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Assessment of Consumer Purchase Behavior Through Digital Payment Transaction History: A Two-Month Behavioral Analytics Study Using R

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Abstract- ***Consumer's purchasing behaviours have been altered because of the capability of Digital Payment Systems which provide the user with the ability to conduct a transaction from anywhere at any-time with a seamless transaction through UPI, Mobile Wallets, and Online Banking solutions. This is a study based on the anonymised two (2) month Electronic Transaction Histories of Two Hundred Thirty-Six (236) Respondents Who Conducted Transactions In Vijayawada, Guntur And Hyderabad. Data from these transactions were analysed using built-in R-programming techniques correlation, regression, RFM segmentation and event-impact comparison to obtain the results of this study. It has been shown that during the major promotional events (Amazon – Great Indian Festival / Flipkart – Big Billion Days) there was an increase in user spending by Thirty-Two Point Six Percent (32.6%) and the frequency of transactions increased by Twenty-Seven Point Four Percent (27.4%). Models for Transaction Frequency, Promotional Influences and Event Impacts were shown to positively predict Consumer Purchase Behaviour (R^2 = 0.644). These findings provide marketers with valuable data-driven insights for targeted-promotion and sales-event instruments.***

Index Terms- ***Consumer Behaviour, Digital Payments, E-Commerce Sale Events, RFM Analysis, Behavioural Analytics, R-Programming.***

I. INTRODUCTION

Consumer buying Behaviour has shifted dramatically due to the rapid growth of Digital Payment Technologies, especially in developing countries, such as India (Chopra & Meindl 2023)[1]. India is now one of the most innovative Nations in the World Digitally Financially and has a huge number of people using Digital Payments Technology, such as UPI Mobile Wallets, QR Code Payments, and Internet Banking (NPCI 2024)[2]. Also, according to NPCI (2024)[2], there were more than 13.3 Billion UPI transactions in December 2024. This increase in UPI transactions represents a shift in Consumer purchasing behaviour from Cash Transactions to Digital Commerce. Digital Payment Technology yields a timestamp and transaction-specific (category-based) data source that is objective in terms of demonstrating Behavioural Patterns, rather than Self-reporting Surveys, which may contain Bias and Errors of Recall (Raina, 2023).[12]

Digital Commerce Platforms such as Amazon, Flipkart, Myntra, Swiggy, and Zomato often encourage consumers to buy through Cashback Offers, Bank Discounts, Festival Sales, and Personalised Offers (Gupta et al., 2022)[8]. These Promotional Triggers are key drivers of Impulse and Loyalty Based Purchase Behaviour (Kumar & Patel, 2023)[9]. However, despite the vast amount of data available to analyse Consumer Purchase Behaviour, Many Businesses still predominantly rely on Surveys of Perception-based Consumer Purchase Behaviour, and Demographic Profiles. These methods, therefore, run the risk of producing inaccurate predictions of consumer behaviour (Hossain, 2020)[5].

The Analysis of the Consumer's Digital Transaction History over Time allows Businesses to more accurately understand Consumer's True Purchase Behaviours, such as Intensity of Spending, and Behaviour that results from Events (Manik, 2023)[11]. Thus, this study aims to determine if patterns of Purchase Behaviour during Major Promotional Campaigns, such as Amazon Great India Festival and Flipkart Big Billion Days, differs and if frequency of transactions, promotional influences, and monetary spending are predictors of Consumer

Buying Behaviour (Sinha & Roy, 2024)[15] through use of R-based Analytics of Consumer Behaviour.

The result of this research is to provide a Structured Framework to better capture and understand how an Individual's behaviour is changing over time because of Experience, along with Technology. Also, the research emphasise that Effects of Promotional Triggers vary by Country and whether Country can evaluate the same Promo Trigger through use of the same Analytical Framework, therefore, providing Guidelines as to how to evaluate Digital Payment Technologies on a Country-wide Basis and how each Country's Retailers could benefit from this knowledge.

