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Article

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INFORMATION & TECHNOLOGY MANAGEMENT | RESEARCH ARTICLE

Beyond the innovator's Dilemma: The process and effect of fintech regulatory environment

Geoffrey Otieno^{1*} and Ruth Kiraka¹

Abstract: Previous research has established that certain characteristics of lead users, such as their ability to identify trends and the benefits they expect from an innovation, are important in determining the success of an innovation. However, the role of regulatory authorities and the innovation process in influencing innovation outcomes has not been thoroughly explored. This study aims to fill this gap by examining the impact of these factors on innovation success, using a mixed-method approach. Data were collected from 321 lead users and eight regulators through both quantitative and qualitative surveys, and analyzed using SPSS and NVivo. The results show that the number of partners involved in the innovation process is a significant factor, whereas work experience has an impact only when considered in conjunction with other variables. This study contributes to the understanding of lead user innovation by demonstrating that factors beyond just trends and benefits can influence the success or failure of innovation and provides new insights into the role of the innovation process and regulatory authorities.

Subjects: Management of IT; Business, Management and Accounting; Information Technology



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Geoffrey Otieno is a PhD candidate researching strategic innovation, innovation management, and lead-user innovation. His research interests include lead user innovation, motivation, innovation processes, and context.

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PUBLIC INTEREST STATEMENT

This study explains the impact of regulatory authorities on innovation. Innovations have the potential to revolutionize employment and lead to user benefits by allowing new or more efficient and effective ways of innovating in the market. However, there are also concerns about the potential negative impacts of regulators such as CAK and CBK. Through our research, we hope to provide insights into how regulators impact innovation and how lead user innovators can work responsibly in innovation efforts to maximize their benefits, while minimizing any negative impacts. This has important implications for the future of business, as regulators could be a valuable means for protecting innovation and enabling success. Our findings will be of interest to the general public, who care about the protection of intellectual property and the growth of innovative solutions, and want to understand how emerging technologies can be used to enhance competitiveness.

| **Keywords:** lead-users; regulator; moderator; innovation

1. Introduction

The concept of “Lead user” refers to individuals or firms that experience significant shifts in their needs and requirements ahead of the general market. Lead users are typically early adopters of new technologies or solutions, and they possess a deep understanding of the market and its potential future developments. They often have unique insights into how a product or service can be improved or adapted to meet the changing needs of their industry.

Lead users play a crucial role in the innovation process, but little research has been conducted on their innovation processes and the role of regulators in the success or failure of their innovations (Hamdi-Kidar & Vellera, 2012). Scholars agree that trend leadership and expected benefits are important lead-user characteristics, but there is ongoing debate about which other factors should be considered. Researchers are now focusing on understanding the innovation process and the role of regulatory authorities in shaping innovation outcomes (Cortez, 2014; Moghissi et al., 2014).

In this study, we focus on the regulatory environment and the role of regulatory authorities in overseeing and controlling fintech activities or sectors. The regulatory authorities studied include the Central Bank of Kenya (CBK), the Capital Markets Authority (CMA), the Sacco Societies Regulatory Authority (SASRA), the Communication Authority of Kenya (CAK), the Kenya Industrial Property Institute (KIPI), the Nairobi Securities Exchange (NSE), and the Insurance Regulatory Authority (IRA). These authorities are responsible for a range of tasks, such as formulating and implementing monetary policies, licensing, and regulating capital markets, regulating savings and credit cooperatives, regulating electronic commerce, issuing patents to innovations, offering greater investment opportunities, and regulating the insurance industry in Kenya (CAK, 2021; CBK, 2015; Chepkoech & Rotich, 2017; Okioga, 2013; Buluma & Mungai, 2017).

Research on the role of regulatory authorities in lead user innovation has been inconsistent, with some studies finding evidence of a relationship between regulators and lead users, while others do not (Moghissi et al., 2014). Further, methodologies have varied, including case studies, mixed methods, and sample studies (see, e.g., Antorini & Schultz, 2007; Franke et al., 2006; Herstatt & von Hippel, 1992; Jeppesen & Frederiksen, 2006; Lilien et al., 2002; Morrison et al., 2000; Poetz & Schreier, 2012). Reviews of this phenomenon have focused on two characteristics: trending leadership and the expected benefits.

Understanding the additional variables and their influence on lead user outcomes in the service industry is essential for successfully identifying different groups of lead users in the fintech sector (Morgeson et al., 2005). In recent years, scholars have debated the impact of regulators on lead-user innovation.

This study aims to contribute to the ongoing debate by examining the relationship between regulators and lead users in the fintech industry.

The motivation for this study is twofold. First, previous research on this topic has been inconsistent, with some studies finding evidence of a relationship between regulators and innovation, while others have found no such relationship. This inconsistency suggests that much remains to be learned about regulators’ impact on lead user innovators and their outcomes. Second, the issue of fintech innovation regulation has become increasingly salient in recent years, with many observers expressing concerns about the negative effects of growing interference by regulators. Therefore, it is important to gain a better understanding of the factors that contribute to regulation, and how they can be mitigated. By examining the relationship between regulators and lead user innovation, this study aims to provide new insights into this important issue and inform strategies for promoting more constructive innovation management.

Does the regulatory environment and process of innovation affect innovation outcomes? This sequential mixed-method study investigates the influence of the innovation process and regulators on lead-user innovation success or failure. To this end, we rely on 321 lead users and eight regulators in the quantitative stage, and 36 lead users and five regulators in the qualitative datasets. This study contributes to the literature in two ways. First, from a theoretical perspective, the conceptual bases of lead user innovation processes and their impact on lead users' innovation outcomes are discussed in light of lead user innovation (von Hippel, 1986, 2017). Second, it augments the theoretical discussion with an empirical exercise to enhance lead user theory by including additional variables for lead users, such as processes and regulators.

