	0.1818	0.9045
1.0000	0.2857	0.5000	0.3636	0.8040
0.8400	0.0000	0.2857	0.0000	0.8543
0.5600	1.0000	1.0000	0.2727	0.0000
0.6400	0.4286	0.4286	0.0909	0.5025
0.0000	0.7143	0.0714	0.5455	0.9950
0.3600	0.8571	0.2143	1.0000	1.0000
0.2000	0.1429	0.0000	0.4545	1.0000

The normalized data table 2 presents a scaled comparison of wealth management firms based on their Assets Under Management (AUM), client satisfaction, investment product diversification, average management fees, and minimum investment requirements. In this table, values are normalized between 0 and 1, making it easier to compare relative standings. UBS Global Wealth Management has the highest AUM (1.0000), while Charles Schwab Wealth Management has the lowest (0.0000). Goldman Sachs Private Wealth Management leads in both client satisfaction (1.0000) and investment product diversification (1.0000), highlighting its strong market reputation and broad investment offerings. However, it has the lowest minimum investment requirement (0.0000), indicating accessibility to ultra-high-net-worth clients. Vanguard Personal Advisor Services has the highest normalized management fee (1.0000), reflecting its cost-efficiency in real values. Charles Schwab and Fidelity have high minimum investment values (0.9950 and 1.0000, respectively), suggesting they require lower capital for entry. Merrill Lynch Wealth Management scores the lowest in client satisfaction (0.0000), which may indicate room for improvement in customer experience. Overall, this table helps in understanding how each firm positions itself across different criteria, with some excelling in client satisfaction and diversification while others focus on affordability and accessibility.

Table 3. Deviation sequence

Deviation sequence				
AUM (Trillions USD)	**Client Satisfaction**	**Investment Product Diversification**	**Avg. Management Fee (%)**	**Min. Investment (Million USD)**
0.7200	0.4286	0.3571	0.8182	0.0955
0.0000	0.7143	0.5000	0.6364	0.1960
0.1600	1.0000	0.7143	1.0000	0.1457
0.4400	0.0000	0.0000	0.7273	1.0000
0.3600	0.5714	0.5714	0.9091	0.4975
1.0000	0.2857	0.9286	0.4545	0.0050
0.6400	0.1429	0.7857	0.0000	0.0000
0.8000	0.8571	1.0000	0.5455	0.0000

The deviation sequence table 3 provides a comparative analysis of wealth management firms based on their AUM, client satisfaction, investment product diversification, average management fee, and minimum investment requirement. In this table, values represent the deviation from the average for each metric, offering insights into how each firm compares to the industry norm. Charles Schwab Wealth Management stands out with the highest deviation in AUM (1.0000), indicating a significant deviation from the average. It also has a notably low minimum investment requirement (0.0050), making it more accessible than many competitors. Goldman Sachs, despite its high client satisfaction (1.0000), exhibits significant deviations in both investment product diversification (0.0000) and management fee (0.7273), which suggests it may focus on a narrower range of products and a higher fee structure compared to others. Vanguard Personal Advisor Services demonstrates a low fee (0.0000) but ranks low in client satisfaction (0.1429), highlighting a potential area for improvement in customer experience. Merrill Lynch excels in client satisfaction (1.0000) but also has a high deviation in fees (1.0000), which could reflect its higher-cost services. Overall, the table highlights differences in how firms balance client satisfaction, investment options, fees, and accessibility. Firms like Vanguard and Fidelity prioritize low fees and minimum investment thresholds, while others like Merrill Lynch and Goldman Sachs focus more on premium services.

