



## ORIGINAL PAPER

# A comparative analysis of technological advancements in FinTech and their impact on various financial sectors

Andrei Cristian Spulbăr<sup>1)</sup>

### Abstract:

This article proposes a thorough exploration of the technological evolution within FinTech and its profound impact on various sectors of the financial industry and climate stakeholders. By adopting a comparative approach, the paper reveals how digital innovations have transformed traditional financial systems, focusing on three main areas: InsurTech, aimed at innovation in insurance; WealthTech, which deals with wealth and investment management through technology; and crowdfunding platforms, which democratize access to financing. The review begins with an overview of the FinTech landscape, tracing its evolution from its origins to the present day, highlighting the catalysts for its rapid growth and how these technologies have responded to the changing needs of consumers and businesses.

Next, the article looks at each sector separately, detailing the specific innovations that have been implemented and their impact on the efficiency, accessibility and personalization of financial services. For example, in the field of InsurTech, it examines how big data analysis and artificial intelligence have enabled the creation of insurance policies that are more flexible and tailored to individual needs. In the WealthTech sector, the focus is on automated investment platforms and wealth management solutions that give users more control and lower fees. In terms of crowdfunding, the article explores how these platforms have paved the way for financing innovative and entrepreneurial projects, removing traditional middlemen from the financial equation.

The review concludes with a discussion of future challenges and opportunities for the FinTech sector, including the need for balanced regulation that protects consumers without inhibiting innovation. The article provides valuable insight into the dynamics between technology and finance, highlighting the role of FinTech in shaping the economic future.

**Keywords:** FinTech, InsurTech, WealthTech, Crowdfunding, Digital Transformation

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In recent years, the FinTech sector has experienced significant growth, redefining the traditional paradigms of financial and banking services. This evolution is supported by a combination of technological advances and an increasing demand for innovative, efficient, and accessible financial solutions. FinTech, a blend of finance and technology, has become a primary field for innovation, offering consumers more convenient, accessible, and personalized financial services. It has also facilitated financial inclusivity, enabling previously unbanked or underbanked individuals to access financial services (Chemmanur et al., 2020), (Girish & Bhowmik, 2023). FinTech technologies have made it possible for previously unbanked or underbanked individuals to access financial services, contributing to poverty reduction and economic growth (Grennan & Michaely, 2020). Additionally, FinTech has introduced new approaches to lending and investments, such as peer-to-peer lending platforms and crowdfunding solutions, providing alternatives to traditional lending systems (Varma et al., 2022).

However, the rise of FinTech also brings challenges for the traditional banking and financial sector. Financial institutions must reinvent themselves to stay relevant amid rapid technological innovations. This involves adopting emerging technologies, such as blockchain and artificial intelligence, and revising their business models to include partnerships with FinTech startups or developing their own innovative solutions (Das, 2019). FinTech has accelerated the digitalization of banking services, allowing customers to access financial services quickly and efficiently without needing to visit a bank physically. Karthika et al. (2022) highlight how FinTech technology has simplified banking functions, from complex transactions to more streamlined processes, thereby improving customer experience and enabling better financial decision-making.

Financial institutions are adopting FinTech technologies to offer innovative products and services, such as mobile payments, peer-to-peer loans, and automated financial advice. Anifa et al. (2022) discuss the expansion of FinTech, which includes a variety of innovative applications in services like payments, financing, asset management, and insurance, demonstrating the primary role of these innovations in shaping the future of financial businesses. FinTech has also led to reintermediation in the financial platform economy, altering the basis of competition in currency and financial markets, encouraging oligopoly, and even monopoly. Langley and Leyshon (2020) explore these reintermediation processes through FinTech, highlighting strong trends toward platform consolidation.

FinTech technologies play a key role in promoting financial inclusion, essential for sustainable and balanced development, as reflected in the UN's Sustainable Development Goals. Arner et al. (2019) argue that FinTech technology is the main driver of financial inclusion, emphasizing the importance of digital infrastructure in supporting digital financial transformation. Developments in the FinTech field disrupt mandates within existing regulatory frameworks. Countries differ in how they balance goals of promoting FinTech development and regulating it, with some viewing FinTech as a means to accelerate development and stimulate financial inclusion, while others support innovation with the objective of promoting competition and efficiency in the provision of financial services (Taylor et al., 2020).