The paper continues with section two, which discusses lead-user theoretical perspectives on financial sector services. We discuss the financial services sector, the regulatory environment, the innovation process, the contextual approach, and outcomes. This section discusses various financial technology service innovations from an emerging market perspective and extends the discussion to include the innovation results. Section three describes the methodology, while Section four presents the results by discussing quantitative data and an overview of the influence of the innovation process and regulators. This section describes the specific effect on each independent variable in terms of all successful and failed innovations. The section ends by describing the effects of the regulators and their responses. Section five discusses the findings and Section six concludes by discussing the empirical evidence and drawing pedagogical, practical, and policy implications.

2. Theoretical perspectives

Some of the most prominent theoretical frameworks used in the study of innovation over the past few decades include the lead user theory (Rosted, 2005; von Hippel, 2005), disruptive innovation theory (Christensen et al., 2018; Danneels, 2004), diffusion of innovation theory (Rogers, 1995), and expectancy theory of motivation (Lunenburg, 2011; Vroom, 1964). Christensen's (1997) disruptive innovation theory states that a product or service overrides an existing product or service by first entering less attractive spaces and then moving upmarket to displace the incumbent. Rogers' (1962) diffusion of innovation theory examines information and adoption to obtain a final product or service for users. It seeks to explain how, why, and at what rate new ideas and technologies spread. Expectancy theory of motivation examines what drives innovation and expected outcomes (Parijat & Bagga, 2014; Vroom, 1964). While all of these theories provide valuable insights into innovation, the Lead User theory is a particularly relevant and comprehensive framework for understanding innovation. Lead User theory posits that innovative solutions are often developed by individuals or groups who face similar challenges to other users but who have a high motivation to solve these challenges due to their unique needs or experiences (von Hippel, 1986). The focus of this theory is on the two characteristics of the user's ability to be ahead of the market trend and expectations from innovation (Rosted, 2005). The proponents of this theory are scholars such as von Hippel (1986, 2005, 2017), Jeppesen and Frederiksen (2006) and Antorini and Schultz (2007).

In early years, scholars debated innovation based on the Schumpeterian view of product manufacturing environments (Vivarelli, 2015). In recent years, gaps have emerged in how various scholars look at theories concerning lead user innovation from the measurement variables proposed, methodologies deployed in the research, context of the research, and recommendations. A literature review on lead user innovation reveals several gaps that need to be addressed. First, there is a tendency to focus on firms rather than on users. While it is important to understand the firm's perspective, neglecting users' needs can lead to innovations that fail to meet expectations. Second, there is a bias towards technological innovation rather than business model or process innovation. While technological advances are undoubtedly important, innovation in other areas such as business models and processes can also significantly impact user outcomes. Third, there is no unified framework for drivers and outcomes, as noted by Claudy et al. (2015). This makes it difficult to compare and generalize our findings. Fourth, there is a lack of clarity between outcomes and types of innovation definitions, which can lead to confusion and inconsistencies in research findings. Finally, there is a need for a user-led approach to innovation in developing countries.

A user-led approach based in a developing country can provide valuable insights into user needs and preferences, inform the innovation process, and improve the likelihood of success. Addressing these gaps is essential to advancing our understanding of lead user innovation and its impact on business performance (Laeven et al., 2015; Teece, 2006).

3. Lead user theory

The lead user theory promotes the measurement of variables through two constructs: trend leadership and expected benefits (Lüthje et al., 2005; Marzouki & Belkahla, 2019). Lead user theory proponents argue that highly experienced and motivated users of products or services know what they want to do (Lee & Shin, 2018; von Hippel, 1986, 2017). By contrast, lead user theory opponents argue that lead user theory misses network advantage in innovation. They argue that network advantage involves a different innovation process that entails the social networking of innovators, and is key to the success of lead user innovation (Hopp et al., 2019; Oo et al., 2019). This argument leaves room for additional variables of lead user innovation, such as innovation processes and the role of regulators, to be considered. Incidentally, von Hippel (2005) agrees with this position by stating that he did not measure all antecedents of lead users. Recent studies have debated democratizing innovation so that users can develop what they want and freely share their results with others (Swann, 2017; von Hippel, 2017).

This view is contested by scholars who state that the measurement of lead user innovation is not precise and that many variations exist depending on the specific context of the research. Scholars argue that this negates the theory that measurements can be performed using two constructs (Hienrth & Lettl, 2011, 2017).

Scholars have evaluated the success or failure of innovation in terms of outcomes (Heidenreich & Spieth, 2013; Schaarschmidt & Kilian, 2014). They averse that successful innovation outcomes can be achieved by identifying the right mix for collaboration with the lead users. This involves identifying the lead users, their motivation factors, and evaluating the innovation process (Somoza Sánchez et al., 2018; Su et al., 2021). Opposers of this view consider success and failure as not exhaustive lists of innovation and other outcomes, such as employment and investment (Vivarelli, 2015). The arguments are that innovation may displace or create employment and should be viewed as such (Djellal & Gallouj, 2007; Romero & Martínez-Román, 2012).

Some scholars have promoted the idea that lead user theory should be combined with other concepts such as design thinking—the use of empathy, the definition of the problem, ideation, prototyping, and market testing of products or services—to bring about new, more successful concepts. They suggested the development of embedded lead users, empathetic lead users, and networking as ways to create successful products or services (Conradie et al., 2015; Schweisfurth & Raasch, 2015). This finding suggests a change in the process of innovation.

4. Lead user innovation process in the financial technology sector

Based on the lead user theory, which favors engaging lead users to stimulate innovation, this study focuses on individuals in the financial services sector environment.

