



THE IMPACT OF INSTALMENT-BASED CREDIT SCHEMES ON CONSUMER DECISIONS AMONG YOUTH IN KANNUR, KERALA

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RESEARCH ARTICLE



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Abstract

The widespread availability of instalment credit options, especially Equated Monthly Instalment (EMI) schemes, Buy Now Pay Later (BNPL) schemes, has significantly transformed the purchasing behaviour of youth in India. This study examines the impact of such credit facilities on the buying behaviour of young consumers in Kannur district, Kerala, with a particular focus on impulsive purchasing tendencies. The primary objective is to understand how easy access to credit influences youth decision-making, spending habits, and their preference for high-value items. Adopting a quantitative research approach, data were collected through a structured questionnaire administered to 100 youth respondents in the district. Descriptive statistics and regression analysis were used to identify key behavioural patterns and influencing factors. The findings indicate a notable correlation between the use of instalment credit and an increase in impulsive purchases, especially in product categories such as electronics and fashion. The study also reveals that many young consumers consider instalment schemes financially convenient, despite having limited or unstable income sources. This research contributes to the literature on consumer behaviour by highlighting the link between credit access and impulsive buying, and offers valuable insights for policymakers and marketers in developing youth-focused and financially sustainable credit solutions.

Keywords: *Instalment Credit, EMI, Youth Purchase Behaviour, Consumer Credit, Impulsive Buying, BNPL*

Introduction

In modern India, the way we buy things has been completely transformed by instalment credit schemes. Instruments like EMI (Equated Monthly Instalment) options on credit cards, Buy Now Pay Later (BNPL) apps, and specialised finance cards are everywhere, making high-value goods accessible even to people with tighter or less stable finances.

The advantages are clear. These plans let consumers, especially young people, easily break up large payments over time. This helps them manage their cash flow and enjoy aspirational products without the immediate financial hit. For businesses, this is a massive win, boosting sales and expanding their customer base significantly.

However, this growing accessibility is a double-edged sword. When credit is too easy, the perceived cost of a purchase drops dramatically, practically inviting impulsive buying. Young consumers, in particular, often focus on instant gratification and overlook long-term financial stability. This can quickly lead to excessive spending and serious debt.

You see this phenomenon play out spectacularly during massive online sales like Amazon's Great Indian Festival or Flipkart's Big Billion Days. These events heavily push instalment plans, causing sales of items like smartphones, laptops, and premium fashion to skyrocket. Take Apple iPhones, for instance. They used to be the ultimate status symbol, yet now they're widely purchased in India using these instalment plans. Easy credit isn't just changing how people buy; it's accelerating market penetration and fundamentally reshaping consumer desires.

Understanding this shift requires looking at consumer psychology. Frameworks from consumer behaviour and behavioural finance offer key insights:

- **The Power of Perception:** The Theory of Planned Behaviour suggests our intention to buy is influenced by what we think, what society expects, and how much control we feel we have. Instalment options cleverly reduce the feeling of financial constraint, making impulsive purchases feel much more achievable.
- **Aspiration and Status:** According to Maslow's Hierarchy of Needs, young buyers often seek to satisfy their needs for esteem and self-actualisation by acquiring status symbols like the latest smartphone or branded gear-items made readily available by easy credit.

- The Bias for the Present: Behavioural finance concepts like present bias and mental accounting help explain the irrationality. People tend to overvalue immediate pleasure and underestimate future obligations when they use instalment plans, making the future debt feel less real than the present reward.

Ultimately, while instalment credit empowers youth to achieve their desired lifestyle, it also carries the risk of fostering financial vulnerability if it's misused. This highlights the urgent need to understand precisely how this access to easy credit is driving the spending, decision-making, and impulsive tendencies of young consumers in emerging markets like India. This study addresses this issue in the context of Kannur district, Kerala, aiming to explore the relationship between access to instalment credit facilities and youth spending habits, decision-making, and impulsive purchasing.

