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About the Journal

MDIM Journal of Management Review and Practice is published by Management Development Institute Murshidabad. The journal started publishing in 2023 in English Language. The journal aims to create and advance knowledge in the field of management sciences and its allied disciplines. High quality research papers, case studies, opinion pieces and book reviews are published in *MDIM Journal of Management Review and Practice*.

Through thought leadership, the journal fosters a knowledge ecosystem that enriches the existing body of knowledge.

MDIM Journal of Management Review and Practice is published twice a year, in March and September. The journal publishes research works that are thought provoking. The most recent developments in the following fields have been covered in recent years. Thought leaders, researchers, academicians as well as corporate professionals publish their scholarly work through this outlet.

The indicative list of areas on which research work is published in this journal are as follows:

- General Management
- Finance & Accounting
- Economics
- Information Technology
- Marketing
- Human Resource Management
- Ethics
- Organization Behaviour
- Operation and Strategic Management
- Public Policies and Governance

The journal has provided a forum for debate and a platform for exchange of ideas from a diverse range of scholarly perspectives in order to promote research with quantitative, qualitative as well theoretical underpinnings on issues confronting the world as a whole in general and business world in particular.

The main features (paper types) of the journal are as follows:

- Applied and Normative Research
- Review Articles
- Case Studies
- Book Reviews

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Aims and Scope

MDIM Journal of Management Review and Practice, a humble initiative of Management Development Institute Murshidabad, strives and fosters to propel research in the arena of business and management sciences by providing evidence-based research papers of highest quality for academicians, researchers, managers and policy makers. The journal endeavors to create influence on corporate and academia think tanks. It aspires to provide a platform for discussions and cross-pollinations of ideas across wide spectrum of scholarly perspectives to garner theoretical, empirical and comparative research on ongoing and probable problems in the business world.

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Role of UPI Application Usage and Mitigation of Payment Transaction Frauds: An Empirical Study

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Abstract

The objective of this investigation is to analyze the intention behind user behavior toward employing Unified Payment Interface (UPI) apps and pinpointing successful solutions for mitigating frauds linked to them. This will increase safety measures, which would lead to an escalation in usage among consumers, ultimately resulting in higher financial inclusion across India through cashless transactions. The Indian digital payment system has been transformed by these platforms, including Google Pay, PhonePe, and Paytm, which together account for over 90% of all online payments made. Users are attracted primarily due to its convenience as well as ease-of-use factors along with influence from their peers who have turned into avid users themselves. Largely, due to COVID-19 lockdown disruptions many people shifted away from traditional monetary exchanges toward Internet Banking options leading to a surge-related crime involving transactional fraudulent practices costing up to 346%. The popularity itself throughout time due again mainly because it's easy access capabilities UPI payment app development on fraudulent activities continued. A structured questionnaire was adopted during the collection phase within Chennai City among active UPI payment apps users whose data were analyzed using multivariate statistical techniques. The result proves that predictors such as perceived security, safety, risk consistent advantageous represents key inferences, supplying impetus towards utilizing

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technology and providing cautionary advice where deficiencies subsist. Info dissemination, emphasizing feature/benefit analysis targeting core customer groups, delivered periodically supplemented defensive protocols, incorporating trial process adaptations can mitigate further risk associated with application utilization. Reader response, demonstrating accommodative response based on familiarity, empowering generational social structure, and enabling transformation gained momentum, demonstrates structural readjustment and solidifies the benefits borne out by increased adaption ratified effective outcomes accruing overall benefits, favourably impacting a variety of demographic profiles, and guaranteeing continued use.

Keywords

Digital payment, behavior intention to usage, UPI application, frauds, perceived ease of use

Introduction

The digital payments software has changed the way people go about paying for things, causing a revolution. Over time in India, digital transactions have been on an upward trend with Unified Payment Interface (UPI) apps, making it easier to transfer money and, therefore, making payments more accessible as well as convenient (Sujith & Julie, 2017). Google Pay, PhonePe, and Paytm are just some of the popularly used applications that have seen increased customer usage; 90% of all electronic commerce operations occur through these services today (Baghla, 2018; Nathani et al., 2022). In January 2020 alone there were over one billion recorded instances, involving UPI apps: this is huge progress from before and depicts how much impact such programs can exert upon individuals' financial stability at large within Indian society. Furthermore, these days users no longer use these types of interfaces simply because they are quick or easy but take advantage also other features like cashback incentives or discounts when shopping online via said platforms, which then drives up their popularity even further among consumers looking for set payment solutions. Nonetheless, change is not only happening due to convenience factors regarding user experience, etc., businesses must be aware too: Customer perception is subject to change based on a number of factors, such as ratings for ease of use and consideration of safety and security issues by business leaders and customers who may be reluctant to use them due to potential vulnerabilities in cyberspace, community feedback regarding previous experiences, and interactions with employees of other companies across a range of industries that could have serious downstream effects if not handled appropriately.