4.1. Financial services sector

Recently, global financial markets have thrived in innovations that have mainly focused on developing and diversifying new borrowing sources. This focus has affected domestic and international financial intermediaries. The variety of services offered has become an essential part of their integrated approach from the perspective of involving customers (Buljevich & Park, 1999; Park, 2009). Kenyan financial services were not excluded from the innovation journey.

According to various scholars, innovative automatic teller machines (ATMs) were deployed in the 1990s (Barako & Gatere, 2008; Schaner, 2017). This was followed by the launch of a Real-Time Gross Settlement (RTGS) system known as the Kenya Electronic Payments and Settlement System

(KEPSS) (CBK, 2006; Misati et al., 2010). Safaricom's mobile money app, M-PESA, was launched in 2007, and all these innovations indicate the availability of user innovations in emerging markets. In 2013, Kenya launched the world's first digital credit solution, and the digital credit market has since expanded rapidly in Kenya and many low-income countries (Totolo, 2018). The innovations were developed by the individuals who used them; hence, it is essential to define their innovation process and the effect of regulators.

5. Lead users and regulatory environment in Kenya

The relationship between innovation and regulation is dynamic, and at times might mean breaking the rules or challenging them (Benghozi et al., 2009). The regulatory landscape has undergone various innovations such as shelved, modified, or implemented. Some countries have grappled with compliance issues, user influence on regulations, and innovation. There is a need for the urgent harmonization of existing and new regulations with innovation and innovation policy instruments and improving the implementation of regulations to foster innovation (Edler et al., 2016). Numerous financial technology regulators can lead to user innovation. Regulators such as the Central Bank of Kenya, Capital Markets Authority, Sacco Societies Regulatory Authority, Communication Authority of Kenya, and Insurance Regulatory Authority may influence the innovation landscape. The Central Bank of Kenya is mandated to formulate and implement its monetary policies (CBK, 2015). The Capital Markets Authority is charged with licensing and regulating the capital markets in Kenya (Okioga, 2013). The Sacco Societies Regulatory Authority (SASRA) regulates savings and credit cooperatives (Buluma & Mungai, 2017; Waiganjo et al., 2016). Kenya's Communication Authority is responsible for facilitating the development of the information and communications sectors, including broadcasting, cybersecurity, multimedia, telecommunications, electronic commerce, postals, and courier services (CAK, 2021). The Insurance Regulatory Authority regulates, supervises, and develops the insurance industry, including its product offering (Chepkoech & Rotich, 2017). All of these regulatory bodies have various statutes that would influence any lead user innovation in ways that can only be determined by the nature and outcomes of the innovation. Based on previous studies (Benghozi et al., 2009; Mazzarol & Reboud, 2006; Mazzucato, 2018), this study reviewed the regulator's role from a moderating perspective.

5.1. Lead user innovation process

Several scholars have classified innovation as a scientific discipline, process, or an outcome (Chen, 2017; Garud et al., 2013). The literature is replete with research on financial technology innovation. However, research on how lead-user innovation processes and regulatory influences are perceived and narrated in practice is limited.

Scholars have proposed various innovation processes (Alam & Perry, 2002). developed a ten sequential stages: strategic planning, idea generation, idea screening, business analysis, cross-functional team formation, service and process design, personnel training, service testing and pilot run, test marketing, and commercialization. Scholars have proposed other innovation processes, including (1) the design-thinking process that proposes five steps: empathy, the definition of the problem, ideation, prototyping, and testing of the product or service (Brown, 2008; Green et al., 2015; Razzouk & Shute, 2012). (2) Construction industry innovation process: This process relies on the evaluation of new construction methods. This process includes recognizing forces and opportunities for innovation, creating a climate for innovation, developing the necessary capabilities, providing new construction technologies, experimenting and refining, and implementing (Orstavik et al., 2015). (3) Other perspectives include the R&D view from a marketing angle that indicates different stages in the new service development process: opportunity identification, development, testing, and the launch of a product (Van Kleef et al., 2005). However, a large body of literature focuses primarily on the conceptual and early development stages of innovation from a firm perspective and not on the individual (Schaarschmidt & Kilian, 2014; Van Kleef et al., 2005).

Various scholars have argued that the innovation process is complicated and characterized by a multitude of choices and barricades (Holzmann et al., 2014). The brainstorming period for financial technology may require a long time to consult stakeholders. This view implies that innovation processes do not follow a particular order, and are not random. Instead, innovation processes involve iterations of the divergent and convergent phases. Divergence considers the cost of resources (people, time, ideas, and money) beyond a system's regular sustenance. Convergence is driven by external forces (such as user beliefs and rules, institutional rules, and organizational mandates) and internal influences (such as resource limitations and discovery of possibilities that focus attention) (Garud et al., 2013).

The study adopted the design thinking methodology due to its focus on the user at the center of the innovation and not the firm (C. Meinel & Leifer, 2012), and previous studies have shown linkages with innovation (Conradie et al., 2015; M. Meinel et al., 2020; Schweisfurth & Raasch, 2015; Yokana, 2016). This is based on von Hippel's (2005) definition that lead users are a source of innovation and can drive part of the innovation process (von Hippel, 2005). Second, the design-thinking process allowed the inclusion of external partners in the innovation process of lead users, which is part of this study (Nakata & Hwang, 2020). Third, the process allows for a non-linear thinking process that scholars define as the continuous use of innovation outcomes to review, question, and improve the lead user's initial assumptions, understanding, and results (Dam & Siang, 2020; Diefenthaler et al., 2017). The design-thinking process is based on five stages: empathy, problem definition, ideation, prototyping, and testing the product in the market (Brenner & Uebernickel, 2016). In the empathy stage, which is the first stage, users and their behaviors were observed. This approach is appropriate for this study because the lead user understands his or her behavior, observes him or her, and questions or experiences with existing products or services. The objective was to understand the problems faced by the lead users (d.school, 2021; von Thienen & Meinel, 2014). Second, at the definition stage, they summarized the findings into concrete needs. Third, ideas were generated and documented to formulate a specific challenge at the ideal stage. Fourth, in the prototype stage, prototypes make it possible to convert ideas into tangible solutions. Finally, the users tested the prototypes during the test stage and made improvements. These tests provide an opportunity to gain further information about the lead user and change the challenge formulation if necessary (Brenner & Uebernickel, 2016; Dam & Siang, 2020). The time taken by the lead user to become involved in the innovation process can be measured at each stage of the design-thinking process.

