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EFFECT OF CUSTOMER VALUE CO-CREATION AND CUSTOMER INNOVATIVENESS ON CUSTOMER LOYALTY IN DIGITAL BANKING, MAPUTO

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Abstract
Despite the growing adoption of digital banking, understanding how customer participation in value creation translates into sustained customer loyalty remains an important concern for commercial banks, particularly in increasingly competitive digital service environments. This study examined the effect of value co-creation and customer innovativeness on customer loyalty in digital banking. The study adopted a cross-sectional survey research design. The target population comprised individual customers of commercial banks residing in Maputo City and Maputo Province, Mozambique, aged 21 years and above, who actively used digital banking channels at least twice a month. A minimum sample size of 349 respondents was established using the inverse square root method, while convenience sampling was employed to select eligible participants. Data were collected using a structured online questionnaire administered in Portuguese. Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM), implemented through the seminr package in R. Measurement model assessment and structural relationships were evaluated, with path significance tested using 5,000 bootstrap resamples. The findings revealed that value co-creation had a strong positive effect on customer loyalty ($\beta = 0.577$, $f^2 = 0.578$, $p = .001$), while customer innovativeness had a small positive effect but significant ($\beta = 0.177$, $f^2 = 0.057$, $p = .001$). However, the moderating effect of customer innovativeness on the relationship between value co-creation and customer loyalty was not statistically significant ($\beta = -0.073$, $p = .082$). The study concluded that value co-creation is a stronger predictor of customer loyalty in digital banking than customer innovativeness, while customer innovativeness does not significantly moderate the relationship between value co-creation and customer loyalty. The study recommended that commercial banks and other digital service providers prioritise customer participation, engagement and collaborative value creation in their service delivery strategies, while treating customer innovativeness as a complementary rather than primary criterion for customer segmentation and loyalty-building initiatives.

Keywords: *Customer value co-creation, customer innovativeness, customer loyalty, digital banking, customer engagement, customer participation, digital financial services.*

INTRODUCTION

The rapid digitalisation of retail banking has reshaped the relationship between commercial banks and their customers. The proliferation of digital channels, the regulatory standardisation of financial products, and growing competition from fintechs have substantially reduced the possibility of differentiation through the product itself (Carbó-Valverde et al., 2024). In response, banks have

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turned to value co-creation, which actively engages customers in personalising and improving services. Under this approach, the customer is treated as a co-producer of the service experience rather than a passive recipient of value (Prahalad & Ramaswamy, 2004a; Vargo & Lusch, 2004). Customer loyalty, in turn, remains one of the most valued outcomes in banking. It is closely linked to profitability, lower customer acquisition costs, and a more stable deposit base (Boonlertvanich, 2019).

In sub-Saharan Africa, this transformation has followed a distinctive path. Mobile money, rather than branch networks, has been the main gateway to formal financial services for much of the population. As a result, commercial banks compete directly with mobile network operators and fintechs for the same customers (Klapper et al., 2025). Customers in such markets can easily switch providers or use several at once. Loyalty is therefore fragile, and banks must rely more on relational sources of advantage than on product features.

Mozambique's current financial landscape reflects this reality. Electronic money institutions (EMIs) have rapidly captured everyday transaction flows. In 2025, e-money account ownership increased by 20% to reach 1,313 accounts per 1,000 adults, whereas commercial bank account ownership grew by only 2%, reaching just 337 per 1,000. This operational shift is closely linked to physical presence: while the number of ATM units declined 0.6% to 1,383 units nationwide, e-money agent networks expanded by 41.8%, reaching a total of 446,604 agents across the country. Consequently, the Financial Inclusion Index score for EMIs advanced to 45.8, while that of traditional banks declined to 28.1. Because basic payment features are now easily replicated, banks can no longer secure customer loyalty through transactional convenience alone (Banco de Moçambique, 2026).

In this context, Mozambican banks have invested in mobile and internet banking as a means of engaging customers more actively. Yet there is little evidence on whether involving customers in these digital channels actually builds loyalty. Moreover, customers differ in their willingness to adopt new technologies. This customer innovativeness may influence both how loyal customers are and how they respond to co-creation initiatives: highly innovative customers may derive value directly from the technology and depend less on participatory experiences, whereas less innovative customers may rely more on them to build a relationship with their bank.