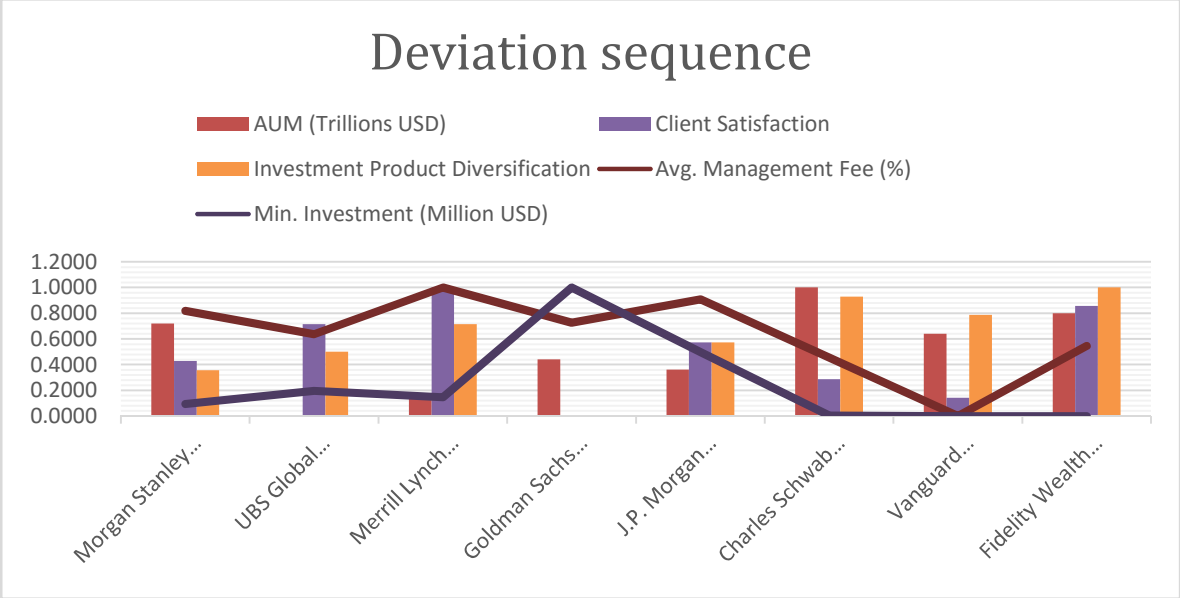

Figure 4. Deviation sequence

The figure 4 Deviation Sequence presents a comparative analysis of wealth management firms based on key financial performance indicators. It includes Assets Under Management (AUM) in Trillions USD (Orange Bars), Client Satisfaction (Yellow Bars), Investment Product Diversification (Green Bars), Average Management Fee (%) (Dark Brown Line), and Minimum Investment Requirement (Million USD) (Light Brown Line).The bar chart elements highlight the relative strength of each firm across these parameters. For example, firms like Charles Schwab and Fidelity Wealth Management show high investment product diversification, while Morgan Stanley and J.P. Morgan exhibit strong AUM. Meanwhile, Merrill Lynch demonstrates a peak in client satisfaction compared to others.The line graphs representing minimum investment and management fees reveal fluctuations, with Goldman Sachs and J.P. Morgan requiring higher minimum investments while Vanguard and Fidelity maintain lower barriers.This deviation sequence helps visualize disparities in offerings and fee structures among firms, indicating which wealth managers are more accessible and which cater to ultra-high-net-worth clients. Investors can use this data to select firms that align with their financial goals, balancing AUM, client satisfaction, and cost efficiency.

Table 4. Grey relation coefficient

Grey relation coefficient				
AUM (Trillions USD)	**Client Satisfaction**	**Investment Product Diversification**	**Avg. Management Fee (%)**	**Min. Investment (Million USD)**
0.4098	0.5385	0.5833	0.3793	0.8397
1.0000	0.4118	0.5000	0.4400	0.7184
0.7576	0.3333	0.4118	0.3333	0.7743
0.5319	1.0000	1.0000	0.4074	0.3333
0.5814	0.4667	0.4667	0.3548	0.5013
0.3333	0.6364	0.3500	0.5238	0.9900
0.4386	0.7778	0.3889	1.0000	1.0000
0.3846	0.3684	0.3333	0.4783	1.0000

The grey relation coefficient table 4 quantifies the relationships between different wealth management firms based on five criteria: AUM, client satisfaction, investment product diversification, average management fee, and minimum investment requirement. The coefficients reflect the strength of each firm's alignment with the industry average for these factors. A coefficient of 1.0000 indicates a perfect match, while lower values represent deviations from the average.Goldman Sachs Private Wealth Management has a high coefficient in investment product diversification (1.0000), suggesting it offers a broad array of products, while its client satisfaction score (0.3333) indicates room for improvement. Vanguard Personal Advisor Services exhibits a strong alignment with low management fees (1.0000), making it a cost-effective choice, though its AUM and other factors show moderate deviation. Charles Schwab Wealth Management has relatively low deviation in most categories, with a particularly high coefficient in minimum investment (0.9900), signaling its accessibility and low entry barriers.Firms like UBS and Merrill Lynch demonstrate balanced coefficients across multiple metrics, reflecting their ability to offer competitive services, but with less specialization in any one area. The grey relation coefficient analysis allows for a nuanced view of how each firm stands relative to others, helping investors identify which characteristics are most aligned with their needs, whether in terms of costs, investment variety, or service accessibility.