FinTech regulation pursues multiple objectives, including investor protection, market integrity, and safeguarding financial stability. Basic principles that many regulators follow include legal certainty, technological neutrality, and proportionality, suggesting various regulatory practices such as the "wait and see" approach, "same risks, same rules," or "new functionalities, new rules" (Amstad, 2019).

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Several regulatory authorities have adopted more interactive approaches, such as innovation offices, accelerators, and regulatory sandboxes, to facilitate safe innovation in the FinTech sector. These approaches allow for the testing and piloting of innovative solutions in a controlled environment, providing regulators with valuable insights into market innovations and enabling the adjustment of the regulatory framework to support innovation while maintaining consumer protection and financial stability (Lehmann, 2019).

Adapting the regulatory framework to keep pace with rapid FinTech innovation presents significant challenges, including managing risks associated with new technologies, ensuring consumer protection, and preventing money laundering and tax evasion. Addressing these challenges requires a combination of flexible regulation, international cooperation, and a commitment to promoting innovation while protecting the integrity of the financial system (Gurrea-Martínez & Remolina, 2020).

Traditional banks are increasingly collaborating with FinTech startups to modernize their core activities and services. This collaboration is driven by banks' desire to adopt a well-defined digital strategy and the presence of a digital director within the organization. Banks frequently invest in small FinTechs but also build product-based collaborations with larger FinTechs, seeking to combine technological innovation with traditional experience and infrastructure (Hornuf et al., 2020). Partnerships between banks and FinTechs can bring significant benefits to both parties, including access to new technologies, improved customer experience, and an expanded range of financial services. However, these collaborations also present certain challenges, such as managing risks associated with new technologies and aligning the strategic objectives of both entities. It is important for banks and FinTechs to manage these challenges through effective communication and by setting clearly defined common goals (Hoang et al., 2021). There are several models of collaboration between banks and FinTech startups, including strategic partnerships, capital investments, and acceleration or incubation initiatives. These models vary depending on the specific objectives of the collaboration, from improving the product and service offerings to exploring new business models or innovative technologies. Selecting the appropriate collaboration model is crucial for the partnership's success and requires careful assessment of the complementarity of resources, competencies, and objectives of each party (Ruhland & Wiese, 2022).

FinTech has transformed the banking sector and financial services by introducing technologies such as artificial intelligence, machine learning, blockchain, and big data analytics. These technologies have facilitated the development of services for fraud detection and prevention, portfolio management (robo-advisors), automated loan processing, and payment digitalization. FinTech innovations, such as mobile payments, digital wallets, and peer-to-peer lending platforms, have improved access to financial services, providing faster, safer, and more convenient solutions for consumers (Dabbeeru & Rao, 2021).

FinTech technologies have made significant advances in the insurance sector, creating the subfield of InsurTech. This includes using advanced data analytics to personalize insurance policies, automating claims processes, and using connected devices to monitor risks in real-time. InsurTech allows insurers to offer more flexible policies and respond more efficiently to customer needs.

FinTech has revolutionized the way payments and fund transfers are made, facilitating fast and secure transactions globally. Blockchain technologies and cryptocurrencies, such as Bitcoin, have introduced new ways of making payments

without traditional intermediaries, reducing costs and processing time. Mobile payments and digital wallets have also become ubiquitous, offering consumers increased flexibility and accessibility. FinTech applications in investments and capital markets have included the development of online trading platforms, robo-advisors for investment management, and crowdfunding platforms for the collective financing of projects and startups. These innovations have democratized access to capital markets, allowing investors of all sizes to actively participate and benefit from investment opportunities.

In addition to its impact on traditional financial services, FinTech plays a crucial role in sustainability and climate protection. FinTech technologies facilitate the development of green financing, which addresses environmental protection or climate change, and provides opportunities for industrialized countries to achieve sustainable growth (Pawłowska et al., 2022). FinTech promotes green innovation by integrating environmental regulations. Studies show that FinTech has a positive synergistic effect with environmental regulations, contributing to regional green innovations (Ni et al., 2023).