With the outbreak of COVID-19, many people are now turning to online and mobile payment options to avoid crowded areas and contact with others (Bohman et al., 2021; Czarnecki et al., 2023). UPI apps were supposed to make online payments easier, but it seems that this is not the case during COVID-19 (Das et al., 2020; Jain et al., 2020). UPI payment transaction fraud has been increasing at

an alarming rate lately (Mitra Mustauphy, 2023). According to a study by Assocham, conducted in collaboration with EY (Ernst & Young), fraud has increased by a whopping 346% in the last two years. This is a major cause for concern for both consumers and businesses alike. Many customers are reporting problems with using UPI apps for payment. There are several reasons for UPI payment transaction fraud, some of which are listed as follows: Phishing: This is one of the most common types of frauds and it involves criminals sending fake emails or text messages purporting to be from your bank or other financial institution. There have been a few cases where people have fallen prey to UPI payment frauds.

The objective of this study is to assess the intentions of users concerning UPI payment apps and establish effective solutions for decreasing fraud occurrences connected with them. The insights obtained from this research could potentially influence policymakers, as well as businesses, enabling them on promoting safe practices when using these applications while reducing fraudulent behaviors. This investigation can also contribute toward enhancing safety and security measures related to UPI payments, resulting in higher usage rates and leading toward greater financial inclusion within India's economy growth framework. Therefore, it is imperative that additional investigations be conducted so that such findings may undergo validation, which will consequently develop a more comprehensive understanding regarding user patterns associated with utilizing UPI payment apps alongside remedial actions established by means of our review aiming at ensuring secure usage while minimizing instances involving fraudulent activities linked to those services being rendered available for use among various members of the public pool alike. In conclusion, our ultimate goal is to increase consumer confidence about the availability of UPI apps among potential customers looking for online platform alternatives across India by conducting insightful research on consumer behaviour with the intention of putting suggestive strategies, such as workable anti-fraud initiatives, into practice.

Review of Literature

UPI is a real-time payment system that enables instant money transfer between bank accounts through a mobile device. UPI has gained widespread popularity in India and has become a dominant mode of digital transactions in the country. With the increase in UPI usage, there has also been a rise in payment transaction frauds. This literature review aims to examine the existing studies on the role of UPI application usage in mitigating payment transaction frauds.

A study found that the adoption of UPI has been driven by factors, such as convenience, ease of use, and availability of incentives. The study also highlighted the importance of UPI in promoting financial inclusion and reducing cash transactions. Another study found that UPI has become the preferred mode of payment for small- and medium-sized businesses due to its low transaction fees and quick settlement time. The study also highlighted the need for improved security measures to prevent payment transaction frauds. Kumar et al. (2022)

delve into the amplification and importance of UPI with regard to India's evolution in mobile payment operations. Its aim is to scrutinize the international impact and escalation of UPI, which has fast become one of India's most favored modes for digital payments. The analysis highlights a call for better security protocols that would help safeguard transactions from collapse as well as cyber deceitfulness while positing that NFC (Near Field Communications)-based UPI remittances will transform merchant-to-customer compensation schemes. Shahid (2022) discussed the UPI platform as the most advanced mobile-based payment system in the recent past. This study examines the factors influencing the UPI adoption, usage, and intention to recommend by the existing customers. The researcher focused on determinants of adoption of UPI by Indian customers based on the diffusion of innovation theory to achieve a specific result on usage and recommendation intentions. The result of the study revealed that relative advantage, complexity, and observability, which are the main determinants of the adoption of UPI, have a significant positive association with the intention to use of users. Furthermore, the results conclude that the higher intention to use and satisfaction positively correlate with the different aspects of UPI that influence the usage and recommendation intentions.