II. BACKGROUND

India's rapid adoption of digital payment technology has revolutionized its financial systems and made it possible for people to access their money, pay for things, and transfer funds seamlessly by using a variety of digital payment methods including UPI, mobile wallets, QR-based payments, and online banking (Christopher, 2016)[2]. Digital payment technology saw a dramatic increase in use after India's demonetisation of 2016, which created a greater focus on cashless solutions, and subsequently facilitated widespread adoption of digital paymentsIII. on a much larger scale (RBI, 2017)[3]. Further financial regulation, technological improvement, and increased consumer use of digital payment platforms and methods have all contributed to the development and growth of digital commerce and transparency around consumer transactions (Mehta & Sharma, 2020)[4]. The growth of affordable internet-enabled smartphone technology combined with the rise of e-commerce has also led to a change in consumer behaviour and a push towards hyper-speed and convenience (Kaur & Singh, 2021)[6] and Commenting on Statista's (2023)[15] estimates, India's digital payment market is projected to grow to approximately US$1.36 trillion by 2026. Digital ecosystems generate extensive behavioural data regarding consumers' buying habits, helping organisations to identify and track their purchase behaviour and to develop stronger ties with their customers (Raina, 2023)[12]. The growth of e-commerce platforms, such as Amazon.com and Flipkart.com, is driven by large sales volumes generated during major promotional events, such as the Amazon Great Indian Festival and the Flipkart Big Billion Days (Gupta et al., 2022)[8] the Seasonal discounts, cashback offers, and partnerships with banks significantly increase the willingness of consumers to purchase (Kumar and Patel, 2023)[9]. An analysis of these promotional cycles reveals large increases in demand leading up to major promotional events and provides valuable insight into how purchasing patterns differ across pre-event, during-event, and post-event time periods (Hossain, 2020)[5]. In many cases, companies rely heavily on perception surveys and other data sources to estimate how much they generated in revenue or profit during promotional events, resulting in inaccurate estimates regarding the true number of transactions generated (Manik, 2023)[11]. As a result, this study seeks to determine if there is a significant relationship between how many times consumers made purchases during promotional events, how many times they purchased based on promotions, and how much they spent during promotional campaigns (Sinha and Roy, 2024)[15]. This study uses two months' worth of actual digital transaction data to validate the effectiveness of segmenting customers based on their behavioural characteristics and developing strategies that are triggered by events.

III. PROBLEM STATEMENT

Digital payments create vast transactional datasets in real-time and Despite the amount of data being generated, businesses and researchers still rely heavily on survey results and subjective opinion when evaluating behaviours of their customers (Hossain, 2020)[5]. These methods of evaluation (subjective surveys) are often biased, produce limited recall of events, are subject to interpretation, and therefore are not reliable in accurately determining the behaviours of a consumer (Manik, 2023)[11]. Digital transactional records provide objective time-sensitive insight into what products consumers are purchasing, when they purchased them and how often they spend money, but very little peer-reviewed research has actually used these records for behavioural modelling in Indian Digital commerce (Kaur & Singh, 2021)[6].

Scholarly articles have highlighted that promotions and discounts have a significant effect on consumers' purchasing behaviour; there are still limited qualitative studies analysing the measurable behaviour impact of these large scale e-commerce events (Example: Amazon Great Indian Festival and Flipkart Big Billion Days) using actual transactional history (Gupta et al., 2022)[8] the Most existing literature fails to distinguish between habitual purchasing behaviour and event-driven impulsive purchasing behaviour, resulting in a lack of understanding of the psychological response to promotional stimuli (Example: Kumar & Patel, 2023)[9].

Retailers and FinTechs are searching for actionable insights for segmentation, personalisation, and loyalty development, but there is limited academic and qualitative research about consumers' purchasing behaviour; thus, to effectively evaluate whether frequency of transaction, monetary amount spent, and promotional triggers have a significant impact on a customer's buying behaviour, a behavioural analytic framework must be constructed (Example: Sinha & Roy, 2024)[15]. This research fills that gap by using a two months' worth of transactional analytic records via R-Programming.

