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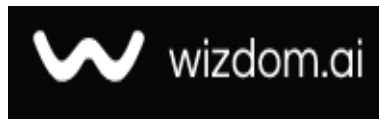
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FinTech and the Development of Crowdfunding Models in Indonesia

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Abstract

General Background: Crowdfunding has become an essential alternative financing mechanism worldwide, particularly in emerging economies. **Specific Background:** In Indonesia, the rapid growth of digital platforms and financial technology (FinTech) provides opportunities to expand financial inclusion, yet challenges persist regarding regulation, trust, and operational efficiency. **Knowledge Gap:** Despite global research, little is known about how FinTech innovations specifically shape crowdfunding ecosystems in developing contexts like Indonesia. **Aims:** This study investigates the role of FinTech in enabling innovative crowdfunding models and examines their sustainability. **Results:** Using a mixed-methods approach with surveys (n=176), interviews (n=33), and case studies, the findings reveal that platform design, operational efficiency, and regulatory support significantly enhance trust and platform credibility, which in turn promote sustainability. **Novelty:** The study offers a comprehensive framework linking FinTech-driven design features, institutional backing, and user trust to the long-term viability of crowdfunding models. **Implications:** These insights advance academic understanding and provide practical guidance for policymakers, entrepreneurs, and investors to foster credible, inclusive, and sustainable crowdfunding systems in Indonesia.

Highlights:

- FinTech strengthens crowdfunding through design, efficiency, and regulation.
- Trust and credibility are central to platform sustainability.
- Findings guide policymakers, entrepreneurs, and investors in emerging markets.

Keywords: FinTech, Crowdfunding, Financial Inclusion, P2P Lending, Financial Innovation.

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Introduction

Crowdfunding represents an important opportunity for FinTech platforms to innovate and develop business models. On the other hand, because the crowdfunding sector is only beginning to emerge, individual countries have pursued their own and often inconsistent regulatory policies. Crowdfunding introduces an innovative technique for allocating external funding for specific projects, making it possible for many investors to collaborate and provide essentially any amount of funding in a way that is appropriate for them. FinTech can be defined broadly as any innovation in financial services that leverages technology to enhance efficiency and provide new solutions. FinTech platforms can be digital platforms that enable some or all aspects of the investment cycle to occur online. The increase in firms involved in startup and early-stage equity as well as crowdfunding shows evidence of the effectiveness of crowdfunding.

FinTech platforms play a critical role in developing crowdfunding models in both supply and demand side dimensions. Demand-side drivers identify a number of themes under which empirical analyses are performed. According to state downgrades, supply-side drivers find that social media and diplomacy rate changes have an influence once the recipient state becomes downgraded and that the platform's credit rating downgrade results in higher rates. The analyses also show that per-capita income and income growth rate difference do affect rates. Namely, funders from rich and fast-growing countries are becoming increasingly selective in funding. Initial steps show that funding rounds per project significantly affect individual funding size: those with more funding rounds receive a larger size [1].

Even though crowdfunding phenomena spread globally with the advent of Web 2.0 and social networks, relevant influences, applications, and outcomes at a local or country level have yet been thoroughly studied, particularly regarding developing countries or geographically isolated areas. The objective is to provide an empirical analysis of crowdfunding in small developing economies. The investigation on this topic focuses on local and geographical factors and restrictions and the role of cultural elements in debates on regulation and restrictions on the operational scope of crowdfunding. There is still a limited understanding of the instances and more mechanistic tendencies of crowdfunding and how the processes influence outcomes. Two issues are of principle importance in this respect – firstly, the degree of public agency involvement in the emergence and development of a local crowdfunding scene and regulatory framework; and secondly, whether the availability of local options changes the crowdfunding landscape in general and for types of crowdfunding that are perceived as higher risk. Accordingly, the present analysis also aims to provide insights into how the complex interactions between local and global factors combine in shaping specific crowdfunding architectures in a local context and whether such a focus can introduce amplification and feedback effects that enable and support local entrepreneurs, projects, and communities[2].

From a methodological perspective, the efforts will combine qualitative and quantitative approaches. The initial fieldwork-based nature of the inquiry seeks to delimit individual crowdfunding markets, regulatory regimes, structural features, and market trends, primarily using comparative case analysis. The outcomes of this analysis feed into a large-N data collection effort focused on country-level regulatory differences and crowdfunding market webs using machine learning-based information extraction. This research builds on these specific insights to explore how FinTech innovations are shaping crowdfunding ecosystems in developing countries, a focus detailed in the following research objectives [1].

1. Research Objectives

The primary objective of this research is to examine the role of FinTech businesses in developing innovative crowdfunding financing models. Crowdfunding, inherently internet-based and global, includes categories such as Peer-to-Peer (P2P) and Peer-to-Business (P2B) lending. Additionally, the emergence of collective gifting models—enabled by Consumer-to-Consumer (C2C) approaches—has facilitated the development of mutual, social, and charitable projects. This research proposes a classification framework to highlight current trends in crowdfunding model development and demonstrates how traditional business domains can be transformed or enhanced through FinTech methods and tools, creating new economic opportunities.

In the last two decades, individual Nortons, altruistic Soviets, advertising Bostonians, or funding users have created new business models such as P2P and C2C have emerged, founded on cost-effective collaboration and interaction. However, these models introduce challenges related to quality assurance, maintaining platform attractiveness, handling temporary interruptions, and navigating informal norms. Both new entrants and established FinTech firms face issues regarding reputation, information asymmetry, trust, and identity management in the digital environment [3].

The research also introduces a heuristic conceptual model that abstracts business domain states into four components: method, detail, task-oriented resource, and object-oriented resource. Afterwards, it reflects practically these inquiries on the Internet and constructs a productivity-oriented assessment and rewards model. In doing so, the research seeks to identify the opportunities and challenges facing FinTech-enabled crowdfunding in the Indonesia and to propose a framework that supports financial inclusion, platform credibility, and efficient project financing.

From the above, the research specifically seeks to:

- a. Classify and analyze current crowdfunding models in Indonesia, including donation-based, lending-based, and equity-based approaches.
- b. Identify the opportunities and challenges FinTech firms face in enabling credible, inclusive, and efficient crowdfunding systems.
- c. Examine key issues such as trust, identity verification, platform reputation, and regulation in digital crowdfunding environments.
- d. Propose a practical framework to support the sustainable growth of FinTech-enabled crowdfunding in Indonesia.

2. Research Hypotheses

In recent years, crowdfunding models have experienced considerable global expansion, primarily fueled by digital transformation and the emergence of financial technologies (FinTech), which have notably transformed the financial landscape for nascent and small-scale enterprises. In Indonesia, crowdfunding presents an encouraging method to advance financial inclusion and foster entrepreneurial innovation, especially given the restricted access to conventional financing avenues.

Nonetheless, numerous challenges persist that hinder the comprehensive actualization of crowdfunding's potential. These challenges encompass regulatory ambiguities, technological constraints, and socio-cultural influences. The extant literature suggests that FinTech innovations possess the capacity to mitigate several of these obstacles by providing transparent, efficient, and adaptable digital solutions. Based on this reasoning, the principal hypothesis of this research is formulated as follows:

" The effectiveness and sustainability of FinTech-driven crowdfunding platforms in Indonesia are significantly affected by factors such as the design of the platform, operational efficiency, regulatory backing, and the trust and perception of users regarding the credibility of the platform, with notable differences identified among various crowdfunding models. "

From the primary hypothesis, the following sub-hypotheses can be carefully formulated:

H1: The design and operational efficiency of crowdfunding platforms have a favorable impact on users' trust and their perception of the platform's credibility.

H2: There are notable disparities in the perception of financial accessibility, operational efficiency, and user trust among the various crowdfunding models, namely donation-based, lending-based, and equity-based.

H3: The regulatory support, encompassing adherence to financial regulations and institutional endorsement, significantly enhances users' trust and the credibility of the platform.

H4: The reliability of trust and the credibility of the platform play pivotal roles in the sustainability of crowdfunding platforms that are empowered by FinTech.

3. Research Questions

This research investigates how the rise of FinTech can contribute to creating a sustainable ecosystem for implementing crowdfunding platforms specifically in Indonesia. Given the dynamic and rapidly evolving nature of Indonesia's FinTech and crowdfunding sectors, it is essential to critically review existing methodologies and frameworks to ensure their alignment with the local market and regulatory environment. To further delineate the scope of inquiry and align the hypotheses with specific analytical goals, the following research questions are proposed:

RQ1: What are the major crowdfunding platforms currently operating in Indonesia, and what models do they adopt (e.g., donation-based, lending-based, equity-based)?

RQ2: How are FinTech companies shaping the design, accessibility, and operational efficiency of crowdfunding platforms in Indonesia?

RQ3: What are the main regulatory, technological, and cultural challenges facing crowdfunding platforms in Indonesia, and what solutions are being implemented?

RQ4: What practical framework can be applied to promote sustainable growth and financial inclusion in crowdfunding platforms in Indonesia?

