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A STUDY ON UPI TRANSACTIONS IN INDIA

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Original Article

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Abstract

The Unified Payment Interface (UPI) platform has been in use in India since 2016. The main implication of UPI is that it helps people in multiple ways. It is not only supporting financial literacy but also contributing to financial inclusion and the economic development of the poor. Cashless payments have the potential to spur economic growth, and digital payments can have a positive impact on economic growth as they facilitate transactions, reduce costs, and improve efficiency. This study will explore the Unified Payment Interface (UPI) ecosystem in India. It will shed light on the trends and relationships between data usage trends, digital transactions, digital payments, and the number of internet users in India. The study also highlights the usage of UPI during the years 2020, 2021, and 2022. Policymakers can use the findings of this study to frame policy for UPI more effectively in the future.

Keywords: Cashless Payments; Data Usage Trend; Digital Transactions; Digital Payments; Number of Internet Users in India; Unified Payment Interface (UPI) Ecosystem

Introduction

Since the nationalization of banks, financial inclusion has been a challenge for both the Indian government and banks. The availability of banking services for the average person, such as transactions and loans, determines the level of financial inclusion in the nation. The digital revolution in India has been intensified by the affordability of smart phones and high-speed mobile data, which has improved the Indian payment system. The launch of the Unified Payment Interface (UPI) by the National Payment Corporation of India (NPCI) has added to the payment system by providing online real-time payment with UPI interbank transactions and money transfers between two accounts that can be made without the need for a bank account number or IFSC code, making UPI the only app needed for digital payment.

The Reserve Bank of India (RBI) has allowed banks to become PSPs (Payment Service Providers), so mobile wallets are no longer necessary. Demonetization and the COVID-19 pandemic accelerated the adoption of technology for online transactions and digital payment mechanisms. Challenges like poor connectivity and online transactions have been addressed, and the government is planning to use mobile transactions through telecom operators and their established

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centers and Cash Out points for financial inclusion. The government is making every effort to reach out to the youth of the nation and encourage them to participate in mission-mode programs.

In 2015, a call was given for a 'Digital India', enabling technology to reach millions of lives all over the country. The movement that transformed the economic landscape of India is attributed to the success of various start-ups and businesses that forayed into the Indian market with a number of innovative products and services.

The Digital India movement is also one of the primary boosters for the 'Digital Payment' area, which saw the rise of numerous digital payment apps. "Paytm" is considered the pioneer in digital payments in India. Then came "Freecharge," "PhonePe," and various other apps that allowed consumers to use these apps and make payments at a number of merchant establishments and online shopping sites.

The advantage of using these apps was that they allowed users to link multiple credit and debit cards under a single umbrella. They also offered attractive offers and discounts for using their apps.

Consecutively, the idea of making payments directly from your bank account, without the need to carry debit cards, was seen as a lucrative market. Thus, the UPI (Unified Payment Interface) came into existence.

Information and Communication Technology (ICT) has transformed the banking system in large measure from paper-mode to virtual mode, and it has facilitated speedy and secure fund transfers between bank accounts. Moreover, ICT enabled a variety of electronic payment mechanisms, commonly called digital payment services, within which UPI has gained popularity. It is an e-payment system that allows users to perform a variety of financial transactions using a smartphone. Using a Virtual Payment Address (VPA), one can send or receive money on the UPI platform without revealing bank account details. However, to execute UPI payment transactions, users must have a bank account and should get registered on the UPI app. In the case of business entities, a current account is required, just like a Point of Sale (PoS) computer. SBI Pay, Union Bank UPI App, Phonepe, G-Pay, BHIM Axis Pay, and WhatsApp Pay are a few examples of UPI apps. Presently, all the banks and fintech players are operating a unified payment interface service through their respective mobile applications.

UPI's core strengths and growth prospects, as well as space for future research to explore the entire e-payment ecosystem in India, UPI uses existing systems, such as the Immediate Payment Service (IMPS) and the Aadhaar Enabled Payment System (AEPS), to ensure seamless settlement across accounts. It facilitates push (pay) and pull (receive) transactions and even works for over-the-counter or barcode payments, as well as for multiple recurring payments such as utility bills, school fees, and other subscriptions.