The literature leaves two main gaps. First, a positive link between value co-creation and loyalty is well established, both in banking (Asnawi & Setyaningsih, 2021; Nguyen et al., 2025; Shoeib & Salavati, 2018; Sun et al., 2020) and in services more broadly (Lee et al., 2019; Mursid & Wu, 2022; Nguyen, 2024; Saurabh & Dinesh, 2025). However, evidence from African banking markets, where mobile money competes directly with banks, remains scarce. Second, customer innovativeness has mainly been examined as a moderator of the satisfaction and loyalty relationship (Ho et al., 2025). Its role in the co-creation and loyalty relationship has received little attention, whether as a direct driver of loyalty or as a boundary condition (Buhler et al., 2024; Kim et al., 2024).

This study therefore asks whether, in a market where mobile money erodes traditional sources of banking loyalty, co-creation in digital channels can strengthen customer loyalty, and whether this effect depends on customers' innovativeness. Given this background, the study sought to examine

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how value co-creation and customer innovativeness influence the loyalty of digital banking customers in Maputo. Specifically, the study sought to answer the following hypotheses:

H1: Customer value co-creation has a positive effect on customer loyalty in digital banking in Maputo.

H2: Customer innovativeness has a positive effect on customer loyalty in digital banking in Maputo.

H3: Customer innovativeness negatively moderates the effect of co-creation on customer loyalty in digital banking in Maputo.

METHODOLOGY

Research Design

This study adopted a quantitative, cross-sectional, explanatory survey design. Data were collected at a single point in time to examine the effects of value co-creation and customer innovativeness on customer loyalty. The design also tests the moderating role of customer innovativeness in the relationship between co-creation and loyalty.

Target Population

The target population comprised individual customers of commercial banks in Mozambique who reside in Maputo city and Maputo Province, are aged 21 or older, and actively use digital banking channels (internet banking, mobile banking applications, or social media) at least twice a month. This conservative criterion was adopted to ensure that respondents were independent adult customers with an established banking relationship and sufficient experience with digital banking services to assess their co-creation experiences and loyalty. Because no disaggregated official statistics exist, the size of the target population is unknown. Therefore, the reference point adopted was the 4.1 million NUIBs (Unique Bank Identification Numbers) registered by December 2025 (Banco de Moçambique, 2026).

Sample Size and Sampling Procedure

Respondents were selected through convenience sampling. Eligibility was verified with a screening question on the frequency of digital channel use.

The adequacy of the sample was assessed in two steps. First, the smallest effect of interest was fixed at $|\beta_{min}| = 0.15$, a small-to-medium effect according to Cohen (2013) benchmarks. Second, the minimum sample size required to detect an effect of this magnitude was computed with the inverse square root method (Kock & Hadaya, 2018), according to which:

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$$n_{\min} > \left(\frac{(z_{\alpha} + z_{1-\beta})}{|\beta_{\min}|}\right)^2$$

where z_{α} and $z_{1-\beta}$ are the standard normal quantiles associated with the significance level (α) and with the statistical power (1 − β). For a two-tailed test with α = 0.05 (z_{α} = 1.96) and the conventional 80% power ($z_{1-\beta}$ = 0.84), the numerator equals 2.80. Substituting $|\beta_{min}|$ = 0.15 gives:

$$n_{\min} > \left(\frac{2.80}{0.15}\right)^2 = 348.4 \rightarrow n_{\min} = 349$$

The required minimum was therefore 349 cases. The final sample comprised 483 valid responses (512 collected minus 29 cases removed during data screening), a figure that surpasses the calculated minimum of 349 cases.

Data collection tools and measurement

Data were collected through a structured questionnaire administered online between November 2025 and March 2026. The questionnaire was administered in Portuguese; the items were translated from English using the back-translation procedure and pre-tested with a pilot sample of n=30.

Constructs were adapted from previously validated scales, using a 7-point Likert scale (1 = Strongly Disagree; 7 = Strongly Agree); Value co-creation: five items adapted from Cheung et al. (2020); Customer innovativeness**:** five items adapted from Paparoidamis and Tran (2019); and Loyalty**:** six items (comprising attitudinal and behavioural loyalty), adapted from Gecti & Zengin (2013), grounded in Dick and Basu (1994).