Kumar and Amalanathan (2022) focused on understanding the UPI's growth and progression in retail digital payments over the years. The main intent of this paper is to figure out how the digital payment service by UPI fits into the digital ecosystem and where it stands in comparison to other digital payment options. The paper also examined the UPI's strengths and weaknesses, as well as opportunities and challenges. The emphasis then shifts to a SWOT analysis of UPI to identify its core strengths and growth prospects, as well as areas for future research to explore the entire e-payment ecosystem in India. Furthermore, the authors found that the expected performance, social impact, pricing rate, safety, and data privacy are considered to be important factors influencing the adoption of the mobile payment system. The implications of the study bring a note in the future, if regulators want to levy a service tax on UPI, they are to be careful and focus on upgrading the existing banking network to make it easier for FinTech businesses to provide payment services. To resolve consumer grievances, PSPs must build effective grievance redressal systems.

The purpose of this paper is to explore how our smartphone simulator can be used to understand UPI user decision-making processes, which will help us devise human-centered phishing prevention strategies (Sharma et al., 2022). It is important to observe users interacting with an actual UPI interface whose design can greatly shape their decision-making and reactions. This study sought to find a more immersive way to present realistic scenarios involving UPI transactions than through scenario-based surveys or interviews. They observed how users responded to the scenarios through a variety of user interface designs and attack models. The study concludes that the application motivated users to make deeper insights into their decision-making processes.

Several studies have examined the various types of payment transaction frauds and the measures that can be taken to mitigate them. A study identified phishing, SIM swapping, and malware attacks as the most common types of UPI frauds.

The study suggested measures such as two-factor authentication, biometric verification, and awareness campaigns to mitigate these frauds. Similarly, a study recommended the use of blockchain technology and machine learning algorithms to prevent payment frauds. In conclusion, UPI has emerged as a popular mode of digital payments in India, driven by factors, such as convenience, ease of use, and financial inclusion. However, the rise in UPI usage has also led to an increase in payment transaction fraud. The existing literature suggests that measures such as two-factor authentication, biometric verification, awareness campaigns, and the use of blockchain technology and machine learning algorithms can help mitigate these frauds. Further research is needed to identify the most effective measures to prevent payment transaction frauds and ensure the security of UPI transactions.

Need and Scope of Study

Over the last few years, UPI payment apps have become increasingly popular due to their ease, convenience, and affordability, as noted by George et al. (2021). With more and more users opting for UPI payments, this technology has revolutionized the way people transfer money. However, there has been a rise in UPI transaction-related frauds, and it is essential to implement measures that can reduce such occurrences and safeguard customers. In addition, the perceived ease of use and usefulness of UPI payments plays a crucial role in determining user behavior toward this technology. If users find it difficult to use or comprehend the workings of a UPI payment app, they may not be inclined to switch from traditional payment methods like cash or cards. Therefore, service providers must design user-friendly interfaces that provide high-quality information and services.

Additionally, in order to encourage the usage of UPI payments and reduce frauds related to it, banks can create awareness campaigns that explain the features and benefits of using a UPI payment app. Customers should also be educated on how to identify suspicious activities or transactions, so they are better equipped to protect themselves against frauds (Knuth & Ahrholdt, 2022; Sudjianto et al., 2010). Risk mitigation strategies such as two-factor authentications can also help reduce the risk of fraud associated with UPI transactions (Basori & Ariffin, 2022). These measures will ensure that users feel safe and secure while using a UPI payment app, thus encouraging more people to switch over from traditional modes of payment (Purwandari et al., 2022; Zhong & Moon, 2022). UPI payments offer many advantages over traditional methods of payment, it is important to take remedial measures to reduce frauds related to these payments (Croxson et al., 2022). The perceived usefulness and ease of use of UPI payment apps should be taken into consideration when designing the user interface, and banks should inform customers about the features and benefits of using UPI payments (Pachabotla & Konka, 2022; Purohit et al., 2022; Sinha & Singh, 2022). Self-efficacy is an important factor in the adoption of UPI payment apps as it allows users to feel more confident in using the app for their transactions (Savitha & Hawaldar, 2022). Self-efficacy has been linked to higher levels of usage and satisfaction with UPI payment applications (Belanche et al., 2022; Liu et al., 2022). However, there are some issues related to UPI payment application usage, such as

security concerns, especially when it comes to frauds (Vinoth et al., 2022). To ensure that users remain safe while using UPI payment apps, organizations can implement various measures to reduce the risk of fraudulent activities (Sinha et al., 2022). Additionally, risk mitigation strategies, such as two-factor authentications, should be put in place to ensure customer safety. With these measures in place, UPI payments can become a safe and efficient way of transferring money.