Another essential aspect is the role of FinTech in facilitating financial inclusion, crucial for addressing climate change challenges. FinTech helps household and business resilience in the face of rapid climate events or the gradual effects of climate change, such as changing precipitation patterns and rising sea levels (Mhlanga, 2022). Additionally, FinTech can facilitate the financing of green projects through blockchain technologies, which enable the tracking and verification of sustainability certifications, ensuring transparency and accountability in supply chains. These technologies are essential for promoting green consumption and developing innovative financial products, such as green bonds (Nassiry, 2018).

As evident from the literature, the impact of these technological innovations is not limited to the financial sector. They have significant implications for stakeholders in the climate field. FinTech can play a key role in financing sustainability projects and achieving sustainable development goals. For example, blockchain technologies can be used to track and verify sustainability certifications, ensuring transparency and accountability in supply chains. Moreover, FinTech facilitates investments in green projects through crowdfunding platforms and green bonds, mobilizing financial resources towards initiatives that contribute to combating climate change. By examining how emerging technologies are transforming financial markets, this article will explore the implications of these changes on regulations, sustainability, and innovation in a global context. We will analyze how these technologies contribute to sustainable development goals and combating climate change, highlighting the crucial role FinTech can play in creating a more resilient and responsible financial future. Thus, this comparative analysis will provide a detailed perspective on how technological advancements in FinTech influence various financial sectors and climate stakeholders, emphasizing the importance of integrating these innovations to ensure a more sustainable and equitable global financial system.

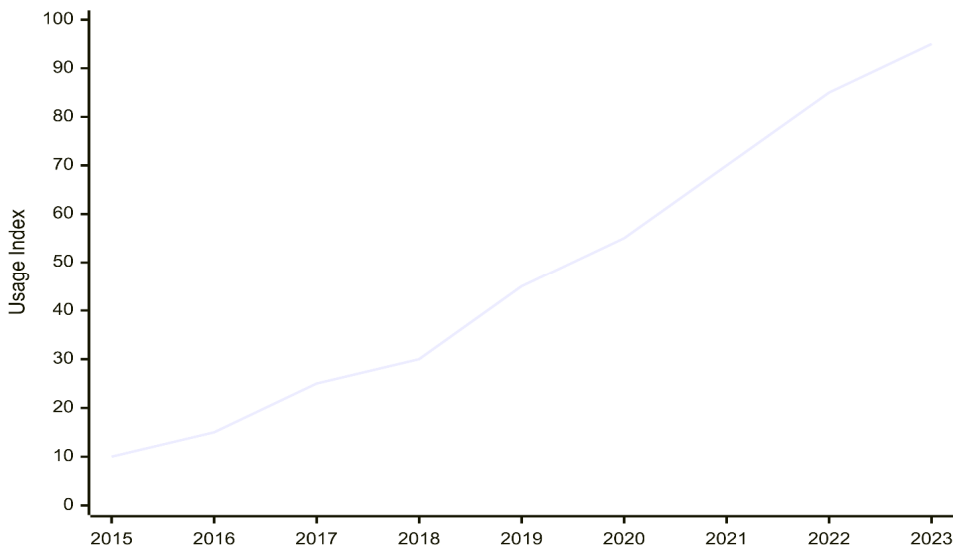
#### *WealthTech and investment management*

WealthTech, the intersection of wealth management and technology, has transformed how financial advisory and investment management services are delivered. Advancements in this sector include robo-advisors, AI-driven platforms that offer automated, algorithm-based portfolio management advice without human intervention. These platforms, like Betterment and Wealthfront, provide accessible, low-cost

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investment management solutions to a broad audience. Additionally, advanced analytics and big data play crucial roles in WealthTech. These technologies analyze vast amounts of financial data to provide insights into market trends, investment opportunities, and risk factors, enhancing the decision-making process for both individual investors and financial advisors. Blockchain technology has also been integrated into WealthTech to improve transparency and security in investment transactions, ensuring that records are tamper-proof and easily verifiable.

Fig. 1. Evolution of AI and ML Adoption in Wealth Management (2015-2023)



Source: Author`s processing of Capgemini World Wealth Report

This diagram shows the growth of AI and machine learning (ML) adoption in wealth management services from 2015 to 2023. The x-axis represents the years, while the y-axis shows the usage index. The line graph illustrates a steady increase in the use of AI and ML, highlighting significant advancements over the years. The diagram captures key trends and provides a visual representation of how AI and ML have progressively integrated into wealth management practices.

