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From Human Judgment to Algorithmic Finance: The Transformation of Financial Decision-Making

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The Evolution of Financial Decision-Making

-In the past, financial decision-making was primarily based on human judgment and personal expertise. Financial professionals such as bankers, investors, and analysts relied heavily on:

- Human intuition
- Experience
- Personal relationships
- Economic judgment

-Decisions were often influenced by subjective opinions and limited access to information. Financial markets operated at a slower pace, and most investment or lending decisions were made through direct human evaluation.



-With rapid technological advancement, the financial industry experienced a major transformation. The rise of computers, digital platforms, and internet technologies enabled financial institutions to process enormous amounts of information quickly and efficiently.

-Key technological innovations included:

- Advanced computing systems;
- Digital banking platforms;
- Big data analytics;
- Machine learning algorithms



Characteristics of Traditional Financial Decision-Making

Traditional financial decision-making was largely dependent on human expertise and professional judgment. Financial decisions were typically made by experienced professionals, including:

- Bankers
- Financial analysts
- Traders
- Portfolio managers

Financial professionals relied on a combination of quantitative and qualitative information, including:

- Fundamental analysis of companies and markets;
- Economic indicators such as inflation, unemployment, and GDP growth
- Market sentiment and investor behavior
- Personal expertise and professional experience



Advantages/Limitations of Traditional Financial Decision-Making

Despite technological limitations, traditional finance offered several important strengths:

- Greater flexibility in unusual or uncertain situations;
- Strong contextual understanding of market conditions;
- Ability to consider ethical and social factors;
- Human creativity and strategic thinking;
- Relationship-based trust between financial institutions and clients;

However, traditional financial decision-making also had several weaknesses:

- Human bias and subjective judgment;
- Emotional reactions such as fear and greed;
- Slower processing and analysis of information;
- Higher probability of human error;
- Limited ability to analyze large volumes of data



Digital Transformation of Financial Markets

-The financial industry has undergone a significant digital transformation over the last few decades. Rapid technological development changed the way financial institutions operate, communicate, and make decisions.

-The growth and adoption of advanced technologies such as:

- Computers and high-performance computing systems;
- Financial databases and digital information systems;
- Cloud computing technologies;
- Artificial intelligence and machine learning;

enabled financial institutions to process enormous amounts of information quickly, accurately, and efficiently.

-Digital innovation also led to the development of entirely new financial services and business models. Some of the most important changes include: Electronic trading platforms that allow real-time buying and selling of financial assets, FinTech companies providing innovative digital financial services, Automated banking systems and online banking platforms, Mobile payment and digital wallet technologies;



Artificial Intelligence and Big Data

-AI has become one of the most powerful tools in modern finance. Unlike traditional systems, AI technologies can process massive amounts of information, identify hidden patterns, and continuously improve their performance through learning and experience.

-AI systems are capable of: Detecting complex market patterns and trends, Predicting potential market movements, Learning from historical financial behavior, Automating financial analysis and decision-making, Improving the speed and accuracy of financial operations.

-The development of Big Data has significantly expanded the amount of information available for financial analysis. Financial institutions now collect and analyze data from a wide range of digital sources in real time.

-Major sources of Big Data include: social media platforms and online sentiment, consumer transactions and spending behavior, macroeconomic indicators and global economic reports.



Benefits of Automation in Finance:

- Faster decision-making:** Algorithms can analyze market data and execute transactions within milliseconds, much faster than human traders.
- Reduced human error:** Automated systems minimize emotional reactions, calculation mistakes, and poor judgment caused by stress or panic.
- 24/7 Market monitoring:** Financial algorithms continuously monitor global markets and react instantly to changes in prices, trends, and news.
- Lower transaction costs:** Automation reduces operational expenses by decreasing the need for manual processes and large trading teams.
- Improved risk management:** Advanced models can identify potential risks earlier and adjust investment strategies automatically.



Emerging Trends in Financial Decision-Making

- **Quantum Computing**-has the potential to revolutionize financial modeling by solving extremely complex calculations much faster than traditional computers. This could improve portfolio optimization, market simulations, and risk analysis.
- **Decentralized Finance (DeFi)**-uses blockchain technology to create financial systems without traditional intermediaries such as banks. Smart contracts allow automatic execution of transactions, lending, and investments in a transparent and decentralized environment.
- **AI-Powered Investment Platforms**-Artificial intelligence is increasingly used in robo-advisors and investment platforms that provide personalized financial advice, automated portfolio allocation, and predictive market analysis based on user behavior and market conditions.
- **Predictive Analytics**-Financial institutions use predictive analytics to forecast market trends, customer behavior, and potential financial risks. By analyzing historical and real-time data, organizations can make faster and more accurate decisions.



Regulatory and Ethical Implications of AI in Finance

- As Artificial Intelligence becomes increasingly integrated into financial systems, the need for effective AI governance has become a major priority. Financial institutions must ensure that AI technologies operate in a transparent, fair, and responsible manner.
- AI governance includes: monitoring the use of AI systems in financial markets, ensuring accountability for automated decisions, preventing discrimination and algorithmic bias, maintaining transparency in financial operations.
- Traditional financial regulations were designed for human-centered decision-making processes. However, the rapid development of AI and digital finance has created the need for updated regulatory frameworks.



The Future of Financial Decision-Making

-The financial industry is rapidly evolving from traditional intuition-based decision-making toward intelligent, technology-driven systems. Advances in Artificial Intelligence, machine learning, and big data analytics are transforming how financial institutions analyze information, manage risks, and make strategic decisions.

Opportunities and Risks of AI in Finance

-Artificial Intelligence offers significant advantages for the financial sector by improving speed, efficiency, and analytical capabilities. AI-powered systems can reduce operational costs, minimize human error, and optimize investment and risk management strategies.

-Despite rapid technological progress, human involvement remains essential in financial decision-making. AI systems can process data and generate predictions, but humans are still needed to provide: ethical judgment and accountability, strategic thinking and creativity, contextual understanding of complex situations, regulatory supervision and risk control.