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Modeling FinTech Variables in the Insurance Industry

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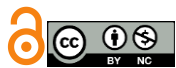*** Corresponding author email address**: F_sefaty51@yahoo.com

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Objective: The primary objective of this study is to model the impact of FinTech variables on the profitability of the insurance industry.

Methodology: This study utilizes a sequential exploratory mixed-method approach. In the qualitative phase, data was collected through interviews with experts in the insurance and FinTech industries, along with a review of scientific literature. The data was analyzed using MAXQDA software to develop a qualitative model of FinTech variables affecting profitability. The second phase employed a quantitative approach, where developed tools were tested on a selected sample for validation and further analysis. The model was then evaluated based on qualitative and quantitative findings, with a causal loop diagram illustrating the interactions between key variables.

Findings: The research identified three key FinTech-related variables: digital literacy, adoption of innovative technologies, and analysis and prediction. These variables form a positive feedback loop, enhancing digital and organizational empowerment. Findings show that FinTech adoption leads to increased operational efficiency, cost reduction, and improved risk assessment, which in turn boosts profitability for insurance companies. Additionally, collaboration with InsurTech startups and the integration of advanced technologies such as artificial intelligence (AI) and blockchain were found to be critical in maintaining competitive advantages and meeting evolving customer expectations.

Conclusion: The study concludes that FinTech represents both a challenge and an opportunity for the insurance industry. Insurers must modernize their processes and adopt innovative technologies to remain competitive and responsive to market changes. The positive interaction between digital literacy, technological adoption, and market analysis strengthens the industry's ability to enhance customer experience and profitability. Traditional insurance companies are encouraged to collaborate with FinTech and InsurTech startups, optimize business processes, and align with regulatory frameworks to effectively utilize FinTech innovations.

Keywords: *FinTech, insurance industry, modeling.*

1   Introduction

In the last decade, the development of information technology (IT) has significantly transformed various industries, including tourism (booking systems for flights and hotels), commerce (electronic order registration systems), and media (electronic content distribution). The financial sector has been no exception. Banks have been among the pioneers in adopting IT, with most banking processes now supported by information and communication technologies (Haber et al., 2018). Today, banks provide many of their services through electronic channels, such as online banking platforms and electronic stock trading. IT investment has become an integral part of banking businesses, regardless of their size. Larger banks focus on improving efficiency and operational advancement, while smaller banks often employ service-oriented business strategies, concentrating on close customer relationships. In both cases, IT plays a critical role (Ranjandish et al., 2020).

In recent years, FinTech companies have significantly expanded their services, entering areas previously dominated by traditional banks. Following the 2008 financial crisis, the most attractive segment of the financial industry for FinTech companies has been payment services, which accounted for 70% of total financial technology investment by 2013 (Lv et al., 2022). Additionally, there was a notable increase in investments in corporate banking services, data analysis, and personal financial management between 2008 and 2013. According to statistical reports, global FinTech investment reached approximately $6.8 billion in 2014. Between January 2010 and June 2015, total investment amounted to $49.7 billion, with 25% of that investment occurring in the first half of 2015 alone (Almulla & Aljughaiman, 2021).

Technological advancements and regulatory changes have transformed the concept and core of the financial industry. Financial technology, or FinTech, is the integration of finance and technology (Haber et al., 2018). The financial services market is undergoing a unique phase due to these changes and developments. This transitional period is driven by extensive transformations, including sustainable development and financial technologies. The birth of financial startups aims to penetrate the financial and banking industry. Since many experts and analysts consider the future of the banking industry dependent on the growth of such startups, FinTech refers to companies that utilize innovative financial technologies to provide more efficient financial services and introduce innovation in financial

services through these technologies. Some FinTech companies directly compete with banks, while others collaborate with them to offer services to banks (Alzwi et al., 2024; Haber et al., 2018; Halteh et al., 2024). FinTech consists of two industries: the financial industry and the technology industry. FinTech has three dimensions: the financial dimension, the technological dimension, and the legal and regulatory dimension. The entire goal of this industry is to provide cheaper, faster, and easier banking services, insurance, financial institutions, and stock exchanges (Almulla & Aljughaiman, 2021).