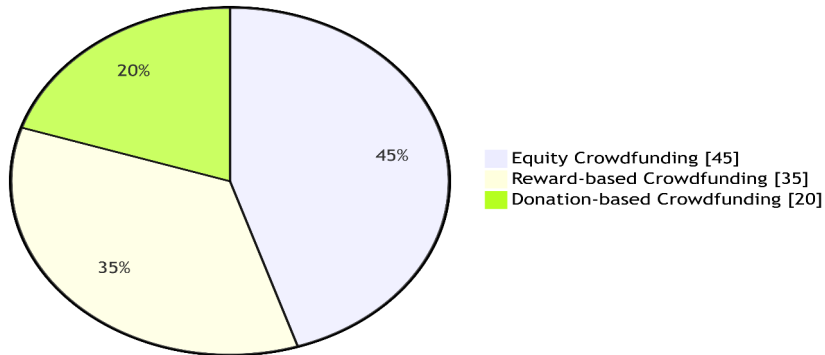
The impact of WealthTech on the financial sector includes democratizing access to investment services, allowing individuals with lower capital to participate in wealth-building activities. It also enhances the efficiency and accuracy of investment management, leading to better investment outcomes. The use of AI and big data in wealth management has resulted in more personalized investment strategies, tailored to individual risk profiles and financial goals, thus improving customer satisfaction and engagement.

### Crowdfunding and alternative finance

Crowdfunding platforms have revolutionized the way businesses and individuals raise capital. These platforms, such as Kickstarter, Indiegogo, and GoFundMe, leverage technology to connect fundraisers directly with potential backers, bypassing traditional financial intermediaries. This digital transformation has opened up new avenues for funding, particularly for startups and small businesses that may struggle

to secure conventional financing.

Fig. 2. Crowdfunding Market Share and Growth Rates



Source: Author`s processing of Statista Crowdfunding Insights

This pie chart compares the market share of different types of crowdfunding (equity, reward-based, and donation-based). It highlights the relative size and growth of each segment over time.

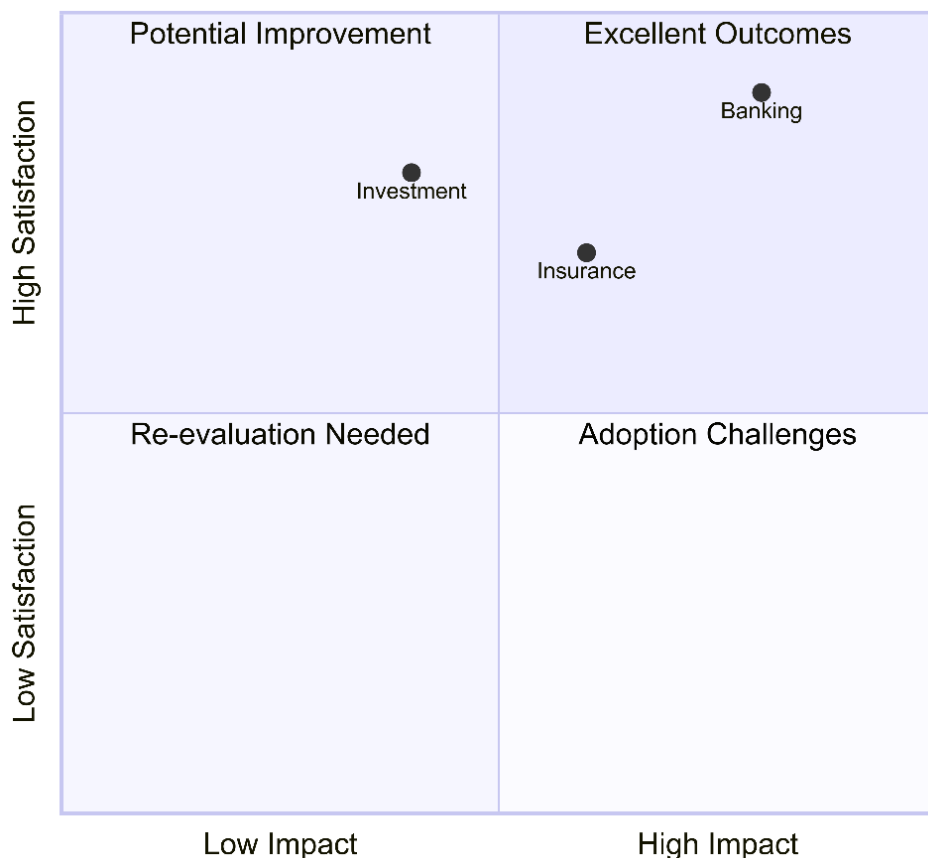
Key advancements in crowdfunding include equity crowdfunding, where backers receive shares in the company in exchange for their investment, and reward-based crowdfunding, where backers receive a product or service in return for their support. Peer-to-peer lending platforms, another facet of alternative finance, enable individuals to lend money directly to others without going through a bank, offering potentially higher returns for lenders and lower interest rates for borrowers. The impact of crowdfunding on the financial sector is significant. It provides an alternative funding source for entrepreneurs and small businesses, fostering innovation and economic growth. Crowdfunding also diversifies investment opportunities for individuals, allowing them to support projects and causes they are passionate about. Moreover, the transparency and community engagement inherent in crowdfunding platforms build trust and credibility between fundraisers and backers, enhancing the overall fundraising experience.

