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# Trend and Growth Rate Analysis of Unified Payment Interface (UPI)

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#### ABSTRACT

The Unified payment Interface (UPI) system was launched in India in April 2016 as a digital Payment system. Among the various digital payment modes, UPI has gained significant importance in the evolving world of digital payments in India. UPI provides a platform that simplifies online payment processes, and its widespread adoption can be observed through the volume and value of transactions completed using UPI. The main purpose of this study is to assess the performance of UPI in the current digital payment landscape of the Indian economy by analysing the trends and growth rates of UPI by taking into consideration the volume and value of UPI transactions over time. The study uses secondary data, collected from the official website of the National Payments Corporation of India (NPCI), and reviews existing literature and journal articles related to the study of trends in digital payments. The analysis focuses on transaction data from 2016-17 to 2023-24, covering eight financial years, in order to identify trends, yearly growth rates, fluctuations, and the key reasons behind these changes. The trend and growth patterns are examined using tables, charts, and trend line analysis. The findings reveal an increasing trend in UPI based on both volume and value of UPI transactions, although the growth rate has fluctuated, showing both increases and decreases year by year. This research is valuable for understanding the impact of UPI on the digital payment system in India, and the trend patterns can provide important insights for the government in formulating future policies for the payment system, as well as for other stakeholders.

Key Words: UPI, Trend, Growth, Transactions.

## INTRODUCTION

The "Unified Payment Interface (UPI)" has transformed and gives a new dimension to "Digital Payment" system in India not now but from the time of its inception in April 2016. UPI is a "Real Time Digital Payment System" because it allows or Facilitate the inter-bank transfers from anywhere and anytime without charging any unnecessary transaction fees. It allows the transfer of fund between different bank accounts without needing to share personal sensitive information, as each user is assigned a unique UPI ID. This ID can be used for various transactions such as bill payments, shopping or many more purposes. UPI promotes "financial inclusion" by catering individual from both urban and rural areas and prefers it over other digital payment mode. The rapid growth in UPI transactions - whether person to person, person to merchant and merchant to merchant are the results of several key factors such as increase in use of smart phones, availability of high speed internet connection facility and government initiatives aimed at transforming India into a "Cashless Economy". The present study is conducted to analyse the trend and Growth Pattern of UPI in India, focusing on both the volume and value of transactions. The data required for this analysis is gathered from the official website of National Payments Corporation of India (NPCI). This analysis offers insights into whether UPI transactions are increasing or decreasing helping to provide a clear understanding of the UPI ecosystem. The findings will provide an insight and highlight the positive and negative or we can say opportunities and challenges for different banks, policymakers and stakeholders and also underlining the UPI contribution and its position in "Digital Payment Landscape".

LITERATURE REVIEW- The present study is based on review of various research papers which are explained below:

**Singh and Devi (2024)** analyzed the trend in growth of transactions in various digital payment modes from 2016-17 to 2022-23 with the use of compound annual growth rate and trend line analysis. There is exponential growth

pattern in various digital payment indicators but UPI in its lead role.

Dash et al. (2023) explored the trend of digital payments and mobile banking transactions in India and also analysed the effect of number of ATM deployed by bank on GDP of India. For the purpose of studied the effect on GDP authors made a comparison of on-site and off-site ATM. The required data collected from secondary sources and for different objective different statistical tool used such as regression and ANOVA etc. From the analysis it is concluded that digital and mobile banking transactions showing increasing trend from 2014 to 2023 which shows that transaction through cash completely lapsed in coming years because of convenience of digital transactions and banks should use deployment strategy for ATM to increase its usage and to increase GDP of country.

**David and Lusia** (2023) studied the growth and also the trend or pattern of transactions sthrough UPI. Authors also discussed the volume of transactions through UPI. The research study is exploratory in nature and secondary data collected from different official websites. In this paper half yearly data taken from jan 2023 to june 2023 and it is found that there is an increase in number of banks live on UPI and volume and value of transactions are also increasing day by day which shows that there is a tremendous growth in UPI payment over cash system. The collected data analysed through graphs and tables.