Crowdfunding has become a significant and fast-growing paradigm in financing innovative projects across the

globe, with Indonesia standing out as one of the most active markets in Southeast Asia. The country's large population, increasing internet penetration, and growing digital economy provide fertile ground for crowdfunding growth. However, the sector faces unique challenges related to regulatory compliance, trust, and financial literacy. Despite these hurdles, Indonesia's crowdfunding platforms have shown strong potential in supporting startups and small to medium enterprises (SMEs), especially in sectors such as technology, creative industries, and MSMEs financing. Unlike traditional venture capital, crowdfunding in Indonesia operates within a complex socio-economic context that requires tailored strategies for sustainable development and inclusion. Understanding the role of the local FinTech ecosystem is therefore critical to fostering innovation and scaling crowdfunding solutions that meet the needs of Indonesian entrepreneurs and investors [1].

Understanding Crowdfunding

Today, one of the tarnished adjectives in capital markets and crowd funding dictionaries is "disintermediated." The reasons lie in the inevitability of adverse selection when capital is raised in an overcrowded market, the potential gains and losses through information externalities, and issues of fraud and deception [2]. Crowdfunding answers the three fundamental questions of our economy: Who decides which projects deserve financing? How can we guarantee they represent the projects' target markets? And perhaps most importantly, what can we do to systematically reduce entrepreneurs' exposure to the risk that they fail to cover their start-up costs? What if those customers provide financing? What if those customers make the decisions and provide financing contingent on the delivery of the product? This is the heart of crowdfunding.

Crowdfunding is defined as one party's attempt to re-finance a project by offering three types of investment opportunities to potential investors: Donation (those investors receive a warm feeling in building a better world; no other return), Passive Investment (those investors want to maximize their Ex-Post-Expected-Payoff), and Active Investment (those risk-neutral investors want to maximize their Ex-Post-Expected-Payoff without any cost on monitoring or redress, or they value non-monetary benefits related to participation) [3]. The potential investors, "apostles," "angels," and "allies," decide whether or not to invest in one of three opportunities each period while the entrepreneur sets the parameters of the game, including the monetary targets of the project similarities of the projects and the costs of investing, to maximize the probability of successful financing. All parameters are endogenously determined within the model, and a detailed and computationally less intensive implicit-difference-game scheme for multi-agent, multi-stage non-linear systems is proposed [4].

It is widely recognized that crowdfunding is an emerging alternative funding source. Within the vast body of international crowdfunding literature, observations and studies could be elaborated to show that the concept of crowdfunding has undergone a rapid evolution from its early stages on to the present day, although the initial ideas prevailed. It is also recognized that has thus far been underestimated. Literature classification based on the funding type is generally based on three aspects: (1) the type of projects funded, (2) the types of donations used when supporting the project, and (3) the expected investing returns. Specific models are derived from such categorizations, such as donation-based crowdfunding, peer-to-peer lending, and equity-based crowdfunding. Each type is then analyzed based on the motivation of the crowd to support fundraising projects and the expected returns [5].

1. Definition and Concept of Crowdfunding

Crowdfunding is an increasingly popular financing mechanism in which one party attempts to finance a project by offering three types of investment opportunities to potential investors: Gifts and Donations which do not yield the donor any tangible reward; Passive Investments, which entitle investors to a monetary reward or some sort of piece of the project; and Active Investments, which are intrusively involved with the project in a way that irreplaceable expertise is obtained by the entrepreneur [2]. When a project is presented, potential investors receive relevant information, partially drawn from a random pool. They may then publicly signal their willingness to invest using a contingent contribution. Each round, non-investing types or types that choose not to publicly initiate an investment opportunity may independently conclude the period. Investors are then called upon to complete their investments contingent on the project's or group's success. A project is successful if the required investments are completed.

In a world without investing, this models nudges credibly categorically in the direction of one of two distinctly identified states. Initial information is often ambiguous, subject to noise and misleading factors. Following preemptive investments, agents generally converge towards a single estimate easily. This behavior is dampened but still persists for non-focal estimates. At the other extreme, the public debate increases ambiguity and potential projects become muddled. Of the two demographic cases in which investments are very rare, one promotes financing and the other does not [6]. Ex ante crowdfunding, in which investors are enticed to finance a project that has not yet been implemented, is more interesting as it poses an entirely new class of dynamics. However, the state of worries immediately prior to the introduction of a product is entirely different. Information has not filtered nor matured in any way. In other words, during the pre-funding phase the investor is not only ignorant of the quality of the project but also of its dynamics, as the applied group structure is difficult to assess [7].

2. Types of Crowdfunding

Generally, crowdfunding can be classified as a kind of "user-generated and user-owned" market-based finance, in

which social media and online platforms enhance finance provision and efficiency to overcome traditional banking system imperfections [3]. Among diverse types of crowdfunding, the peer-to-peer lending and crowdfunding fall into two distinct categories, one monetizing and free to take high returns for lenders, and one donation-based and altruistic for diverse commendations like kind deeds social network. Besides the above divisions, crowdfunding genres are diversified according to the number of funders, bank techniques, and immediacy of backing. In short, crowdfunding may be characterized by funder payments, by underlying financial instruments, and by whether or not funders are entitled to subsequent consideration [8].

By the usage of funder payments, a large number of crowdfunding models have been developed. The models can be classified into two categories of "Keep-it-All" and "All-or-Nothing" crowdfunding. The funders will provide project initiators the funding if their project total funding amount is greater than the specified funding goal. Otherwise, the project will not be funded and repay all funders. "Keep-it-All" crowdfunding models allow a project initiator to collect funds even if the goal is not achieved. On the other hand, fundraising success will not support project implementation in "All-or-Nothing" case. Thus, compliance with the expectations of an "All-or-Nothing" model for a project in regard to fund distribution is expected to be more problematic than a model for a project using a "Keep-it-All" allocation rule. For the two categories of crowdfunding models outlined above, different fundraising dynamics can be expected [9].

a. Donation Based Crowdfunding

Crowdfunding platforms have emerged as vital sources of financial support for startups and small to medium-sized businesses (SMBs), undergoing remarkable growth over the past decade. These platforms offer an array of funding methodologies, including reward-based, debt-based, equity-based, and donation-based crowdfunding. Since the inception of the first reward-based platform in 2009, numerous others have appeared globally. Although donation-based crowdfunding serves as a funding mechanism, it embodies a complex marketplace that necessitates strategic assessment based on the types of platforms utilized and the specific contexts of individual countries [5].

Donation-based crowdfunding is commonly defined as a method through which individuals, groups, or organizations seek financial support directly from the public, typically via online platforms [10].

Donation-based crowdfunding stands out as a widely adopted and increasingly effective method for raising funds, allowing a large number of individuals to contribute small amounts. This approach enables diverse communities to come together and support various causes or projects financially [11] [12].

b. Reward-based Crowdfunding

Crowdfunding is vital in FinTech, notably through reward-based models where backers support projects for non-financial rewards like merchandise. Repeat crowdfunding is rare, as contributors receive rewards but no ownership, limiting potential returns and reducing philanthropic value [3].

Reward-based Crowdfunding is a funding method where individuals offer capital in exchange for expected rewards or incentives. It involves individuals or groups providing capital for various rewards, including products or exclusive experiences [13].

c. Equity-based Crowdfunding

Equity-based crowdfunding allows individuals to invest in start-ups or small businesses, receiving ownership equity in return. This funding method broadens investment opportunities that were once restricted to accredited investors [14].

Equity crowdfunding provides firms with an opportunity to exit by permitting investors the chance to trade their equity shares in well-organized markets. This can occur in various ways, whether through secondary exchanges or peer-to-peer trading platforms where individuals also can buy and sell shares directly with each other. This method provides non-cash benefits by preselecting investor skills, highlighting the crucial impact of investor-shareholder interactions on economic performance.

Equity crowdfunding acts as a capital-raising tool where firms seek funding via online platforms, granting equity stakes in the process. Unlike public offerings, private equity placements remain unlisted, leading to informal trading. Thus, equity crowdfunding resembles a market for lemons due to its illiquidity. Attracting high-quality firms can be challenging, given uncertainty about secondary market trading after issuance. Crowdfunders evaluate projects based on net discounted cash flow minus transaction costs but often can't afford to invest directly, limiting informed investment choices. Consequently, informed firms may resort to inferior platforms that consolidate private and public equity in illiquid markets [3] [15].

d. Lending-based Crowdfunding

Lending-based crowdfunding is specifically defined as a method of raising funds where individuals or businesses can borrow money from a diverse group of people, often through a specialized online platform. This approach

allows for greater access to capital and helps connect borrowers with potential lenders directly [16].

Crowdfunding is a form of alternative financing, while the use of social media by entrepreneurs, startup companies, commercial companies, and project authors to attract and collect financial resources from private people. The advancement of Web.2 technology allow the new generation of crowdfunding projects not only to provide and collect information but also to create social and professional online communities via social networks [3]. Crowdfunding changes the traditional one-to-many investment typology to a many-to-many, platform-mediated one. Crowdfunding can be redefined as "the social media supported feedback-based democratized alternatives to market-based innovation financing".