Literature Review

How demonetization in India in 2016 played a significant role in promoting financial inclusion in the country [1]. It argues that demonetization led to an increase in the adoption of digital payment methods, including mobile banking and e-wallets. This shift towards digital payments is seen as a positive development for promoting financial inclusion in India, as it has allowed for greater access to banking services and reduced the dependence on cash.

The role of the Unified Payment Interface (UPI) in promoting financial inclusion in India. The author discusses how UPI has revolutionized the payment system in India by enabling easy and instant money transfers through a single mobile application [2]. Despite the challenges, UPI has the potential to bridge the gap between the banked and unbanked population in India, and the government and banks are making efforts to reach out to the youth to participate in the mission mode programs for financial inclusion. Professionals were more inclined to use UPI compared to students and homemakers [3]. The authors suggest that these demographic differences should be taken into account when designing UPI-based services and marketing campaigns to increase adoption and usage.

Role of the National Payment Corporation of India (NPCI) in developing and promoting the UPI platform and opined those millions of users adopting the platform in a natively hurt period of time [4]. There is a significant increase in the usage of mobile payments among the youth, which has resulted in a change in their spending behaviour [5]. They suggest that there is a need for more awareness and education campaigns to promote safe and secure mobile payment usage among youth.

The challenges faced by rural customers in accessing digital banking services in Indian banking systems. The study was conducted in selected villages in the Pune district of Maharashtra state. The authors collected data through a survey of 350 respondents and analysed it using descriptive statistics and factor analysis. [6]. The results revealed that customers faced challenges such as low digital literacy, inadequate access to smart phones and the internet, and a lack of trust in digital banking services.

Impact of the COVID-19 pandemic on the e-payment trajectory in India. The study finds that the pandemic has accelerated the adoption of e-payment methods in India, especially in urban areas, as people are looking for contactless transactions to avoid the spread of the virus [7].

The shoppers are happy with plastic use, and the non-platinum card clients are fascinated to utilize the card for purchases, meaning that utilising the card is not so distant in the future [8]. However, banks and other financial institutions are motivating the use of plastic cards.

The affirming data shows that buyers feel good about spending through plastic cash, as easy access to money, no cash-carrying risks, and reward shopping are the major factors that play an important role behind it [9].

Digital payment using a wallet was highly convenient for consumers to purchase products online without physical movement across places [10].

The use of computerized wallets is rapidly becoming the standard method of online instalment. Customers are embracing advanced wallets at an unfathomably quick pace, to a great extent because of comfort and convenience [11].

In a period of digitalization, the examination intends to contemplate client recognition. Utilization design inclinations and fulfilment level with respect to advanced wallets in view of an investigation of 25 respondents. It additionally recognizes the hindrance and difficulties to the selection of the same [12]. The outcome demonstrates that there is a tremendous undiscovered market for computerized wallets, both regarding expanding mindfulness and its use.

The development of the cashless sex change framework is achieving new milestones. Individuals tend to move to cashless exchanges. It is on the right track to state that the cashless framework is a prerequisite as well as a requirement for the general public [13].

Need for the Study

As our Indian Financial Institutions are growing rapidly in our country, people are using the latest technology for financial transactions. One of the latest technologies is cashless payment. As there are many modes for cashless payments, one of them is UPI (Unified Payment Interface). The UPI enables cardholders to make payments only by scanning the merchant's UPI QR code; they cannot make p2p or peer-to-peer payments. In the peer-to-peer mode of payment, a user can transfer funds from a bank account to another individual's account through a digital medium like the Internet or a mobile device. The study tells us about the frauds and regulatory framework of UPI in India, i.e., observed frauds, as well as the factors that are contributing to the success of UPI in India. This study also helps in measuring the relationship between smartphone user numbers and data usage trends in India.

Objectives of the Study

- To study the Unified Payment Interface (UPI) Eco system in India
- To measure the UPI transactions during the last 8 years (2015-2022),
- To find out the factors contributing to the success of UPI in India
- To measure the correlation between the number of smartphone users in India and data usage trends in India

Scope of the Study

The present study focuses on UPI transactions in terms of the number of transactions per day or per month. The study considers UPI transactions for 8 years (2015–2022). The study considers UPI transactions in India. It will study the relationship between the number of internet users and data usage trends in India using the Karl Pearson method.

Research Methodology

The study is exclusively based on secondary sources of data since it is descriptive and analytical in nature. The secondary source of data is collected from the official website of the NPCI (National Payments Corporation of India) selected for the study.

