

Smart Financial Management System Based on Integrated Artificial Intelligence and Big Data analytics

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Abstract

The ideas of "financial technology," "economic and technological interaction," and "science and technology" are increasingly important for the development of financial products, enhanced financial effectiveness, and reduced costs of currency services. In other words, the economic model, strategic plan, various techniques, personnel operations, marketing, along with other aspects, are all being changed by the rising technology framework in the financial industry. One of the most significant industries is the banking industry, which has a close relationship with sophisticated machine intelligence, or AI, and a lot of data. Technological technology' use in the finance sector has made it easier to avoid fraud and analyse risks, including credit card theft. In order to compile pertinent data for this research work, both primary quantitative and secondary qualitative research approaches were taken into account. 65 out of 100 employees were chosen to participate in the survey, and their results were examined using charts and diagrams in Excel. Additionally, the secondary qualitative approach is employed to gather theoretical data from publications, papers, and websites.

Keywords: "Artificial Intelligence (AI)", Big Data, "Financial technology", technology, "smart financial management system"

Introduction

“Artificial Intelligence” or AI is at the heart of a surge of innovations that are having varying degrees of effect throughout the economy and society. Its involvement in technology and development, when combined with advances in automated systems, cognitive computing, and systems integration, is helpful for preventing serious problems related to financial services (Milana, & Ashta, 2021). The term "financial analysis" refers to a review of the agreements in the “*Transaction Processing Systems*” or TPS. As a result, this must begin with the same cash-flow commitments that the “*transaction processing level*” or TPL maintains and manages. This viewpoint provides a clear picture of the significance of smart financial contracts in improving the efficiency and quality of bank operations. “*Machine-readable code*” is used to represent practically every financial agreement (Brammertz, & Mendelowitz, 2018). All payments are calculated and, in many cases, processed automatically. AI in financial services means to the use of AI technology in field of knowledge organization. This matter has generated interest for generations, with both traditional and top-notch AI technology being utilized to a growing array of investment, industrial, and social areas. As per the views of Cao (2022), unlike other research that focuses on the difficulties, properties, and opportunities of finance that have provide help and support to the current generation and making socially approaches. This paper provides a detailed and analytical picture of the tremendous difficulties, methods, and opportunities of AIDS quantitative during the past few decades.