To investigate these phenomena, the study adopts a quantitative research approach. A structured questionnaire was administered to a sample of 100 youth respondents in Kannur district, Kerala. Purposive sampling was used to select participants who actively engage in online and offline shopping and are aware of instalment credit options. The collected data were analysed using descriptive statistics, cross-tabulations, and regression analysis to examine the relationship between credit usage and impulsive buying behaviour. This methodology ensures focused insights into youth spending patterns and the influence of instalment credit on consumption decisions.

Literature Review

The rise of instalment credit schemes such as Buy Now Pay Later (BNPL) and credit card EMIs has transformed consumer spending, particularly among youth. Madiha Khan and Shejuti Haque (2020) found that education, rising demand for luxury goods, and improved living standards significantly drive BNPL usage in Dhaka City, often triggering impulsive purchases. Similarly, Keil and Burg (2023) demonstrated that BNPL availability increases impulsive buying, especially in online shopping contexts, highlighting the role of deferred payment options in promoting unplanned purchases.

Payment methods also influence consumer perceptions and spending behaviour. Kamleitner and Erki (2013) observed that cash payments create stronger immediate psychological ownership compared to credit cards, while Chatterjee and Rose (2012) found that credit card usage shifts focus from product costs to benefits, encouraging present-oriented consumption. Feinberg (1986) further confirmed that exposure to credit card cues increases the probability, speed, and magnitude of spending, emphasising the behavioural impact of the "buy now, pay later" philosophy.

Discounts and scarcity also affect purchase decisions in BNPL or deferred payment situations. Gabler and Reynolds (2013) reported that scarcity adds emotional value to less visible products, while discounts drive purchases of highly visible items. Wilcox, Block, and Eisenstein (2011) highlighted the interplay between credit card debt, available credit, and spending behaviour, demonstrating that higher self-control increases spending when credit is limited but reduces it when credit availability is high.

Materialism and transformational expectations further influence credit usage. Richins (2011) found that materialistic consumers overuse credit, believing it will lead to life improvements, while Kumar, Salo, and Bezawada (2024) noted that BNPL adoption increases overall consumer expenditure, particularly in online retail contexts. Susanto, Apriza, and Muthiarsih (2024) emphasised the role of hedonic motivation in impulsive buying among Gen Z in e-commerce platforms like Shopee, showing that easy credit options enhance the enjoyment of shopping and promote unplanned purchases.

Recent regulatory and financial considerations have also been explored. Guttman-Kenney, Firth, and Gathergood (2023) examined BNPL use in relation to credit cards, and Johnson, Rodwell, and Hendry (2021) argued that existing BNPL regulations are insufficient to prevent impulsive or risky spending among consumers. Collectively, these studies indicate that instalment credit schemes significantly influence impulsive buying, spending patterns, and consumer decision-making, highlighting the importance of understanding psychological, demographic, and regulatory factors in credit-induced consumption.

Ikmal et al. (2025) investigated how Buy Now, Pay Later (BNPL) features—specifically ease of use, deferred payment structures, and perceived affordability—shape and influence impulsive buying behaviour among Generation Z consumers in Shah Alam, Malaysia. The study found that easy-to-use BNPL platforms, the option to defer payments, which reduces the immediate pain of spending, and a strong perception of affordability collectively heighten consumers' tendency to make impulsive purchases.

Jamshid VP and Hamamali EK (2025) examined how psychological factors such as perceived affordability, financial planning behaviour, and aspirational buying influence consumers' adoption of EMI schemes, along with the role of promotions like zero-interest offers and extended repayment terms. Their findings show that EMI facilities significantly increase consumer spending, especially among younger and middle-income groups, by enhancing perceived financial flexibility. However, the study also notes concerns about long-term financial obligations and the risk of indebtedness, despite EMI options being viewed as a practical tool for managing short-term liquidity.

Problem Statement

The proliferation of instalment credit schemes in India has significantly altered the purchasing landscape, particularly among youth. While these schemes, such as credit card EMIs, Buy Now Pay Later (BNPL) platforms, and finance company cards, enable young consumers to access high-value products with minimal immediate financial strain, they also have the potential to encourage impulsive buying and excessive spending. Events like Amazon's Great Indian Festival, Flipkart's Big Billion Days, and the availability of EMI options for products such as Apple iPhones exemplify how easy credit can stimulate unplanned

consumption. Despite the growing use of instalment schemes, there is limited empirical research examining their impact on youth purchase behaviour in smaller regions like Kannur district, Kerala. Specifically, there is a gap in understanding how access to easy credit influences impulsive purchases, spending patterns, and decision-making processes among young consumers. This research seeks to address this gap by systematically investigating the relationship between instalment credit usage and youth buying behaviour in the region.