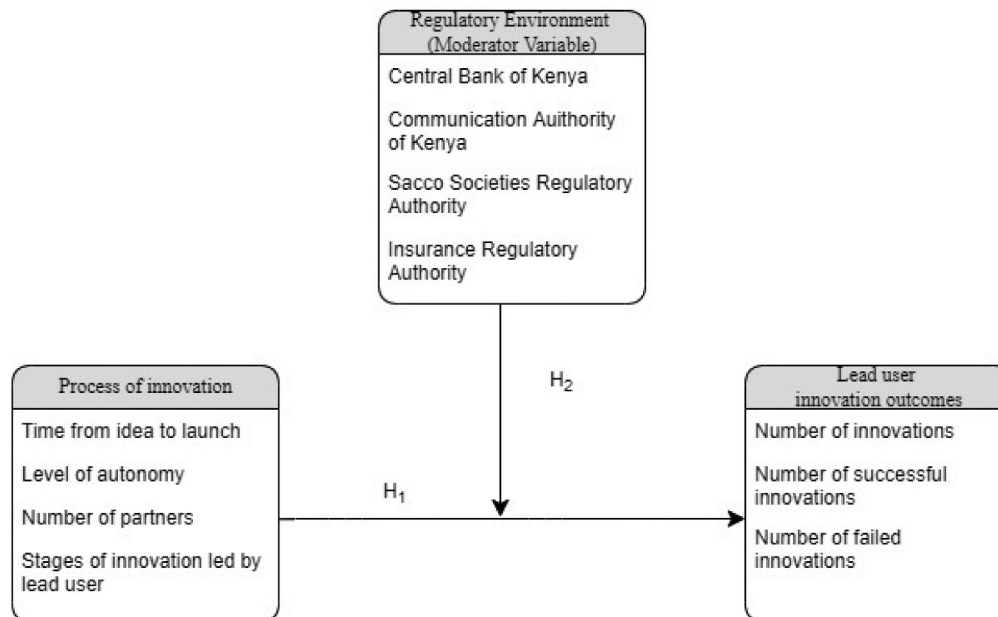
The level of autonomy of the lead user is based on several factors, such as information availability, number of partners needed, and funding (Beugelsdijk & Jindra, 2018; Burcharth et al., 2017). Information is critical for encouraging user participation in innovation. However, user information is not always readily available, and it can be expensive to transfer information from the user to a service developer (von Hippel, 2005). This expense contradicts the diffusion of the innovation theory, which considers information and adoption as part of a standard cost structure. However, on the one hand, regarding the number of partners needed for innovation, scholars state that the more the partners, the more mistrust and conflict, and as a result of expectations from third parties and overlapping roles, the lower the innovation performance and weaker the ties (Davis, 2016).

However, multiple partners in an innovation effort increase team performance and results (Du et al., 2014). Extensive consultation with users, such as detailed interviews, focus groups or group discussions, and representation, can assist in deriving the desired outcomes (Löfqvist, 2010). The study examined the number of partners each lead user had and the innovation outcomes. Despite the number of partners, other factors such as regulators could also impact innovation.

5.2. Contextual approach

Previous studies have analyzed industrial products and a developed world context. Therefore, it is essential to analyze other lead user antecedents to test the lead user theory in an emerging market context.

Figure 1. Conceptual framework.



This study attempts to measure the influence of a lead-user emerging market perspective on innovation and regulatory authorities. This may shed light on whether there is a correlation with the outcomes of the chosen innovation (Burroughs & Glen Mick, 2004).

5.3. Lead user outcomes

The outcomes considered in this study included all successful and failed innovations developed by respondents. These were based on previous studies that examined all innovations, successful innovations, and failed innovations (Gerben et al., 2003). All innovations in this study refer to innovations made by lead users, including success, work-in-progress, and failure. Successful innovations were considered innovations launched into the market by respondents. In this study, failed innovations refer to innovations that lead users to not successfully launch into the market. Consequently, the lead users did not progress any further or the same development. Work-in-progress innovations are not included in this study. These variables can be summarized in a diagrammatic form as shown in Figure 1:

The methodology deployed to analyse these outcomes is discussed in the next section.

6. Methodology

The study design used in this research is a sequential mixed-methods approach. Taro Yamane's formula was employed to estimate the sample size due to the difficulty in establishing an actual population of lead users. The formula considered 25.1 million mobile phone users using Mpesa, Kenya's most widely used fintech product. Regulators were selected based on lead user feedback, accessibility, and willingness to participate. The study involved both quantitative and qualitative phases, with the quantitative phase consisting of a survey and statistical analysis of 321 lead users and eight regulators. The qualitative phase comprised in-depth interviews with 36 lead users and five regulators, providing additional insights into the influence of regulatory authorities. The study developed relationships among lead users' processes, regulators, and outcomes to explain their interactions.

6.1. Data treatment for process, regulators, and outcomes

Quantitative and qualitative data were analyzed separately using SPSS and NVivo, respectively. The analysis included regression, ANOVA, and Principal Component Analysis tests. Variables were

reviewed and categorized, such as the number of innovation partners, duration, level of autonomy, and regulators. The number of innovations, successful innovations, and failed innovations were also regrouped into different categories. The ANOVA tests were conducted using 321 samples and 16 regressors. The analysis led to new findings and results.