**Dhivya** *et al.*(2023) discussed the Uniqueness of UPI system for which author evaluated the present status of Unified Payment Interface on the basis of number of banks live on UPI, volume and value of transactions and its expansion in way of global reach. Author compared the UPI with other digital payment mode and it is determined that UPI expanding at an increasing rate and at the top of different digital payment mode. Author also elaborated the challenges faced through the time of usage of UPI system such as digital illiteracy, poor network connection, no transaction cost charged to maintain its infrastructure etc. but different steps are taken to overcome this issues such as Bharat Net Project, PMGDisha.

**Durwin** *et al.* (2023) discussed the UPI and NFC digital payment mode and their growth pattern in last years and how artificial intelligence powered security system play an important role to overcome the fraud incidents. It is observed from the discussion that artificial intelligence system is powered with many security features and there is a need to establish this type of system timely to do the digital transactions through UPI and NFC in safe mode. **Hiwase and Shirke(2023)** focused on growth of UPI on year to year basis and comparative analysis of two UPI apps phone pe and paytm for the financial year ending on march 2023. The comparison done on the basis of different parameters such as volume and value of transactions, market capitalization of each app. It is obtained from the comparative analysis that both apps are good on the basis of different parameters. But for the continuous growth of UPI new features and options should be provided time to time in these apps.

Pathak (2023) investigated the multiple factors which are contributing in the growth of UPI system in India and then analysed the major factors out of above on the basis of author's point of view. The study is based on previous year studies. Author divided the growth of UPI system on the basis of P2P and P2M in terms of volume and value of transactions. It is found from the above analysis that there are many factors responsible for the growth of UPI such as knowledge about UPI, infrastructure, security, economic to use but many authors pointed out that infrastructure, security and attitude towards UPI followed by convenience and no cost transactions are key factors.

Saritha and pawar (2023) analysed the performance of UPI in terms of number of banks live on UPI, volume and value of transactions during Pre and Post pandemic period. The study is descriptive and analytical in nature and based on mainly secondary data. For the analyses purpose paired t-test and incremental percentage is used. From the statistical analysis it is observed that that there is significant difference in volume, value and no of banks live on UPI in pre and post pandemic period and transaction through UPI is continuously increasing year by year excepting in covid-19 situation.

Vidhya And Sankar(2023) understand the growth pattern of UPI from 2016 to 2022 and consumer perception for UPI on the basis of its differed feature and problem faced. Independent variable are features of UPI, problems in UPI, Volume and value of transactions. Dependent variables are growth and perception for UPI. Primary data collected through the survey method and secondary data used to know growth pattern of UPI. Tables and bar diagrams used for obtaining the results. It is concluded that transaction through UPI continuously increasing and 99 percent respondent are in favour of UPI and maximum are highly satisfied but server down is the main issue faced in transaction through UPI. To make India a digital economy govt should focused to implement DIGITAL INDIA PROGRAMME all over the country.

Parida (2022) evaluated UPI performance and analyse UPI trend during pre and post pandemic period., Value of transaction is independent variable and Dependent Variables are Performance and trend of UPI., Secondary method used and sample of 23 months taken before pandemic and after pandemic period., To achieve the objective trend percentage and incremental percentage & Descriptive statistics used and for testing hypothesis t-test used., There is a boom in the value of transactions after pandemic period and upward trend is found in both these time period., To maintain this upward trend and increment in UPI transactions in future focus should be on maintaining more effective UPI technology with more benefits.

Kumar (2018) Focused on present and future scenario of UPI system in context of number of transactions in a time period and what is the possibility of growth of UPI and how digital empowerment possible through UPI. The

study is based on secondary data collected from RBI AND NPCI SITE. For data analysis different statistics tools are used like regression analysis, moving average method etc. from the above study it is found that in present transaction through upi are less in number but it has a growth pattern in future. The study is only based on secondary data but we can take primary data in future study for getting results.

## **OBJECTIVE OF THE STUDY**

The main purpose or objective of the study is to observe the Performance of UPI in present digital payment system of Indian Economy and to obtain this key objective some sub-objectives are listed below:

- To Study the Trend or Pattern of UPI in India
- To observe the Yearly Growth Rate of UPI

## RESEARCH METHODOLOGY

The research methodology comprises of following sections which are discussed here:

Research Design – The present Research is a quantitative, descriptive cum analytical and longitudinal study. Data Collection method and sources – This study based on secondary data that is collected from the official website of "National Payment Corporation of India (NPCI)". The required data available on monthly basis but it is adjusted on financial year basis (April-March) for present research.