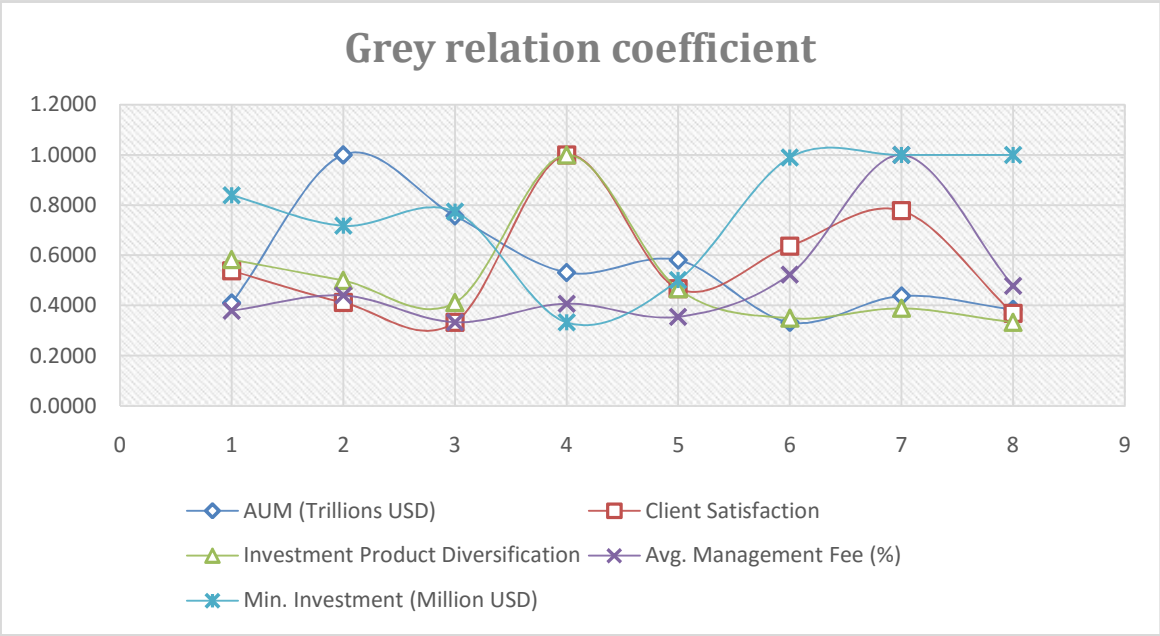

Figure 5. Grey relation coefficient

The figure 5 Grey Relation Coefficient visualizes the relationship between key financial indicators of wealth management firms using multiple plotted lines with different markers. The five variables analyzed include Assets Under Management (AUM) in Trillions USD (Blue Diamonds), Client Satisfaction (Orange Squares), Investment Product Diversification (Gray Triangles), Average Management Fee (%) (Yellow Crosses), and Minimum Investment Requirement (Million USD) (Blue Stars).This analysis helps identify the correlation and influence of these factors on overall performance. The oscillations in the curves indicate fluctuations in these parameters among different firms. For example, the blue star-marked line (Minimum Investment Requirement) shows sharp peaks and valleys, suggesting significant variability across firms in entry-level investment criteria. Similarly, client satisfaction (orange squares) follows an upward trend in certain areas, indicating firms with stronger customer approval ratings.The grey relation coefficient method is typically used to determine the strength of relationships among multiple variables. In this case, it helps investors and analysts identify which firms strike a balance between AUM, fees, client satisfaction, and investment diversification. A higher correlation among these factors can indicate firms that provide a strong mix of financial performance and customer value. This chart serves as a powerful tool for decision-making in wealth management selection.

