QRIS Adoption and Budgeting Discipline Among Gen Z: The Mediating Role of Spending Visibility

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Abstract. The rapid diffusion of QRIS has normalised cashless transactions among Generation Z in Indonesia, yet its implications for disciplined budgeting remain underexplored. This study investigates how Perceived Ease of Use and QRIS Intensity influence Budgeting Discipline through Spending Visibility among Gen Z users in an urban–peri-urban ecosystem (Makassar versus the buffer areas of Maros and Gowa). A quantitative, cross-sectional survey was administered to 220 eligible respondents and analysed using PLS-SEM. The measurement model demonstrates satisfactory reliability and validity. The structural model indicates that both perceived ease of use and QRIS intensity positively relate to spending visibility, and spending visibility, in turn, positively predicts budgeting discipline. Notably, QRIS intensity exhibits a negative direct association with budgeting discipline, suggesting a frictionless-spending mechanism that may weaken restraint even as digital transaction traces strengthen monitoring capacity. Mediation analysis reveals that spending visibility partially mediates the effect of perceived ease of use on budgeting discipline and competitively mediates the effect of QRIS intensity. These findings highlight that the budgeting impact of QRIS is shaped by competing behavioural forces and underscore the importance of visibility-enhancing features and financial self-regulation to support disciplined budgeting among high-frequency cashless users.

Keywords: QRIS, digital payments, spending visibility, budgeting discipline, Generation Z.

1 Introduction

Indonesia's retail payment landscape has rapidly shifted towards QR-code-based transactions, supported by the national standard Quick Response Code Indonesian Standard (QRIS) introduced and maintained by Bank Indonesia to enable interoperable QR payments that are faster and more convenient across payment service providers [1]. This infrastructure has particular behavioural relevance for Generation Z, whose day-to-day consumption routines are strongly intertwined with mobile-based transactions and cashless payment channels. While QRIS adoption is frequently positioned as a driver of efficiency and inclusion, the broader behavioural-finance question is whether frictionless payment experiences strengthen or weaken individuals' ability to keep

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spending aligned with planned budgets. Evidence from behavioural research on digital payments suggests that "less tangible" payment modes may reduce the subjective "pain of paying", thereby lowering psychological resistance to spending and potentially encouraging impulsive purchases [2]. At the same time, QRIS-based transactions automatically generate digital traces transaction histories, confirmations, and notifications that may enhance users' awareness of where money goes. This informational feedback can function as a self-regulatory cue: expense-tracking is widely conceptualised as a monitoring behaviour that provides feedback for evaluating spending against goals and adjusting financial decisions accordingly [3]. Consequently, digital payments create a plausible dual mechanism: reduced friction may facilitate spending, whereas enhanced spending visibility may support budgeting discipline.

Existing studies often examine either (i) technology acceptance and adoption outcomes such as usage intention and continuance or (ii) spending consequences of cashless payment use, without modelling the mechanism that connects adoption-related perceptions to budgeting discipline as a concrete financial-management outcome. The Technology Acceptance Model (TAM) has robustly established perceived ease of use as a central belief shaping how individuals engage with a technology [4], yet empirical work remains comparatively limited in linking this belief and the behavioural intensity of QRIS use to disciplined budgeting via a theoretically grounded mediator. Moreover, the Indonesian QRIS context provides a distinctive setting because standardisation has reduced fragmentation across payment systems [1, 26, 28], which may influence how consistently transaction information is consolidated and reviewed. Finally, urban–peri-urban differences (Makassar versus its buffer areas such as Maros and Gowa) may shape routines, merchant density, and payment opportunities, implying that a geographically stratified Gen Z sample can sharpen inference on whether the proposed mechanism holds across contexts rather than being a purely metropolitan phenomenon.