7. Quantitative results

Innovation outcomes can be classified as all innovations developed, successful innovations developed, and failed innovation, and are evaluated based on innovation and regulatory effects. A reliability test revealed a Cronbach's alpha of 0.88, indicating strong internal consistency for the process of the innovation construct. The KMO and Bartlett's test showed a sampling adequacy of 0.84, and Bartlett's test of sphericity was significant, indicating that the data were useful for factor analysis. The total variance was derived, and only one component explained 56.07% of the total variance, which was highly correlated with all stages of innovation led by users. Among lead users, 31.5% had full autonomy, 43.3% had partial autonomy based on their needs, 16.5% had partial autonomy based on progress, 1.2% had no autonomy, and 7.4% were unsure. Of the lead users, 12.8% participated for more than two years, 33.3% for periods between 1 and 2 years, 29.6% for periods between 4 and 12 months, 12.5% for periods between 1 and 3 months, 1.6% for periods between 1 and 4 weeks, 0.9% for less than a week, and 9.3% couldn't remember the duration. During the innovation process, 3.7% of lead users had no partners, 19.3% had one partner, 19% had two partners, 18.4% had three partners, 18.4% had four partners, and 21.2% had more than four partners.

8. Multiple regression model

A regression model explained the relationship between the independent and moderating variables and dependent variables. The model is expressed as follows:

$$\text{Successful innovation} = \beta_0 + \beta_1(T) + \beta_2(P_N) + \beta_3(A_L) + \beta_4(S) + \beta_5(RG1) + \beta_6(RG2) + \beta_7(T * RG_1) + \beta_8(P_N * RG1) + \beta_9(A_L * RG1) + \beta_{10}(S * RG1) + \beta_{11}(T * RG2) + \beta_{12}(P_N * RG2) + \beta_{13}(A_L * RG2) + \beta_{14}(S * RG2) + \epsilon$$

Where: T: Time

P_N : Number of partners

A_L : Level of autonomy

S : Stages of innovation

RG1 : Regulator group 1

RG2 : Regulator group 2

β_0 : Intercept

β_1 to β_4 : Coefficients of the independent variables

β_5 and β_6 : Coefficients of the moderating variables

β_7 to β_{14} : Coefficients of interaction terms

ϵ : Error term

The model comprises four independent variables: time, number of partners, level of autonomy, and stages of innovation, as well as two moderating variables: regulator group 1 and regulator group 2. It also has interaction terms to test how the relationship between the independent and

dependent variables varies based on the regulator group. The dependent variable is the success or failure of the innovation, represented as a binary variable (1 for successful innovation and 0 for failed innovation).

8.1. Influence of process of innovation—all innovations

The correlation between the model and the dependent variable was statistically significant, as shown by the ANOVA test for the process of innovation and number of fintech innovations, where the significance value of the F statistic was less than 0.05, as shown in Table 1.

Table 2 depicts that out of the 16 predictors in the process of innovation model for the number of fintech innovations, only two variables (partial control by financial service providers based on their needs and more than four partners) are significant at a significance level of 0.05. The variables “less than one week” and “0 partners” have negative coefficients, meaning they have a negative effect on the number of innovations, holding all else constant.

8.2. Influence of lead user process of innovation on successful innovations

The ANOVA for successful innovations yielded statistically significant results, and the model summary indicates slight positive autocorrelation with a Durbin-Watson statistic of 1.92. Table 3 shows the results as described.

Six variables (1–2 years, 4–12 months, 1–3 months, Partial controlled by financial service provider based on their need, four partners, and more than four partners) are significant at the 0.05 level of significance.

8.3. Influence of lead user process of innovation on failed innovations

The relationship between the model and the number of failed innovations is not strong, with an *R* value of 0.27, indicating that the model explains only 27% of the variation. The Durbin-Watson statistic of 1.92 shows slight positive autocorrelation. The ANOVA test did not yield a statistically significant correlation between the model and the dependent variable, with a significance value of the F statistic greater than 0.05. However, the variable “4 partners” is significant at a significance level of 0.05.

8.4. Influence of regulatory environment on lead user innovation outcomes

Lead users’ views on the influence of fintech regulators, including the CAK, CBK, CMA, IRA, KIPi, NSE, RBA, and SASRA, were collected. A reliability test yielded a strong Cronbach’s alpha score of 0.83 for the regulator construct.

Table 1. Process of innovation—ANOVA model for the number of innovations

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	258.30	16.00	16.14	3.10	.000 ^b
	Residual	1,581.66	304.00	5.20		
	Total	1,839.97	320.00			

Notes: a. Dependent Variable: Number of fintech innovations developed

b. Predictors: (Constant), More than four partners, 4 to 12 months, Full, 1 to 4 weeks, No Autonomy, less than one week, 0 partners, Stage of Innovation, More than two years, two partners, 1 to 3 months, Partially controlled by the financial service provider based on progress, four partners, three partners, 1 to 2 years, Partially controlled by the financial service provider based on their need