Table 5. GRG & Rank

	GRG	Rank

Morgan Stanley Wealth Management	0.5501	5
UBS Global Wealth Management	0.6140	3
Merrill Lynch Wealth Management	0.5221	6
Goldman Sachs Private Wealth Management	0.6545	2
J.P. Morgan Private Bank	0.4742	8
Charles Schwab Wealth Management	0.5667	4
Vanguard Personal Advisor Services	0.7211	1
Fidelity Wealth Management	0.5129	7

The GRG (Grey Relation Grade) and rank table 5 provides a final assessment of wealth management firms based on their overall performance across various factors, as indicated by their GRG scores. The GRG values represent the relative closeness of each firm to the optimal performance across the metrics, with higher values indicating better overall alignment with the desired characteristics.Vanguard Personal Advisor Services leads the table with the highest GRG of 0.7211, reflecting its strong performance in key areas such as management fees and minimum investment requirements, making it an attractive option for cost-conscious investors. Goldman Sachs Private Wealth Management follows closely with a GRG of 0.6545, ranked second, suggesting it excels in investment product diversification and client satisfaction, despite its higher fees. UBS Global Wealth Management ranks third with a GRG of 0.6140, indicating a balanced offering but slightly less aligned with the optimal performance.Other firms, such as Charles Schwab (ranked 4th) and Morgan Stanley (ranked 5th), show moderate GRGs, reflecting competitive performance but room for improvement in specific areas. J.P. Morgan Private Bank, with the lowest GRG of 0.4742, ranks 8th, suggesting it may face challenges in aligning with investor preferences in terms of cost and investment accessibility. This table helps investors identify firms that strike the best balance of factors according to their priorities.

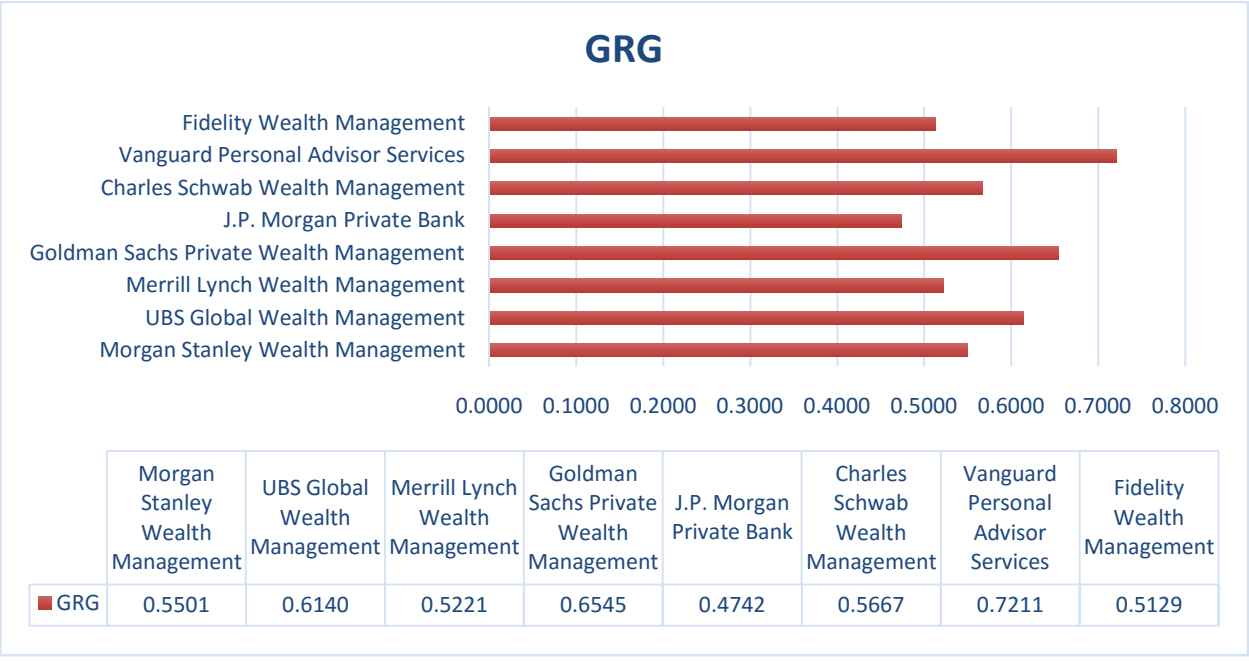

Figure 6. GRG

This figure 6 the GRG (Growth Rate Grade) scores for eight major wealth management firms. The data is presented in both a horizontal bar chart and a corresponding data table below.Vanguard Personal Advisor Services leads the pack with the highest GRG score of 0.7211, followed closely by Goldman Sachs Private Wealth Management at 0.6545 and UBS Global Wealth Management at 0.6140. These top performers suggest they have demonstrated superior growth rates relative to their peers in the wealth management sector.In the middle tier, Charles Schwab Wealth Management shows a solid performance