Data Analysis Procedure

The data were screened for careless responding and outliers with four complementary methods: response invariance (straight-lining); the interquartile range; the modified Z-score (Iglewicz & Hoaglin, 1993); and the Mahalanobis distance at α = 0.001 (Tabachnick & Fidell, 2013).

Cases were classified as suspect if they showed straight-lining, or if at least two methods flagged them across two or more constructs (DeSimone et al., 2015). This procedure identified 29 cases from an initial n = 512 (5.7%), which were removed.

Partial Least Squares Structural Equation Modelling (PLS-SEM), using the seminr package in R (Ray et al., 2021) was selected for three reasons: it is suited to testing theoretically derived relationships in models with latent variables; it is robust to non-normally distributed Likert data; it handles models with interaction terms efficiently (Hair et al., 2019).

Reliability (α, ρA and ρC ≥ 0.70), convergent validity (AVE ≥ 0.50) and discriminant validity (HTMT < 0.85) were assessed followingHair et al. (2019) and Henseler et al. (2015), path significance was tested with 5,000 bootstrap resamples (two-tailed p-values and 95% confidence intervals), and f^2 values were interpreted as small (≥ 0.02), medium (≥ 0.15) or large (≥ 0.35) (Cohen, 2013).

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The assessment of discriminant validity via the HTMT criterion revealed a value of 0.967 between behavioural and attitudinal loyalty, above the liberal threshold applicable to conceptually close constructs (0.90), indicating near-total latent overlap. Given this situation, the first alternative recommended by Henseler et al. (2015) was tested, removing problematic items while preserving the structure of the two constructs. The item removal did not solve the problem. Thus, attitudinal and behavioural loyalty were aggregated into a single construct (Loyalty), comprising six items.

To control for common method bias (CMB) inherent in single-source cross-sectional data, procedural controls (confidentiality of responses) were combined with a full collinearity VIF test (Kock, 2015). All inner VIF values were well below the conservative 3.3 threshold (Co-creation, 2.02; Customer Innovativeness, 1.34; Loyalty, 2.06), suggesting that CMB is unlikely to be a concern.

Ethical Considerations

Participation was voluntary, and informed consent was obtained electronically after respondents were told the purpose of the study and their right to withdraw. Contact details were optional, requested only from those wishing to receive the results, and stored separately from the responses. All data were treated confidentially and analysed in aggregate. No incentives were offered, and no foreseeable risks were involved.

RESULTS

This section presents the empirical results in three parts. First, it describes the demographic profile of the respondents. Second, it reports the assessment of the measurement model, namely the reliability, convergent validity, and discriminant validity of the constructs. Third, it presents the structural model estimates used to test the three hypotheses: the direct effect of co-creation on loyalty, the direct effect of customer innovativeness on loyalty, and the moderating effect of customer innovativeness on the relationship between co-creation and loyalty. It also reports the explanatory power of the model.

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Demographic characteristics

Table 1 presents the demographic characteristics of the respondents in terms of gender and age distribution.

Table 1: Demographic profile of the respondents

Variable	Category	n	%
Gender	Female	217	44.9%
	Male	266	55.1%
	Total	483	100%
Age	21-35 years	252	52.2%
	36-60 years	228	47.2%
	60+ years	3	0.6%
	Total	483	100%

As shown in Table 1, the sample was fairly balanced by gender, with a slight majority of men. Respondents were concentrated in the working-age groups, split almost evenly between those aged 21–35 and 36–60, while customers over 60 were barely represented. This profile is consistent with active users of digital banking channels, who tend to be younger and economically active.

Reliability, Convergent and Discriminant Validity

Table 2 presents the measurement model assessment results for construct reliability, convergent validity and discriminant validity using the Heterotrait-Monotrait (HTMT) ratio.

Table 2: Reliability, convergent validity and discriminant validity (HTMT) of the measurement model

Construct	A	ρA	ρC	AVE	1	2	3
1. Co-creation (COC_EXP)	0.914	0.919	0.936	0.745	—		
2. Customer innovativeness (CUSTINN)	0.861	0.866	0.901	0.647	0.521	—	
3. Loyalty (LOY)	0.899	0.918	0.922	0.666	0.749	0.530	—

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As shown in Table 2, all constructs were confirmed to exhibit reliability (α, ρA, ρC ≥ 0.70), convergent validity (AVE ≥ 0.50), and discriminant validity (HTMT < 0.85).