Lending-based crowdfunding, or peer-to-peer lending, user borrowing through an agency's exchange, is completed using the bank-like online data processing and credit scoring. Debt financing for business projects is not regulated on the target level and simple credit risk evaluation should make lending-based crowdfunding globally operational. In the case of the high country or project risk and ambitions, in conjunction with user lending probability assessment, a suggestion would be for bidding and an assessment auction-based using risk-neutral methods, which completion will lead to financing without supervisory agencies. Verification of user lending necessity can be made by any company through a large investment number deposit in the owner's profit share during the project to analyze personal history and social networking data from social websites posting loans offers asynchronously, establishing a score to be clients of the granting authority [17].

The following Table (1) presents a classification of the main types of crowdfunding. It provides definitions for each type, highlights their key characteristics, and outlines the primary advantages and challenges associated with them. This overview helps clarify the fundamental differences between crowdfunding models and their impact on both investors and project initiators.

Type	Definition	Key Features	Advantages	Challenges
Donation-based	Financial support with no monetary return	Small contributions from a wide audience	Easy and effective for social causes	Low incentives for contributors; relies on goodwill
Reward-based	Support in exchange for non-monetary rewards	Backers receive products or experiences	Attracts supporters; builds community	No ownership or financial return; limits repeat investment
Equity-based	Investment in exchange for ownership shares	Investors get equity in startups or businesses	Potential profit; supports business growth	Legal complexity; illiquid shares; hard to assess quality
Lending-based	Borrowing money with interest through digital platforms	Credit evaluation, peer-to-peer lending	Faster access to funds; simplified banking process	Risk of default; challenges in credit assessment

Table 1. Classification and Characteristics of Crowdfunding Models

3. Key Crowdfunding Platforms (Global and Regional Examples)

By November 2011, more than 530 crowdfunding platforms have raised at least \$ 500,000 each, representing a minimum of \$ 276 million amount raised worldwide on crowdfunding platforms. Since September 2010 over \$ 65 million, or a minimum of about 1500 projects have been funded through crowdfunding platforms. The spread of funding projects and platforms has created growing interest from public actors. With expectations that participatory funding will develop on Europe, recently on 26 February 2012, a conference organized by policy makers, regulators, and crowdfunding platforms gathered in Brussels for the Crowdfunding: Finance on the Edge conference, one of the protocols established was to better inform the European Commission. As other Digital era businesses, crowdfunding business models are expected to multiply and diversify quite quickly, depending on tight regulations, tax regimes, trust institutions and public incentives. Some crowdfunding platforms do already fund projects widely on markets typically pyramidal, building and brand-bridging markets, whereas many others are building on loosely connected enterprises, relying on several dispersed investors with different interests. Several crowdfunding platforms have emerged globally, each with distinct characteristics and target markets. For a detailed comparison of leading crowdfunding platforms, see Table (2) [18][19][20].

Platform Name	Type of Crowdfunding	Funding Model	Target Market	Key Features	Region Focus
Kickstarter	Reward-based	All-or-Nothing	Creative projects	Wide reach, product pre-orders, access	Global
Indiegogo	Reward-based, Equity	Keep-it-All	Tech, creative startups	Flexible funding, equity options, diverse	Global

				campaigns	
GoFundMe	Donation-based	Keep-it-All	Personal causes	Social sharing, charity-focused	Global
LendingClub	Lending-based (P2P)	Fixed interest rates	Personal and business loans	Credit evaluation, direct borrower-lender interaction	Mainly USA
Crowdcube	Equity-based	All-or-Nothing	Startups, SMEs	Equity shares, secondary trading option	UK & Europe
FundRazr	Donation & Reward-based	Keep-it-All	Non-profits and social causes	Social media integration, multiple campaign types	Global

Table 2. Comparison of Leading Crowdfunding Platforms

Generally speaking, by implementing a broad review of all existing crowdfunding models, identifying their key success factors, parameters and constraints, it is expected to deliver –solid, measurable input to policy makers– assessing the credibility, sustainability, and implementability of the chosen strategy or regulatory step, as well as to identify fiscal, financial or informational market deficiencies that would undermine any chosen approach if unaddressed [21]. Four crowdfunding market models are related to four types of fundraising methods employed to fund projects with public participants. They are p2p lending markets (or loan-based crowdfunding) that gather funds from the public to pay them through contracts, rewards markets (or donation crowdfunding) that fund businesses with public money on the condition of being rewarded something else than the project share, share (or equity crowdfunding) markets that are based on the transfer of equity in ventures in return to capital, and fundraising (or donation markets) sources of money that originated from public goodwill and provide non-returned micro-grants [19] [22].

While these early developments provided the foundation for today’s crowdfunding landscape, the industry has grown exponentially in the last decade. As of 2023, global crowdfunding volumes have exceeded USD 40 billion annually, driven by digital transformation, regulatory maturity, and increased public participation across diverse economies. As shown in Table 3, the crowdfunding market has experienced significant growth over the past decade [23][24].

Year	Number of Global Platforms	Market Size (Billion USD)
2012	500+	0.3
2016	1500+	5.1
2020	2500+	13.9
2023	3000+	30+

Table 3. Global Crowdfunding Platforms and Market Size over the Years

This evolution underscores the need to analyze not only the technical structures of crowdfunding platforms, but also the regulatory and cultural environments that shape their success across regions.

4. Legal and Regulatory Frameworks

The emergence of platforms that mediate space for producers and funders to interact has created a new phenomenon: crowdfunding. Crowdfunding is a specific service that allows for micro-fund raising via the internet for peer projects, commercial ventures, or projects like art or health. However, it has become a mass phenomenon that has attracted substantial venture capital investment, with thousands of platforms operating in numerous countries [18][25].

The expansion of the crowdfunding market exhibits variability across different jurisdictions. These discrepancies can be elucidated by positing that distinct start-up ecosystems exist, which are comprised of layers of informal norms and formal regulations. The crowdfunding sector is characterized by rapid innovation and a significant risk of failure, thereby necessitating a robust regulatory framework. The landscape of entrepreneurial finance may vary between nations, as will the design of their corresponding regulatory structures. The existing financing landscape, accumulated experiences, and prevailing expectations may result in either a relatively predictable regulatory framework or a chaotic environment, which could either enhance or hinder the vibrancy of their entrepreneurial crowdfunding markets. It constitutes a fundamental topic within international political economy, drawing from diverse disciplines and employing typologies of registration and legal systems in different nations to comprehend the rationale behind the regulation of crowdfunding platforms across various jurisdictions [26][27].

Overview of Financial Technology (FinTech)

The term “FinTech” (Financial Technology) is increasingly used in today’s lexicon to describe digitally-enabling, technology-based innovation models in the financial services space. In the management literature, the “context” for FinTech is an emerging digital platform network in the financial ecosystem in which a broad variety of financial related transactions happen through intermediating functions enabled by technologies [28][29]. There are four primary groups of actors collaborating to make this context take place, the first two are incumbents and challengers involved in digitally-enabled business model versus product category cooperation/disruption; and the latter two represent traditional and digital infrastructures providing broader access to transactional platforms within the ecosystem [30]. Financial institutions are also increasingly gearing up their robotic process automation investments to automate business processes, improve operational efficiency, and reduce costs. FinTech is a broad term encompassing venture capital, peers to peer lending platforms, equity crowdfunding platforms, payment companies, insurance tech, regtech and bank challengers. However, many in the industry would only consider payment and transfer companies as classic FinTech [28].

1. Definition and Scope of FinTech

Different scholars have proposed various definitions of FinTech, reflecting its evolving nature and broad scope. Some popular definitions include:

a. “FinTech” is a term describing the emerging, disruptive digital financial services without existing traditional banking systems. Even in jurisdictions where traditional banks nevertheless flourish, new digital players enter the market and change the game [31].

b. FinTech is a mix of technological innovations that are changing the future of financial service offerings and disruptive innovations that are bringing new entrants to the field perceived as threats by traditional finance actors [28].

c. FinTech is an internet platform that offers close to bank-like services such as invitation and acceptance of money transfers and investment recommendations [32].

Many definitions agree that FinTech involves emerging technologies in finance, yet some limitations exist. Questions arise about whether stock algorithmic trading systems or financial models qualify as FinTech. The disruptive nature of FinTech raises issues about whether applications like iPads in bank branches are included. Additionally, some definitions are vague, lacking clarity on FinTech's scope. Research on FinTech categorizes topics as descriptive or exploratory, using a motivational matrix to highlight unfilled opportunities. The importance of including financial regulation perspectives is also noted, with proposed research directions emphasizing this need.

2. Historical Development and Evolution

The historical development of societies and economies is closely tied to advancements in financial technology, or FinTech. These innovations have transformed not just transactions but many critical life aspects. Over time, they have reshaped how transactions occur and how businesses operate, adapt, and innovate. Individuals now manage their finances more effectively and conveniently. As these technologies rapidly evolve, they are set to redefine traditional practices, improve access to financial services, and enhance efficiency in financial interactions, resulting in significant shifts in economic structures and social dynamics. Understanding FinTech's role in our changing world is vital for sustaining economic growth and improving quality of life for individuals and communities alike [33]. This underscores the critical need for ongoing research and policy development in FinTech.