Limitations of the Study

- This study is limited to UPI transactions in India.
- This study is restricted to only a secondary source of data.
- The study uses only the correlation method.

Regulatory framework of UPI in India

The regulatory framework for UPI is primarily overseen by the Reserve Bank of India (RBI) and the National Payment Corporation of India (NPCI). The RBI has issued guidelines and regulations to ensure the safety and security of UPI transactions, such as mandatory two-factor authentication for any transactions above a certain amount as per the requirement of banks to report any fraudulent transactions.

In addition, the NPCI is responsible for the operations and management of the UPI system and has implemented various measures, such as limiting the number of transactions per day, per hour, and per month, implementing limits on the number of transactions, and regular monitoring and deducting fraud. To counter these frauds, the National Payments Commission of India (NPCI), which operates the UPI, has introduced several security measures. For instance, users are encouraged to set up UPI PINs and to share them with anyone. NPCI also recommended using UPI-enabled mobile apps only from trusted sources and keeping them updated with the latest security patches.

Furthermore, users are advised to be vigilant and not click on suspicious links or respond to unsolicited messages. If a user suspects that their UPI account has been compromised, they should immediately contact their bank and report the incident to the relevant authorities.

Latest Developments

As per the RBI's statement on Development and Regulatory policies-

- This facility allows all inbound travellers visiting India to make local payments using the Unified Payment Interface (UPI) while they are in India.
- The facility began on February 21st, 2023, and is currently available to travellers from G20 countries at selected

international airports in Bangalore, Mumbai, and New Delhi. Eligible travellers will be provided with prepaid payment instrument (PPI) wallets linked to UPI for making payments at merchant outlets.

- Delegates from G20 countries can also use this facility at various meeting venues.
- In the beginning, UPI-linked wallets will be issued by ICICI Bank, ISFC Bank, Pine Labs Private Limited, and Transform International Limited.
- Travellers visiting India can now enjoy the convenience of UPI payment at over five crore merchants across India that accept QR code-based UPI payments.

Factors Contributing to the Success of UPI in India

Following factors contributed to the Success of UPI in India-

- **Government Support**

  The Indian government has been supportive of digital payments and has launched several initiatives to promote digital transactions, including the launch of UPI.

- **Ease of Use**

  UPI is a simple and user-friendly platform that allows users to transfer money without the need for bank account details or IFSC codes. This has made it popular among users, especially those who are less familiar with digital payments.

- **Interoperability**

  UPI is an interoperable platform, which means that users can transfer money between different banks and payment service providers. This has made it more convenient for users and increased its reach.

- **Low Transaction Costs**

  UPI transactions are generally low-cost, making them an attractive option for users who want to avoid high transaction fees.

- **Security**

  UPI uses multi-factor authentication and encryption to ensure the security of transactions, which has helped to build trust among users.

- **Collaboration between Banks and Fintech Companies**

  UPI has been developed through collaboration between banks and fintech companies, which has helped to create a robust and innovative platform.

Results

This section measures the number of Internet users, data usage trend over the period of the last 8 years from 2015 to 2022, and UPI transactions in India over the past 3 years, i.e., 2020, 2021, and 2022.

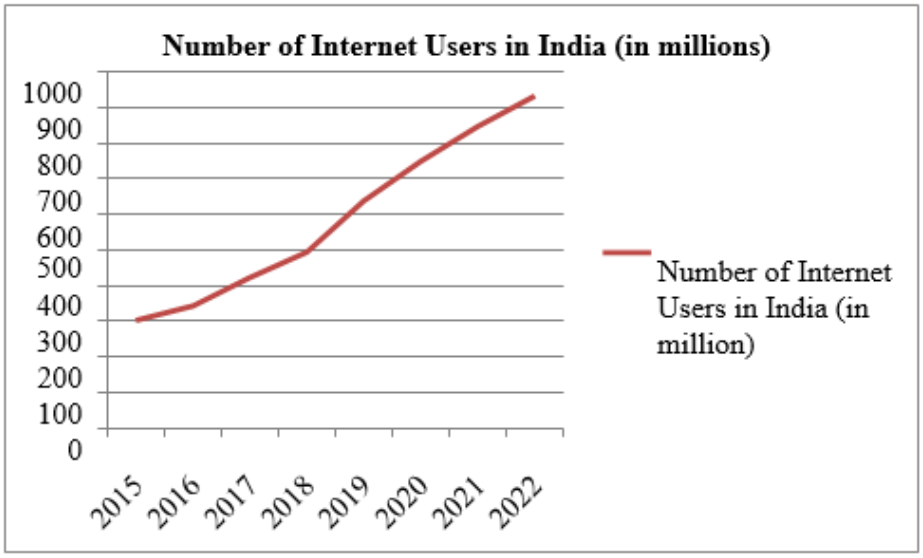
Table 1 and Figure 1 represent the number of internet users in India over the past 8 years, from 2015 to 2022.