Effect of Customer Value Co-Creation on Customer Loyalty in Digital Banking

The first hypothesis (H1) states that customer value co-creation has a positive effect on customer loyalty. The corresponding estimate is reported in Table 3.

Table 3: Effect of Customer Value Co-Creation on Customer Loyalty in Digital Banking

Hyp.	Structural path	B	T	p	95% CI	f²	Decision
H1	Co-creation → Loyalty	0.577	11.270	< .001	[0.480, 0.679]	0.578	Supported

As shown in Table 3, customer value co-creation has a strong, statistically significant positive effect on customer loyalty ($\beta = 0.577$, $t = 11.270$, $p < .001$). The 95% confidence interval $[0.480; 0.679]$ does not include zero, confirming the statistical reliability of the estimate. Furthermore, the effect size of $f^2 = 0.578$ indicates a large effect of value co-creation on customer loyalty within the digital banking environment. Based on these statistical results, H1 is supported.

Effect of Customer Innovativeness on Customer Loyalty in Digital Banking

The second hypothesis (H2) states that customer innovativeness has a positive effect on customer loyalty. The corresponding estimate is reported in Table 4.

Table 4: Effect of Customer Innovativeness on Customer Loyalty in Digital Banking

Hyp.	Structural path	β	t	p	95% CI	f^2	Decision
H2	Customer innovativeness → Loyalty	0.177	4.076	< .001	[0.091, 0.262]	0.057	Supported

As shown in Table 4, customer innovativeness exerts a statistically significant positive direct effect on customer loyalty ($\beta = 0.177, t = 4.076, p < .001$). The 95% confidence interval $[0.091; 0.262]$ excludes zero, confirming the statistical significance of the estimate. The effect size ($f^2 = 0.057$) indicates a small direct contribution of customer innovativeness to loyalty among digital banking clients. Based on these statistical results, H2 is supported.

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Moderating Effect of Customer Innovativeness on the Relationship Between Value Co-Creation and Customer Loyalty

The third hypothesis (H3) states that customer innovativeness negatively moderates the effect of co-creation on customer loyalty.

Table 5: Moderating Effect of Customer Innovativeness

Hyp.	Structural path	β	t	p	95% CI	f^2	Decision
H3	Co-creation × Customer innovativeness → Loyalty	−0.073	−1.742	.082	[−0.152, 0.009]	0.019	Not supported

As shown in Table 5, the interaction effect between value co-creation and customer innovativeness on customer loyalty is negative but statistically non-significant ($\beta = -0.073$, $t = -1.742$, $p = .082$). The 95% confidence interval $[-0.152; 0.009]$ crosses zero, and the effect size ($f^2 = 0.019$) reflects a small interaction effect. These results indicate that customer innovativeness does not significantly moderate the impact of value co-creation on loyalty at the standard 5% significance level ($p < .05$). Based on these statistical results, H3 is not supported.

DISCUSSION

The strong positive effect of co-creation on loyalty (H1: β = 0.577, $f^2 = 0.578$) is consistent with previous studies, such as Cossío-Silva et al. (2016), who found that value co-creation significantly increased customers' attitudinal loyalty in personal care services. Mahmood et al. (2025) reported positive effects of value co-creation on customer loyalty in banking, although their data came from bank managers and supervisors rather than customers. Royo-Vela et al. (2024) showed that co-creation enhances trust and reputation among online bank customers, which are close antecedents of loyalty. These findings are also consistent with service-dominant logic, and the view that value is created jointly with customers (Prahalad & Ramaswamy, 2004a; Vargo & Lusch, 2004, 2017), and with the view that dialogue, access, risk assessment, and transparency build the customer relationship (Prahalad & Ramaswamy, 2004b).

Customer innovativeness had a positive but small direct effect on loyalty (H2: β = 0.177, $f^2 = 0.057$). Previous research has treated innovativeness mainly as a boundary condition. Ho et al. (2025), in a PLS-SEM study of 258 United States mobile banking users, found that innovativeness, as a dimension of technology readiness, strengthens the link between satisfaction and loyalty. These results suggest that, beyond conditioning other relationships, more innovative customers are also more loyal in their own right, plausibly because they are more comfortable with technology that mediates bank relationships. However, its modest magnitude indicates that customer innovativeness is a secondary driver compared with co-creation.