Research Methodology

The objective of this study is to investigate users' behavioral intentions toward utilizing UPI payment applications in India and explore feasible measures to mitigate fraud risks associated with UPI transactions. The research methodology employed in this empirical study involves descriptive statistical techniques, and the data were gathered from UPI payment app users through a structured questionnaire. The questionnaire comprises queries related to various factors, such as internal attacks, external attacks, perceived relative advantages, perceived safety, perceived security, perceived risk, and behavioral intention to use—fraud prevention. The results of the survey analysis provide valuable insights into user behavior concerning the adoption of UPI payments, which can aid in identifying potential areas where remedial actions could be implemented to minimize fraud risks linked with UPI transactions.

Results and Discussion

In India, the UPI apps usage is very popular among the consumers and it is very important to know the demographic profile of the users and their perception to reduce fraud. The following are the three demographic profiles and two perceptions of reducing fraud behavior intention of UPI apps in India. The majority of the UPI apps users in the study area belongs to a male and graduated educational background. Furthermore, respondents are salaried employees. The majority of the respondents are using UPI apps less than 5 times in a week and maximum of the respondents prefer to use UPI apps in their daily requirements.

The result depicts the use of UPI apps and how to reduce fraud awareness attributes. UPI apps have increased in popularity in recent years, as they offer a convenient and safe way to transfer money. However, there have been some reports of frauds associated with UPI apps. To reduce the risk of fraud, it is important to be aware of the potential risks and to take steps to protect consumers themselves (Fan & Yu, 2022). There are many advantages to using UPI apps, but there are also some risks that need to be considered. According to the findings, the digital certificate attribute has higher awareness among UPI app users and reduces UPI app payment frauds when compared to other attributes such as receiving a one-time password login, using third-party app protection, UPI PIN & virtual keyboard, one device registration, login & transaction monitoring SMS, secure socket layer/server firewalls, others (technology features, etc.). These attributes enhance the consumers

Table 1. Demographic Characteristics for the Respondents.

Demographic Characteristics (N = 404)	Frequency	Percentage (%)
Gender		
Male	296	73.3
Female	108	26.7
Educational status		
School level	24	5.9
Graduate	336	83.2
Postgraduate	32	7.9
Professional and others	12	3.0
Occupation		
Self-employed	16	4.0
Student	12	3.0
Salaried employee	364	90.1
Professional	12	3.0
Number of times using UPI payment (per week)		
Less than 5 times	220	54.5
5 to 10 times	104	25.7
10 to 15 times	28	6.9
More than 15 times	52	12.9
How frequent do you prefer to use UPI app?		
Every day	128	31.7
Once a week	88	21.8
3–5 times a week	76	18.8
Occasionally	112	27.7

Source: Primary Data.

Table 2. UPI Fraud Awareness Attributes.

UPI Fraud Awareness Attributes	Minimum	Maximum	Mean	Std. Deviation
Digital certificates	1	8	7.06	2.089
One-time password	1	8	6.17	1.927
Apps & browser protection	2	8	5.64	1.175
UPI PIN & virtual keyboard	1	8	4.84	.963
Device registration	1	8	4.09	.881
Login & transaction monitoring SMS	1	8	3.43	1.302
Secure socket layer/server firewalls	1	8	2.72	1.760
Others (technology features etc.,)	1	8	2.05	2.203

Source: Primary Data.

Table 3. UPI Apps Preference to Usage.

UPI Apps	Oftenly	Sometimes	Occasionally	Not Prefer to Use
PhonePe	168	76	64	96
Gpay	180	148	64	12
Amazon Pay	60	44	156	144
Paytm	80	88	84	152
BHIM	68	76	108	152
MobiKwik	40	88	76	200
Airtel UPI	56	80	100	168
iMobile Pay	28	76	108	192
Payzapp	60	52	84	208
Freecharge	36	56	104	208
Others	48	52	100	204

Source: Primary Data.