Time Period - The study is based on eight financial years from 2016-17 to 2023-24.

Statistical tools – Tables, different types of Chart and trend line analysis used to study the trend in UPI transactions and growth rate calculation formula to observe yearly growth rate in transactions. R-Squared value or Coefficient of Determination or Goodness of fit measure is also calculated. Different tools are applied through MS-EXCEL.

**Variables used** – The research objectives of the current study are achieved with the help of two variables that are Volume and Value of UPI transactions.

#### Formula for Calculating Growth Rate

Year-over-Year (YoY) Growth Rate =

((Current Year's Volume-Previous Year's Volume)/ Previous Year's Volume)\*100

## DATA ANALYSIS AND INTERPRETATION

• Study Trend of UPI on the basis of "Volume of UPI transactions" – The volume of UPI transactions refers to the number of transactions executed or completed through the UPI system. The transactions can be Person To Person, Person to Merchant and others. The data related to UPI transactions (in millions) for eight financial years (2016-17 to 2023-24) available on official websites of National Payment Corporation of India (NPCI) that is <a href="https://www.npci.org.in/what-we-do/upi/product-statistics.">https://www.npci.org.in/what-we-do/upi/product-statistics.</a>

**Table 1: Year-Wise Volume of UPI Transactions (in millions)** 

Year	Volume of UPI transactions (in millions)
2016-17	17.86
2017-18	904.87
2018-19	5,391.52
2019-20	12,518.61
2020-21	22,330.65
2021-22	45,967.53
2022-23	83,751.14
2023-24	1,31,164.71

Source: Compiled from NPCI Website (UPI product statistics)

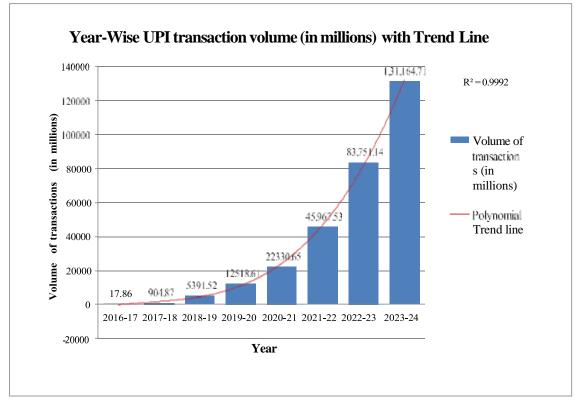


Figure 1: Column Chart with Trend-Line of UPI Transaction Volume

Source: Table 1

**Interpretation of Table 1 and Figure 1**: In the above table first column associated with different years and second column is combined with volume of transactions (in millions) with respect to particular year. The data collected for eight years from 2016-17 to 2023-24. The table shows an increasing trend in volume of UPI transactions over the years.

In the figure 1 the trend of UPI on the basis of Volume of transactions is interpreted. "Column chart" is preferred because this chart effectively compares the values across different years and displays each year "volume of transactions in millions" as a separate column. Different years taken on x-axis means horizontally from 2016-17 to 2023-24 and "Volume of transactions" labelled on Y-axis means in vertical form. It is observed from the above chart that in 2016-17 means in first financial year of UPI existence the volume of transactions is only 17.86 million but in 2017-18 it is 904.87 million, in 2018-19 it is 5,391.52 million, in 2019-20 transaction volume is 12,518.61 million then in 2020-21 it is 22330.65 million, in 2021-22 this increased to 45,967.53 million and in 2022-23 and 2023-24 it is 83,751.14 million and 1,31,164.71 million which shows that volume of transaction increasing year by year. There is modest rise in transaction volume from 2016-17 to 2019-20 but after that there is remarkable rise year after year. In first year volume of transactions is very less due to less awareness between people and different organisations about UPI because it is in introductory stage in country but after 2016-17 the volume of transactions starts increasing and continuously increase that is visible from the increased height of column in subsequent years which show an "Upward Trend" in volume of UPI transactions which shows an exponential increase and it is due to increase in adoption and preference of UPI in India.