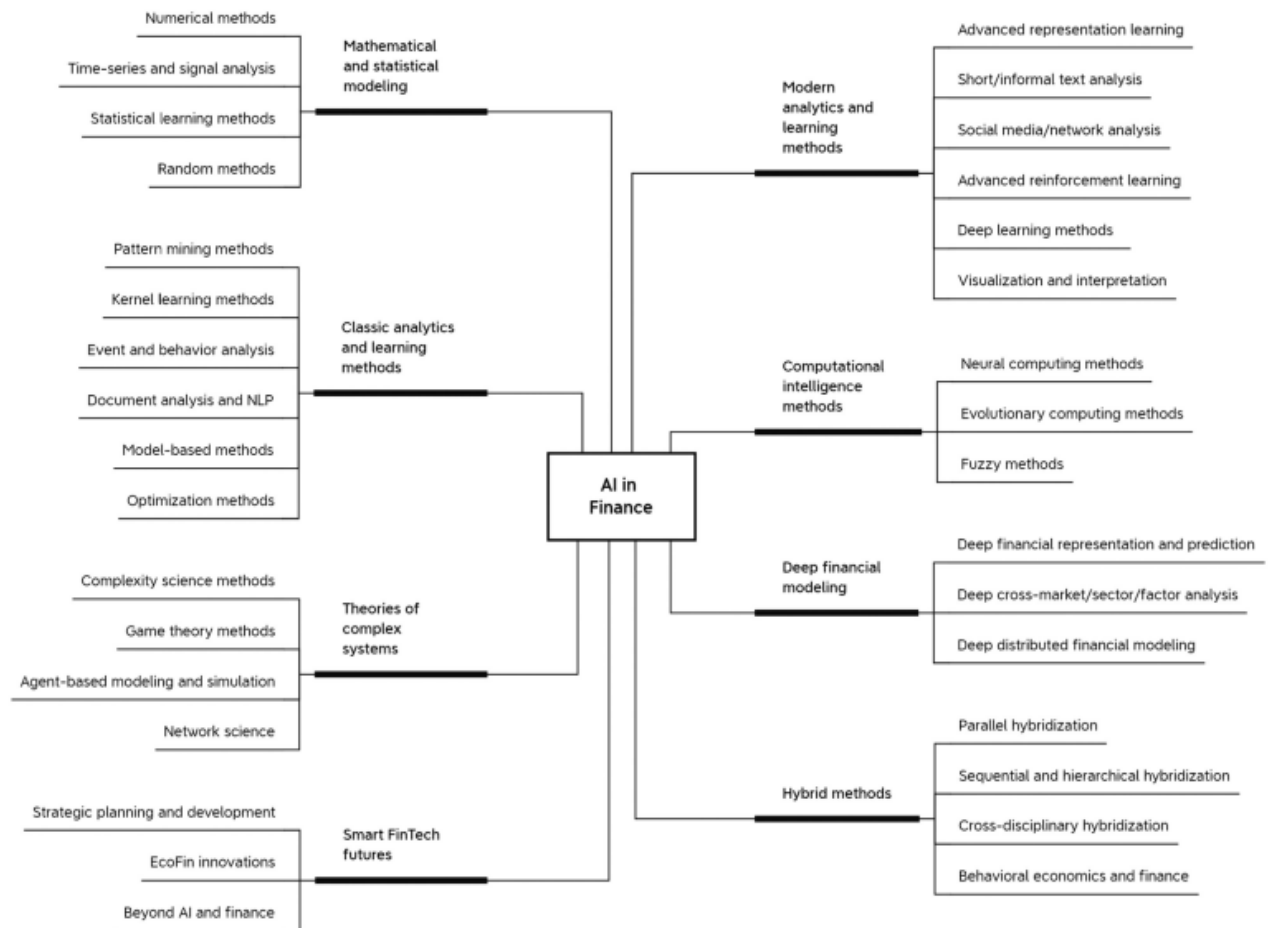


Figure 1: “AI financial ecosystem and data science in finance”

(Source: Cao, 2022)

The issues that financial firms and data face are examined first, followed by a rigorous classification and a full history of AI research in finance over the years. Data-driven analytics and learning are then used to organise and highlight financial enterprises and data. The following sections compare, evaluate, and debate traditional and new AI financing strategies. Finally, future generations and analytical study papers research are considered, as well as unresolved issues and potential. As stated by Zheng et al., (2019), Artificial intelligence or AI extends beyond traditional computer simulations of the human intellect, such as man-machine games, machine authentication, and speech recognition, and is at the heart of the current technological revolution and industrial development. As a result, AI 2.0 has arisen as a new generation of artificial intelligence (Jain & Pandey, 2019).

To accomplish intellectualization, standardisation, and automation of large-scale commercial transactions, financial management has a rapid and precise machine learning capacity. As a result, it can increase service efficiency while lowering expenses. Besides, Wang et al., (2020), AI integrated with big data, for example, might connect long-tail markets and eliminate information asymmetry, leading to more effective capital allocation and risk management. Furthermore, identity identification and natural language processing technologies can allow computers to operate like a workforce, perform all-around perception, and give interactive services to clients.