3. Core Technologies Enabling FinTech

Understanding the future trajectory of FinTech requires a comprehensive analysis of its technological applications across core financial operations—such as money management, lending, payments, and investments—alongside their specific implementations. Insights gained will be crucial for understanding FinTech's core intelligence. Most FinTech firms perceive technologies as frameworks integrating knowledge and applications. As action facilitators, technologies require defined roles for effective task engagement. This influence extends across various disciplines, but focusing solely on technology overlooks social and cultural contexts. Ignoring macro-level structural changes may lead to missing critical FinTech aspects. By rethinking resource integration in FinTech, we can achieve a more nuanced understanding.

a. Blockchain

Blockchain technology enables innovative investment distributions through token issuance in Initial Coin Offerings (ICOs). Tokens can represent various assets, from currency to digital shares, allowing for flexible use. Their issuance and trading are managed by smart contracts, which autonomously enforce agreements. Blockchain enhances trust within the system, though it also requires investor confidence in the code. Much of this code is open source, and while community oversight is beneficial for decentralized blockchains, early developers have substantial influence. Thus, establishing trust in the founders is crucial, and the project team's intentions along with regulatory compliance can be validated individually [34].

b. Artificial Intelligence (AI)

Artificial Intelligence (AI) is a technological framework built around an in-depth integrated model, which is composed of a conclusion and a series of sub-models. These models are hybrid or complex in nature, composed of a different algorithm. In other words, the technological framework is composed of the following algorithms: sentiment analysis (to mine reviews), neural network based clustering (to cluster the DVDs with a non-parametric Bayesian algorithm), Latent Dirichlet Allocation (to generate topics), Page Rank (to rank the generated topics), and Support Vector Machines (to classify reviews related to the topics). Generally speaking, analyzing a collective intelligence phenomenon requires the construction of a technological framework that is composed of diverse coupled algorithms [35].

c. Big Data Analytics

The FinTech industry has the potential to use both public and proprietary big data sources, with traditional financial data sources being augmented by new public data sources. Social networks, weather data, video streaming, mobile telecommunication data, and satellite data have become more widely used in recent years. The availability of big data has led to advancements in algorithms and machine learning infrastructure for financial services. Banks and traditional financial institutions have shifted their focus and intention to speed up the adoption of big data technologies and tools. Various applications of big data in finance have been identified, with a specific focus on the implementation of big data technologies in banking. Demonstrated uses of big data include credit scoring, peer-to-peer lending, anti-money laundering, algorithmic trading, and behavioral vetting [36].

d. Smart Contracts

Smart contracts constitute a fundamental technology within the FinTech landscape, permitting the automated, secure, and transparent execution of agreements without reliance on intermediaries. Predominantly developed on blockchain platforms like Ethereum, smart contracts are self-executing code that enforces the stipulated terms and conditions of a contract upon the fulfillment of predefined criteria. This functionality mitigates the risks associated with fraud, reduces administrative expenses, and enhances the efficiency of transactions. In the realm of FinTech, smart contracts support a variety of applications, including decentralized finance (DeFi), automated insurance claims processing, digital identity verification, and peer-to-peer lending. Their capacity to function in a trustless and autonomous manner positions them as essential facilitators for scalable, real-time financial services within a decentralized framework [37][38].

The following Table (4) provides a concise summary of the core technologies that are driving innovation and transformation within the FinTech sector. Each technology plays a distinct role in reshaping financial services, from enhancing operational efficiency to enabling new financial models and improving user experiences. Understanding these technologies and their specific applications offers valuable insight into how FinTech is evolving and the mechanisms through which it delivers value to both service providers and end-users.

Technology	Description	Applications in FinTech
Blockchain	A decentralized technology that allows token issuance and autonomous contract execution via smart contracts.	Tokenized investments, Initial Coin Offerings (ICOs), decentralized trust mechanisms, automation of agreements
Artificial Intelligence (AI)	A technological framework using interconnected algorithms for analysis, decision-making, and pattern recognition.	Sentiment analysis, customer behavior analysis, fraud detection, credit risk scoring
Big Data Analytics	Use of vast and diverse data sources to gain financial insights and make informed decisions.	Credit scoring, peer-to-peer lending, anti-money laundering, algorithmic trading, personalized financial services
Smart Contracts	Self-executing programs on blockchain platforms that automatically enforce contract terms when conditions are met.	Decentralized finance (DeFi), insurance claims automation, digital identity verification, peer-to-peer lending

Table 4. Summary of Core Technologies Enabling FinTech

4. FinTech Adoption and Global Market Trends

Although FinTech phenomena have become more pronounced in recent years, and notably during the COVID-19 pandemic, disputes about how to frame, understand, and conceptualize them remain. The designation itself is often debated, rendering it challenging to distinguish FinTech from FinTech-Elite. FinTech-related developments often challenge regulatory frameworks. While existing regulations framed in relation to traditional industries—primarily

banks, capital markets, and insurance—often loosely fit the new FinTech realities, profound blindspots often remain that allow innovation to flourish on the outskirts of regulation. Some examples are not always emerging from outside finance, as established institutions, including banks, insurance firms, and stock exchanges, also actively engage in FinTech. Regulatory scrutiny of these developments often focuses on the incumbent financial players, which are perceived as a risk to incumbents rather than consumers. However, in other cases, regulatory attempts to cover the entire FinTech spectrum have also failed, resulting either in unstable regulatory environments or outright regulatory failures [39].

The question has also been raised of how (sustainable) ecosystems for innovative FinTech firms in emerging markets can be developed and what proactive policy measures would help to grow local FinTech industries. As an illustration, it seems that policies that support FinTech firms' activities and growth are important and that banks should embrace emerging FinTech competition. However, the importance of business opportunities enabled by FinTech in thriving local finance and education markets for firm emergence and growth in less financially developed countries has also frequently been noted. The need for a broader understanding of the ecosystems for FinTech start-ups is perceived alongside more targeted studies of specific national and regional ecosystems. How variations across national environments affect start-up firm emergence and strategy across countries and regions have also been addressed [22].

In sum, FinTech's technological backbone, regulatory dynamics, and global adoption patterns collectively shape a rapidly evolving financial ecosystem that demands continuous interdisciplinary inquiry.

Literature Review

Crowdfunding emerged as a tool in online social media for entrepreneurship fundraising [40]. The role of platforms or social media in crowdfunding models, which were developed as a source of equity for companies that are lacking formal venture capital finance, has been popular. Crowdfunding platforms, which played a crucial role in orchestrating contributions, were studied, particularly in the domain of social networks. The relationship between pledged crowdfunding contributions and social network characteristics was addressed. It examined whether social network characteristics, such as size, density, and degree centrality, affect pledge contributions within the same platform. A cross-platform study was also conducted to identify common patterns between social networks and their contributions in terms of pledge amounts and number of contributors. These studies were limited to social network participants and transaction behavior, while the crowdfunding models, such as equity and debt projects, were selected based on perceived risks by investors [19].

Crowdfunding, which is an investment-oriented fundraising and capital-raising mechanism, is a new model that offers a new opportunity for SMEs to grow and as a sourcing opportunity for potential investors to invest in companies and projects at an early stage. Crowdfunding allows SMEs to raise new investments, which help them to grow and develop new products or ideas into the market. This pooling of funds can be accomplished through the internet, where interested parties can make a capital contribution in exchange for equity or some future return, depending on the type of model. Crowdfunding also enables later recourse into established companies that, due to their growing potential, are preparing their IPO and have the ambition to report on the stock exchange [41]. This is where improving capital structures is necessary before a more extensive research is either successful or not, which makes access to increased funding a topped pressure to develop the SME's competitive advantage. The aim of the research is to critically review the extant literature pertaining to the domain of the role of FinTech in developing crowdfunding models and the various dimensions associated with crowdfunding and its dimensions.

1. Existing Research on Crowdfunding

Crowdfunding is a collective effort by people who network and pool their money together, enabling accessibility of vast networks through online platforms [3]. It can be seen as an open call to provide financial resources primarily on crowdfunding platforms (CFPs), which provide a matching service between fundraisers and funders. Projects have different features and funders have heterogeneous preferences over these projects. Crowdfunding platforms could be divided into two main categories: Reward-based CFPs and investment-based CFPs. Reward and donation-based CFPs fall into the first category, while equity-based, Royalty-based and lending-based CFPs are considered part of the latter [42]. Crowdfunding, which has emerged with the rapid development of the internet and social media, refers to the aggregation of financial resources from a heterogeneous set of individuals through an open call. Though this crowd of people can be interested in financial, social or charitable returns, the provision of private investment is by far the most studied segment. The current research landscape could be characterized as fragmented, niche-driven and in its youth.