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The positive effect of customer innovativeness is consistent with previous studies on digital financial services, although its magnitude differs; Jenkins et al. (2022) found that innate innovativeness significantly increased the likelihood of adopting internet banking. Similarly, Amoroso and Ackaradejruangsri (2019) found that personal innovativeness strongly influenced loyalty towards mobile wallet applications in Thailand. The present study confirms the direction of this relationship but shows a considerably weaker effect ($\beta = 0.177$, $f^2 = 0.057$). Two differences may explain this contrast. First, those studies examined either the initial adoption of digital services or loyalty to a specific application, whereas the present study examines loyalty to the bank as a whole, which depends on a broader set of relational factors. Second, the present model includes co-creation, which emerged as the dominant predictor of loyalty and may absorb part of the variance that innovativeness explains in models without relational antecedents.

The interaction between co-creation and customer innovativeness was not statistically significant ($\beta = -0.073$, $p = .082$, 95% CI [−0.152; 0.009]) and its effect size fell just below the 0.02 threshold for a small effect ($f^2 = 0.019$). Although the point estimate is negative, the confidence interval includes zero, so the direction of the moderation cannot be inferred from these data. The hypothesis was grounded in expectation-confirmation theory (Bhattacherjee, 2001), which posits that more innovative customers hold higher reference expectations, so that a given level of co-creation is less likely to exceed them. The data neither confirm nor refute this mechanism, as the confidence interval includes zero as well as negative effects of up to about −0.15. Research examining the moderating role of customer innovativeness in the co-creation and loyalty relationship remains scarce. One of the few exceptions is Silalahi et al. (2026), who studied 309 customers of local coffee shops in Indonesia and likewise found no significant moderating effect of personal innovativeness on the link between value co-creation and loyalty. They did find that innovativeness significantly weakened the link between co-creation and satisfaction, which is suggestive of the mechanism proposed here but concerns a different outcome and cannot replace evidence on loyalty.

CONCLUSION

Based on the findings, the study concludes that value co-creation is a stronger predictor of customer loyalty in digital banking than customer innovativeness, while customer innovativeness does not significantly moderate the relationship between value co-creation and customer loyalty.

From a practical perspective, the effect of co-creation on loyalty justifies investing in co-creation mechanisms as a lever for strengthening customer loyalty in digital banking. Although the evidence comes from digital banking customers, the recommendations are addressed to organizations that serve customers through digital channels in general, such as commercial banks, mobile money operators, and, where relevant, to regulators and policy-makers concerned with digital financial inclusion.

Organizations are recommended to prioritize co-creation as their main loyalty lever given its strong effect. Resources should go first to mechanisms that make customers active participants, such as in-app channels for suggestions and feedback, customer panels or beta-testing groups for new features,

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and visible follow-up showing how customer input changed the service. These co-creation initiatives should also be applied across the whole customer base: because no evidence of moderation was found, there is no empirical basis for restricting them to, or tailoring them by, customers' level of innovativeness.

Customer innovativeness, in turn, should be treated as a complementary rather than a primary targeting criterion, its small direct effect indicates that more innovative customers tend to be somewhat more loyal, which makes them natural candidates for early-adopter programmes and early access to new digital features; this should supplement, not replace, broad co-creation efforts. Organisations should also track co-creation as a managed indicator, monitoring customers' participation in co-creation activities alongside their loyalty indicators, and test any planned segment-specific initiative in a pilot before scaling it up. For regulators, policy-makers and industry associations, the findings suggest that encouraging participatory and transparent digital channels may help providers build more durable relationships with their customers in markets where switching between providers is easy. These recommendations rest on cross-sectional, self-reported data, so the relationships should be read as associations rather than proven causal effects.

ABOUT AUTHOR

Zeferino Carlos Nhumaio is a PhD student in Marketing Management at the Department of Management, Eduardo Mondlane University, Mozambique. His research examines customer loyalty in the banking sector, focusing on banks proactive use of digital channels to interact with customers and gather market intelligence. He investigates how customer value co-creation impacts loyalty.

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AI DECLARATION

During the preparation of this work, the author used Claude AI (Anthropic) in order to improve the language and readability of the text. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the published article.

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