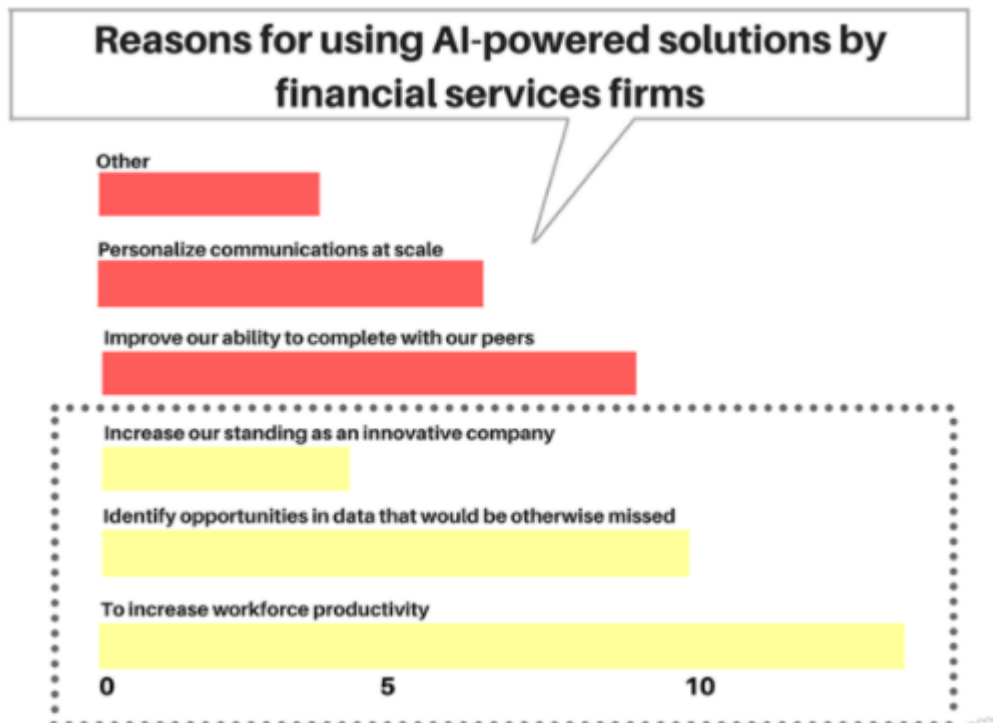


Figure 2: Increasing performance of banking industry after using AI technology

(Source: Zheng et al., 2019)

Combining financial intelligence with the next generation of AI might result in a "financial brain" that delivers comprehensive financial services tailored to real-world financial demands. Numerous financial applications, including investing, lending, credit, protection, policy, and customer relations, are inextricably linked to AI technology's backing. The financial services business creates a lot of structural

data compared to other industries; thus, it has an edge when it comes to building AI technology (Mitrache, 2021). Taking care of the needs of a more inclusive financial system Traditional professional financial services frequently have a high entry hurdle, leaving average people with unmet financial needs. The efficacy of credit evaluation technologies can drastically lower the financial threshold, allowing consumers to receive better services. As a result, everyone may benefit from a level playing field when it comes to achieving inclusive finance. The financial AI research is to look at the prospects of creating a "financial brain" in the AI 2.0 age. Scholars are looking to recent developments in a range of sectors, including investment management, vulnerability assessments, liquidity position, financial consulting, and cryptography, to help them do so. (Jain & Pandey, 2019).

Literature Review

Data gathering, uttermost care for users and their experiences, and processors are all top priorities in the banking business. Oza (2020) has identified that Artificial Intelligence (AI) can educate machines to execute those calculations and conduct analyses in the same way that people do, but with a better level of efficiency. Artificial Intelligence enhances outcomes by employing approaches drawn from human intelligence's qualities and characteristics at a scale that exceeds the human scale. Financial hazards are identified, measured, and controlled via risk management. The typical risk management approach is extremely difficult and heavily reliant on specialist knowledge. According to Zheng et al., (2019), consumers may now communicate with businesses more easily because of the combination of smartphones and E-commerce. The use of computerised financial services has increased dramatically in the twenty-first century. Artificial intelligence is being used to emulate, augment, improve, and reproduce human intellect to create intelligent computers.