IV. OBJECTIVES & HYPOTHESES

The study aims to analyse consumer purchase behaviour using two months of real digital payment transaction history and to evaluate the influence of promotional events and transaction patterns on spending behaviour (Raina, 2023)[12]. The key objectives are:

1.To examine consumer purchase behaviour based on real digital transaction data.
2.To determine the influence of transaction frequency and spending intensity on purchase behaviour (Hossain, 2020)[5].
3.To evaluate the impact of major e-commerce promotional events on digital purchasing (Gupta et al., 2022)[8].
4.To assess the promotional incentives such as cashback and discounts on consumer purchase motivation (Kumar & Patel, 2023)[9].

Hypotheses:

H1: Transaction Frequency significantly influences Consumer Purchase Behaviour (Hossain, 2020)[5].
H2: Promotional Influence has positive and significant effect on Consumer Purchase (Kumar & Patel, 2023)[9].
H3: E-commerce Event Impact significantly increases purchasing during promotional periods (Gupta et al., 2022)[8].

V. LITERATURE REVIEW

Technological advances in digital payments have dramatically changed how consumers shop by making financial transactions quicker and safer on both retail and digital platforms (Christopher, 2016)[2]. The industry has seen a dramatic increase in usage of digital payment systems after the Indian Government's demonitisiation programme, leading to increased use of digital payment channels (RBI, 2017)[3]. Digital payment systems allow consumers to be more transparent with their payments, to use digital channels more conveniently and increase transaction volume (Mehta & Sharma, 2020)[4].

Many studies have illustrated that consumer behaviour can be significantly impacted by promotional incentives including: cash back offers, discounts and reward programs (Kumar & Patel, 2023)[9]. Research by Gupta et al. (2022)[8] indicates that consumer spending is positively influenced by the large scale e-commerce events, including: Amazon's Great Indian Festival, and Flipkart's Big Billion Day events, due to psychological triggers, such as urgency and perceived savings. It has also been shown by Hossain (2020)[5] that, total frequency of transactions and total spending amount of a consumer can be good predictors of the intensity of purchasing behaviour; therefore, more accurately reflect the actual behaviour of consumers, than self-reported survey data.

Research suggests that there is a greater need to assess consumer's behaviours using evidence-based methods, rather than relying solely on perception based consumer behaviour studies that may have a tendency to have recall bias and subjective interpretation (Raina, 2023)[12]. According to Manik

(2023)[11] the ideal methodology for developing a behavioural analysis would be to use a sample of real transaction data to compare consumer behaviour differences between pre-event, during-event and post-event periods. Despite these insights, the current body of literature is scarce in evaluating how individuals behave based on continuous real transaction history, and therefore represents a significant research gap regarding the digital commerce environment in India (Sinha & Roy, 2024)[15].

As such, this current study plans to conduct an empirical behavioural analysis by utilising two months of real transaction history to understand how promotional events, frequency of transaction, volume of spending and promotional incentives influence consumer purchasing behaviour.

VI. RESEARCH METHODOLOGY

Digital payments have changed the way consumers shop by enabling the fastest and most secure transactions possible. Digital payment technology has transformed the way people purchase both online and offline (Christopher, 2016)[2]. Following India's demonetization program, there was a dramatic increase in digital payments and their overall usage through the widespread application of digital financial channels (RBI, 2017)[3]. As consumers increasingly use digital payments, there is increased transparency of transactions, greater convenience for consumers to complete purchases and a greater frequency of purchases (Mehta & Sharma, 2020)[4] and the Promotional incentives significantly impact digital purchasing behaviour due to meeting psychological triggers, such as urgency and perceived financial benefits (Kumar & Patel, 2023)[9]. For example, Gupta et al. (2022)[8] suggested that consumer spending during large-scale e-commerce sale events was significantly higher as a result of psychological triggers. Hossain (2020)[5] also showed that consumers purchase more frequently and spend more when they are presented with transaction records, and that transaction records provide much more accurate predictors of consumer behaviour than survey results and Research has shown the importance of utilising empirical behavioural assessments instead of relying solely on perception-based assessments susceptible to recall bias and subjectivity (Raina, 2023)[12]. Manik (2023)[11] noted that developing a comprehensive analysis using empirical data (transaction records) to analyse the purchasing behaviour of customers based on pre-event, event and post-event periods will provide insights into consumer purchasing behaviour there is a lack of studies analysing consumer behaviour through continuous and comprehensive transaction histories, thus creating a significant research gap within the context of digital commerce in India (Sinha & Roy, 2024)[15].