Building on TAM and self-regulation perspectives, this study aims to explain budgeting discipline among Gen Z QRIS users by testing a mediated model in which Perceived Ease of Use (X1) and QRIS Intensity (X2) affect Budgeting Discipline (Y) through Spending Visibility (Z). Specifically, the study evaluates: (1) whether perceived ease of use and QRIS intensity increase spending visibility, (2) whether spending visibility improves budgeting discipline, (3) whether ease of use and intensity exhibit additional direct effects on budgeting discipline, and (4) whether spending visibility statistically mediates the relationships between the exogenous variables and budgeting discipline.

2 Literature Review

2.1 Technology Acceptance Model (TAM)

The present study is grounded in a combined theoretical lens that links technology-enabled payment behaviour to financial self-regulation. First, the Technology Acceptance Model (TAM) posits that users' beliefs particularly perceived ease of use shape the extent to which a technology is adopted and embedded in routine behaviour, because ease reduces cognitive and operational barriers to repeated use [5]. In a QRIS

setting where interoperable QR-code payments are standardised nationally this logic is especially salient: the more effortless QRIS feels, the more likely it is to become a default payment method in everyday consumption [6].

Secondly, behavioural perspectives on payment mechanisms emphasise that the form and timing of payment influence spending through salience and psychological "pain of paying". When payments are less transparent or less tightly coupled to the act of consumption, spending may increase because the subjective cost feels attenuated [5,7]. Experimental evidence shows that differences in payment mechanisms can change subsequent spending intentions and consumption levels, partly through reduced salience of the outflow [7], while related work demonstrates that cashless modes can dampen the pain of payment and thereby loosen spending restraint [8]. More recent behavioural research continues to document that contactless or mobile payments can promote higher purchasing, and that lower pain of paying does not always fully explain the effect suggesting additional mechanisms may operate in parallel [9].

This leads to the third pillar: self-regulation (control theory), which conceptualises goal-directed behaviour as a feedback loop comprising goal standards, monitoring, comparison, and corrective action [6]. Within personal finance, "budgeting discipline" can be interpreted as a self-regulatory outcome: individuals translate goals (e.g., staying within a spending limit) into planned budgets, monitor progress, and adjust behaviour when deviations occur. Importantly, self-monitoring is a pivotal element of this loop, because feedback is required for corrective control [8]. In digital payment environments, transaction histories, real-time confirmations, and notifications create a continuous stream of spending feedback what this study terms spending visibility which can facilitate monitoring and make it easier to evaluate spending against budget goals. Evidence in financial self-regulation research supports the idea that expense tracking functions as a self-regulatory behaviour by generating feedback that informs downstream financial decisions and behaviours [9, 27].

Taken together, TAM explains why Gen Z adopts and routinely uses QRIS (ease-driven engagement) [5], behavioural payment theory explains how cashless payments can weaken restraint through reduced salience and pain of paying, and control theory explains when and through what mechanism digital traces can strengthen discipline via feedback and monitoring [6,7]. This combined lens motivates the study's mediated model: QRIS adoption beliefs and usage intensity shape spending visibility, which then shapes budgeting discipline.

2.2 Variables

Perceived Ease of Use (X1). Perceived ease of use refers to the extent to which an individual believes that using a system requires minimal effort [4]. In QRIS usage, this includes perceptions that paying via QRIS is easy to learn, straightforward to execute, and uncomplicated in day-to-day contexts. Theoretically, ease of use should increase the likelihood of frequent engagement with system features (e.g., reviewing transaction history), because low effort reduces the "activation cost" of monitoring behaviours.

QRIS Intensity (X2). QRIS intensity captures the respondent's degree of reliance on QRIS in routine transactions (e.g., frequency of QRIS payments or proportion of transactions conducted via QRIS within a defined period). This construct represents behavioural exposure: higher intensity implies more cashless, frictionless transactions, which per behavioural payment research may reduce payment salience and weaken restraint [1,5]. However, intensity simultaneously increases the volume of recorded transactions, potentially enhancing visibility and enabling monitoring.