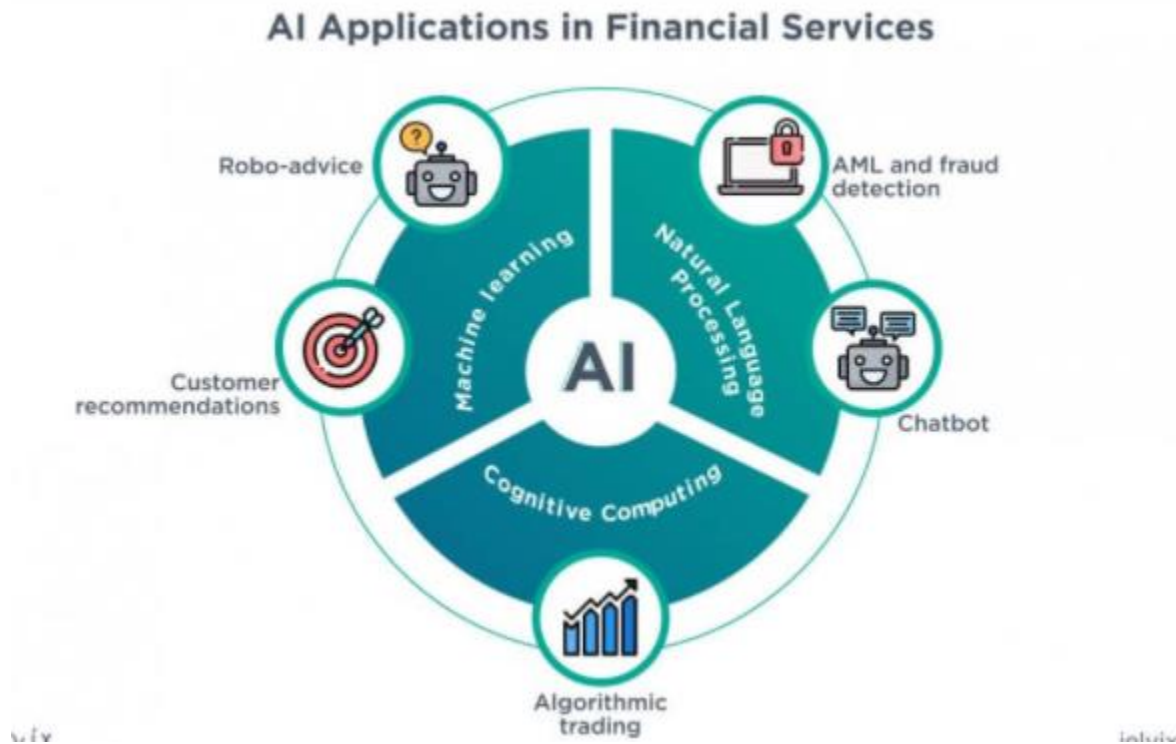


Figure 3: Applications of AI in financial services

(Source: Tadapaneni, 2019)

Artificial intelligence has shown to be a potent tool in financial services, with roots in computer science, linguistics, psychology, mathematics, and philosophy. Firms are now analysing data acquired over time using analytical methods such as machine learning and artificial neural networks (ANN). As mentioned by Tadapaneni (2019), adaptive pattern recognition is enhanced by AI, which uses sophisticated statistical methods and enormous amounts of data to deliver the "best guess" response to any specific and tightly specified issue set. When used with caution, discretion, and research, AI has tremendous potential for good influence. This article shows about the AI technology and its generations, to study the hard concepts of the A.I and its uses (Jain, Yadav & Shrivastava, 2019). Benefits to customers and organisations, data privacy and protection, the removal of human capital, and the long-term viability of financial services are all important factors to consider when using AI.

The worldwide financial services business is quickly changing due to artificial intelligence (AI). Besides, according to Buchanan (2019), AI has the ability to disrupt and improve the present financial services business as a collection of related topics of computer science and transfer learning are examples of such technology. The Internet serves as a bridge between the Internet of Things and the financial sectors. As a result of their high time, labour expenses, and poor coverage, traditional risk management cannot fulfil the financial demands of most individuals (Jain, Kumar, Shrivastava, 2021). Meanwhile, AI mixed with big data may aid in the development of solid credit systems, the assessment of business risks in unpredictable environments, and the implementation of anti-fraud activities.