Table 2. Process of innovation—coefficients

Model	Unstandardised Coefficients		Standardised Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta				Tolerance	VIF
1(Constant)	0.67	0.68			0.99	0.32		
Stage of Innovation	0.12	0.29	0.02		0.41	0.69	0.90	1.12
More than two years	0.23	0.55	0.03		0.42	0.67	0.55	1.83
1 to 2 years	0.48	0.45	0.09		1.08	0.28	0.37	2.70
4 to 12 months	0.74	0.45	0.14		1.64	0.10	0.38	2.61
1 to 3 months	0.28	0.53	0.04		0.54	0.59	0.54	1.85
1 to 4 weeks	0.04	1.09	0.00		0.04	0.97	0.88	1.13
Less than one week	-0.56	1.39	-0.02		-0.41	0.69	0.91	1.10
Full	1.00	0.54	0.19		1.85	0.07	0.26	3.87
Partially controlled by the financial service provider based on their need	1.59	0.53	0.33		3.01	0.00	0.24	4.23
Partial controlled by the financial service provider based on progress	0.62	0.59	0.10		1.05	0.30	0.34	2.97
No Autonomy	0.31	1.25	0.01		0.25	0.80	0.84	1.19
0 partners	-0.23	0.76	-0.02		-0.30	0.77	0.78	1.28
2 partners	0.19	0.42	0.03		0.46	0.65	0.59	1.69
3 partners	0.32	0.43	0.05		0.74	0.46	0.58	1.71
Four partners	0.73	0.42	0.12		1.73	0.08	0.60	1.66
More than four partners	1.66	0.41	0.28		4.04	0.00	0.57	1.75

Notes: a. Dependent Variable: Number of fintech innovations developed

PCA revealed that two factors, regulator group one (RBA, CMA, NSE, IRA, and SASRA) and regulator group two (CAK, CBK, KIPi), accounted for almost 60% of the variability in the original variables.

Table 4 depicts Parameter estimates that showed regulator group one was not significant, while regulator group two had a negative effect on innovation development at a significance level of 0.05.

The following section presents the tests conducted on successful innovations based only on the influence of regulator groups.

8.5. Influence of regulatory authorities on successful innovations

The analyzed data revealed that 22.7% of innovators had at least three successful innovations, while 77.3% had less than three. However, the regulator effect analysis showed that both regulator groups were not significant at the 0.05 level, indicating that they did not influence the development of successful innovations. The B coefficient for the variables also suggests that both regulator groups had a negative effect on successful innovation.

8.6. Influence of regulatory authorities on failed innovations

The data analysis revealed that 84.1% of innovators had no failed innovation and 15.9% had at least one failed innovation. Regulator group one did not show any significant influence on the failed innovations, whereas regulator group two was significant at a level of significance of 0.05 with a negative effect on innovation development based on the B coefficient for the variables.

9. Qualitative Results

9.1. Influence of process of innovation on lead user outcomes

Subjects reported using non-systematic processes when asked about the process. Two respondents summarized this with the following quotes:

We do not care much about the formality of it. The process of innovation is different, and the creativity involved is different for different people, and for us or, rather, for this product, we leave it open. (Participant 029)

Rather than developing the solution blindly based on your perspective. You need to visit the customers and address their pain. Develop your solutions based on customer feedback. So, it is more about developing what the customer wants rather than developing what you think the customer needs. So, it is about being sensitive. (Participant 012)

In terms of the time taken to innovate and launch, one participant said,

I have learned that rushing to the market is not always a good thing, especially when it is a new service. Because if you come with a new service to the market and people do not like it, their mindset will be fixed that “I am not going to use this.” Furthermore, it is very hard to change the customer’s ideology of your service if they have a negative mindset about it from the first instance of interaction. (Participant 025)

On why the innovators succeed with various partners, one participant added the following:

Because, when you sit down as two or three people, and you look at the market, your perspective may be a bit shallow. However, when you bring in the other users, you get some good information that helps change things. (Participant 029)

Table 3. Process of innovation – regression model for successful innovations

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	135.17	16.00	8.45	5.15	.000 ^b
	Residual	498.91	304.00	1.64		
	Total	634.08	320.00			

Notes: a. Dependent Variable: Number of successful innovations

b. Predictors: (Constant), More than four partners, 4 to 12 months, Full, 1 to 4 weeks, No Autonomy, Less than one week, 0 partners, Stage of Innovation, More than two years, two partners, 1 to 3 months, Partial controlled by the financial service provider based on progress, four partners, three partners, 1 to 2 years, Partial controlled by the financial service provider based on their need

9.2. Influence of regulators on lead user outcomes

The qualitative interview respondents added more information to what was gathered during the quantitative phase. The two respondents summarized their views as follows:

I would say regulations from the government, especially on the different regulations which are required. Furthermore, the heavy taxation on businesses that are starting up negatively affects our innovations. (Participant 027)

Regulators of fintech have contradictory rules, and none is clear on who is the ideal regulator of the fintech – Communication Authority, KRA, CBK, or CMA? (Participant 029)

9.3. Qualitative responses by regulators

Quantitative findings show that regulators have a moderating effect on innovation. In interviews with the five regulators, they shared their viewpoints on the construct variables of the study.

9.4. Process of innovation—regulator response

On the process, one regulator commented on partnership during innovation.

Another issue is how the regulator’s partner with a potential innovator on something. Even co-fund and funding may need just sharing ideas or providing a space where they work. This requires a government policy, then probably downstream to the regulatory frameworks. Then that gives a regulator specific budgetary allocation for such kinds of activities to support innovators. (Regulator 02)

I wanted to tell you that traditionally, regulators, especially in the financial sector space, are very conservative. They are very conservative. Moreover, because of the fear, that risk that we are supposed to protect may materialise. They fear committing to something quite risky in their view or something they do not know. (Regulator 04)

Regarding market forces, the regulatory respondent stated that the industry was not very attractive.

People did not associate financial sector space as a place for innovation for a very long time. Until quite recently that people realised you could do many things. That is diffusion between financial services and technology. That is what has brought in much innovation. (Regulator 02)

Regarding the possibility of a unified approach for innovators, there was a view that it would be complicated. One regulator summarizes this.