with a score of 0.5667, while Morgan Stanley Wealth Management and Merrill Lynch Wealth Management maintain respectable scores of 0.5501 and 0.5221 respectively. Fidelity Wealth Management scores 0.5129, placing it in the lower-middle range of the group.J.P. Morgan Private Bank has the lowest GRG score at 0.4742, though it's worth noting that even this lowest score is still above the 0.4000 mark, indicating that all firms in this comparison maintain relatively strong growth performance. The relatively tight range of scores (between 0.4742 and 0.7211) suggests that while there are clear leaders and laggards, the wealth management industry maintains fairly consistent growth standards across major institutions.

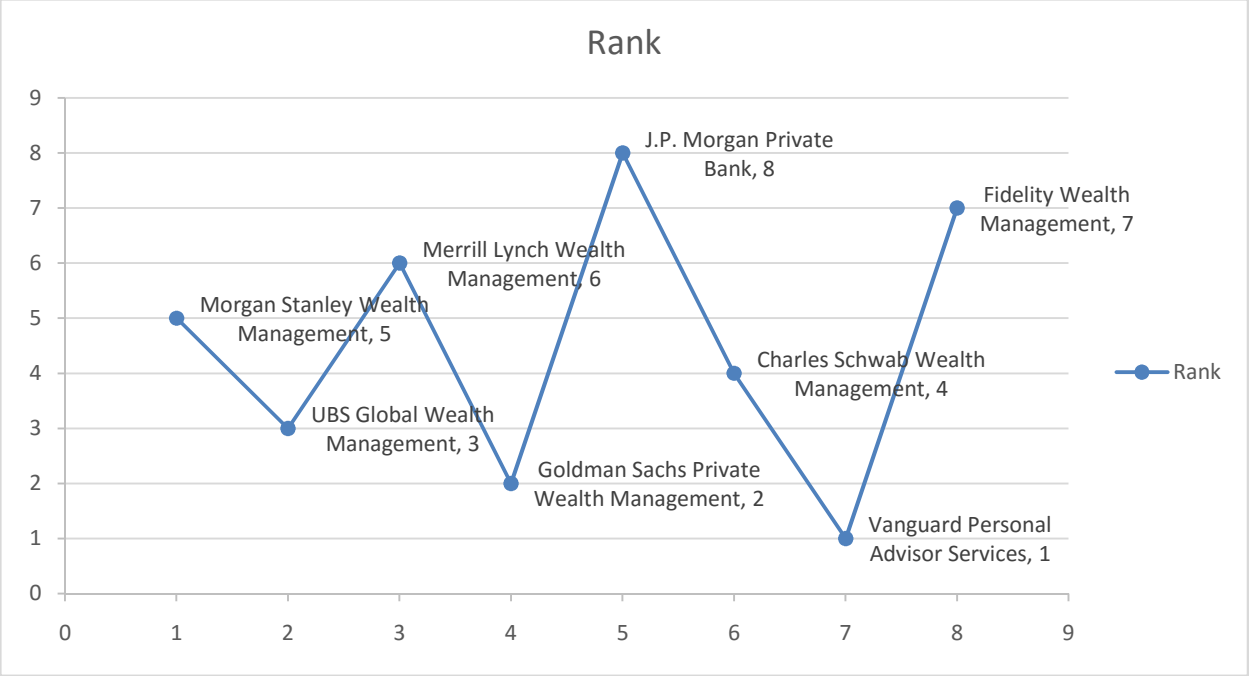

Figure 7. Rank

This figure 7 shows the ranking of eight major wealth management firms, where a lower rank number indicates better performance (1 being the best, 8 being the lowest ranked).Vanguard Personal Advisor Services achieves the top rank (1), which aligns with its highest GRG score from the previous chart. Goldman Sachs Private Wealth Management follows at rank 2, and UBS Global Wealth Management holds rank 3, maintaining their strong positions from the GRG analysis.In the middle rankings, Charles Schwab Wealth Management sits at rank 4, followed by Morgan Stanley Wealth Management at rank 5, and Merrill Lynch Wealth Management at rank 6. These positions largely correspond to their respective GRG scores, though with some slight variations in order.At the lower end of the rankings, Fidelity Wealth Management places at rank 7, and J.P. Morgan Private Bank occupies the lowest position at rank 8. The graph's zigzag pattern visually emphasizes the varying performance levels across these institutions. It's particularly notable that J.P. Morgan Private Bank's lowest ranking is consistent with its lowest GRG score from the previous analysis, while Fidelity's position near the bottom represents a slight divergence from its mid-range GRG score.The ranking provides a clear hierarchical view of these wealth management firms' relative performance, though it's important to note that being included in this elite group of eight major firms is itself a marker of significant industry standing.

Conclusion

wealth management is a multifaceted service that combines various financial disciplines to meet the unique needs of high-net-worth individuals (HNWIs). With an emphasis on achieving long-term financial goals, wealth management addresses portfolio diversification, risk management, estate planning, tax strategies, and retirement planning, all while taking into account non-financial aspects like lifestyle planning and legacy building. The role of a wealth manager extends beyond financial advice, as they act as trusted advisors, providing personalized solutions tailored to their clients' specific financial circumstances, objectives, and risk tolerance. Given the complexities involved in wealth management, research plays a crucial role in improving financial decision-making, optimizing strategies, and ensuring sustained wealth preservation and growth.The integration of research in wealth management helps financial advisors assess market trends, identify risks, and develop customized financial solutions for clients. By utilizing data-driven insights, wealth managers can refine investment strategies, plan taxes more efficiently, and adapt to emerging opportunities and economic shifts. Furthermore, research allows