Table 1: Number of Internet Users in India and (2015-2022)

Year	Number of Internet Users in India (in millions)	Percentage of Growth
2015	302.36	-
2016	342.65	13.30%
2017	422.2	23.30%
2018	493.96	16.90%
2019	636.73	29.00%
2020	749.07	17.60-%
2021	845.68	12.90%
2022	932.22	10.20%

Source: Collected by author

Figure 1: Number of Internet Users



Interpretation

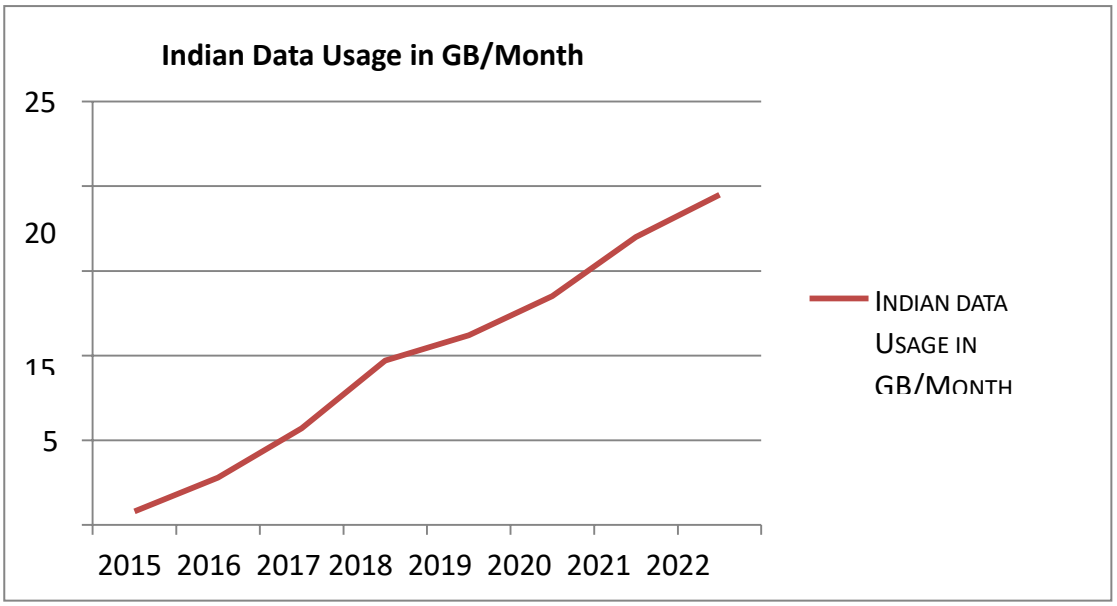
The data collected from the website over the years is about the number of internet users in India. How's an increase in the number of internet users from 302.36 million to 932.22 million from 2015 to 2022? Here, the internet users have increased by 13.30% when compared with the previous year, and if we observe, the internet users have increased more in the year 2019 by 29%. Then, in the next year, it decreased to 17.6%, and in 2022, it declined to 10.20% (see Table 2 and Figure 2 below).

Table 2: Data Usage Trend in India (2015-2022)

Year	Indian data Usage in GB/Month	Percentage of growth
2015	0.8	-
2016	2.8	250%
2017	5.7	103.60%
2018	9.7	70.20%
2019	11.2	15.50%
2020	13.5	20.50%
2021	17	25.90%
2022	19.5	14.70%

Source: Collected by author

Figure 2: Data Usage Trend in India (2015-2022)



Interpretation

The above-collected data is about the data usage trends in India from 2015 to 2022. The data usage trends in India have increased from 0.8 GB/month to 19.5 GB/month. The growth of data usage trends in terms of percentage, when compared with 2015 to 2016, increased by 250%. In 2017, it decreased to 103.60%; over the years, the growth in data usage decreased by 14.70%.