Table 4. Parameter estimates for regulators—all innovations

Parameter Estimates		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	Less than five innovations	1.86	0.17	114.46	1.00	0.00	1.52	2.20
	Five or more innovations	4.54	0.51	79.27	1.00	0.00	3.54	5.54
Regulators	Regulators 1 (RBA, CMA, NSE, IRA, SASRA)	0.07	0.18	0.14	1.00	0.71	-0.28	0.41
	Regulators 2 (CAK, CBK, KIPi)	-0.64	0.20	10.59	1.00	0.00	-1.03	-0.25

Notes: Link function: Logit.

There is going to be many turf wars. Each regulator is developing its policies. The government intended to have one policy and an Innovation regulatory sandbox for the entire financial sector. However, again, that is easier said than done. (Regulator 01)

One regulator commented on the regulatory role in motivating innovation.

We pride ourselves on being a responsive regulator. The industry is very versatile, and with its changing nature, we encourage innovators to try out innovations as the regulations are being crafted. This stems from the nature of the industry. If innovation awaits regulation, the innovations will mutate before the regulation is developed. (Regulator 03)

Another regulator commented on the lack of a clear regulatory framework, as mentioned by innovators.

However, we are saying that, in the absence, for instance, with us in the financial sector space, in the absence of a clear regulatory framework, the innovators are bound to have many challenges with regulators. (Regulator 01)

The regulator is thinking of future ways to motivate innovators through competition and policy changes.

Furthermore, by the way, even to motivate people in the innovation sector, you know you can put in a competition where potential innovators excite the market. Through a competition or something like that, the selected ones can be placed in an incubation corner somewhere. However, that requires a governmental policy cascaded down to the main financial sector regulators, including the telco regulator, the Communication Authority. Once it is cascaded, now they know because sometimes they return much money to the Treasury for which they did not even spend. (Regulator 03)

When asked about the chances of getting a unified approach in which all regulators come together to assist the innovators, one regulator said,

So, I would be very hesitant to talk about a joint sandbox for the entire financial sector because there are many what I would call egoistic turf wars. Yeah. That is the reality on the ground, which, again, nobody will tell you in writing. (Regulator 01)

Another regulator gave a different opinion on obtaining a mandate to motivate and support innovators.

I would promote a situation where so long as these regulators are still separate, they should be empowered by a legal and policy framework, which allows them to participate, encourage or incentivise innovators in one way or the other within their current or their existing legal framework. There was a government directive in 2014 that sought to merge regulators that would have resulted in a one-stop-shop for the licenses. (Regulator 02)

9.5. Outcomes of innovation—regulator response

Regarding the influence of the success or failure of innovation, one regulator said that the approach taken by certain regulatory authorities could harm or promote innovation.

Mpesa, when it came, the regulator said, “my friend use it at your own risk”. They did not stop it; they said to use it at your own risk, Kenyans were told, just like now the Cryptocurrency, the Bitcoin. Bitcoin, the Central Bank has said, and even we say, we do not regulate it, so we do not undertake that risk on behalf of the Kenyan government. So, if you decide to use it, “shida yako”. (it is your problem)

The above statement can discourage the adoption of innovation in the test phase.

10. Discussion

Researchers agree that lead users are the most effective users to incorporate into service development (Matthing et al., 2006). However, little is known about the effects of regulatory authorities on innovation and its outcomes (Lilien et al., 2002; Lüthje & Herstatt, 2004; Schreier & Prügl, 2008).

This study's objective was to determine the influence of regulators on the process of innovation and outcomes in the financial technology sector in an emerging market setting. This objective supports the hypothesis that regulators have no impact on the innovation process and outcomes.

The quantitative data indicate that over 75% of lead users took four or more months to develop innovation. This gives managers and decision-makers an indicative timeframe for any innovation. 77% of the lead users ended up having two or more partners. Previous studies' treatment of individual performance outcomes in broad terms oversimplified the contribution of specific individuals and therefore, the choices faced by innovators and managers.

Concerning all innovations, the variables "Partially controlled by the financial service provider based on their need" and "more than four partners" were significant at a significance level of 0.05. This indicates that financial service providers' control was critical in developing innovation, while having more than four innovation partners affected the innovation outcomes. The B coefficients for the variables "less than one week" and "0 partners" are the only two variables with negative coefficients, which means that for all things held constant, they have a negative effect on the number of innovations. These findings are supported by the argument that there is continued recognition of the importance of full and partial autonomy for lead user innovators, and the need for multiple partners in the process that help address key innovation gaps. Scholars argue that business incubators and accelerators are crucial interventions for addressing the lead user process of innovation by providing them with innovation support (e.g., technology assistance, infrastructure support, access to potential customers (networks), and financial support) (Lall et al., 2013). However, these findings contradict scholars who state that the more the partners, the more the mistrust and conflict, and as a result of expectations from third parties and overlapping roles, the lower the innovation performance and the weaker the ties (Davis, 2016).

Reviewing successful innovations, six variables were significant (to 1–2 years, 4–12 to months, 1–3 months, Partially controlled by financial service providers based on their needs, four partners, and more than four partners) at a significance level of 0.05.

For failed innovations, the variable "4 partners" was significant at a significance level of 0.05. This implies that having four partners during the innovation process is likely to result in a failure.

Concerning regulators, for all innovations developed, regulator group one (RBA, CMA, NSE, IRA, SASRA) was not significant at a significance level of 0.05, implying that it did not influence the innovations developed. Regulator group two (CAK, CBK, and KIPi) was significant at a significance level of 0.05. Our study found that the regulator impact is significant for the total number of innovations, which has important implications for lead users, their innovations, and industry. This is the first study to demonstrate regulators' moderation and impact in the fintech sector context, thus providing new insights into lead user innovation. These findings have important implications for strategic innovation, and suggest new directions for future research and potential interventions to increase total innovation. Based on the B coefficient for the variables, regulator group two has a negative effect on innovation development.