Spending Visibility (Z). Spending visibility is conceptualised as the perceived clarity, immediacy, and retrievability of spending information that arises from QRIS-enabled payment traces (transaction logs, confirmations, and notifications). In control-theory terms, visibility is the informational input that supports self-monitoring and feedback loops [8]. Empirical work on financial self-regulation frames expense tracking as a monitoring behaviour that provides feedback for evaluating alignment between spending and goals, thereby informing subsequent behaviour [9]. Accordingly, spending visibility is positioned as the mediator that translates QRIS-related beliefs and behaviours into budgeting outcomes.

Budgeting Discipline (Y). Budgeting discipline reflects the extent to which individuals consistently plan their spending, adhere to budget constraints, and review or reconcile spending against plans. This aligns with the budgeting and cash-flow management dimension of financial management behaviour, for which validated measurement frameworks exist in the personal finance literature [10]. Conceptually, budgeting discipline is an outcome of effective self-regulation: clearer feedback (visibility) should enable more accurate self-evaluation and corrective action.

2.3 Conceptual Framework and Hypothesis

The conceptual framework proposes that perceived ease of use and QRIS intensity influence budgeting discipline both directly and indirectly through spending visibility. First, when QRIS is perceived as easy to use, individuals are more likely to interact with the system seamlessly and utilise ancillary informational cues (e.g., transaction records), thereby increasing spending visibility [4]. Second, higher QRIS intensity increases the frequency of recorded payment events, which expands the informational footprint available for monitoring thus strengthening visibility as an operational feedback mechanism [8,9].

Spending visibility is expected to improve budgeting discipline because it reduces informational frictions in self-monitoring: when expenditure is readily observable, individuals can more effectively compare actual spending with intended budgets and adjust behaviour in line with goals [8]. Nevertheless, behavioural payment theory indicates that high reliance on cashless payments may also diminish restraint by reducing the salience and pain associated with parting with money [5]. Accordingly, the model allows for the possibility that QRIS intensity may exert a countervailing direct effect on budgeting discipline, even if its indirect effect through visibility is beneficial. This yields a theoretically richer account: QRIS can simultaneously increase

feedback (visibility) and decrease friction (pain of paying), with discipline determined by the net balance of these forces.
Based on the above arguments, the hypotheses are formulated as follows:

- **H1:** Perceived Ease of Use (X1) positively influences Spending Visibility (Z).
- **H2:** QRIS Intensity (X2) positively influences Spending Visibility (Z).
- **H3:** Perceived Ease of Use (X1) positively influences Budgeting Discipline (Y).
- **H4:** QRIS Intensity (X2) negatively influences Budgeting Discipline (Y).
- **H5:** Spending Visibility (Z) positively influences Budgeting Discipline (Y).
- **H6:** Spending Visibility (Z) mediates the relationship between Perceived Ease of Use (X1) and Budgeting Discipline (Y).
- **H7:** Spending Visibility (Z) mediates the relationship between QRIS Intensity (X2) and Budgeting Discipline (Y).

3 Methodology

3.1 Research design, population, and sampling

This study adopts a quantitative, explanatory research design using a cross-sectional survey to examine how Perceived Ease of Use (X1) and QRIS Intensity (X2) relate to Budgeting Discipline (Y) through Spending Visibility (Z) among Gen Z users of QRIS-enabled payment instruments. The cross-sectional approach is appropriate for estimating structural relationships between latent constructs within a single observation window and is commonly implemented in behavioural finance and information-systems research employing PLS-SEM for prediction-oriented modelling and theory extension [11].

The target population comprises Gen Z individuals residing in South Sulawesi who actively use QRIS for day-to-day payments. To capture meaningful contextual heterogeneity, the population is structured into two geographical strata: (i) urban Gen Z in Makassar (city context) and (ii) non-city Gen Z in the urban periphery Maros and Gowa (buffer areas supporting Makassar). This stratification is theoretically relevant because payment routines, merchant density, and day-to-day mobility patterns may differ between the core city and surrounding districts, potentially shaping both transaction intensity and the salience of spending records (visibility) in budgeting practices.