Research Objectives

The study aims to achieve the following objectives:

1. To examine the level of awareness and usage of various instalment credit schemes (credit card EMIs, BNPL apps, and Insta EMI Cards etc.) among youth in Kannur district.
2. To analyse the influence of instalment credit on youth purchase behaviour, particularly in terms of frequency of purchases, preference for high-value items, and spending patterns.
3. To investigate the role of instalment credit in promoting impulsive buying behaviour among young consumers.
4. To assess youth perceptions and attitudes toward instalment credit, including affordability, financial convenience, and potential financial risks.

Significance of the Study

This study is significant both theoretically and practically. Theoretically, it enhances understanding of youth consumer behaviour by examining how instalment credit influences impulsive purchases, spending patterns, and decision-making, integrating frameworks such as the Theory of Planned Behaviour and behavioural finance. Practically, the findings provide insights for marketers, retailers, and financial institutions to design targeted EMI and BNPL offers, especially during events like Amazon's Great Indian Festival and Flipkart's Big Billion Days. The study also highlights the need for financial literacy, helping policymakers promote responsible credit usage among youth. Overall, it sheds light on the dual role of instalment credit, facilitating aspirational consumption while posing potential financial risks by offering guidance for both business strategy and consumer education.

Results and Discussion

Table 1: Demographic Details

Variable	Categories	Frequency	Percentage
Age Group	18–21	35	35%
	22–25	45	45%
	26–30	20	20%
Gender	Male	88	88%
	Female	12	12%
Education Level	Undergraduate	70	70%
	Postgraduate	25	25%
	Others	5	5%
Monthly Income (₹)	<10,000	40	40%
	10,000–20,000	45	45%
	>20,000	15	15%

The demographic analysis shows that most respondents belong to the 22–25 age group (45%), followed by 18–21 years (35%), reflecting the predominance of college students and young professionals in Kannur. Only 20% fall in the 26–30 bracket, suggesting that instalment credit adoption is higher in early adulthood. Gender distribution is skewed, with 88% male and only 12% female respondents, which may highlight male dominance in financial decision-making or higher male participation in consumer credit activities. Most respondents are undergraduates (70%), and a considerable proportion (40%) earn below ₹10,000, while only 15% report earning above ₹20,000. This indicates that youth with limited or unstable income sources are also active users of instalment credit.

Overall, the demographic profile reflects that instalment credit schemes have gained significant traction among students and young earners, who are often at the initial stages of financial independence but still aspire for high-value consumption.

Table 2: Usage of Instalment Credit Instruments and Analysis (N = 100)

Instrument	Users (Frequency)	Users (%)	Key Usage Purpose	Analysis / Insights
Credit Card EMI	30	30%	Electronics, fashion, and online shopping	Preferred by employed youth; easy EMI conversion and cashback offer increase adoption.
Debit Card EMI	8	8%	Gadgets, appliances	Least used due to limited availability; mainly accessible to account holders in select banks.

Pay Later (BNPL Apps)	22	22%	Small-ticket online purchases, fashion	Popular among students and early jobbers, it encourages impulsive purchases due to low entry barriers.
Bajaj Insta EMI Card	40	40%	High-value items (mobiles, electronics, appliances)	Most preferred option; attractive for no-cost EMI schemes and strong retail partnerships.

Among the instruments, the Bajaj Finance Card (40%) emerged as the most widely used, followed by Credit Card EMIs (30%), BNPL apps (22%), and Debit Card EMIs (8%). The dominance of Bajaj Finance highlights its strong retail partnerships and the popularity of no-cost EMI schemes, especially for electronics and appliances. Credit cards remain a significant tool for both online and offline EMI transactions, particularly among employed youth.