wealth managers to evaluate financial products more effectively, ensuring that clients receive tailored services that reflect their current needs and future aspirations. The significance of research lies in its potential to enhance portfolio performance, manage risks, and optimize wealth preservation across generations.Grey Relational Analysis (GRA) serves as an innovative tool in wealth management, offering valuable insights to wealth managers and clients alike. GRA is particularly useful when data is limited or unclear, which is often the case in the financial industry where numerous factors influence investment decisions. GRA assesses relationships between multiple variables, enabling decision-makers to understand the degree of association between different factors. In wealth management, GRA can be applied to analyze market trends, evaluate financial products, and enhance decision-making by transforming qualitative and quantitative data into grey numbers. This approach reduces ambiguity and offers a clearer picture of how various factors influence wealth management outcomes.By employing GRA, wealth managers can identify key drivers of performance, prioritize actions, and enhance decision-making in an uncertain financial environment. This method aids in making more informed, objective, and effective decisions, ultimately benefiting both the wealth manager and the client. In the context of wealth management firms, GRA can provide valuable insights into factors such as Assets Under Management (AUM), client satisfaction, investment product diversification, management fees, and minimum investment requirements. These parameters are critical for evaluating the performance and attractiveness of different wealth management firms, offering a comprehensive assessment of each firm's capabilities and offerings.In this research, various wealth management firms were evaluated based on several criteria, including AUM, client satisfaction, investment product diversification, management fees, and minimum investment amounts. The results highlighted that Vanguard Personal Advisor Services achieved the highest ranking, reflecting its strong performance across multiple metrics, including client satisfaction and product diversification. On the other hand, J.P. Morgan Private Bank received the lowest ranking, suggesting that it may need to refine its offerings or adjust its strategies to better meet client expectations.The rankings derived from this analysis underscore the importance of a holistic approach to wealth management, where multiple factors must be considered to deliver optimal results for clients. In particular, AUM, client satisfaction, and the range of investment products offered are key determinants of a wealth management firm's success. The analysis also shows that wealth management firms must balance competitive management fees with personalized services that cater to the unique needs of high-net-worth individuals.wealth management is a dynamic and complex field that requires constant adaptation to changing economic conditions, client needs, and regulatory frameworks. By leveraging advanced methods like Grey Relational Analysis, wealth managers can make more informed, data-driven decisions that enhance their clients' financial well-being and ensure long-term growth. As this research demonstrates, utilizing such techniques not only improves decision-making but also enables wealth management firms to refine their services, strengthen client relationships, and ultimately, stay ahead in a highly competitive market.

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