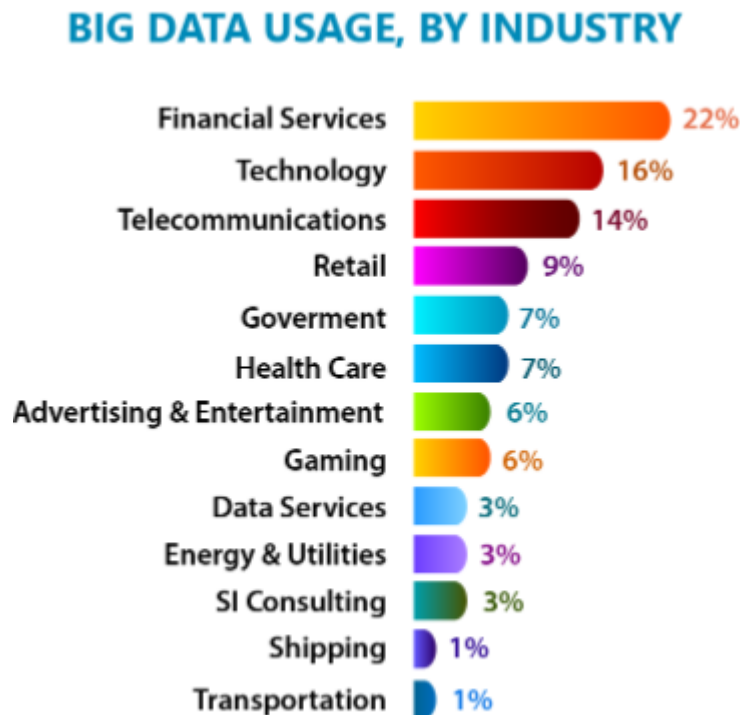


Figure 4: Big data usage by industry

(Source: Bag et al., 2021)

Based on the above image, it has been identified that Big data is mostly used by financial services. Moreover, banking sectors can create a connection map between firms based on investment, guarantees,

lending, holding, along with the relationship between “shareholders and legal persons” using big data technologies, which is useful for associate analysis and risk management. The big data framework is widely used throughout the financial industry, but it does not assist small and medium-sized firms in taking full advantage of it, and huge organisations with a lot of valuable data risk losing their competitive advantage. In the case of an Automated financial model, to develop an optimal portfolio for asset management, advisors must employ risk models to reduce portfolio creation costs while improving quality. Some academics have included multi-armed bandits into the sequential decision-making process, created online portfolio selection algorithms, and carefully examined the balance between exploration and exploitation to enhance portfolio blending. The cornerstone of control of risks is credit assessment. Its only reliable financial aspects in conventional financial credit data are credit, credit card, foreign currency, private loan, and other financial transaction data. The Fair Isaac Corporation (FICO), for example, takes into account factors including domicile, occupation, duration of service, debt-to-income ratio, and credit line (Jain, Kumar, Shrivastava, 2021). As the total result, the weighting factor is derived utilising expertise-based approaches. Unlike conventional credit information management, intelligent credit information systems that use big data and AI take into consideration commercial, governmental public utility, lifestyle, and social data.

Banks Are Investing in Big Data

Has your organization already invested in technology specifically designed to address the big data challenge?

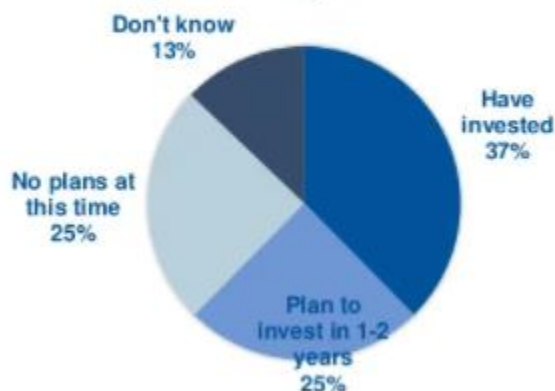


Figure 5: Banks are investing in Big Data

(Source: Wang et al., 2020)

It has been observed from the above image that banking organisations are focused to invest in Big Data technology for addressing financial risk. The importance of big data in the financial sector is self-evident. In the sphere of business model innovation, the ability to locate new clients and determine their intrinsic needs in order to deliver the best possible service to them is critical to the financial industry's survival and growth.

Maintaining the confidentiality of financial information requires identity verification. Collected data were analysed such as identification, photo recognition, voiceprint recognition, and optical character recognition (OCR) might help minimise check costs and enhance user experience. Identity authentication in the network world is a thorough validation approach for the relationship between an entity and its identity. To automate human authentication, governments and companies use a range of biological characteristics. Despite the fact that the big data age has come, a huge proportion of firms struggle to

understand data. As a result, data ownership, security, and credit intermediates create barriers to data exchange. To address the problem of information decentralisation, a new generation of Internet technology is necessary (Chen, 2020). As a result, blockchain technology was developed. Bitcoin relies on blockchain, which is a decentralised, publicly accessible, and immutable record. It is a sort of cryptographic-protected digital currency (a "cryptocurrency"). Blockchain offers a wide range of potential applications in finance, including digital money, payment and clearance, smart agreements, and banking transactions. Bitcoin, Litecoin, and other digital payments, as well as more secure and open decentralized financial reporting networks, payment and settlement systems, are examples of typical uses (Milana & Ashta, 2021). Blockchain technology relies heavily on consensus procedures and security assurances.