FinTech companies, by understanding the market and customer demands, offer a variety of services that banks, due to structural limitations, are unable to provide (Shoetan, 2024). The synergy and collaboration between technology engineers, investors, and financial managers will change the future of financial markets and the way services are provided in these markets. In fact, FinTech companies use innovative financial technologies to provide higher-quality and more robust financial services. FinTech is the combination of finance and technology and replaces traditional financial mechanisms through new technology-driven processes (Abbas, 2024; Gomber et al., 2017). The growth of investment in FinTech has become a social and economic phenomenon. FinTech startups offer decentralized financial services, which allows customers to choose from a variety of companies for the same service rather than receiving a specific service from a single financial institution. This feature enables customers to compare the services they receive, ultimately leading to the qualitative development of financial services (Lim et al., 2019).

Businesses and innovative technologies in the financial and banking industry increase access to financial services. Therefore, the expansion of these companies' activities, along with the creation of the necessary infrastructure and government support, can lead to greater access to financial services for citizens and increased public satisfaction with financial and banking services. On the other hand, government support for FinTech companies can create high-quality and innovative services in the financial sector, which have not yet been fully considered by major players. One significant issue is that FinTechs, as small businesses, have limited backing, which restricts their sustainability. However, FinTech innovation in areas such as risk management, pattern discovery, and artificial intelligence can contribute to their long-term sustainability. One of the key features of FinTech businesses is creating competition. The existence of competition in service delivery can be

considered one of the most important duties of governments. Therefore, the presence of FinTechs as new and innovative businesses in the financial sector can help eliminate monopolies in financial services. Additionally, using new business models to deliver financial and economic services is one of the essential requirements for moving from digitization to smartization, highlighting the importance of FinTechs and their role in economic transformation and the future economy (Wang et al., 2023).

A key aspect for professionals regarding FinTech is increasing funding opportunities in addition to financial services provided by banks. Various types of crowdfunding (reward-based, donation-based, and equity-based) can offer more benefits to startups and small and medium-sized enterprises. Additionally, FinTech can potentially assist larger companies in securing financing or provide credit solutions or initial coin offering (ICO) options based on blockchain technology, offering more security, liquidity, and transparency than other financing options (Suseendran et al., 2020).

Some FinTech solutions, particularly in payments and credit spaces, have led to disintermediation, partly benefiting from the current lenient global regulations. As mentioned earlier, FinTech companies cannot replace banks but rather coexist, collaborate, or potentially become like banks. This argument is supported by the fact that no technological advantage remains sustainable in the long term, as the adoption of equal or superior technology by new or existing competitors is swift, and technological convergence may be imminent. Nevertheless, policymakers should ensure a level playing field for all participants in the banking sector by promoting fair cooperation or competition between banks and FinTech companies through appropriate policies. Another critical issue for policymakers is that a multidisciplinary dialogue and global cooperation on a fundamental legal framework and policy set for FinTech are needed. A shared set of specific regulations is essential to maintain financial system stability, ensure smooth functioning of financial markets, protect consumers, and enhance socio-economic welfare. The subsequent intermediation in some FinTech applications and the complexity of some FinTech products may promote fraudulent activities, predatory practices, price manipulation, and information asymmetry in the absence of strict regulations (Zaghlol et al., 2021). Moreover, when collected data are not used appropriately by underlying algorithms, "cherry-picking" practices may result in financial exclusion and price discrimination. For these