BNPL apps, while less dominant, are highly popular among students and first-time credit users, driving small-ticket, impulsive purchases due to their ease of use and lack of stringent eligibility requirements. Debit card EMIs are the least used due to limited availability and awareness, reflecting a product still in its early stages in India. Overall, the analysis shows that youth prefer flexible, accessible, and low-barrier instruments, with fintech-driven BNPL and finance company cards gradually challenging the dominance of traditional credit cards.

Table 3: Credit Awareness

Question	Response Options	Frequency	Percentage
Awareness of Instalment/BNPL Schemes	Yes	90	90%
	No	10	10%
Source of Awareness	Friends	25	25%
	Social Media	40	40%
	Retailers	20	20%
	Advertisements	15	15%

An overwhelming 90% of respondents are aware of instalment credit and BNPL schemes, reflecting their widespread penetration among youth. Social media (40%) emerged as the leading source of awareness, followed by friends (25%), retailers (20%), and advertisements (15%). This shows that digital platforms play a crucial role in promoting instalment credit schemes, especially fintech-driven BNPL models. Peer influence is also noteworthy, indicating that word-of-mouth significantly drives adoption among young consumers.

The findings highlight the success of marketing strategies by credit providers and retailers in reaching young audiences through digital media. This also reflects the increasing financial literacy among youth in terms of credit facilities, although awareness does not always translate into responsible usage.

Table 4: Purchase Behaviour

Question	Options	Frequency	Percentage
Frequency of Online Purchases	Rarely	15	15%
	Sometimes	55	55%
	Often	30	30%
Preference for Instalments over One-time Pay	Strongly Agree	28	28%
	Agree	42	42%
	Neutral	20	20%
	Disagree	7	7%
Product Categories Bought on Instalments	Strongly Disagree	3	3%
	Electronics	50	50%
	Fashion	30	30%
	Gadgets	15	15%
	Others	5	5%

The analysis of purchase behaviour reveals that 55% of respondents sometimes make online purchases using instalment credit, while 30% do so often, showing that instalment-based transactions are a regular feature in youth consumption.

Electronics (50%) and fashion (30%) dominate instalment purchases, highlighting a preference for high-value and lifestyle-related items. Importantly, 70% of respondents either strongly agree or agree that they prefer instalments over one-time payments, reinforcing the growing reliance on credit for managing affordability.

This indicates that instalment credit is not only enabling youth to afford expensive products but also influencing their consumption priorities towards aspirational goods. The results suggest that instalment facilities are a key driver of youth purchase behaviour in both planned and unplanned shopping contexts.

Table 5: Impulsive Buying

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Instalment schemes make me buy more than planned	22%	45%	20%	10%	3%
I often purchase high-value items without prior planning if an instalment plan is available	25%	40%	18%	12%	5%

The responses clearly point to the role of instalment credit in stimulating impulsive purchases. Around 67% of respondents agree or strongly agree that instalment schemes make them buy more than planned, while a similar proportion admit to purchasing high-value items without prior planning if instalment options are available. This highlights the psychological impact of spreading payments over time, which reduces the perceived financial burden and encourages spontaneous consumption.

The findings indicate that instalment schemes are reshaping traditional buying behaviour from cautious spending to instant gratification, especially in categories like fashion and electronics. Such impulsivity, while beneficial to retailers and credit providers, may raise concerns about financial discipline among youth.

Table 6: Perception & Attitude

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Instalment credit makes purchases more affordable	30%	50%	15%	3%	2%
Instalment schemes lead to financial stress later	15%	25%	25%	20%	15%
Overall satisfaction with instalment schemes	20% (Very Satisfied)	50% (Satisfied)	20% (Neutral)	7% (Dissatisfied)	3% (Very Dissatisfied)

The perception analysis reveals a positive view of instalment schemes, with 80% of respondents agreeing that instalment credit makes purchases more affordable. However, around 40% acknowledge that it may lead to financial stress later, suggesting a dual perception: instalment credit is seen as enabling but also potentially risky. Satisfaction levels are high, with 70% reporting being either satisfied or very satisfied, reflecting the youth's favourable experience with credit facilities.