Sampling is implemented as stratified purposive sampling with planned balance across the two strata (Makassar vs Maros & Gowa). Respondents are recruited based on eligibility criteria aligned with the constructs under investigation, namely: (a) belonging to Gen Z age cohort, (b) having used QRIS for transactions within a recent period (the last three months), and (c) residing and conducting routine economic activity primarily in Makassar, Maros, or Gowa. This approach ensures that observed relationships are estimated on participants with sufficient exposure to QRIS usage, thereby strengthening construct validity for both intensity and visibility measures.

Given the use of PLS-SEM, minimum sample adequacy is determined through a priori statistical power considerations rather than relying solely on heuristic rules.

Following established guidance, power is assessed with reference to the maximum number of predictors for an endogenous construct and an anticipated medium effect size, with conventional thresholds for significance ($\alpha = 0.05$) and statistical power (≥ 0.80) [12,13]. Practically, the study targets a sample size that not only satisfies power for the structural model but also remains defensible for subgroup comparisons between the urban and non-city strata.

3.2 Measurement instrument and Data collection procedure

Data were collected using a structured questionnaire designed to operationalise the four latent constructs in the research model Perceived Ease of Use (X1), QRIS Intensity (X2), Spending Visibility (Z), and Budgeting Discipline (Y) among Gen Z respondents who actively conduct payments using QRIS, which is the national QR-code payment standard introduced by Bank Indonesia. The instrument was organised into (i) an eligibility screen (Gen Z cohort and recent QRIS use), (ii) demographic and socioeconomic profiling (including residence stratum: Makassar vs Maros/Gowa), and (iii) the construct measures.

All perceptual items were measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), consistent with the original logic of attitude measurement in survey research. Perceived Ease of Use (X1) items were adapted from the Technology Acceptance Model tradition, capturing the degree to which respondents perceive QRIS as effortless to learn and use in daily transactions [14]. Budgeting Discipline (Y) was measured by adapting the budgeting and cash-flow management facets of the Financial Management Behavior Scale (FMBS), focusing on the extent to which individuals plan spending, adhere to budget limits, and review expenditures.

To represent the behavioural exposure to digital payments, QRIS Intensity (X2) was operationalised through self-reported usage metrics that capture the respondent's transaction frequency and routine reliance on QRIS (how often QRIS is used relative to other payment modes within a recent reference period). This approach is consistent with modelling intensity as a behavioural antecedent that can shape downstream financial monitoring practices. The mediator, Spending Visibility (Z), was operationalised as the perceived clarity and immediacy with which respondents can observe and recall their spending due to QRIS-enabled features such as transaction histories, real-time confirmations, and payment notifications. This conceptualisation is supported by evidence that payment notifications and digital feedback can meaningfully influence post-payment awareness and subsequent spending behaviour. In parallel, research on personal finance applications suggests that digital tools facilitating tracking and feedback can strengthen financially capable behaviours, providing further grounding for visibility-oriented measurement items [15, 16].

Given the Indonesian setting, the questionnaire was prepared for administration in Indonesian. Where items originated from English-language sources (TAM- and FMBS-based measures), translation procedures followed a back-translation logic to preserve semantic equivalence across languages. Prior to full deployment, the questionnaire underwent a small pilot to ensure item clarity, appropriateness of wording for Gen Z

respondents, and completeness of response options; minor refinements were made to improve readability and reduce ambiguity.

Data collection was conducted through a combination of online distribution (QR-linked survey forms) and targeted dissemination in the two strata (Makassar vs Maros/Gowa) to maintain the intended sampling structure. Participation was voluntary and anonymous, and the opening page provided informed-consent information, including the study purpose, confidentiality assurances, and the right to withdraw at any point. To mitigate common method concerns inherent in single-source survey designs, the instrument incorporated procedural remedies such as clear separation between predictor and outcome sections, non-evaluative wording, and emphasis on anonymity to reduce evaluation apprehension and socially desirable responding [17].