**Trend line in Figure 1** – The "Polynomial trend Line" added with column chart to effectively visualise the trend in volume of transactions over the years. The Polynomial Trend line have highest R-Squared value (0.9992) and if  $R^2$  value is between 0.9-1.0 then it denotes the very strong correlation between data and selected trend line. It means the selected trend line is excellent fit to show the trend in present data and it also represents the goodness of fit. The polynomial trend line is a "curved line" in shape. UPI transactions are combined with non-linear growth it is associated with fluctuations and only this trend line would capture this type of data effectively. It also shows "Upward Slope" for volume of UPI transactions.

• Study Trend of UPI on the basis of <u>"Value of UPI transactions"</u> - The value of transactions related to UPI refers to the amount of money transferred through the Unified Payment Interface (UPI) system with in or during a particular period. The data related to value of UPI transactions are available on official websites of National Payment Corporation of India (NPCI) month wise in terms of crores and the website link is

https://www.npci.org.in/what-we-do/upi/product-statistics. In present research it is collected for eight (2016-17 to 2023-24) financial years.

Table 2: Year-wise Value of UPI transactions (in crores)

Table 2: Year-wise Value of UP1 transactions (in crores)		
Year	Value of transactions (in crores)	
2016-17	6952.14	
2017-18	1,09,831.80	
2018-19	8,76,970.72	
2019-20	21,31,730.14	
2020-21	41,03,653.58	
2021-22	84,17,572.48	
2022-23	139,20,675.21	
2023-24	199,86,697.12	

Source: Compiled from NPCI website (UPI Product Statistics)

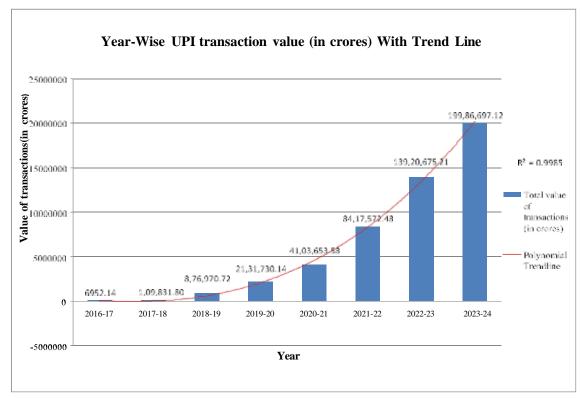


Figure 2: Column Chart with Trend-Line of UPI Transaction Value

Source: Table 2

**Interpretation of Table 2 and Figure 2:** The table 2 combined with the value of UPI transactions (in crores) from 2016-17 to 2023-24 which shows an increasing trend in value of UPI transactions. The "Column chart" is used in figure 2 to show the increase in value of UPI transactions by comparing the values across different years and display each year "value of UPI transaction" in a different column. In 2016-17 means in first financial year of UPI existence the value of transactions is only 6952.14 crore, in 2017-18 the value is 1,09,831.80 crores, in 2018-19 this value is 8,76,970.72 crore, in 2019-20 the value is 21,31,730.14 crore, in 2020 -21 this value reached to 41,03,653.58 crore, in 2021-22 the value is 84,17,572.48 which is approx. double from previous year value, in 2022-23 the value is 139,20,675.21 crore and in 2023-24 this value reached to 199,86,697.12 crore means in each year the value of UPI transactions is increasing tremendously. It is observed from the chart that there is slow increase in transactions value from 2016-17 to 2019-20 due to lack awareness about UPI and Covid-19 outbreak situation but after 2019-20 this value increases tremendously. In 2021-22 it is doubled from previous year which show post covid-19 pandemic effect. It is clearly visible that when value of transaction is increase year by year then height of column in subsequent years is also increased which shows or indicate an "Upward Trend" in value of UPI transactions.

**Trend Line in Figure 2**:The "Polynomial Trend line" added which best fit to the data on the basis of calculated R-Squared value (0.9985) and if  $R^2$  value is between 0.9-1.0 then it denotes the very strong correlation between plotted data and selected trend line. It means the selected trend line is excellent fit to show the trend in data over the different years and termed as "Excellent Trend line Fit". The polynomial trend line touches the data points of each column and shape of this line also show "Increasing Trend" or low to high in value of UPI transactions because the trend line have an "upward slope" which shows an increase of UPI adoption in India. The polynomial trend indicates that the growth is not linear but exponential. This implies that the adoption and use of UPI have accelerated over time. The upward curve suggests that if this trend continues, the transaction volume may grow even more steeply in the future.