reasons, policymakers must actively seek to understand and acquire existing knowledge about FinTech applications and their underlying mechanisms. Implementing appropriate regulatory strategies and providing an environment for mutual knowledge exchange and constructive communication between regulators and FinTech companies is key. This will ultimately lead to the increased capacity of informed regulators who can introduce efficient and appropriate rules aimed at creating a beneficial FinTech ecosystem for all. Furthermore, this will help FinTech companies clearly understand current and future policies and ensure that all their processes can comply (Nurlaela et al., 2020). Arner et al. (2015) provided a typology of the FinTech industry, highlighting five main areas: finance and investment, risk management and operations, infrastructure and payments, data security, and customer interface. A breakdown of FinTech companies' investments shows that the most attractive services for investment are in finance, investment, payments, and infrastructure. Recent trends indicate that FinTech is rapidly evolving and becoming a significant competitive force against traditional banks, raising the question of whether FinTech is a potential threat or opportunity for traditional banks (Abtahi & Azadineghad, 2019). The term "FinTech" is a combination of "financial" and "technology," used to describe the integration of technology into financial services to enhance service delivery to consumers. FinTech covers various sectors, including education, retail banking, fundraising, nonprofits, investment management, and insurance (Lv et al., 2022). FinTech's roots can be traced back to the expansion of the internet in the 1990s. The rapid evolution and penetration of technology in the financial sector, particularly in insurance, have significantly impacted these industries. InsurTech, a branch of FinTech focused on the insurance sector, aims to provide new services and products, reduce bureaucracy, and align with modern consumer needs. This technological innovation is reshaping the insurance sector, enhancing customer service experiences, and increasing competition in the industry. InsurTech also influences customer behavior and expectations, offering benefits such as improved efficiency, cost reduction, better risk assessment, superior customer experiences, and greater financial inclusion (Gupta & Arora, 2017).

As a result of these changes, traditional insurance companies are seeking new ways to attract and retain customers, while exploring digital ecosystems to enhance customer experience. To adapt to this evolving landscape, insurance companies are encouraged to modernize their

product development capabilities and shift from a product-centric approach to a customer-centric one. This shift is necessary to meet changing customer demands and remain competitive in the industry. Companies are also advised to strategically optimize their business processes to remain flexible and improve performance to ensure survival and achieve better market positioning (Haber et al., 2018).

Insurance is a financial product that protects individuals against loss through contracts known as insurance policies (Jin et al., 2020). As one of the critical sectors providing long-term financial resources and distributing risk, the insurance industry can significantly contribute to the development of a country's business environment (Khazaei et al., 2022). Recently, there has been increased attention among researchers in areas such as risk theory and actuarial mathematics. Additionally, customer focus has become an essential aspect of responding to recent developments in the insurance sector. Customer-oriented trends, including low customer trust in insurance companies, the shift in customers' roles from service consumers to active collaborators, and the use of digital tools to create value for consumers, are crucial, particularly in the context of interactive services (Gholami et al., 2022).

FinTech is revolutionizing the financial services industry, and companies must integrate FinTech into their operations to stay competitive. FinTech's rapid growth, especially during the COVID-19 pandemic, has led to the rise of decentralized finance (DeFi), which allows peer-to-peer transactions without intermediaries through blockchain networks (Feyen et al., 2021). Customers generally have a positive perception of the technology-based services offered by FinTech and InsurTech. However, the lack of transparency in these artificial intelligence (AI)-based technologies can raise consumer concerns (Almulla & Aljughaiman, 2021). Despite the numerous innovations and benefits brought by InsurTech, resistance from key market players in Iran remains. Implementing technological changes in the insurance industry has proven challenging and time-consuming, with traditional insurers demonstrating a greater reluctance to adopt technology and improve customer service. Regulatory frameworks also hinder startups seeking to introduce technological innovations in this sector. In response, the insurance industry must pay close attention to how these technologies can be applied to enhance operations (Gomber et al., 2017).

The core of insurance arrangements is the transfer of risk from the customer to the insurer. The rise of FinTech, particularly InsurTech, is driving a significant transformation in the insurance industry by improving operational efficiency and service delivery while reducing costs (Kou et al., 2019). InsurTech enables insurers to offer personalized, on-demand insurance solutions that cater to evolving customer needs (Fernando & Dharmastuti, 2021). Given the rapid advancements in financial technology, the International Association of Insurance Supervisors (IAIS) conducted an exercise in 2016 to identify the developments in FinTech, their drivers, and potential impacts on the insurance landscape. The results of this analysis were included in an IAIS report, which aims to inform the insurance regulatory community and stakeholders about these developments and facilitate strategic discussions on future work (Zaghlol et al., 2021).