3.3 Data Analaysis Technique

The analysis proceeded in two stages: preliminary data screening and model estimation using partial least squares structural equation modelling (PLS-SEM). PLS-SEM was selected because the study is prediction-oriented and involves a mediated structural relationship (the indirect effects of Perceived Ease of Use and QRIS Intensity on Budgeting Discipline through Spending Visibility), for which variance-based SEM is widely recommended in behavioural and information-systems research. Model estimation and inference were conducted using SmartPLS 4.

Prior to model estimation, the dataset was screened for response quality and suitability for multivariate analysis. This included checking missing values, identifying implausible patterns (straight-lining), and reviewing descriptive statistics to understand the distributional profile of the indicators. Because data were collected through a single self-report instrument, potential common method bias was assessed using a full collinearity approach; following established guidance, models with full collinearity VIF values not exceeding 3.3 were interpreted as unlikely to be materially contaminated by common method bias [18,19].

The PLS-SEM assessment followed contemporary reporting guidelines, beginning with the evaluation of the reflective measurement models and proceeding to the structural model. For the measurement model, indicator reliability was examined through outer loadings, and internal consistency reliability was assessed using composite reliability (and Cronbach's alpha as a supporting indicator). Convergent validity was evaluated via the average variance extracted (AVE), applying the classical AVE logic established in the SEM literature. Discriminant validity was examined using the heterotrait–monotrait ratio (HTMT), supplemented where relevant by conventional criteria, as HTMT has been shown to offer stronger sensitivity in detecting discriminant validity problems in variance-based SEM [20,21].

For the structural model, collinearity among predictor constructs was first assessed to ensure stable estimation. Hypotheses were then tested through the magnitude and significance of path coefficients. Statistical inference relied on bootstrapping to obtain standard errors and confidence intervals for direct and indirect effects; this includes explicit testing of mediation via the bootstrapped indirect effect of Spending Visibility linking the exogenous constructs to Budgeting Discipline. Explanatory power was

assessed using R^2 for endogenous constructs, while substantive contribution was examined using effect sizes as recommended in PLS-SEM guidance. Predictive relevance was evaluated using the Stone–Geisser Q^2 procedure via blindfolding for reflectively measured endogenous constructs [22]. To strengthen the study's predictive argument, out-of-sample predictive performance was also considered using PLSpredict guidelines, where appropriate. Model fit was reported using the SRMR as an approximate fit measure for PLS path models, consistent with updated methodological discussions in the PLS literature.

Finally, because the sampling strategy explicitly distinguishes Makassar (urban) from Maros/Gowa (non-city buffer areas), the analysis framework allows for structured comparison across strata. Where multi-group comparisons are conducted, measurement invariance is assessed using the MICOM procedure prior to interpreting group differences in structural paths, thereby reducing the risk of misleading conclusions due to non-invariant measurement.

4 Result and Discussion

4.1 Result

Respondents Profile.

Table 1. Respondents Characteristic

Characteristic	Category	Overall (n=220)	Makassar (n=110)	Maros & Gowa (n=110)
Gender	Male	86 (39%)	40 (36%)	46 (42%)
	Female	135 (61%)	70 (64%)	64 (58%)
Age group	17–19	44 (20.0%)	19 (17.3%)	25 (22.7%)
	20–22	121 (55.0%)	64 (58.2%)	57 (51.8%)
	23–26	55 (25.0%)	27 (24.5%)	28 (25.5%)
Primary status	Student	136 (61.8%)	64 (58.2%)	72 (65.5%)
	Employee	70 (31.8%)	40 (36.4%)	30 (27.3%)
	Student–employee	14 (6.4%)	6 (5.5%)	8 (7.3%)
Monthly disposable funds	< IDR 1m	52 (23.6%)	20 (18.2%)	32 (29.1%)
	IDR 1–3m	104 (47.3%)	54 (49.1%)	50 (45.5%)
	> IDR 3m	64 (29.1%)	36 (32.7%)	28 (25.5%)
QRIS usage frequency	< 1×/week	30 (13.6%)	10 (9.1%)	20 (18.2%)
	1–3×/week	86 (39.1%)	38 (34.5%)	48 (43.6%)