Table 3: Descriptive Statistics

	Mean	**Standard Deviation**	**N**
VAR00001	590.5963	236.44019	8
VAR00002	10.0250	6.63320	8

- VAR00001 defines the number of Internet Users in India.
- VAR00002 defines the Data Usage Trends in India.

Table 4: Correlation

		Number of Internet Users in India	**Data Usage Trend in India**
Number of Internet Users in India	Pearson Correlation	1	0.987
	Sig (2-tailed)		<0.001
	N	8	8
Data Usage Trend in India	Pearson Correlation	0.987	1
	Sig (2-tailed)	<0.001	
	N	8	8

- Correlation is significant at the 0.01 level (2-tailed)

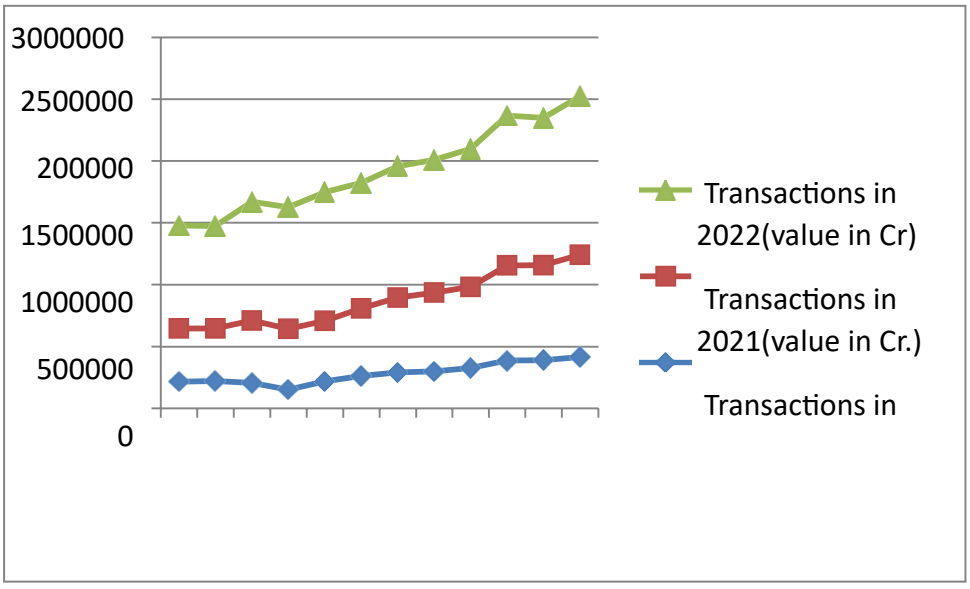
Table 5: Digital Transactions in India during the Year 2020, 2021 & 2022

Months	**Transactions in 2020 (Values in Cr.)**	**Transactions in 2021 (Values in Cr.)**	**Transactions in 2022 (Values in Cr.)**
January	2,16,242.97	4,31,181.89	8,31,993.11
February	2,22,516.95	4,25,062.76	8,26,843.00

March	2,06,462.31	5,04,886.44	9,60,581.66
April	1,51,140.66	4,93,663.68	9,83,302.27
May	2,18,391.60	4,90,638.65	10,41,520
June	2,61,835.00	5,47,373.17	10,14,384
July	2,90,537.86	6,06,281.14	10,62,991
August	2,98,307.61	6,39,116.95	10,72,792.68
September	3,29,027.66	6,54,351.81	11,16,439.09
October	3,86,106.74	7,71,444.9	12,11,582.50
November	3,90,999.15	7,68,436.11	11,90,593.39
December	4,16,176.21	8,26,848.22	12,82,056.01

Source: Collected by author

Figure 3: Digital Transactions in India during the Year2020, 2021 &2022



Source: Collected by author

Interpretation

The above data in Table 3, 4 & 5 and Figure 3 tells us about the digital transactions in India during the years 2020, 2021, and 2022. It shows an increase in the usage of cashless or online payments over the years. In the year 2020, at the beginning of the calendar year, the value of UPI transactions stood at INR 2.16 lakh crore. At the end of the calendar year, the transactions had increased by INR 4.16 lakh crore. In the year 2021, the value was INR 4.31 lakh crore. By the end of the year, the value had increased to INR 8.26 lakh crore. In the last month of 2022, the value of UPI transactions

stood at INR 12.82 lakh crore. At the end of the calendar year 2022, UPI's total transaction value was INR 125.95 lakh crore, up 1.75 year-on-year.