Regarding successful innovations, neither regulator group was significant at the 0.05 level, implying that they did not influence the successful innovations developed.

Regarding innovation failure, Regulator group two is significant at a significance level of 0.05. Our results indicate that the regulators' influence is a significant factor in the number of failed

innovations. This has important implications not only for lead users and their innovations, but also for the industry as a whole. Importantly, this study is the first to demonstrate the moderation of the regulatory body and its contribution to user innovation failure. These findings are of utmost significance for strategic innovation, and suggest new avenues for future research and potential interventions aimed at reducing the number of failed innovations. Based on the B coefficient for the variables, regulator group two has a negative effect on innovation development.

The qualitative results indicate that innovators deploy a systematic approach to the process even though they may not be aware. The various stages mentioned supported the quantitative findings and could be summarized as the design-thinking process.

The innovators start alone but eventually partner with others to develop their innovations. This supports various scholars who advocate for open innovation (Lüthje & Herstatt, 2004; Schuurman & De Marez, 2012) but contradicts the findings of other scholars who focus on firm-based innovation or closed innovation (Felin & Zenger, 2014; Weber, 2011).

All regulators agreed that they were conservative in their innovation approach, confirming the findings of earlier studies (Cortez, 2014; Zhu et al., 2006). Regulators' influence was found to have various facets that supported the quantitative findings. First, innovators agree that certain regulators can influence innovation outcomes. Second, they added that other regulatory roles, such as tax administration and licensing, should be reviewed to harmonize the environment. Third, regulators must review their budgetary allocation for partnership activities.

In line with the objectives of regulatory influence and the innovation process, the results suggest that leadership and benefits only influence lead-user innovation. The results provide new insights into the relationship between lead users, their innovation processes, regulatory environment, and innovation outcomes. The findings support scholars' views that innovation may fall within an agency's jurisdiction but not square well within the agency's existing regulatory framework (Cortez, 2014). They enhance the lead-user theory of von Hippel (2005) that trend leadership and expected benefits influence lead-user innovation by adding other new variables, such as the chosen innovation process and regulators. These were the shortcomings of von Hippel's study of a similar nature, where he stated that he did not capture these variables.

The choice of Kenya in this study limits the generalizability of the results. Nonetheless, the results are valid for answering these research questions. Further research is needed to establish the actual effects of the interactions between various variables.

11. Conclusion

The study focused on innovation in the context of an emerging market's approach to user participation, and hence fills the contextual gap. This study, conducted in a financial services industry setting, shifts attention from previous studies on product and organizational process innovation to service industry innovation. Based on quantitative and qualitative analyses of lead users in response to innovation outcomes, innovation processes and regulatory environments are instrumental in innovation outcomes in the current theoretical focus on trend leadership and expected benefits. These findings support the request of scholars that there is a need to engage in the analytical study of individual performance outcomes from the angle of unique sets of people, such as innovators in the fintech space (Buchner, 2007).

The study methodology effectively identified and interviewed lead users despite the coronavirus pandemic and its consequences. Although the pandemic limited the generalizability of the results, this approach provided new insights into lead user variables and their significant interactions.

Previous studies' treatment of individual performance outcomes in broad terms oversimplified the contribution of specific individuals and, therefore, the choices facing managers.

11.1. Theoretical contribution

These findings agree with those of scholars who still do not know much about lead-user innovation. Further research is required to include other lead user identity variables (Chatterji et al., 2008; Hienerth et al., 2007) that could enhance lead user theory.

The results suggest that leadership and benefits are not the only factors that influence lead-user innovation. The results provide new insights into the relationship between lead users, their innovation processes, regulatory environment, and innovation outcomes. They enhance the lead-user theory of von Hippel (2005) that trends leadership and expected benefits influence lead-user innovation by adding the innovation process and the regulatory environment. These were the shortcomings of von Hippel's study of a similar nature, where he stated that he did not capture these variables.

11.2. Managerial contribution

The results can be useful for financial institutions seeking to engage in open innovation strategies, as they provide an enhanced checklist for identifying innovators. Government institutions could better understand who leads users and enhance their relationship with them by engaging them in policy formulation activities. This represents a different view of organizational strategies and measures that can lead to the successful collaboration, co-creation, and co-evolution of various innovative projects.

The duration of a successful innovation suggests deploying separate teams or a sandbox approach to innovation. This would entail a testing environment in which innovation can be piloted or run securely to enhance chances of success.

11.3. Policy implications

This study allows policymakers and regulators to explore partnership criteria and regulatory amendments based on innovation processes and current regulatory feedback. This may also guide regulators in engaging various lead users based on their processes and partners.

11.4. Limitations and future research

Regulator findings pose a new challenge for future research: Should regulators be moderators or mediators at different stages of the innovation process? Do the outcomes differ? Based on these conclusions, future studies could address whether regulators should be better equipped as mediators at pre-launch stages and moderators at post-launch stages or vice-versa. This recommendation was consistent with the results of Kaulartz and von Hippel (2018). They averred that identifying lead users through variables other than the relatively abstract ones of trend leadership and expected benefits would be of greater value.

11.5. Observations from the process of innovation

Social distancing and work-from-home challenges make the landscape more difficult for innovation teams. The researcher observed that the teams had difficulty meeting each other as a team and meeting clients. This was because of the restrictions imposed by various government directives during the pandemic.

The choice of Kenya in this study limits the generalizability of the results. Nonetheless, the results are valid for answering these research questions. This study opens new avenues for future research. First, there is a need for a time-series study of various lead users to explore lead user theory based on the longer study duration of their success. Although depicted in this study, the interaction of the various variables forms a great source of information on the lead-user innovation journey over a time-series study. It is essential to explore the theory of liminality for lead-user innovation at various stages of growth.

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