The financing of early-stage projects was typically based on personal relationships and required face-to-face interactions. This procedure involves high levels of risk, uncertainty, and information asymmetry. These issues lead to the rise of an innovative methodology to raise funds known as 'Crowdfunding'. On this context, a competitive equilibrium is characterized and the corresponding pure strategy auction mechanism is developed. The competitive equilibrium is not efficient. Crowdfunding is a suitable way to raise the initial capital if and only if the information asymmetry is large enough to justify the setup cost of commission fees. It is shown that Crowd in an auction mechanism is not only a collective action, but also an informational advantage. It is in the interest of both fundraisers and funders to adopt the Crowd auction mechanism.

2. Existing Research on FinTech in Finance

The role of technology-based financial services in facilitating transaction processes is investigated in this paper. Analyses are focused on the operation of crowdfunding services, which have become one of the most rapidly developing forms in the context of financial technologies. The development and expansion of the service is accompanied by a reform to legislation regulating the operation of crowdfunding platforms in order to assure users about the forbearance of various risk factors. This research aims to review crowdfunding platforms operating in Hungary from a service perspective and to determine the potential new parameters affecting the service. They could be meaningful both to the practitioners developing these services and to the legislative authorities in devising the legislative framework of operation. The emergence of quickly growing international players could rather mean a potential risk for national operators. The fast pace of development in the sector means new challenges for legislators [43].

Innovation has always been a main driver and pathway to success. Creative ideas and their economic exploitation have formed the key to development and prosperity for centuries. Since the turn of the millennium, this importance has increased with the acceleration of technological advancements, scientific growth and globalization. Consequently, the phenomenon of technocreativity emerged, which refers to the rapid marketization of novel inventions, commercialized ideas and models based on creative logic, and has fundamentally reformed the economy. Prior to the modifying forces of new technologies, societal structure, communication and consumption, the features of the prevailing constructive milieu created barriers causing an innovation gap and unmet need. The speedy penetration of innovated industries provides hitherto non-existent services as answers to unfulfilled requests [44].

Technologies became prevalent in all fields in the past decade. Information and communication technology started the global informing era. Almost every user has become a mobile internet user producing several terabytes of content daily. IT became an accelerator propagating other technologies into the economy. As a result of this, more traditional industries could create radically new instruments, regulations and infrastructure transforming competition. Meanwhile, external change factors made financial literacy inadequate for new solution-oriented, self-service products and resulted in unbanked or underbanked customers.

3. Studies at the Intersection of FinTech and Crowdfunding

The researchers observe a pronounced and significant lack of empirical research that thoroughly investigates FinTech's direct impact on various crowdfunding models and the nuanced dynamics of funding. Although a more comprehensive analysis of multiple factors, influencing global crowdfunding has indeed been conducted—encompassing numerous project and funding dimensions—it simultaneously acknowledges the historical changes that have taken place over time. A more focused and detailed examination further highlights the substantial effects that FinTech exerts on crowdfunding efforts worldwide, particularly concerning crucial product aspects, which include factors such as pricing strategies and model selection, both of which are vital in understanding the current landscape.

4. Theoretical Framework (e.g., Technology Acceptance Model, Innovation Diffusion Theory)

According to the Technology Acceptance Model (TAM), perceived ease of use and perceived usefulness are key determinants in the acceptance of technology. This model has been further enhanced by the addition of external variables. Thus, the following variables were selected: trust, perceived ease of use, perceived relative advantage (i.e. perceived usefulness), perceived network externality, and purchase intention, as they were deemed most relevant for this research. The order of analysis was conducted in line with [45], and based on the research of the variables and constructs, it was decided to format each variable accordingly, with similar format and wording for easier comprehension.

With the intention of improving the TAM by adding external variables, the model was followed. For this purpose, the 5 external variables were translated into 20 hypotheses. Subsequently, the hypotheses were translated into statements. Finally, these statements were formatted by group, yielding five groups of statements. The formatting was done with the goal of providing a clear and simple visual representation to facilitate comprehension of results. The statements were then tailored to the survey based on the scale selected. To design the survey to reflect the constructs of the model accurately, the qualitatively and quantitatively developed statements were translated into English.

The statements were also revised internally to ensure appropriate wording. The target was the modern crowdfunding modal of Donations. Consequently, the statements were edited to represent this mode while retaining the original constructs. As the original statements were in Spanish, forward and backward translations were performed. Then, a pilot test was conducted with five participants as a quality check prior to commencement of the survey. After this round, minor changes were made to enhance comprehensibility.

The Intersection of FinTech and Crowdfunding

This section explores how FinTech enables and transforms crowdfunding practices, with a focus on innovation,

accessibility, investor behavior, operational challenges, and ethical considerations.

Financial technology (FinTech) comprises new applications and business models impacting financial markets and services. The modern FinTech ecosystem features established institutions, emerging FinTech companies, and regulatory bodies. These stakeholders share complementary resources, leading to innovative finance solutions. FinTech firms often reconfigure resources with emerging technologies like Distributed Ledger Technology and Artificial Intelligence. Changes in system structure or behavioral patterns depend on market needs. Crowdfunding, a cooperative financing model, relies on pooling investments from many contributors via operational platforms, with advanced models leveraging FinTech. Understanding the interaction of technology and crowdfunding is key due to the limited academic literature on the FinTech ecosystem's structure, primarily explored by finance and economics scholars. This research focuses on the FinTech ecosystem in Lithuania, examining enabler technologies impacting crowdfunding and their value creation mechanisms across four enabler technologies. It identifies transformative enabler technologies in crowdfunding and their significance in model value creation. The FinTech ecosystem model illustrates how emerging technologies manifest in finance, with a detailed analysis of stakeholder interactions in a specific market. Interaction degrees are classified into four types—interactivity, homogeneity, tangibility, and information asymmetry—and evaluated through case studies of four venues.

1. The Role of FinTech in Crowdfunding Innovation

FinTech is transforming crowdfunding by introducing new platforms and advanced technologies. Crowdfunding is evolving globally, moving beyond traditional platforms to include mobile donation systems, social networks, and in-game purchases. The rise of new platforms, such as save-for-later and peer-to-peer commerce, is notable. Additionally, innovative methods like bundling, reverse auctions, pooled funding, and local hiring donation services are emerging in crowdfunding campaigns. This rapid development has prompted research into FinTech's role in crowdfunding efficiency and risk. Investors are increasingly concerned with the profitability of crowdfunding and whether innovating platforms yield better results. Similarly, platform operators are examining market structure, related factors, and competition. However, existing studies often lack empirical analysis and focus on theoretical frameworks without real-world data. This research evaluates FinTech as crowdfunding innovation by analyzing a wide range of platforms and categorizing them into traditional and FinTech based on their development and operational models. Traditional platforms are web-based, while FinTech platforms prioritize app deployment for user interaction. The research also tracks yearly crowdfunding methods and campaigns. An empirical machine learning analysis explores the relationships between FinTech platform features, method innovations, campaign variations, and overall market outcomes [3] [46].

2. Enhancing Accessibility and Financial Inclusion

Crowdfunding has gained popularity as a means for companies to raise capital by connecting those needing funds with willing investors through online platforms. These websites showcase firms seeking investment, allowing investors to explore opportunities. If a funding goal is met, the funds are accessed; if not, investors retain their money. This model is beneficial for small companies that struggle to secure traditional financing from venture capital. The Internet's commercialization has facilitated private investment solicitation. Crowdfunding is being used not just for startups but also for established firms, prompting governments to explore it as a means to access untapped human capital, which could result in new funding mechanisms for startups.

Traditional financing methods often require large investments and extensive due diligence, making them unsuitable for small amounts sought through crowdfunding. Companies may also be deterred by non-disclosure requirements and the risk of losing control over their ideas when seeking larger investors. Online platforms attract more small-tier investors and reduce intimidation through anonymity, enabling inexperienced investors to engage more easily.

Evidence is emerging showing that investors may strategize their investments across various crowdfunding platforms, leading to increased competition among startups for funding. This influx could oversaturate the market, necessitating higher quality in early-stage funding rounds to attract interest. Interestingly, the growth of crowdfunding does not appear to diminish the income of pre-existing financing platforms; rather, brokers are recognizing crowdfunding's significant impact and adjusting their strategies in response. However, early signs of backlash and regulatory attempts suggest that crowdfunding may face challenges ahead [36].

3. Impact on Investor Behavior and Decision-Making

Crowdfunding models significantly influence investor behavior and decision-making across various aspects. Understanding crowdfunding, its types, and regulations is essential for grasping marketplace dynamics. Investors should be aware of the fundamental types of crowdfunding—donation-based, reward-based, equity-based, lending-based, revenue-based, and revenue-sharing—to make informed choices about project participation. A deep comprehension of crowdfunding business models and incentives is necessary to align investments with personal interests and perform due diligence before committing funds. Additionally, knowledge of the various organizational structures for crowdfunding schemes and awareness of regulatory frameworks, especially concerning accredited and unaccredited investors, is critical.