Hypothesis

Ho: There is no significant relationship between Internet users in India and data usage trends in India.

H1: There is a significant relationship between Internet users in India and data usage trends in India.

Results from testing hypothesis

It has been found that there is a strong positive correlation between Internet users in India and data usage trends in India. The correlation coefficient of 0.987 is close to 1, which suggests that there is a very strong relationship between the two variables, and it is highly unlikely that this relationship occurred by chance.

Therefore, we reject the null hypothesis and conclude that there is a significant relationship between Internet users in India and data usage trends in India. The data provide strong evidence to support the alternative hypothesis that there is a positive correlation between Internet users in India and data usage trends in India.

The following are the findings from the study on the number of internet users in India, the data usage trend in India, and digital transactions in India, along with the results from the test of hypothesis:

Number of Internet Users in India

- The number of internet users in India has been growing at a rapid pace in recent years, increasing from 302.36 million in 2015 to 932.22 million in 2022. This represents a growth rate of over 200% in just seven years [14].

- The increasing number of internet users in India also indicates rising internet penetration in the country. As of 2022, it is estimated that more than two-thirds of the Indian population has access to the internet.

- Despite the impressive growth in recent years, the number of internet users in India still represents only a fraction of the country's total population. This suggests that there is still significant potential for further growth in the future, as more people gain access to the internet.

- The Indian government has launched several initiatives in recent years to promote digital connectivity in the country, such as the Digital India campaign. These policies have likely played a crucial role in driving the growth of internet usage in India [15].

- The growth of internet usage in India has significant economic implications, as it has spurred the development of new industries and created new opportunities for businesses to reach customers online. This trend is expected to continue in the future, further fueling India's economic growth [16].

Discussion

Data Usage Trend in India

- The data shows that Indian data usage has been increasing rapidly over the years, from 8 GB per month in 2015 to 19.5 GB per month in 2022. This represents an increase of more than 24 times in just seven years.

- The rapid increase in data usage can be attributed to the increasing internet penetration in India. As more people gain access to the internet, they are using more data for various online activities, such as video streaming, social media, and online gaming.
- The increase in data usage has led to the growth of the digital economy in India, as more people are using the internet for online transactions, e-commerce, and digital payments.

- The availability of affordable data plans has played a key role in driving the growth of data usage in India. As data prices have become more affordable, more people have been able to access the internet, leading to an increase in data usage.

- Despite the significant increase in data usage, there is still potential for further growth in the future, as more people in India gain access to the internet and as new technologies, such as 5G, become more widely available. This presents opportunities for businesses and industries to expand their digital offerings and reach more customers.

Descriptive Statistics

- The mean for the number of internet users in India is around 590 million, with a standard deviation of around 236 million, indicating a relatively large spread of values. This suggests that there has been some variability in the number of internet users over the years, with some years experiencing higher growth rates than others.

- Similarly, the mean for the data usage trend in India is around 10 GB/month, with a standard deviation of around 6.6 GB/month, indicating a relatively large spread of values as well. This suggests that data usage in India has also varied significantly over the years, with some years experiencing higher growth rates than others.

- It suggests that both the number of internet users and data usage in India have been growing over the years, but with some variability in the growth rates from year to year.

Correlation

The correlation coefficient of 0.987 suggested that there is a very strong positive linear relationship between the number of internet users and the data usage trend in India. This means that as the number of internet users in India increases, so does the data usage trend in India. The statistically significant p-value indicates that this relationship is unlikely to be due to chance.

The results suggest that the growth of the digital economy in India, driven by the increase in the number of internet users and their data usage, has significant implications for businesses and industries operating in the country.