In recent years, policymakers have increasingly focused on financial inclusion through the use of technology, particularly in the insurance sector. Emerging InsurTech startups are leveraging advanced technologies such as AI, machine learning, the Internet of Things (IoT), and blockchain to create unique value propositions and improve business models, positioning themselves as strong competitors against traditional insurance companies. Blockchain, in particular, offers significant potential to streamline and simplify complex and time-consuming insurance processes, transforming the industry and allowing customers to access insurance services from anywhere, at any time, through digital tools such as smartphones (Zaghlol et al., 2021).

Among the innovative financial technologies are FinTech and cryptocurrencies. This study attempts to provide a general framework for these technologies, review common regulatory methods in other countries, and offer suggestions regarding the regulation of FinTech and cryptocurrencies. FinTech and cryptocurrencies could mark the beginning of a new era of technology-driven financial services, with the potential to change the banking ecosystem to the benefit of customers, supported by national banks and facilitated by laws, regulations, and regulatory frameworks established by central banks.

2   Methods and Materials

The present study was conducted to model the impact of FinTech variables on the profitability of insurance companies. Therefore, a sequential exploratory mixed-method approach (see Diagram 1) was employed to model the impact of FinTech variables on the profitability of insurance companies. The justification for using the

sequential exploratory mixed-method design lies in the fact that, in the case of modeling FinTech variables on the profitability of insurance companies, there is no pre-existing theory, framework, or model regarding the criteria, standards, and indicators. Thus, the sequential exploratory approach was adopted.

Accordingly, in the qualitative phase, the initial qualitative framework for the impact of FinTech on these companies was developed through a review of scientific literature and interviews with experts in the insurance industry. The credibility of this framework was assessed using an alignment method. The second phase involved quantitative assessment, where, after selecting the research sample, the developed tools were implemented quantitatively, validated, and the qualitative model of FinTech's impact on insurance companies was evaluated using the research sample.

It should be noted that this study is applied in terms of its objective. Additionally, as mentioned, a mixed-method approach was employed, consisting of both qualitative and quantitative sections. Therefore, regarding the research method, the qualitative section is a qualitative case study, and the quantitative section is descriptive-survey. The statistical population in the qualitative phase consists of theoretical experts (university professors) and practical experts (managers of insurance companies). The sampling method will be judgmental, and the sample size will continue until theoretical saturation is reached. The qualitative research instrument is an interview that includes two sections: the first section pertains to the expert's information, and the second includes the main questions. After designing the interview form and selecting participants, content validity was used to ensure the accuracy of the findings from the researcher's and participants' perspectives. In this way, the interview questions were reviewed and approved by insurance domain experts and several FinTech specialists, after which they were finalized for implementation. Additionally, during the interview process, some questions were added or modified. This process ensured the content validity of the research.

3   Findings and Results

The results obtained from modeling FinTech variables on the profitability of the insurance industry are presented as the initial model for the application of FinTech variables on the profitability of financial institutions (insurance industry) as follows:

Figure 1

Qualitative Model of FinTech Variables on the Profitability of the Insurance Industry
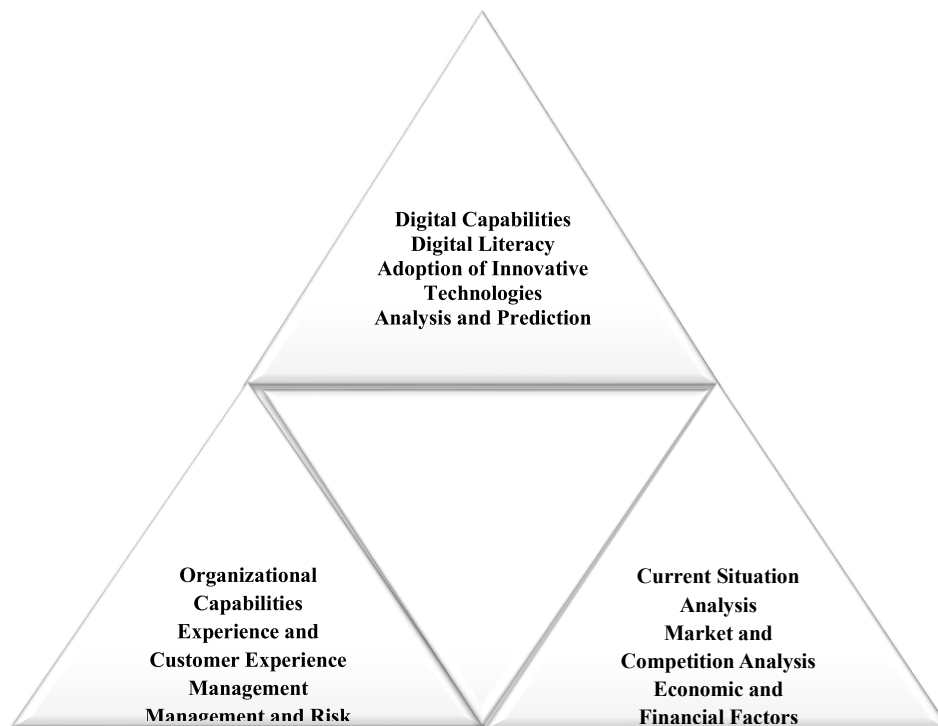
The qualitative model of FinTech variables on the profitability of the insurance industry, analyzed using MAXQDA software, examines the impacts of financial technologies on the financial performance and profitability of insurance companies. This model can include various variables, each of which, in turn, affects the profitability of the insurance industry.

The results of the model analysis are as follows:

1. **Key Variables**: The model may include variables such as big data collection, the use of innovative technologies to improve insurance services, and the enhancement of insurance process efficiency. These variables help insurance companies provide better services, thereby increasing customer satisfaction.

2. **Impact on Profitability**: The use of FinTech can lead to cost reductions, faster service delivery, and improved accuracy in risk assessment. These factors can, in turn, contribute to increased revenue and profitability for insurance companies.

3. **Qualitative Modeling**: Using MAXQDA software, qualitative data collected from interviews and surveys were analyzed, and patterns within the data were identified. This analysis can help identify relationships between FinTech variables and profitability.

4. **Results and Findings**: The results of this model may include identifying new opportunities to improve insurance services, reduce financial risks, and offer innovative solutions to attract new customers.

Overall, the qualitative model of FinTech variables on the profitability of the insurance industry, using MAXQDA software, provides a deeper analysis of the effects of financial technologies on the performance of the insurance sector. This model can assist managers and decision-makers in the insurance industry in designing more effective strategies for leveraging innovative technologies to improve profitability.

To obtain a comprehensive and final causal loop diagram regarding the application of FinTech in the insurance industry, the three previous causal loops must be combined, and through careful re-examination and proper interaction between them, an appropriate causal loop can be established. This loop can serve as a qualitative model and form the basis for software calculations in the quantitative modeling phase.

The resulting circular causal diagram includes 48 indicators. These indicators can be used as key variables in analyzing and designing FinTech systems, clearly defining the causal relationships between them. By using this diagram, a better understanding of how various factors influence one another and the overall system's performance can be achieved, enabling more informed decisions regarding the development and improvement of FinTech systems in the insurance industry.