Understanding the factors influencing adverse incentives affecting investor choices is essential. Crowdfunding

platforms rely on user-generated content and ratings, facing agency risks. While expert investors typically make better choices than ordinary ones, it's crucial to examine their impact on market equilibrium. In peer-to-peer lending, moral hazards arise when borrowers mislead lenders about risk levels. This situation relates to whether crowdfunding platforms function as intermediaries. Risk may increase in partially inefficient marketplaces if platforms engage in their own projects. Platforms with limited firm representation and closer connections to selected startups tend to be more successful. However, displaying comments linearly can harm outcomes. Conversely, investors might be drawn to faulty projects pitched by dishonest seeders in decentralized settings, creating moral hazards. Recognizing the factors influencing crowdfunding campaign success, particularly in reward-based models, is vital. Pricing tiers and reward types are key determinants. Additionally, investor awareness of other options and stronger ties with backers boost success chances. Project owners are advised to explore various crowdfunding types after trying one [3] [47].

4. Operational and Technological Challenges

A potential solution is to impose eligibility criteria for issuers or proposals on the platform, limiting access to professional and sophisticated investors. However, this may detract from expected financial, entrepreneurial development, and inclusion benefits. Alternatively, special-purpose regimes could be introduced for crowdfunding-like models, similar to peer-to-peer platform regulations. Crowdfunding is a broad term that includes various services and audiences. For each model, regulators must analyze the activity type (e.g., donation, debt, equity) and structure (e.g., purpose, investor type, markets) to establish a fitting regulatory framework. Operational challenges in financing will be pronounced during development. Mobilizing quality investment opportunities is essential for long-term sustainability. While reputation effects can help, understanding project size, quality, and cash flows can be expensive. Retail and SME credit histories are often limited, and outreach is hampered by a lack of connections. These uncertainties may benefit retail crowdsourcing, but the attracting party generally has better information and should disclose it. FinTech empowerment might not ensure overall investment efficiency due to underlying structural inefficiencies and inconsistent investor behavior. Crowdfunding theory indicates potential confusion. Failures in banking and the rise of alternative finance sources may support some models while limiting others, suggesting instability in the finance sector. Competing models and convergence elements are likely to emerge [48][49].

5. Risk Factors and Ethical Considerations

A successful crowdfunding campaign depends on how effectively the entrepreneur identifies and communicates the project's risk factors, such as the founding team, product, market, finance, and business model. This risk assessment is facilitated by previous experiences and educational expertise, which help mitigate negative impacts on crowdfunding performance. Founders face challenges in articulating these risks because crowdfunding is a new concept, lacking established heuristics.

A literature review on crowdfunding campaigns identified various risk factors, which were categorized into six distinct groups. Strategies to mitigate these risks were also explored, offering founders tools to better present their projects. Problem framing is crucial, as it determines which aspects of a situation are highlighted or overlooked, ultimately influencing the perceived need for solutions. Crowdfunding remains an unsolved issue, with formal knowledge on effective problem framing still evolving. Businesses may choose to abandon it or work to combat negative perceptions. Uncertainties related to framing stem from gaps in the problem frame, affecting funding outcomes [3].

Method

A. Research Design

This research adopts a comprehensive mixed-methods approach that effectively combines both qualitative and quantitative research designs to thoroughly examine the critical role of FinTech in enabling and transforming various crowdfunding platforms. The design aims to generate rich empirical evidence as well as a deeper contextual understanding by integrating surveys, in-depth case studies, insightful interviews, and relevant platform data. Through this multifaceted methodology, the research intends to shed light on the significant impacts and innovations brought about by FinTech in the evolving landscape of crowdfunding.

B. Data Collection

1. Quantitative Phase

A thorough survey was conducted with a varied group possessing pertinent experience or interest in crowdfunding. The questionnaire aimed to examine numerous factors that affect investor behavior, selection of platforms, and the perceived credibility of crowdfunding models. A total of (176) responses were obtained and analyzed through sophisticated methodologies, including Structural Equation Modeling (SEM) and Confirmatory Factor Analysis

(CFA). These analytical approaches evaluated the hypothesized relationships between significant platform attributes, such as technological infrastructure and user interface, and critical outcomes, including firm credibility and investment intent, thereby offering important insights to the domain.

2. Qualitative Phase

Semi-structured online interviews were conducted with 33 experts from FinTech companies, regulatory authorities, traditional banks, and academia to explore the opportunities, risks, and challenges of FinTech-driven crowdfunding. The qualitative data from these interviews underwent thematic analysis, identifying core patterns and varied stakeholder perceptions. Ethical standards were strictly upheld, including informed consent, confidentiality, and voluntary participation. Additionally, five in-depth case studies focused on crowdfunding platforms in developed and emerging markets. Online interviews with Chief Technology Officers (CTOs) or co-founders provided insights into operational models, the strategic use of FinTech innovations, and adaptations to regulatory changes. This multifaceted approach offered a comprehensive understanding of technology's role within regulatory frameworks in crowdfunding.

C. Sampling Strategy

a. Sampling Frame: Participants for this research will be individuals with significant experience or exposure to crowdfunding platforms. Purposive sampling will be used for expert online interviews to identify knowledgeable individuals. For the online survey participants, convenience sampling will be utilized to gather a broad range of responses.

b. Sample Sizes: The research aims to collect data from a total of 176 online survey respondents, conduct 33 expert online interviews, and analyze 5 case studies of crowdfunding platforms to enhance the findings.

D. Analytical Techniques

1. Quantitative Analysis

SEM and regression analyses were meticulously conducted to thoroughly validate the measurement models and rigorously test four key hypotheses that relate to platform infrastructure, policy support, effective time management, and firm credibility. Various diagnostic tests, including KMO (0.855) and Bartlett's test, confirmed the strong validity of the factor structures employed in the analysis. Furthermore, multicollinearity was carefully ruled out since all VIF values remained below the critical threshold of 10, indicating a robust underlying construct validity in the conducted analyses.

2. Qualitative Analysis

Thematic coding revealed several key themes that emerged clearly: FinTech significantly enhances transparency and user access, providing users with greater control and understanding over their financial activities. Crowdfunding not only creates monetary value but also generates important non-monetary value such as increased exposure for projects and fostering community engagement among contributors. Nonetheless, regulatory uncertainty still persists and continues to represent a significant challenge in both developed and emerging markets, thereby complicating the landscape for innovative financial solutions. This uncertainty creates hurdles that can deter investment and slow down progress. Moreover, technology is playing an increasingly critical role in effectively connecting investors, creators, and platform providers. It streamlines interactions and enables more efficient transactions across the board, which enhances accessibility and fosters collaboration in a rapidly evolving financial ecosystem.

E. Ethical Considerations

All individuals participating in the research were briefed on the project's nature and objectives, and consent was acquired before data collection. Strict measures maintained confidentiality and anonymity, ensuring personal information privacy. Participants could withdraw from the study at any time without repercussions. Table (5) shows descriptive statistics for the 176 participants in the quantitative phase, including demographic profiles, survey administration details, and a summary of the analytical methods used. These findings formed the basis for Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA).

Variable	Description / Categories	Value
Total Participants	Completed Surveys	176
Gender	Male / Female	73 (41.5%) / 103 (58.5%)
Age Group	20s-30s	123 (69.9%)
Marital Status	Married	58 (32.9%)
Education Level	Highest Level Achieved	Majority: Bachelor's

Monthly Income	Income Range	Majority: Below \$3000
Employment Status	Occupation	74 employees (41.9%)
Years Living in Indonesia	Residency Duration	Majority: >20 years
Survey Administration Method	Distribution Format	100% Online
Survey Period	Data Collection Timeframe	July 4-10, 2024 (7 days)
Country	Country of Respondents	Indonesia
Data Analysis Technique	Analytical Framework	Structural Equation Modeling (SEM)
Model Estimation Method	Estimation Method Used	Maximum Likelihood (ML)
Measurement Assessment	Validation Method	Confirmatory Factor Analysis (CFA)

Table 5. *Descriptive Statistics and Analytical Overview of Survey Participants*

Table (6) summarizes the analytical tools and techniques employed in both the quantitative and qualitative phases of this research, including ethical protocols to ensure participant protection and research integrity.

Phase / Aspect	Tool / Method	Purpose / Description
Quantitative	Structural Equation Modeling (SEM)	To assess relationships between variables, test hypotheses, and estimate impact
	Confirmatory Factor Analysis (CFA)	To validate measurement model and latent constructs
	Regression Analysis	To examine the influence of time, policy, technology, and credibility; hypothesis testing
	Descriptive Statistics	To describe sample characteristics and platform design perceptions
	Variance Inflation Factor (VIF)	To test multicollinearity
	KMO & Bartlett's Test	To assess sampling adequacy and factorability
Qualitative	Thematic Analysis	To extract patterns and core themes from interview transcripts
	Semi-Structured Interviews	To explore expert perceptions across sectors
	Case Study Analysis	To provide contextual insights into operational strategies and innovation on real platforms
Ethical Tools	Informed Consent, Anonymity, Voluntary Participation	To uphold research ethics and protect participant rights

Table 6. *Overview of Research Analytical Tools and Techniques*

Results and Discussion

A. Results

In the section, it presents results from extensive quantitative analysis using Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA). The main objective was to validate hypothesized relationships between key platform features, such as technology infrastructure, competitiveness in time management, policy support, and platform credibility. This analysis also aimed to assess the influence of these factors on investor behavior and overall trust in the platform.