≥ 4×/week	104 (47.3%)	62 (56.4%)	42 (38.2%)

Source: Primary Data (2025)

The final sample comprised 220 Gen Z respondents, stratified evenly across Makassar (n=110) and the peri-urban buffer areas of Maros and Gowa (n=110) to capture an urban–non-city payment ecosystem. Overall, the sample was dominated by female respondents (59.5%) and concentrated in the 20–22 age group (55.0%), indicating strong representation of Gen Z individuals who are actively embedded in mobile-based consumption routines. In terms of socioeconomic profile, nearly half of respondents reported monthly disposable funds of IDR 1–3 million (47.3%), while 29.1% reported more than IDR 3 million. Most participants were students (61.8%), although a substantial proportion were already in employment (31.8%), suggesting that the sample captures both allowance-based and income-based financial decision contexts.

With respect to QRIS usage, the sample displayed sufficient behavioural exposure for the proposed model: 47.3% of respondents reported using QRIS four times per week or more, and a further 39.1% used QRIS one to three times per week, indicating that QRIS is embedded in routine transactions rather than being an occasional payment option. Notably, QRIS usage intensity was higher in Makassar, where 56.4% reported ≥4× weekly use compared with 38.2% in Maros–Gowa. This difference is consistent with the expectation that urban settings provide denser QRIS-enabled merchant networks and more frequent transaction opportunities, whereas peri-urban contexts may still involve a relatively higher reliance on alternative payment modes.

Table 2. Indicator loadings and convergent validity

Construct	Indicator	Loading	Cronbach's α	CR	AVE
Perceived Ease of Use (X1)	X1_1	0.84			
	X1_2	0.88			
	X1_3	0.82			
	X1_4	0.78	0.87	0.91	0.71
QRIS Intensity (X2)	X2_1	0.74			
	X2_2	0.85			
	X2_3	0.80	0.80	0.88	0.64
Spending Visibility (Z)	Z_1	0.87			
	Z_2	0.83			
	Z_3	0.79			
	Z_4	0.76	0.86	0.90	0.69
Budgeting Discipline (Y)	Y_1	0.84			

Y_2	0.81			
Y_3	0.77			
Y_4	0.72	0.83	0.89	0.67

Source: Primary Data (2025)

All constructs satisfied the standard criteria for reflective measurement quality, with outer loadings generally exceeding the recommended threshold and providing evidence of indicator reliability. Internal consistency was supported by Cronbach's alpha (0.80–0.87) and composite reliability (0.88–0.91). Convergent validity was confirmed as AVE exceeded 0.50 across all constructs, indicating that each latent variable explained more than half of the variance in its indicators, consistent with established SEM validity logic.

Table 3. Structural paths and hypothesis testing (bootstrapping)

Hypothesis	Path	β	t	p	Decision
H1	X1 → Z	0.33	6.88	<0.001	Supported
H2	X2 → Z	0.41	8.21	<0.001	Supported
H3	X1 → Y	0.12	2.10	0.036	Supported
H4	X2 → Y	-0.18	3.45	0.001	Supported
H5	Z → Y	0.46	9.02	<0.001	Supported
Mediation hypothesis	**Indirect path**	**Indirect β**	**t**	**p**	**Interpretation**
H6	X1 → Z → Y	0.15	6.01	<0.001	Partial mediation
H7	X2 → Z → Y	0.19	7.30	<0.001	Competitive mediation*

Source: Primary Data (2025)

Perceived ease of use exerted a positive and significant effect on spending visibility (β=0.33), suggesting that frictionless QRIS usage encourages stronger engagement with transaction traces and related monitoring cues, consistent with TAM logic for ease-driven engagement. QRIS intensity had an even stronger positive effect on spending visibility (β=0.41), implying that more frequent QRIS usage increases the salience of records and feedback. Spending visibility, in turn, displayed a strong positive association with budgeting discipline (β=0.46), consistent with the proposition that clearer expenditure feedback supports goal monitoring and budgeting adherence.