Methodology

Research methods help to gather various information and factual data from different sources. In this context, researchers have considered mixed method to gather data related to significant of smart financial management system based on integrated big data and AI analytics. Mixed method can be beneficial when the research study needs to collect wide data from different perspectives and there is a lack of particular information related to the study. For this research, primary quantitative and secondary qualitative methods are used to develop better understanding. For primary data, survey has been conducted. 100 employees from different banking sector are chosen among then only 65 people are responded. Thus, "Population size" is 100 and "sample size" is 65. 3 close ended questions are asked to them for collecting their responses. To analysis the responses, excel graph and charts have been used. On the other hand, secondary qualitative method is also used to collect factual data from different sources such as journals, articles, newspaper, company websites. Quantitative data refers to descriptive studies that have attempted for tight formalization of the data gathering and statistical treatment to obtain exact data about the core demographic, represented in advanced economies. Besides, qualitative approaches have the advantage of allowing us to comprehend what is impossible to pinpoint and compute using quantitative methods because they allow us to explore the substance of occurrences.

Analysis and interpretation

Survey has been conducted by considering 65 employees who are working in banking sector. 3 close ended questions are asked and their responses are analysed by excel graphs and charts.

Survey questions

Q1. Do you think that Smart financial management system can be helpful for detecting economic problems and risk associated in banking organisations?

TABLE 1: Smart financial management system helps to detect economic problems and financial risks (Source: Created by the researchers)

Options provided	Total respondents	Collected responses	Percentile
Strongly agreed	65	23	35%
Agreed	65	20	31%
Neutral	65	5	8%
Disagreed	65	12	18%
Strongly disagreed	65	5	8%

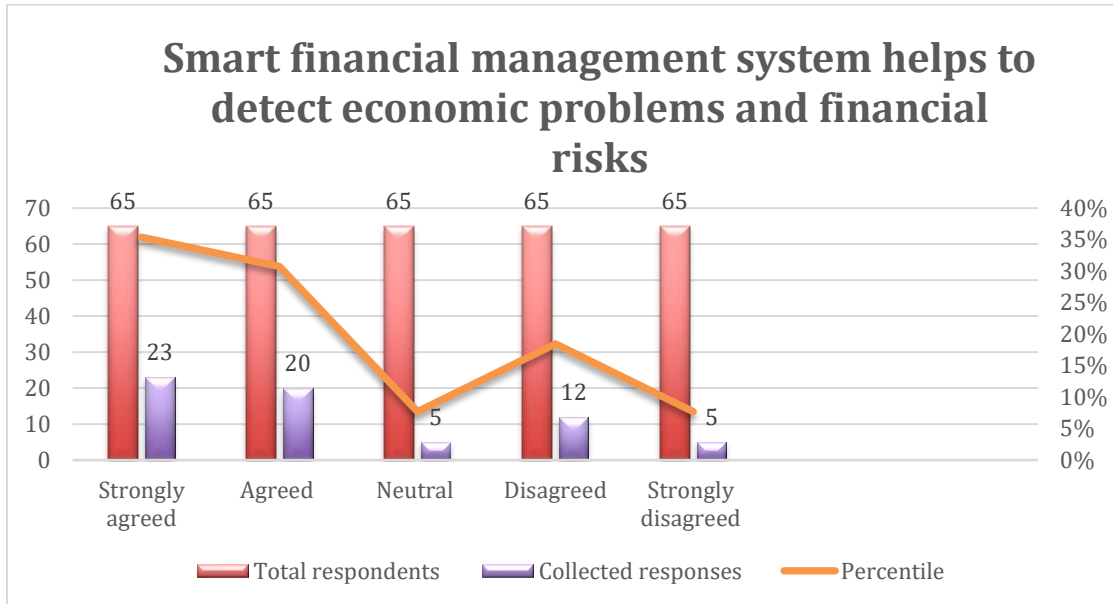


Figure 6: Smart financial management system helps to detect economic problems and financial risks