Digital Transactions in India

- The data shows a significant increase in the number of digital transactions in India over the past three years, with the total number of transactions increasing from 19.74 crore in January 2020 to 128.2 crore in December 2022. The data shows that there are monthly trends in digital transactions in India. For example, in 2020, the number of transactions was relatively low in April and May, likely due to the COVID-19 pandemic and the subsequent lockdowns. However, in 2021 and 2022, the number of transactions in these months increased significantly, suggesting that people had adapted to the new normal of using digital channels for their transactions.

- There is some seasonality in the number of digital transactions, with some months (such as November and December) experiencing higher transaction volumes than others. This is likely due to factors such as festivals and end-of-year shopping.

- The growth of digital transactions in India presents opportunities for businesses to expand their online offerings and reach more customers. However, it also highlights the importance of having secure and reliable payment systems in place to ensure a positive customer experience.

- The government of India has been promoting digital transactions as part of its push towards a cashless economy. The growth in the number of digital transactions suggests that these initiatives are having an impact and that there is potential for further growth in the future.

- The COVID-19 pandemic has played a significant role in driving the growth of digital transactions in India. With lockdowns and social distancing measures in place, people have increasingly turned to online channels for their shopping and payment needs. The data suggests that this trend is likely to continue, even as the pandemic subsides.

- The growth of digital transactions in India presents an opportunity for financial inclusion, particularly for those who are currently unbanked or underbanked. With the increasing availability of digital payment options, more people in India may be able to access financial services and participate in the formal economy.

- While the growth of digital transactions in India presents many opportunities, there are also challenges to be overcome. For example, there is still a significant portion of the population that is not familiar with digital payment methods or does not have access to the necessary technology or infrastructure. Additionally, there are concerns about the security of digital transactions and the potential for fraud or cyberattacks.

Conclusion

This study highlights the significant growth of the digital economy in India in recent years. The number of internet users has been rapidly increasing, indicating rising internet penetration and the potential for further growth. Affordable data plans and the expansion of the digital economy have both contributed to the significant increase in data usage. The strong positive correlation between the number of internet users and the data usage trend in India suggests that as more people gain access to the internet, data usage is likely to increase as well.

The growth of the digital economy is further reflected in the significant increase in digital transactions in India, which presents opportunities for businesses and financial institutions to expand their offerings and reach more customers.

However, there are also challenges to be overcome, such as ensuring the security of digital transactions and promoting financial inclusion for those who are currently unbanked or underbanked.

To leverage the growth of the digital economy, businesses can expand their online offerings and reach more customers through digital channels. Policymakers can promote digital connectivity in the country through initiatives such as the Digital India campaign, while individuals can take advantage of digital services and payment options by becoming more familiar with digital technologies and adopting digital payment methods. Ensuring the security of digital transactions, protecting personal data, and promoting sustainability and inclusivity should also be prioritised.

The growth of the digital economy in India presents significant opportunities for economic growth and development, while also highlighting the importance of addressing challenges affecting security, inclusivity, and sustainability. By embracing the growth of the digital economy and addressing these challenges, businesses, policymakers, and individuals can contribute to India's continued development and success in the digital age.

Suggestions

The following are the suggestions from the study on the number of internet users in India, the data usage trend in India, digital transactions in India, and based on the result's softest hypothesis:

- Businesses can leverage the growth of the digital economy by expanding their online offerings and reaching more customers through digital channels. This may include developing mobile apps, optimising websites for mobile devices, and offering digital payment options.

- Policymakers can continue to promote digital connectivity in the country through initiatives such as the Digital India campaign. This can include investing in digital infrastructure, promoting digital literacy, and providing incentives for businesses to adopt digital technologies.

- Individuals can take advantage of the increasing availability of digital services and payment options by becoming more familiar with digital technologies and adopting digital payment methods. This can help to promote financial inclusion and increase access to financial services.

- Businesses and policymakers should prioritise ensuring the security of digital transactions and protecting individuals' personal data. This may include implementing strong data privacy policies, investing in cyber security measures, and promoting awareness of cyber threats.

- Businesses and policymakers should also consider the needs of individuals who may not have access to digital technologies or who may be less familiar with digital payment methods. This may require developing alternative solutions, such as offline payment options or increasing access to digital technologies and training.

- As the digital economy continues to grow, businesses and policymakers should prioritise sustainability and minimise the environmental impact of digital technologies. This may include promoting the use of renewable energy sources, reducing e-waste, and promoting responsible use of digital technologies.

Conflict of Interest

The authors declare that they have no conflict of interests.

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