Notably, QRIS intensity had a negative direct effect on budgeting discipline (β=-0.18). This pattern is consistent with behavioural payment evidence that frictionless or less salient payment modes may reduce the psychological resistance to spending and thereby weaken restraint, even while digital traces simultaneously enhance visibility.

Spending visibility significantly mediated the relationship between perceived ease of use and budgeting discipline (indirect β=0.15), while the remaining direct effect of ease on discipline stayed significant, indicating partial mediation. For QRIS intensity,

the indirect effect through spending visibility was positive (β=0.19), yet the direct effect remained negative (β=-0.18), producing a competitive mediation pattern. Substantively, this implies that QRIS intensity simultaneously increases monitoring capacity (via visibility) but also encourages frictionless spending that may undermine budget discipline if self-regulatory practices are not strong.

Table 4. Effect Size

Predictor → Endogenous	f^2	Magnitude
X1 → Z	0.13	Small–medium
X2 → Z	0.21	Medium
Z → Y	0.28	Medium
X1 → Y	0.02	Small
X2 → Y	0.05	Small

Source: Primary Data (2025)

Effect size analysis indicates that QRIS intensity and perceived ease of use contribute substantively to spending visibility, while spending visibility is the most influential driver of budgeting discipline in the model. In contrast, the direct effects of ease and intensity on budgeting discipline are comparatively smaller, reinforcing the centrality of the visibility mechanism.

4.2 Discussion

The findings provide a coherent behavioural account of how QRIS shapes budgeting discipline among Gen Z. First, the positive association between perceived ease of use and spending visibility implies that when QRIS feels effortless, users are more likely to rely on it routinely and to engage with the informational affordances that accompany digital payments. This result is consistent with TAM, where ease reduces activation costs and supports sustained usage engagement.

Secondly, QRIS intensity was found to increase spending visibility. This suggests that frequent QRIS transactions expand the "trace volume" and salience of recorded spending, making it easier for users to observe patterns and recall expenditures. In self-regulation terms, this supports the monitoring stage of goal-directed control, because feedback becomes more accessible and continuous [23,24]. The strong positive path from spending visibility to budgeting discipline is therefore theoretically intuitive: when expenditures are clearly visible through transaction logs and confirmations, individuals can compare actual spending against budget targets and adjust behaviour accordingly.

However, the model also reveals an important tension: QRIS intensity negatively affects budgeting discipline directly, even while exerting a positive indirect influence through visibility. This pattern suggests that the behavioural convenience of QRIS can reduce friction at the moment of payment, thereby lowering the psychological resistance to spending. Such a mechanism aligns with classic payment research

showing that differences in payment form and coupling can influence spending behaviour by changing salience and the subjective experience of payment [25]. Accordingly, the results indicate that QRIS may produce two simultaneous forces: (i) increased informational feedback (visibility) that supports budgeting, and (ii) reduced payment friction that may undermine restraint. The presence of competitive mediation for QRIS intensity reinforces this interpretation and suggests that visibility-enhancing features alone may not fully offset the behavioural risks of frictionless spending among high-intensity users.

From a practical standpoint, these findings imply that payment-system stakeholders particularly e-wallet providers and banking apps implementing QRIS should treat "visibility" as a design objective rather than a passive by-product of transaction records. Features that strengthen budgeting discipline may include real-time categorisation, weekly summaries, budget-limit alerts, and friction-increasing prompts for discretionary categories. Such interventions aim to amplify the positive pathway (intensity → visibility → discipline) while mitigating the negative direct pathway (intensity → reduced restraint → lower discipline).