#### *Digital transformation in financial services*

Digital transformation encompasses the integration of digital technologies into all aspects of financial services, fundamentally changing how these services are delivered and consumed. This transformation includes the adoption of mobile banking, digital payments, blockchain, and AI, which collectively improve efficiency, accessibility, and customer experience in the financial sector.

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Fig. 3. Impact of Digital Transformation on Financial Services



Source: Author's own processing

This illustrates the correlation between the impact of digital transformation and customer satisfaction levels across banking, insurance, and investment sectors. Quadrants categorize the outcomes from excellent to challenging adoption.

Mobile banking and digital payments have made financial services more accessible to a broader audience, including unbanked and underbanked populations. The convenience of managing finances through mobile apps and the ease of making cashless transactions have led to widespread adoption of these technologies. Blockchain technology has introduced transparency and security in financial transactions, reducing fraud and ensuring the integrity of financial records. AI has revolutionized customer service, risk management, and investment advisory through personalized services, advanced analytics, and predictive modeling.

The impact of digital transformation on financial services is multifaceted. It enhances operational efficiency, reduces costs, and improves customer satisfaction by providing seamless, personalized financial experiences. Digital transformation also fosters innovation, enabling financial institutions to develop new products and services that meet the evolving needs of their customers. Furthermore, it supports financial inclusion by providing access to financial services for previously underserved populations, contributing to economic growth and stability.