1. Measurement Model Evaluation (CFA)

A Confirmatory Factor Analysis (CFA) was conducted to thoroughly assess the reliability and validity of the employed measurement model. This analysis involved the computation of factor loadings in addition to the Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's Alpha for each latent construct. These computations were crucial to ensure that both convergent and discriminant validity were sufficiently examined. Table (7) displays the loadings alongside the reliability statistics, which clearly demonstrate that all constructs meet the established acceptable thresholds for both validity and reliability. This meticulous evaluation underlines the robustness of the measurement model.

Construct	Indicator Code	Indicator Statement	Factor Loading	Average Variance Extracted (AVE)	Composite Reliability (CR)	Cronbach's Alpha
Design & Operational Efficiency (H1)	DOE1	The platform is technically reliable and stable.	0.81	0.70	0.88	0.83
	DOE2	The system is fast and responds quickly to actions.	0.79			
	DOE3	I feel secure using the platform's technology.	0.87			
	DOE4	The platform uses up-to-date and modern technology.	0.85			
	DOE5	The platform allows me to complete investments quickly.	0.78			
	DOE6	Time taken for transaction confirmation is reasonable.	0.80			
	DOE7	The process flow on the platform saves me time.	0.83			
Regulatory Support (H3)	RS1	The platform complies with national financial regulations.	0.82	0.69	0.85	0.80
	RS2	The platform provides clear policies for investor protection.	0.79			
	RS3	The platform is supported or endorsed by credible institutions.	0.85			
Trust & Platform Credibility (H4)	TPC1	I trust the platform to handle my financial information responsibly.	0.88	0.74	0.90	0.87
	TPC2	The platform has a good reputation among investors.	0.86			
	TPC3	I believe the platform is transparent in its operations.	0.84			

	TPC4	The platform provides sufficient information about projects and risks.	0.85			
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Table 7. *Measurement Model Evaluation – CFA Results for Latent Constructs and Indicators*

Table (7) shows factor loadings from 0.78 to 0.88, indicating strong correlations between indicators and latent constructs. These outcomes support the validity of the measurement model and corresponds well with the proposed research model. Average Variance Extracted (AVE) values exceeded 0.50, confirming convergent validity. Composite Reliability (CR) ranged from 0.85 to 0.90, and Cronbach's Alpha values were between 0.80 and 0.87, both surpassing the 0.70 threshold, highlighting strong internal consistency reliability for each construct.

The revised constructs were defined to reflect the research hypotheses. The Design & Operational Efficiency construct included indicators for system reliability, speed, user security, modern infrastructure, and time-saving attributes, encapsulating technical reliability and user-centered efficiency. The Regulatory Support construct focused on compliance, investor protection, and institutional credibility. Additionally, the Trust & Platform Credibility construct addressed perceptions of transparency, reputation, responsible data management, and information adequacy. These findings affirm the measurement model's robustness, laying a foundation for the structural model analysis of interconnections among these constructs in the FinTech-enabled crowdfunding context in Indonesia.

2. Model-Based Group Differences (H2)

In order to assess Hypothesis 2, which posits that various crowdfunding models—namely donation-based, lending-based, and equity-based—have different impacts on financial accessibility and perceptions of the platform, a comparative group analysis was conducted. Participants were categorized based on their chosen crowdfunding model: donation-based (n=60), lending-based (n=65), and equity-based (n=51). An analysis of variance (ANOVA) was conducted to ascertain whether significant disparities existed among these groups concerning perceived financial accessibility, platform efficiency, and user trust. The outcomes revealed statistically significant group differences in perceptions of financial accessibility ($F = 4.27$, $p = 0.016$) and operational efficiency ($F = 5.13$, $p = 0.008$), suggesting that the type of model influences users' experiences and perceived value. Post-hoc comparisons utilizing Tukey's HSD test indicated that individuals utilizing equity-based platforms reported greater financial accessibility and operational satisfaction compared to their counterparts using donation- or lending-based platforms. However, no statistically significant differences were detected among the models with respect to trust in the platform ($F = 1.88$, $p = 0.159$). These findings, as detailed in Table (8), substantiate Hypothesis 2 and imply that the nature of the crowdfunding model significantly contributes to shaping user experiences and perceptions of financial inclusion within the Indonesia.

Dependent Variable	F-value	p-value	Interpretation
Financial Accessibility	4.27	0.016	Significant difference across model types
Operational Efficiency	5.13	0.008	Significant difference across model types
Trust in Platform	1.88	0.159	No significant difference detected

Table 8. *One-Way ANOVA Results for Perceptions across Crowdfunding Model Types*

The results indicated in Table 8 demonstrate that perceptions of financial accessibility and operational efficiency exhibit considerable variation among different crowdfunding models, namely donation-based, lending-based, and equity-based models. This variation is supported by statistically significant F-values of (4.27) and (5.13), alongside p-values falling below the (0.05) threshold. Consequently, these findings substantiate Hypothesis H2, which posits that the specific crowdfunding model influences users' assessments regarding the ease of accessing financial resources and the operational efficiency of the platform. Notably, post-hoc comparisons (not illustrated in this document) revealed that lending-based platforms received the highest ratings concerning operational efficiency, likely attributable to their more standardized and technology-driven processes.

In contrast, donation-based platforms were evaluated more favorably regarding accessibility, which may reflect their lower barriers to entry and broader appeal to social sentiments. Nonetheless, the level of trust in the platform did not exhibit noteworthy variations among the three types of models ($p = 0.159$), indicating that the perceived trustworthiness is likely influenced more by platform-specific factors such as transparency, credibility, and user experience, rather than by the funding model itself. This finding underscores the essential importance of trust as a fundamental element across all crowdfunding sectors, regardless of their structural differences. Such divergent perceptions underline the urgent necessity to tailor FinTech-enabled platform characteristics to correspond with

the expectations and behaviors typical of each model type, especially to promote financial inclusivity and enhance operational efficiency.

3. Structural Model Assessment (SEM)

The structural model underwent comprehensive evaluation using maximum likelihood estimation techniques. Key model fit indices were analyzed to assess the proposed framework's adequacy, including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Chi-square to degrees of freedom ratio (Chi-square/df). Results confirmed the model's acceptable fit across all criteria.

Table 8 provides a detailed summary of the proposed pathways, including standardized path coefficients (β), associated p-values, and the results of each hypothesis examined meticulously. All three hypotheses, which were rigorously evaluated within the structural model, attained statistical significance at the 0.05 threshold, underscoring their relevance. It is particularly noteworthy that both Design & Operational Efficiency and Regulatory Support had significant positive influences on Trust & Platform Credibility, which subsequently exerted a notable positive effect on Sustainability outcomes. These findings not only validate the proposed conceptual model but also highlight the critical importance of trust in fostering FinTech success within the increasingly intricate crowdfunding environments. This underscores the necessity for further exploration of these relationships to bolster future research initiatives.

Hypothesis	Path	β	p-value	Result
H1	Design & Operational Efficiency → Trust & Platform Credibility	0.52	0.001	Accepted
H3	Regulatory Support → Trust & Platform Credibility	0.43	0.004	Accepted
H4	Trust & Platform Credibility → Sustainability	0.47	0.002	Accepted
Model Fit Indices: The structural model showed acceptable fit with the data, with values as follows: Comparative Fit Index (CFI) = 0.92 Tucker-Lewis Index (TLI) = 0.90 Root Mean Square Error of Approximation (RMSEA) = 0.06 Chi-square/df = 2.5 These indices confirm the model's adequacy for further hypothesis testing.				

Table 9. Structural Model Results (Hypothesis Paths, Standardized Coefficients, and p-values)

As shown in Table (8), the results of the structural model indicate significant relationships among the primary constructs identified in this research. The notable path coefficient from Design & Operational Efficiency to Trust & Platform Credibility ($\beta = 0.52$, $p = 0.001$) emphasizes the crucial role that platform usability, rapidity, and technical reliability play in cultivating user trust. This indicates that when crowdfunding platforms function efficiently and offer secure, user-friendly digital environments, they enhance the confidence and engagement of stakeholders. Similarly, the significant effect of Regulatory Support on Trust & Platform Credibility ($\beta = 0.43$, $p = 0.004$) underscores the necessity of clear policy frameworks, adherence to financial regulations, and institutional support in fostering public trust. Regulatory transparency and formal endorsement seem to mitigate perceived risks and legitimize FinTech-enabled crowdfunding models, particularly in emerging markets such as Indonesia. The final validated pathway from Trust & Platform Credibility to Sustainability ($\beta = 0.47$, $p = 0.002$) confirms that the establishment of trust is not merely a functional outcome but serves as a strategic driver of long-term platform viability. Thus, the sustainable advancement of crowdfunding initiatives is linked to how effectively platforms manage credibility, protect user interests, and maintain reputational integrity. These findings support the conceptual framework, highlighting that FinTech-oriented crowdfunding platforms' long-term success relies on operational efficiency and institutional reliability.