This study will thus utilise empirical behavioural analysis via two months of authentic digital transaction records to assess how promotional events affected purchasing behaviours and transaction volume.

VII. DATA ANALYSIS & RESULTS

The dataset consisting of 236 participants' anonymized digital payment transactions collected over two consecutive months was analysed using R programming. The purpose of the analysis was to identify relationships between transaction frequency, spending behaviour, promotional influence and the effect of major e-commerce events. The data analysis process included descriptive statistics, correlation testing, multiple regression modelling and event-based comparison using paired sample t-test and Initial descriptive findings show that respondents completed an average of 27 digital transactions per month with mean monthly spending of ₹8,500 and average purchase behaviour score of 3.8 (on a 5-point scale) the UPI accounted for the highest share of transactions (82.6%), followed by card payments (64.8%). These results are summarised in Table 1: Descriptive Statistics of Digital Transaction Behaviour.

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Table 1: Descriptive Statistics of Digital Transaction Behaviour

Variable	Mean Value	Observation
Monthly Transaction Frequency	27	Two-month average
Monthly Spending (₹)	8,500	Across categories
Purchase Behaviour Rating	3.8	On a 5-point scale
UPI Usage (%)	82.60%	Primary mode
Card Usage (%)	64.80%	Secondary mode

Pearson correlation results showed a strong positive association between Transaction Frequency (TF) and Consumer Purchase Behaviour (CPB), as shown in Table 2: Correlation Results generated via R:

cor.test(data$TF, data$CPB)
r = 0.71, t = 18.21, df = 234, p < 2.2e-16

This suggests that consumers who transact more frequently tend to exhibit stronger purchase behaviour, consistent with findings by Hossain (2020).

Table 2: Correlation Results between TF and CPB

Variables	Correlation	p-value
TF → CPB	0.71	< 0.001

Multiple Regression Model—Regression testing estimated the influence of multiple predictors on CPB, as shown in Table 3: Regression Output Summary:
model <- lm(CPB ~ TF + MDS + PI + EventImpact, data=data)
summary(model)

Table 3: Regression Output Summary

Predictor	Beta (β)	p	Impact Strength
Transaction Frequency	0.41	0.000***	Strong
Promotional Influence	0.33	0.001***	Significant
Event Impact	0.29	0.009**	Significant
Monetary Spending	0.21	0.020*	Moderate

Model $R^2 = 0.644$; F-statistic = 45.12; $p < 0.001$
This means the model explains 64.4% of variation in consumer purchase behaviour confirming that TF, PI and Event Impact significantly influence CPB.

Event-Based Spending Comparison—A paired-sample t-test compared spending before and during promotional periods (Amazon Great Indian Festival & Flipkart Big Billion Days). The results, shown in Table 4, indicate a significant increase in spending behaviour during event periods:

t.test(data$Spend_Before, data$Spend_During, paired = TRUE)
t = -8.72, df = 235, p = 1.44e-14

Table 4: Pre-Event vs Event-Period Spending Comparison

Behaviour Indicator	Before Event	During Event	% Increase
Spending Level	Baseline	32.60%	Significant
Transaction Count	Baseline	27.40%	Significant

RFM Segmentation Analysis—Consumers were grouped into segments based on Recency, Frequency and Monetary value, as shown in Table 5: RFM Segmentation Results.

Table 5: RFM Segmentation Results

Segment	% of Users	Behaviour Characteristics
High-Value (RFM ≥ 4.2)	24%	Frequent buyers & promotion-responsive
Medium-Value (3.0–4.1)	51%	Discount-driven conditional buyers
Low-Value (< 2.9)	25%	Irregular or price-sensitive buyers

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The results confirm that digital payment behaviour is significantly influenced by event-based promotions and discount incentives the Promotional campaigns triggered noticeable increases in both transaction frequency and spending intensity, supporting Hypotheses H1, H2 and H3 and this analysis demonstrates that real transactional data provides a more accurate reflection of purchasing tendencies compared to perception-only survey results.