(Source: Self developed)

It is remarkable to identify from the above graph and chart that above 65% respondent are agreed that implementing smart financial management system can be helpful for detecting financial risks, economic problems and security issues related to finance services. Development of financial technologies as well as science create a big revolution in financial service after implementing Internet finance and innovative services. On the other hand, 8% to 18% respondent are disagreed with the fact. Since most number of respondent are agreed with the fact thus, it can be stated that smart financial system really helps to detect economic and financial issues in a proper manner.

Q2. Do you think that large data groups and computer aided reasoning are the most useful technologies to develop smart financial management system?

TABLE 2: Large data groups and computer aided reasoning are most effective technologies in smart financial management

(Source: Created by the researchers)

Options provided	Total respondents	Collected responses	Percentile
Highly Agree	65	20	31%
Agree	65	22	34%
Neutral	65	4	6%
Disagree	65	10	15%

Highly Disagree	65	9	14%
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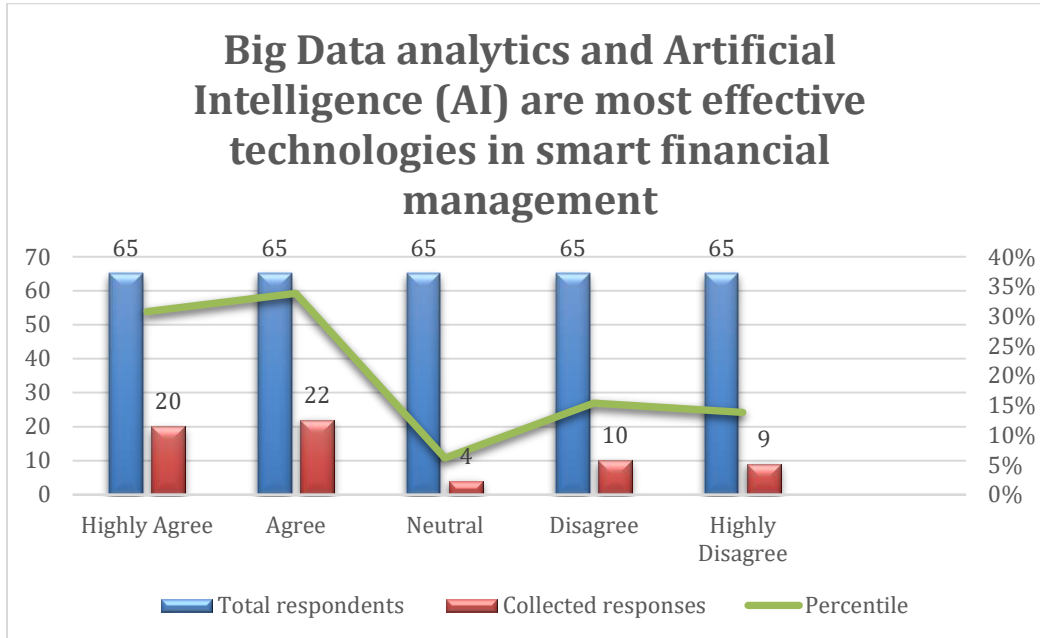


Figure 7: Big Data analytics and Artificial Intelligence (AI) are most effective technologies in smart financial management

(Source: Self developed)

According to the above figure, it has been identified that 31% to 34% responded are agreed that Big Data and AI technologies are the most advanced technologies widely used in different sectors mainly financial sector.

Q3. Do you agree with the fact that smart financial system can enhance financial service stability and also create long term viability in financial services?