## TO OBSERVE THE "YEARLY GROWTH RATE" OF UPI.

Table 3: Year-Wise UPI Transaction Volume Growth (in Percentage)

		Growth (in Tercentage)
Year	Volume of transactions (in millions)	Growth Rate (in percentage)
2016-17	17.86	0.0
2017-18	904.87	4966.5
2018-19	5,391.52	495.8
2019-20	12,518.61	132.2
2020-21	22,330.65	78.4
2021-22	45,967.53	105.8
2022-23	83,751.14	82.2
2023-24	1,31,164.71	56.6

Source: Compiled from NPCI Website (UPI product statistics)

Year-Wise UPI Transaction volume Growth Rate 6000 4966.5 5000 4000 Growth ] 3000 Growth Rate 2000 1000 132.2 105.8 78.4 82.2 56.6 0 2016-17 2017-18 2018-19 2019-20 2020-21 2021-22 2022-23 2023-24 Year

Figure 3: Line Chart of "UPI Transaction Volume" Growth Rate

Source: Table 3

Interpretation of Table 3 and Figure 3 – The growth rate regarding volume of UPI transactions has been calculated year over year (Y-O-Y) basis. In 2016-17 the growth rate was zero due to the introduction period of UPI. The volume of transactions was 17.86 million in 2016-17 which increased to 904.87 million with growth rate of 4966.5 per cent approx.5000 per cent which indicates a tremendous growth in 2017-18 (as shown in table 3 and figure 3). It was a significant year in way of UPI adoption due to the implementation and increase in awareness at extensive level and demonetization (November 2016) also the reason of this increase. However, the volume of transactions in 2018-19 has been increased to 5,391.52 million with a growth rate of 495.8 per cent yet the growth rate was comparatively low as compared to previous year (i.e., 2017-18) and line chart also shows this steep decline in growth rate after the peak in 2017-18 due to the stability in economy post-demonetization and adoption of UPI is highest in 2017-18 and due to it in this year new user acquisition is reduced. In 2019-20 again the volume of UPI transaction increased to 12,518.61 million with a growth rate of 132.2 per cent which was

lower in comparison to 2018-19 when growth rate was 495.8% because now UPI entered in mature phase and growth rate started to stabilize(as show in table and figure). In 2020 -21, growth rate decrease again and now it remains only 78.4% even the volume of UPI transactions was increased in comparison to 2018-19 and reason for this decrease was effect of covid-19 pandemic. In 2021-22, volume of UPI transactions was 45,967.53 million with growth rate of 105.8 % which is slightly more in comparison to previous year (i.e.,2020-21) because of UPI introduced with more new features, post-pandemic increase in digital adoption of UPI by merchant and individual. In 2022-23, the volume of transactions increased over the 2021-22 with growth rate 82.2% but the growth rate is again goes down in comparison to previous year growth rate (i.e., 2021 -22). The same situation of increase in volume of transactions but decrease in growth rate arises in 2023-24 in comparison to 2022-23. The growth rate in 2023-24 was only 56.6 % though growth rate in 2022-23 was 82.2%. The reason of rapid decline in growth rate reflects the situation of market saturation which slows the adoption pattern of UPI among people. After 2019-20 the growth rate is more stable but with decreasing pattern.

Table 4: Year-Wise UPI Transaction Value Growth (in Percentage)

Table 4. Tear	Value of transactions Growth (in Percentage)  Value of transactions		
Year	(in crores)	(in percentage)	
Tear	(in crores)	(in percentage)	
2016-17	6952.14	0	
2017-18	1,09,831.80	1479.83	
2018-19	8,76,970.72	698.47	
2019-20	21,31,730.14	143.08	
2020-21	41,03,653.58	92.50	
2021-22	84,17,572.48	105.12	
2022-23	139,20,675.21	65.38	
2023-24	199,86,697.12	43.58	

Source: Compiled from NPCI Website (UPI product statistics)