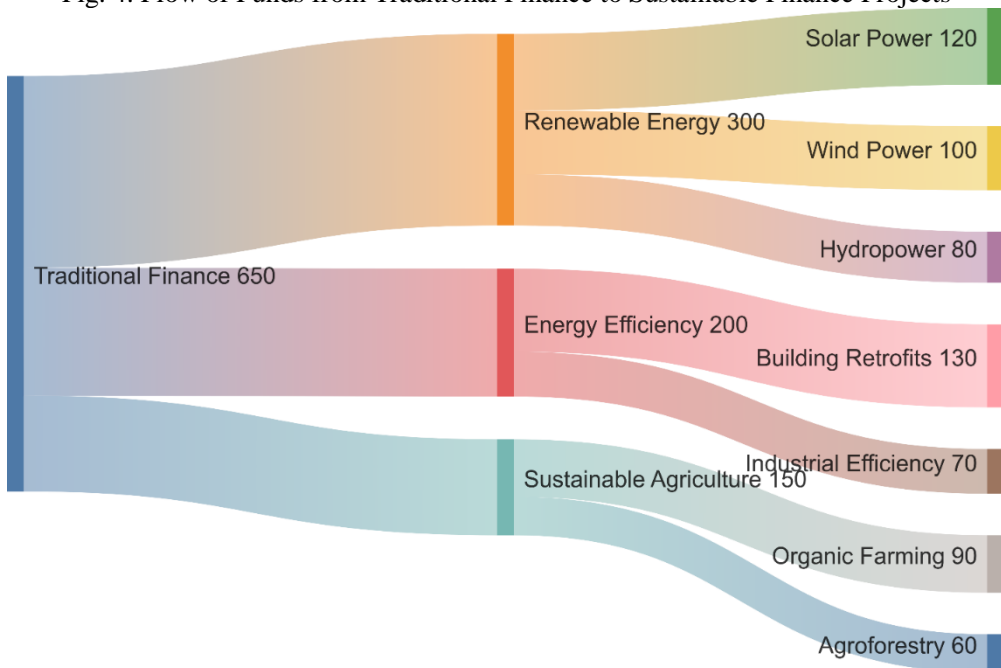
*Impact on climate stakeholders*

Technological advancements in FinTech also have significant implications for climate stakeholders. Sustainable finance, powered by FinTech innovations, is driving investments in environmentally friendly projects and businesses. Green bonds, carbon trading platforms, and sustainable investment funds are examples of how technology is facilitating the flow of capital towards climate-positive initiatives.

Blockchain technology is being used to enhance transparency and traceability in supply chains, ensuring that companies adhere to environmental standards and reducing the risk of greenwashing. AI and big data analytics are helping organizations assess and mitigate climate risks by analyzing environmental data and predicting the impact of climate change on various sectors.

The impact of these technologies on climate stakeholders is profound. They enable better tracking and reporting of environmental performance, fostering accountability and encouraging sustainable practices. FinTech innovations also facilitate the mobilization of private capital towards sustainable development goals, supporting the transition to a low-carbon economy. Additionally, the integration of environmental, social, and governance (ESG) factors into investment decision-making is becoming more prevalent, driven by technological advancements that provide the necessary data and analytics to assess ESG performance.

Fig. 4. Flow of Funds from Traditional Finance to Sustainable Finance Projects



Source: Author`s processing of WorldBank Climatefinance topics

The diagram visually represents the movement of financial resources from traditional finance sources to various sustainable finance initiatives. This diagram is crucial for understanding how different sectors within sustainable finance receive funding and the relative importance of each sector in the overall landscape of sustainable



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finance. The Sankey diagram consists of nodes and links. Nodes represent the different sectors and technologies involved in the flow of funds, while the links between the nodes illustrate the volume of financial resources moving from one sector to another. The width of each link is proportional to the quantity of funds it represents, making it easy to see where the majority of the funds are allocated.

Key sectors and technologies:

1. Traditional finance: the starting point of the diagram is "Traditional Finance," representing the conventional sources of financial resources. These include banks, institutional investors, and other financial entities that allocate capital towards various projects.
2. Sustainable finance sectors: the diagram shows three main sectors where traditional finance is being directed: Renewable Energy, Energy Efficiency, and Sustainable Agriculture. Each of these sectors is crucial for promoting sustainable development and addressing climate change.
3. Renewable energy:
  - Solar power: a significant portion of funds flows into solar power projects, highlighting the growing importance of solar energy in the global energy mix. Solar power is a key technology for reducing greenhouse gas emissions and providing clean, renewable energy.
  - Wind power: another major recipient of funds, wind power projects are essential for harnessing wind energy and converting it into electricity. Wind energy is a critical component of sustainable energy strategies worldwide.
  - Hydropower: funds also flow into hydropower projects, which utilize the energy of flowing water to generate electricity. Hydropower is one of the oldest and most established forms of renewable energy.
4. Energy efficiency:
  - Building retrofits: a substantial portion of funds is allocated to improving the energy efficiency of existing buildings. This involves upgrading insulation, windows, heating systems, and other components to reduce energy consumption and greenhouse gas emissions.
  - Industrial efficiency: investments in industrial efficiency focus on optimizing manufacturing processes and equipment to reduce energy use and emissions. This sector is vital for achieving significant reductions in energy consumption across various industries.
5. Sustainable agriculture:
  - Organic farming: funds are directed towards organic farming practices that avoid synthetic chemicals and promote biodiversity. Organic farming is essential for creating sustainable food systems and reducing the environmental impact of agriculture.
  - Agroforestry: this practice integrates trees and shrubs into agricultural landscapes, providing multiple benefits such as improved soil health, increased biodiversity, and enhanced carbon sequestration.