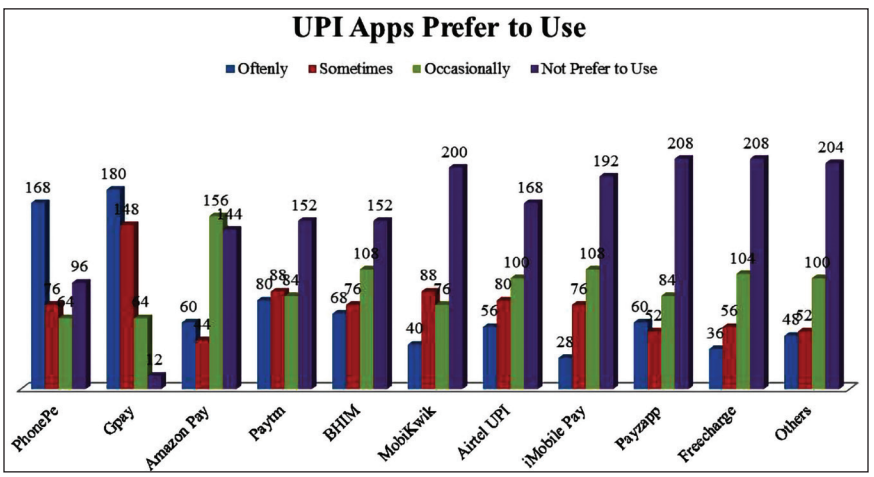

Figure 1. UPI Apps Prefer to Use.

Source: Primary Data.

to make use effectively and help to understand and reduce the UPI app payment frauds in their daily needs (Chavan et al., 2022) (Tables 1-3).

According to the results, Google Pay is the most preferred UPI app in the study area, with the respondents saying that they use it the most (Figure 1). The consumer prefers Gpay because of its simple and straightforward interface, according to the results. PhonePe ranks second in terms of consumer usage preferences. In the recent past, the PhonePe app was a UPI app that was extremely popular in India. It is known for its user-friendly interface and wide range of features. Customers prefer to use this app. Other apps such as Amazon Pay and Paytm are tied for third place among the respondents, each saying that they use them the most. Similar apps include BHIM, MobiKwik, Airtel UPI, iMobile Pay, Payzapp, Freecharge, and others.

Table 4. Descriptive Statistics and Test of Normality for Perception Variables

	Descriptive Statistics				Tests of Normality				Reliability
Variables	Mean	Std. Error	SD	Variance	Skewness (Std. Error = 0.121)	Kurtosis (Std. Error = 0.242)	Kolmogorov–Smirnov[a] (*df* = 404)	Shapiro–Wilk (*df* = 404)	Cronbach's Alpha
Internal attacks	3.558	0.044	0.887	0.787	–0.291	–0.067	0.073**	0.969**	0.869
External attacks	3.422	0.041	0.833	0.693	–0.472	0.359	0.098**	0.972**	0.876
Perceived relative advantages	3.875	0.039	0.785	0.617	–0.072	–0.914	0.125**	0.935**	0.866
Perceived safety	3.786	0.039	0.781	0.61	–0.57	0.745	0.080**	0.950**	0.930
Perceived security	3.836	0.035	0.707	0.5	–0.328	–0.217	0.097**	0.969**	0.927
Perceived risk	3.836	0.033	0.666	0.443	–0.113	–1.024	0.106**	0.960**	0.822
Behavior of intention to use—fraud prevention	3.619	0.042	0.84	0.705	–0.663	0.359	0.121**	0.952**	0.829

Note: [a]Lilliefors Significance Correction; **Denotes 1% sig. level

Source: Primary Data.

Table 5. Correlation Matrix.

Variables	IA	EA	PRA	PES	PESU	PER	BIU
Internal attacks (IA)	1						
External attacks (EA)	**0.600**** **(0.000)**	1					
Perceived relative advantages (PRA)	**0.262**** **(0.000)**	**0.169/**** **(0.001)**	1				
Perceived safety (PES)	**0.161**** **(0.000)**	**0.111*** **(0.025)**	**0.630**** **(0.000)**	1			
Perceived security (PESU)	**0.214**** **(0.000)**	**0.147**** **(0.003)**	**0.532**** **(0.000)**	**0.732**** **(0.000)**	1		
Perceived risk (PER)	**0.445**** **(0.000)**	**0.295**** **(0.000)**	**0.625**** **(0.000)**	**0.575**** **(0.000)**	**0.585**** **(0.000)**	1	
Behavior of intention to use—fraud prevention (BIU)	**0.229**** **(0.000)**	**0.135**** **(0.007)**	**0.746**** **(0.000)**	**0.751**** **(0.000)**	**0.647**** **(0.000)**	**0.662**** **(0.000)**	1

Note: **Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.01 level (2-tailed).