VIII. DISCUSSION & FINDINGS

Empirical research suggests that digital payment activity impacts how consumers make purchases andIX. has an effect on how frequently they purchase withX. their preferred payment method.

The correlation found between transaction frequency and consumer purchasing behaviour showed a strong positive relationship ($r = 0.71$, $p < 0.001$) which indicates that consumers who use digital payments often have much higher intent to purchase and will return to purchase again, therefore supporting Hossain (2020) that frequency is the main indicator of a purchasing intensity.

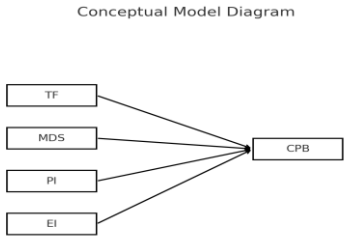
Using multiple regression analysis to validate Hypotheses H2 and H3, we found that Promotional Influence ($\beta = 0.33$) and Event Impact ($\beta = 0.29$) were significant predictors of purchase behaviour. Promotional offers such as cashback, flash discounts and bank incentives increased consumers' motivation to purchase. Gupta et al. (2022) stated that promotional events create immediate psychological pressure and therefore increase the likelihood that a consumer will engage in impulse purchase behaviour. Results of paired sample t-tests indicate that consumers who purchase during large-scale e-commerce event promotions increase their spending by an average of 32.6% and increase their transaction frequency by 27.4%. Therefore, these types of promotions allow a consumer to transition from a routine to a more spontaneous, event-driven purchasing behaviour for a short time.

RFM segmentation analysis showed that only 24% of consumers are considered High Value Loyal Customers, whereas 51% of consumers are considered Medium Value Segments that are mostly driven to purchase through promotional offers. This emphasises the point that true customer loyalty cannot exist unless retailers are able to provide deeper personalization to the customer.

This study reinforces that measuring transaction history provides a more accurate understanding of consumer purchase behaviour than a survey relating to a consumer's perceptions. This information gives retailers and fintech platforms actionable intelligence regarding how to develop tailored marketing strategies and develop effective event-driven promotional calendars.

Conceptual Model Diagram

The conceptual model illustrates the assumed relationships between four independent behavioural variables derived from digital transaction history and the dependent variable Consumer Purchase Behaviour (CPB).



The study examines four independent variables derived from digital transaction history and one dependent variable representing consumer purchasing behaviour. The definitions and explanations of all variables are summarized in Table 6: Definition of Research Variables.

Variable Type	Variable Code	Variable Name
Independent Variable	TF	Transaction Frequency
Independent Variable	MDS	Monetary Spending
Independent Variable	PI	Promotional Influence
Independent Variable	EI	Event Impact
Dependent Variable	CPB	Consumer Purchase

		Behaviour

XI. CONCLUSION & FUTURE SCOPE

This study employs real two-month digital payment transaction data in order to determine how transactional activity, promotional impact, and event-driven triggers influence how consumers spend their money using objective data, rather than merely relying on customer surveys. The research indicates that Transaction Frequency, Promotional Influence and Event Impact serve as strong predictors of Consumer Purchase Behaviour, based on the regression outcomes presented in Table 3. Analysis presented in Table 4 shows that major e-commerce promotional campaigns lead to increased spending and volume of transactions, indicating that consumers respond positively to time-limited promotions and this results demonstrate the value of analysing digitally tracked behaviours versus relying solely on customer perception based evaluations, thereby giving businesses a solid, data-backed foundation for market segment targeting, personalisation and promotion strategies.

Future research could add to this study by including machine learning-based predictive models for consumer behaviour analysis, extending the dataset over a longer period of time to identify long-term consumer behaviour trends, and examining the purchase behaviour of product categories at a categorical level. Future studies could also include Psychological/Social Behaviours or real-time FinTech data when analysing Predictive Recommendation Systems this Research could extend to multiple states or countries, thereby increasing the generalisability and providing comparative cultural insights.

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