5 Conclusion

This study set out to explain how QRIS-based payment practices shape budgeting discipline among Gen Z in an urban–peri-urban setting (Makassar versus the buffer areas of Maros and Gowa). Drawing on a combined technology-adoption and behavioural self-regulation lens, the findings collectively indicate that QRIS does not influence budgeting discipline through a single pathway; rather, it produces countervailing forces that can either strengthen or weaken financial discipline depending on whether users convert digital payment traces into meaningful monitoring.

First, perceived ease of use was associated with stronger spending visibility, implying that when QRIS is experienced as effortless, Gen Z users are more likely to engage with the informational affordances embedded in digital payments (e.g., confirmations and transaction histories). Secondly, QRIS intensity increased spending visibility, suggesting that higher transaction frequency expands the volume and salience of digital spending records, thereby increasing the opportunity for monitoring. Crucially, spending visibility emerged as the most consequential mechanism in the model: clearer, more retrievable spending information was linked to stronger budgeting discipline, consistent with the view that self-regulation depends on feedback and monitoring to keep behaviour aligned with financial goals.

At the same time, the results also support a behavioural caution: greater QRIS intensity can directly undermine budgeting discipline, consistent with the proposition that frictionless payments may reduce the psychological resistance to spending at the point of purchase. Importantly, this does not negate the beneficial role of spending visibility; instead, it indicates a competitive dynamic whereby frequent QRIS use increases discipline indirectly through enhanced visibility, while also increasing the risk of weakened restraint directly through reduced payment friction. In practical terms, the evidence implies that QRIS-driven financial discipline among Gen Z is less about

whether they use QRIS, and more about whether their usage is accompanied by strong monitoring cues that transform transaction traces into budgeting feedback.

5.1 Practical and theoretical implications

From a design and policy perspective, the results suggest that stakeholders (payment service providers, e-wallet/banking app developers, and financial educators) should treat visibility as an intervention point. Features such as categorised transaction summaries, weekly/monthly spending insights, budget-limit alerts, and real-time nudges for discretionary categories can amplify the positive pathway from QRIS use to discipline by strengthening monitoring, while simultaneously mitigating frictionless overspending. Theoretically, the study extends technology-adoption logic by demonstrating that acceptance-related beliefs and behavioural usage intensity can be meaningfully linked to a concrete financial-management outcome (budgeting discipline) through a self-regulatory mechanism (spending visibility), rather than stopping at adoption or continuance outcomes alone.

5.2 Limitations

Several limitations should be recognised. First, the design is cross-sectional, which restricts causal inference and cannot fully capture how budgeting discipline evolves over time as QRIS usage becomes habitual. Secondly, the measures rely on self-reported survey data, which may be affected by recall bias or social desirability, especially for budgeting-related behaviours. Thirdly, the sampling frame although intentionally stratified between Makassar and Maros–Gowa still reflects one regional ecosystem; therefore, generalisation to other provinces or metropolitan areas should be made cautiously. Finally, although procedural and statistical remedies can be applied, common method bias remains a potential concern in single-instrument designs.

5.3 Future research

Future studies could strengthen inference in four ways. (1) Employ longitudinal designs to test whether the negative direct effect of QRIS intensity on budgeting discipline strengthens, weakens, or reverses as users develop stable budgeting habits. (2) Incorporate objective behavioural data (e.g., consent-based transaction logs or app-based spending summaries) to validate self-reported QRIS intensity and spending visibility. (3) Test theoretically meaningful moderators, such as financial literacy, self-control, income stability, or the presence of budgeting features within the payment app, to identify which Gen Z segments benefit most from visibility and which are most vulnerable to frictionless spending. (4) Extend the model through multi-group analysis across regions, occupational status (students vs employed), and levels of merchant density to evaluate contextual robustness and to inform place-sensitive policy interventions.

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