This dual perception indicates that while instalment credit is empowering youth to achieve aspirational consumption, there is also awareness of the long-term financial risks associated with overdependence on such schemes. It highlights the need for responsible credit practices and financial education among young consumers.

Regression Model

Model:

$$Y=a+bX+e$$

Where:

- **Y = Impulsive Buying Behaviour score** (measured from questionnaire Likert-scale responses)
- **X = Instalment Credit Usage score** (frequency of using credit instruments like BNPL, credit cards, etc.)
- **a = Constant, b = Regression Coefficient, e = Error term**

Results

Table 7: Model Summary

Model Summary	Value
R (Correlation Coefficient)	0.62
R ² (Coefficient of Determination)	0.384
Adjusted R ²	0.372
Std. Error of Estimate	0.475

Table 8: ANOVA

ANOVA (Model Significance)	Value
F-statistic	59.21
Significance (p-value)	0.000 (<0.05)

Table 9: Coefficients

Coefficients	B (Unstandardized)	Beta (Standardized)	t-value	Sig. (p-value)
Constant (a)	1.25	–	4.10	0.000
Credit Usage (X)	0.58	0.62	7.70	0.000

The regression analysis reveals a clear and meaningful relationship between instalment credit usage and impulsive buying behaviour among youth. The correlation value ($R = 0.62$) points to a moderately strong positive association, indicating that as the use of instalment credit increases, impulsive purchasing tendencies also rise. This relationship is further reinforced by the coefficient of determination ($R^2 = 0.384$), which suggests that approximately 38.4% of the variation in impulsive buying can be directly explained by the extent of instalment credit usage. The regression coefficient ($b = 0.58$, $p < 0.05$) provides additional evidence of this influence, showing that for every unit increase in credit usage, impulsive buying is likely to increase by 0.58 units on the Likert scale, highlighting the practical significance of the finding. Moreover, the overall model demonstrates strong statistical validity, with an F-value of 59.21 ($p < 0.05$), confirming that instalment credit usage is not only positively associated with but also a reliable predictor of impulsive buying behaviour. This underscores the idea that easy access to credit facilities has a substantial impact on shaping spending habits, encouraging impulsivity, and potentially influencing financial decision-making patterns among young consumers.

Conclusion

The present study investigates the influence of instalment credit on the purchase behaviour of youth in Kannur district, Kerala, with a particular focus on impulsive buying tendencies. The findings clearly indicate that easy access to credit facilities, such as credit card EMIs, Buy Now Pay Later (BNPL) apps, and finance company cards like Bajaj Finance, has a substantial impact on both planned and unplanned purchases among young consumers. Demographic analysis shows that the majority of users are young males between the ages of 18–25, with undergraduates forming the largest segment, highlighting that instalment credit schemes are especially attractive to students and early-career professionals seeking high-value goods within their limited budgets. The analysis of credit awareness demonstrates that social media and peer influence play a key role in informing youth about available credit options, while most of the respondents report using these instruments to purchase electronics, fashion, and other lifestyle products. Importantly, impulsive buying analysis reveals that a significant portion of youth engage in unplanned purchases when instalment options are available, suggesting that credit accessibility reduces the perceived financial burden and encourages immediate gratification. This is further supported by the regression analysis, which indicates a moderately strong positive relationship between credit usage and impulsive buying behaviour, with instalment credit explaining approximately 38% of the variance in impulsive purchases.

Perception and attitude data indicate that while young consumers view instalment credit as a convenient and affordable option, they are also aware of potential financial stress if overused. The instruments analysis shows that Bajaj Finance cards and credit card EMIs dominate high-value purchases, whereas BNPL apps are preferred for smaller-ticket impulsive purchases, and debit card EMIs have limited adoption due to restricted availability.

Overall, the study highlights the dual role of instalment credit in empowering youth to achieve aspirational consumption while simultaneously fostering impulsive buying behaviour. These findings have important implications for marketers, financial institutions, and policymakers. Marketers can leverage instalment schemes to attract youth consumers, while financial institutions should focus on offering responsible credit options with clear terms. Policymakers and educators should also promote financial literacy programs to ensure that youth can manage credit responsibly and avoid long-term debt issues. The study contributes to the literature on consumer behaviour by demonstrating the significant influence of credit accessibility on youth purchasing patterns and provides a foundation for future research on credit-induced impulsivity and financial decision-making among young consumers.