TABLE 3: Smart financial system enhances financial service stability and creates long term viability
(Source: Created by the researchers)

Options provided	Total respondents	Collected responses	Percentile
Highly Agree	65	27	42%
Agree	65	15	23%
Neutral	65	4	6%
Disagree	65	11	17%
Highly Disagree	65	8	12%

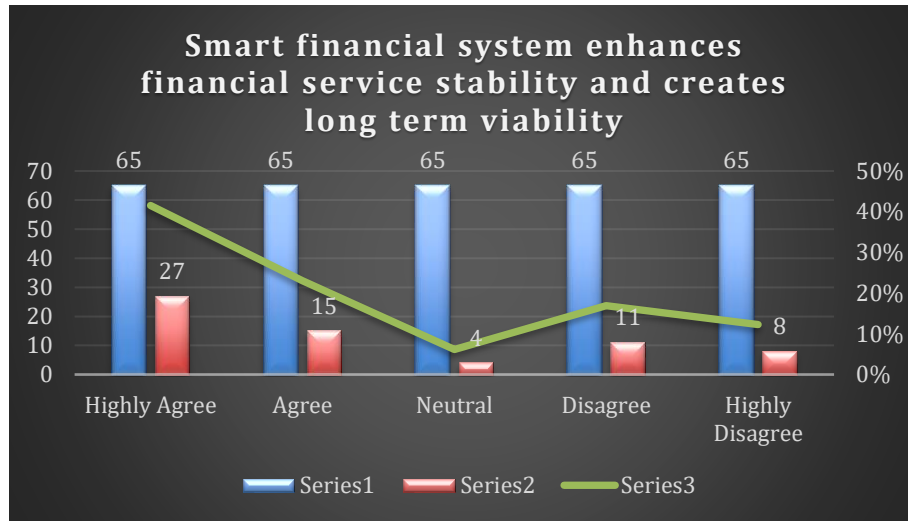


Figure 8: Smart financial system enhances financial service stability and creates long term viability
(Source: Self developed)

Based on the above data, it has been observed that almost 60% responded from all participants are beneficial for Smart financial management system as it helps to prevent serious credit risks. Smart financial system can improve long term business performance in terms of streamlining invoicing along with bill correction, preventing record keeping redundancy, minimising accounting errors, as well as proper budget planning to manage sustainable business growth among banking organisations.

Discussion and findings

A “Smart financial management system” is the methods and technology that an organisation uses to control and regulate its revenue, expenditure, and assets in order to maximise profits and ensure long-term viability. The intellectual capacity of a firm, or even how it arranges knowledge transfer via language, technology connections, and linkages with some other organisations, partners, and consumers, may influence its productivity. According to Rabah (2018), a majority of commercial institutions have implemented digital tools including such smartphones, social networking sites, internet, world wide web, big information analysis, and Robotics. According to other researchers, all businesses must adopt AI, especially those in important industries, because neglecting doing so in the highly competitive environment from businesses that have employed AI to improve judgement could be devastating (Faccia, Al Naqbi, & Lootah, 2019). For example, by working out with the data the companies can able to make their business grateful. A whole organisation can come into strongpoint, the Artificial Intelligence or Robotics can make a company better than ever. When judgments are exceptionally exact, Intelligence selection is far more likely to be successful in the short term. For even more variety picks, a human factor would still be necessary (Hasan, Popp, & Oláh, 2020). If the assumptions are wrong, rules could be established to enable the algorithm to offer judgements or recommendations to assist students make smart choices by combining several principles into a unified conceptual that identifies which guideline would be used. It could also be done with the use of machine learning, which provide recommendations and guidelines that can be utilized in a wide range of investor characteristics.

Conclusion

Thus, it can be concluded that with expanding cross-disciplinary connections and integration of AI, machine learning, data science, economics as well as finance, computerised economic growth is a hard thing to execute. In recent years people are still using the computers to make a well performing A.I still people could not make a proper well generated A.I which could be possible in future generations. This paper provides a thorough and detailed examination of the benefits and drawbacks of both traditional and current AI and data Science (AIDS) strategies in banking. In addition to this, financial issues, debit and credit security all can be successfully managed by smart financial system which is developed by integrated by AI and big data analytics. Both primary quantitative and secondary qualitative research methods have been considered for this research to gather quality and factual data related to AI and big data used in financial sectors.

Future scope

In this current era, AI and Big Data are most growing advanced technologies can develop sustainable business environment in financial sectors. Concept of advanced technology such as smart financial management system has emerged as new evolution for financial development by preventing external threats, and minimising systematic issues in finance services.

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