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The transformative power of FinTech is profoundly reshaping the financial landscape, with wide-ranging implications across various sectors and for climate stakeholders. This comparative analysis has underscored the multifaceted impact of technological advancements in FinTech, particularly in areas such as InsurTech, WealthTech, Crowdfunding, and the broader scope of digital transformation within financial services. The integration of these technologies not only enhances operational efficiency and customer experience but also promotes financial inclusivity and sustainable development.

### *Impact on financial sectors*

The financial sector has experienced significant disruption due to FinTech innovations, necessitating a paradigm shift among traditional financial institutions. Banks and financial service providers are increasingly adopting technologies such as blockchain, artificial intelligence (AI), and machine learning (ML) to remain competitive. This adoption facilitates the provision of personalized financial services, enhances customer satisfaction, and streamlines complex processes. AI and ML, in particular, have revolutionized wealth management through robo-advisors and advanced analytics, democratizing access to investment management and enabling more efficient decision-making.

Moreover, the insurance sector has seen the rise of InsurTech, which leverages data analytics and connected devices to personalize insurance policies and automate claims processes. This not only improves customer service but also allows for real-time risk monitoring, thereby increasing the efficiency and responsiveness of insurance providers.

### *Crowdfunding and alternative finance*

Crowdfunding platforms have democratized capital raising, providing startups and small businesses with alternative funding sources. These platforms connect fundraisers directly with potential backers, bypassing traditional financial intermediaries and fostering innovation and economic growth. Equity crowdfunding and peer-to-peer lending are notable advancements, offering new investment opportunities and fostering community engagement. The transparency and accountability inherent in these platforms build trust between fundraisers and backers, enhancing the overall fundraising experience.

### *Digital transformation in financial services*

The digital transformation within financial services encompasses a broad spectrum of technologies, including mobile banking, digital payments, blockchain, and AI. These technologies have made financial services more accessible, particularly to unbanked and underbanked populations. Mobile banking and digital payments offer convenience and flexibility, leading to widespread adoption and financial inclusion. Blockchain technology enhances transaction transparency and security, reducing fraud and ensuring the integrity of financial records. AI has revolutionized customer service, risk management, and investment advisory by providing personalized services and predictive analytics.

### *Impact on climate stakeholders*

FinTech innovations also play a crucial role in addressing climate change and promoting sustainable development. Sustainable finance, driven by FinTech, channels investments into environmentally friendly projects and businesses. Technologies such as blockchain and AI facilitate green financing by enhancing transparency and traceability in supply chains and by providing advanced analytics to assess and mitigate climate

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risks. Green bonds, carbon trading platforms, and sustainable investment funds are examples of how FinTech supports climate-positive initiatives.

Moreover, FinTech promotes financial inclusion, which is essential for building resilience against climate change. By providing access to financial services, FinTech helps households and businesses withstand the impacts of rapid climate events and gradual changes such as rising sea levels and shifting precipitation patterns. Blockchain technology enables the tracking and verification of sustainability certifications, ensuring accountability in green projects and supply chains. This fosters trust and encourages sustainable practices across industries.

### *Conclusion and future directions*

The comparative analysis of technological advancements in FinTech reveals a dynamic and rapidly evolving landscape that is reshaping financial services and contributing to sustainable development. As FinTech continues to advance, it is imperative for regulatory frameworks to adapt accordingly. Flexible regulation, international cooperation, and a commitment to innovation are essential to managing the risks associated with new technologies while protecting consumer interests and maintaining financial stability.

Partnerships between traditional financial institutions and FinTech startups will be crucial for leveraging technological innovation while maintaining the stability and reliability of established financial systems. These collaborations can bring significant benefits, including access to new technologies, improved customer experiences, and expanded financial services. However, managing the strategic alignment and risks associated with such partnerships requires effective communication and clearly defined goals.

Looking ahead, the integration of FinTech with sustainable finance presents a unique opportunity to mobilize financial resources towards combating climate change and achieving sustainable development goals. By fostering innovation and promoting financial inclusion, FinTech can play a pivotal role in creating a more resilient and equitable global financial system. The ongoing evolution of FinTech will continue to shape the future of finance, driving progress and fostering a sustainable and inclusive economic landscape.

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