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References

1. Chatterjee, P., & Rose, R. L. (2012). Do payment mechanisms change the way consumers perceive products? *Journal of Consumer Research*, 38(6), 1129–1139. <https://doi.org/10.1086/661730>
2. Feinberg, R. A. (1986). Credit cards as spending facilitating stimuli: A conditioning interpretation. *Journal of Consumer Research*, 13(3), 348. <https://doi.org/10.1086/209074>
3. Gabler, C., & Reynolds, K. (2013). Buy now or buy later: The effects of scarcity and discounts on purchase decisions. *Journal of Marketing Theory and Practice*, 21(4), 441–456. <https://doi.org/10.2753/MTP1069-6679210407>
4. Guttman-Kenney, B., Firth, C., & Gathergood, J. (2023). Buy now, pay later (BNPL) ...on your credit card. *Journal of Behavioral and Experimental Finance*, 37, 100788. <https://doi.org/10.1016/j.jbef.2023.100788>

5. Ikmal, H., Poon, K., Peng, Y., Cheng, A. Y., Loy, C. K., & Hansaram, S. K. (2025). The Impact of Buy Now, Pay Later Services on the Impulsive Buying Behavior of Generation Z in Shah Alam, Malaysia. *International Journal of Research and Innovation in Social Science (IJRISS)*, 9(9), 9349–9369. <https://doi.org/10.47772/IJRISS>
6. Jamshid VP, & Hamamali EK. (2025). The Influence of EMI Payment Options on Consumer Spending Behaviour: A Study in Kozhikode District, Kerala. *International Journal of Innovative Research in Technology IJIRT*, 11(12), 3893–3898.
7. Johnson, D., Rodwell, J., & Hendry, T. (2021). Analyzing the impacts of financial services regulation to make the case that buy now-pay-later regulation is failing. *Sustainability*, 13(4), 1992. <https://doi.org/10.3390/su13041992>
8. Kamleitner, B., & Erki, B. (2013). Payment method and perceptions of ownership. *Marketing Letters*, 24, 57–69. <https://doi.org/10.1007/s11002-012-9203-4>
9. Khan, M., & Haque, S. (2020). Impact of Buy Now Pay Later mechanism through installment payment facility and credit card usage on the impulsive purchase decision of consumers: Evidence from Dhaka City. *Southeast University Journal of Arts and Social Sciences*, 3(1).
10. Keil, J., & Burg, V. (2023). “Buy Now, Pay Later” and impulse shopping. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4629415>
11. Kumar, A., Salo, J., & Bezawada, R. (2024). The effects of buy now, pay later (BNPL) on customers’ online purchase behavior. *Journal of Retailing*, 100(4), 602–617. <https://doi.org/10.1016/j.jretai.2024.09.004>
12. Kusmalinda, T. (2025). Systematic literature review: Consumer behavior in the use of credit cards and pay later payment systems. *Jurnal Impresi Indonesia*, 4, 1038–1051. <https://doi.org/10.58344/jii.v4i1.6194>
13. Richins, M. L. (2011). Materialism, transformation expectations, and spending: Implications for credit use. *Journal of Public Policy and Marketing*, 30(2), 141–156. <https://doi.org/10.1509/jppm.30.2.141>
14. Susanto, D., Apriza, M. W., & Muthiarsih, T. (2024). Usage of buy now pay later, hedonic motivation, and impulse buying among Gen Z in e-commerce Shopee. *Asian Journal of Management Entrepreneurship and Social Science*, 4(2), 1377–1392.
15. Wilcox, K., Block, L. G., & Eisenstein, E. M. (2011). Leave home without it? The effects of credit card debt and available credit on spending. *Journal of Marketing Research*, 48(Special Issue), S78–S90. <https://doi.org/10.1509/jmkr.48.SPL.S78>

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