Figure 2

Circular Causal Diagram for the Application of FinTech in the Insurance Industry
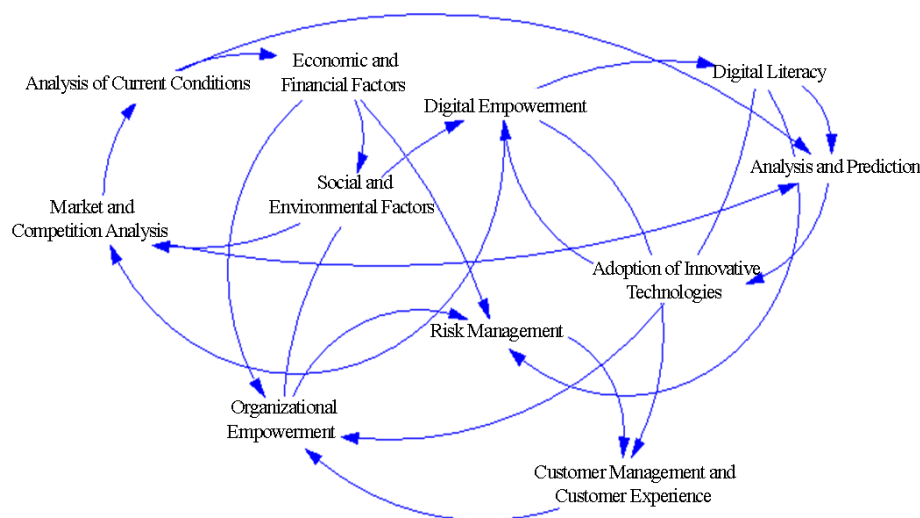
4   Discussion and Conclusion

The causal loop of digital empowerment includes three key indicators: digital literacy, adoption of innovative technologies, and analysis and prediction, which are interconnected in a positive causal loop. Digital literacy refers to the skills that enable individuals to effectively use digital technologies. Individuals with high digital literacy can easily adopt new technologies. The adoption of innovative technologies refers to the acceptance of new tools and systems. People with high digital literacy are usually more inclined to adopt new technologies, and this adoption leads to improved individual and organizational capabilities, laying the groundwork for better analysis and prediction. Analysis and prediction involve the ability to analyze data and information to forecast trends and make informed decisions. With increased digital literacy and the adoption of innovative technologies, individuals and organizations can collect and analyze more data, contributing to more accurate predictions regarding market trends and consumer behavior. These three elements operate in a positive loop: digital literacy leads to the adoption of innovative technologies, the adoption of innovative technologies enhances analysis and prediction, and effective analysis and prediction increase the need for digital literacy. As a result, this loop continuously strengthens and improves the digital capabilities of individuals and organizations, contributing to the creation of an efficient and innovative digital ecosystem. The findings align with the prior studies (Bahrami et al., 2022; Cao et al., 2021; Haghighi Kafash, 2022; Kelley & Wang, 2021; Liu, 2023; Parsamanesh et al., 2021; Pauch, 2022; Wang, 2021).

The causal loop showed that the analysis of current conditions, based on three key indicators including market and competition analysis, economic and financial factors, and environmental and social factors, forms a positive causal loop where each of these elements helps strengthen and improve the other elements. Based on the research findings, the following recommendations are provided:

- Invest in modernizing outdated systems and integrating new technologies in insurance companies.
- Collaborate with Insurtech startups to drive innovation and remain competitive in the insurance industry.
- Adapt to changing customer expectations and offer more personalized and convenient services.

- Work with regulators to create a more enabling environment for the adoption of innovative technologies in the insurance industry.
- Utilize advanced technologies such as artificial intelligence, data analytics, and the Internet of Things in insurance processes to increase efficiency and improve customer service.
- Offer on-demand and personalized insurance products to customers using advanced technologies.

Given the advancements in FinTech and technology in the banking and insurance industries, several recommendations can be made for future research in these industries. Some of these suggestions include:

- Research on the adoption of new technologies: Examine the factors that influence the adoption of FinTech technologies in the insurance industry and identify existing barriers and challenges.
- Analyze the impact of Insurtech startups on traditional insurance business models and how this industry is changing due to technological innovations.
- Study customer experience with digital insurance services and identify the strengths and weaknesses in delivering these services.
- Investigate how new technologies can be applied to risk management and data analysis to improve decision-making in the insurance industry.
- Analyze the effects of regulations on innovation: Explore the impact of laws and regulations on the adoption of FinTech technologies in the insurance industry and propose solutions to facilitate this process.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

Funding

Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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