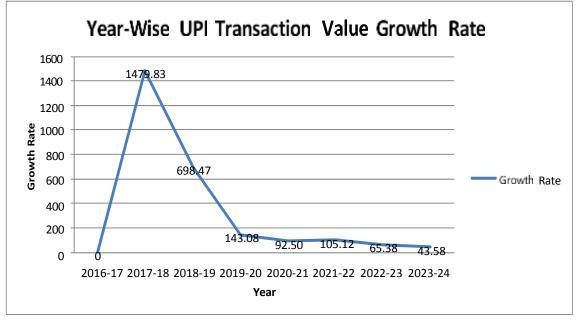


Figure 4: Line Chart of "UPI Transaction Value" Growth Rate

Source: Table 4

**Interpretation of table 4 and Figure 4** – The growth rate from financial year 2016-2017 to 2023-24 calculated on the basis of year over year(Y-O-Y) increase in value of UPI transactions. The value of UPI transactions in 2016-17 was 6952.14 crore with no growth rate due to the introduction year of UPI (as show in table 4 and fig.4). In 2017-18, the value of UPI transactions was 1,09,831.80 crore with growth rate of 1479.83 % which shows an shocking hike or increase in value of UPI transaction in comparison to previous year(i.e., 2016 -17) as it is also visible in figure 4 the direction of line have an upward slope. The reason of this unpredictable growth rate is demonetization and increase in awareness and adoption of UPI at an extended level. The value of UPI transactions in 2018-19 was 8,76,970.72 crores with growth rate of 698.47 as it is visible from table 4 and figure 4 that value of UPI transactions are increasing with decreasing growth rate in comparison to previous year(i.e.,2017-18) and therefore growth rate line in figure 4 goes down dramatically due to less new user of UPI because it have already heavy adoption in 2017-18. In next year 2019-20, the value of UPI transactions was 21,31,730.14 crores with growth rate of 143.08 % which shows again decline in growth rate as compare to 2018-19 the reason for that UPI start to enter in mature stage. The value of UPI transactions in 2020-21 reached to 41,03,653.58 crore and growth rate in this year is 92.50 and both these values have the same pattern as in previous year (i.e 2019-20). The line in figure 4 also shows that growth rate is declined due to effect of Covid-19 outbreak. But in 2021-22, the value of UPI transactions are 84,17,572.48

crore with growth rate of 105.12 in this year value and growth rate of UPI transactions both was in increasing pattern in comparison to the year 2020-21(as shown in table 4 and figure4) and this slight increase in growth rate is due to post-pandemic digital adoption, increase in adoption by merchant, introduced UPI with new features such as UPI auto pay etc. In next two years (i.e. 2022-23 and 2023-24) the value Of UPI transactions was 139,20,675.21 crore and 199,86,697.12 crore and the growth rate was 65.38% and 43.58% (shown in table 4 and figure 4) and in these two years also value of UPI transactions are increasing with growth rate but growth rate was in decreasing rate in comparison to their respective previous year and the reason for this decrease was market reach at its saturation point, stability in consumer behaviour for use of digital payment In figure 4 it is clearly visible that the direction of growth line in downward position.

CONCLUSION AND FINDINGS –The two variables "Volume" and "Value of UPI transactions" are effective parameter or indicator or measure to study or observe the adoption and usage of UPI payment system in India and it also helpful to study the trend and growth pattern of this payment system in our country. It is sought out that transaction through UPI are increasing in previous 8 financial year but with decreasing growth rate is due to some key factors. There is different reason for this pattern of growth rate such as demonetization, early mature stage of UPI, Covid-19 outbreak, saturation of market etc. The growth rate is not stable it is associated with fluctuations over the period. The volume and value of UPI transactions are continuously increasing over the years with growth rate. The reason of increase in transactions can be easy access of internet facility, usage of smartphones at wide level and programme imitated by government and increase in literacy level of people. The growth rate was at its peak in 2017-18, then decrease arise from 2018-19 to 2020-21 and then only in 2021-22 a slight increase in growth rate after post pandemic. In last years (i.e., 2022-23 & 2023-24) the growth rate starts declining again due to

market reach at saturation point. The growth pattern can be predictable in near future on the basis of advancement in technology, adoption of UPI in different sectors and regions and by improving its security system.

**LIMITATIONS** – The research is only based on only two variables that are volume and value to study trend of UPI therefore this number can be increased to get more refine and accurate results.

**SUGGESTIONS** – The UPI system should be launched with new features timely to make stable the growth rate. There should be combine effort of government, retail companies, stakeholders and policy makers to maintain the increase in transactions which is necessary for an increase in growth pattern of UPI.

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