4. Qualitative Analysis Results

The qualitative phase of this study provided valuable insights into the perceptions and determinants influencing the adoption of financial technology (FinTech) within crowdfunding platforms. A thematic analysis of semi-structured interviews conducted with 33 industry experts unveiled several salient themes. Respondents identified enhanced transparency as a principal advantage of FinTech, asserting that it facilitates improved communication regarding project specifics and associated risks, thereby cultivating trust among investors. Furthermore, participants highlighted the role of FinTech in augmenting user accessibility and operational efficiency, noting that more efficient investment processes and reduced transaction times confer substantial competitive benefits.

A prominent theme identified is the regulatory challenges impacting operational efficiency of platforms. Experts observe that uncertainties and inconsistencies across jurisdictions hinder scalability and innovation. Additionally, the integration of FinTech solutions is crucial for platforms to stand out in a crowded market. Lastly, qualitative insights highlight the importance of collaborative ecosystems; partnerships among platforms, financial institutions,

and regulators are vital for sustainable growth and increased investor confidence. These insights enhance the understanding of FinTech's role in transforming crowdfunding and the systemic challenges it encounters.

B. Discussion

1. Overview

This section interprets the key findings from the research's quantitative and qualitative components. The goal is to evaluate how the results align or differ from prior academic literature, examine their theoretical implications, and consider their practical relevance for FinTech-enabled crowdfunding in Indonesia. The research tested four main hypotheses regarding the influence of design, efficiency, regulation, and trust on the success of crowdfunding platforms in Indonesia. The discussion further elaborates on these hypotheses based on the results obtained.

2. Discussion of Key Findings

The structural model presented in this study demonstrated a remarkably strong and statistically significant relationship that exists between platform design and both operational efficiency and trust in the platform ($\beta = 0.52$, $p < 0.01$). This compelling evidence supports the notion that a user-centered design within the FinTech sector—which emphasizes technical reliability, effective efficiency in time management, and the integration of modern system attributes—is absolutely essential for bolstering levels of investor confidence. These findings closely align with prior research studies (e.g., [50] [51]) that consistently highlight the immense significance of a seamless interface and a secure infrastructure in actively promoting user adoption.

b. H2: Group Differences in Crowdfunding Models

The comparative analysis that was conducted revealed substantial disparities in the perceived accessibility and efficiency among a variety of different crowdfunding models. Users who engaged with equity-based platforms expressed a notably higher level of satisfaction, which is potentially attributable to the organized and investor-focused characteristics that define these particular platforms. This notable finding is consistent with existing research suggesting that equity crowdfunding generally necessitates elevated standards of transparency and governance, as highlighted by Mollick [52]. Such elevated standards could contribute significantly to enhanced perceptions of trustworthiness and value among users. This suggests that platform providers, in conjunction with regulatory authorities, ought to give serious consideration to model-specific approaches that aim to improve financial accessibility. Additionally, they should strive to enhance user satisfaction by customizing features and regulations to harmonize with the distinct attributes inherent to each crowdfunding model. Such tailored strategies might ultimately foster a more engaging and supportive environment for all users across the various crowdfunding landscapes.

A notably significant positive path coefficient ($\beta = 0.43$, $p < 0.01$) provides substantial support for the hypothesis that both regulatory compliance and institutional endorsement play crucial roles in contributing to the enhancement of user trust within various financial systems. This finding not only aligns with but also corroborates existing literature that highlights the critical importance of policy clarity and institutional support. Such elements are essential in effectively mitigating perceived risks that often arise within digital finance contexts, as discussed extensively in the works of Zetzsche et al. [27]. In summary, a strong emphasis on both regulatory frameworks and institutional backing can result in bolstered user confidence.

The hypothesis has been statistically confirmed ($\beta = 0.47$, $p < 0.01$), indicating a robust and noteworthy impact of trust and platform credibility on users' perceptions regarding long-term sustainability. These results correspond with the findings presented by Moysidou and Hausberg [53], who formulated and empirically assessed a model for building trust within the context of lending crowdfunding. Their research illustrated that trust in the platform and the quality of the information provided were considerably more influential than trust in the project creator. This underscores the concept that platform credibility serves as a strategic resource for maintaining ongoing investor engagement and the viability of the platform.

From this standpoint, trust and credibility transcend their initial roles as mere functional elements that support singular transactions; they serve instead as vital and fundamental components that contribute significantly to the enduring viability and longevity of the platform. Such essential factors foster a positive atmosphere wherein users are more inclined to reinvest in the ecosystem and actively advocate for the platform to their friends, family, and colleagues. This communal endorsement, in turn, helps in building a stronger and more sustainable ecosystem that benefits all participants involved.

In support of our research, Sıcakyüz and Erdebilli [54] examined the significance of electronic trust in fostering sustainable competitiveness within the Turkish e-commerce landscape. Their investigation revealed that elements such as delivery reliability, favorable user feedback, and merchant credibility were pivotal to users' continued engagement with the platform. Although their analysis concentrated on e-commerce rather than crowdfunding, their conclusions reinforce the argument that trust and perceptions related to the platform significantly impact user retention and long-term sustainability, resonating with the sustainability aspects outlined in our model.

These compelling findings collectively highlight and underscore the essential importance of trustworthiness within various platforms for successfully attaining sustainable user engagement. This principle is not only applicable within the specific fields of crowdfunding projects but also extends to a broader range of digital platforms, impacting their overall effectiveness and user satisfaction.

3. Integration with Qualitative Insights

The qualitative results significantly enriched these outcomes by contributing much-needed depth. Interview participants emphatically underscored the paramount importance of transparency, system responsiveness, and clarity in policy formulation processes. Furthermore, they acknowledged that robust intersectoral collaboration and the deliberate establishment of a supportive ecosystem are vital for effectively tackling a range of regulatory challenges and for actively promoting the sustainable development of diverse platforms. These insightful accounts not only further validate but also expand upon the intricate implications of the quantitative model, thereby offering a more nuanced and comprehensive comprehension of FinTech's pivotal systemic role in the ongoing progression of crowdfunding initiatives.

4. Implications

a. Theoretical Implications

Enhances existing frameworks that effectively connect the various attributes of FinTech with essential concepts of trust and sustainability specifically within the framework of alternative finance. Actively promotes the development and formulation of comprehensive models that seamlessly integrate critical technological, regulatory, and relational elements that significantly influence the overall efficacy and success of financial platforms in today's dynamic environment.

b. Practical Implications

Platform developers must prioritize technical stability, swift performance, and user-centered design in their endeavors to create effective solutions. Policymakers are required to enhance regulatory clarity to instill greater confidence within the sector among users and stakeholders alike. Moreover, it is vital to formally implement robust mechanisms designed to cultivate trust across the platform landscape, including comprehensive investor protection policies and stringent transparency standards that can foster a more secure environment for all participants. Additionally, it is crucial to encourage active and ongoing collaboration among policymakers, innovative FinTech developers, and established financial institutions in order to create an environment that not only promotes groundbreaking innovation but also safeguards investor protection and ensures the long-term sustainability of various platforms for the benefit of all users involved in the ecosystem.

Conclusion

This research meticulously examined the pivotal and multifaceted factors that significantly affect the success and sustainability of crowdfunding platforms that are enabled by FinTech in Indonesia. The research placed a strong emphasis on various critical aspects including design and operational efficiency, regulatory support, trust, along with the consequential effects these elements have on platform sustainability over time. Utilizing an innovative mixed-methods approach that combines sophisticated quantitative structural equation modeling with in-depth qualitative thematic analysis, the research delivered a comprehensive understanding of how intricate technological, regulatory, and relational dynamics collectively influence user perceptions and the overall viability of these platforms in the contemporary digital landscape.

The principal findings emerging from this nuanced investigation indicate that a user-centric approach to platform design and optimal operational efficiency significantly enhance user trust and the perceived credibility of the platform. This enhancement of trust subsequently has a positive effect on user perceptions regarding long-term sustainability and reliability of the system. Furthermore, the provision of robust regulatory support serves to fortify this trust, thereby highlighting the critically important role that clear-cut policies and substantial institutional backing play within the broader context of digital finance ecosystems. The distinctions that exist among various crowdfunding models further underscore the necessity for customized and tailored strategies that adequately address the specific characteristics and diverse requirements inherent to each model. Such strategies are vital in order to enhance financial accessibility and maximize overall user satisfaction.

In summation, it becomes evident that FinTech is not merely improving crowdfunding mechanisms; rather, it is

actively transforming the very structure, accessibility, and potential impact of crowdfunding initiatives. By facilitating the development of more intelligent, efficient, and transparent systems, FinTech is profoundly influencing the future landscape of financing. This evolution is occurring in a manner that aligns cutting-edge innovation with abundant opportunity on a global scale, creating pathways for enhanced financial inclusivity and greater economic participation for a diverse range of users.

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