Source: Primary Data.

The bold characters show the statistical significance for the relationship testing between the variables.

Testing for normality and using descriptive statistics to find the determinants of behavior intention to use UPI fraud prevention (Tables 4 and 5). When the data are not normally distributed, then the results of any statistical tests could be inaccurate. By understanding the distribution of the data, analysts can make more informed decisions about which statistical tests to use. Testing for normality we can ensure that the data is not skewed and that the results of any statistical tests are not biased. Finally, descriptive statistics can provide valuable insights into the relationships between internal attacks, external attacks, perceived relative advantages perceived safety, perceived security, perceived risk, behavior of intention to use—fraud prevention variables, which can help to identify potential causes of UPI fraud and provide remedial measures to reduce the same. This is important when investigating the determinants of behavior intention to use UPI fraud prevention as it can help us to identify which factors are most important in influencing behavior. Finally, by using both normality tests and descriptive statistics we can be more confident that the results of our analysis are robust and reliable. The result indicates that the perceived relative advantage, perceived security, perceived risk, and perceived safety placed higher relative to the study compare to other variables, such as internal attacks and external attacks awareness toward behavior intention to use UPI and reduce frauds.

Table 6. Multiple Regression Analysis—Determinants of UPI Apps Usage and Behaviors Intention to Use of Prevent UPI Frauds.

Variables	No of Items	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	ANOVA			Durbin-Watson	Unstandardized Coefficients		Standardized Coefficients	*t*-Value (Sig.)	Collinearity Statistics	
						F-Value	*df*	Sig.		*B*	Std. Error	Beta		Tolerance	VIF
Dependent variable															
Behavior of intention to use—fraud prevention	6	0.845	0.713	0.710	0.374	248.09	4,399	0.00	2.238				***		
Independent variables															
(Constant)										0.305	0.121		2.527 (0.012)*		
Perceived safety	17									0.313	0.039	0.351	8.082 (0.000)**	0.380	2.631
Perceived relative advantages	8									0.322	0.034	0.364	9.597 (0.000)**	0.500	2.000
Perceived risk	10									0.187	0.039	0.179	4.796 (0.000)**	0.517	1.936
Perceived security	19									0.090	0.041	0.092	2.233 (0.026)*	0.424	2.358
Internal attacks	9											–0.028	–0.924 (0.356)	0.787	1.270
External attacks	9											–0.035	–1.258 (0.209)	0.908	1.101

Note: Dependent variable: Behavior of intention to use—fraud prevention.

Predictors in the model: (Constant), perceived safety, perceived relative advantages, perceived risk, and perceived security

Source: Primary Data.

Predictors in the model: (Constant), perceived safety, perceived relative advantages, perceived risk, and perceived security (Table 6). The regression analysis utilizing OLS method was applied to detect the noteworthy effects of factors that impact UPI apps usage and prevent fraudulent activities. The variables considered were perceived safety, perceived relative advantages, perceived risk, perceived security as well as internal and external attacks in order to explore how each variable influences consumer behavior when it comes to using UPI apps and preventing frauds. Results show that all aforementioned variables have a positive influence on intentional behavior toward consumers' use of both UPI apps and fraud prevention measures; this being significant for influencing decisions made by these individuals. The perceived safety with respect to influencing user behaviours regarding uptake or rejection of any given app or feature offered within them.

The regression analysis with OLS method has been applied to find the significant influences of determinants of UPI apps usage and fraud preventions with respect to perceived safety, perceived relative advantages, perceived risk, perceived security, internal attacks, and external attacks. The result explores that the perceived safety, perceived relative advantages, perceived risk, and perceived security were positive and significant, influencing the behaviour of intention to use UPI apps & fraud prevention consumers. Perceived safety is likely to be a major factor influencing consumer behaviour as it pertains to UPI apps and fraud prevention. Perceived safety is likely to be a major factor influencing consumer behavior as it pertains to UPI apps and fraud prevention. If consumers believe that using a particular UPI app is safe and that their personal information will not be compromised, they are more likely to use it. On the other hand, if consumers perceive that there is a risk of fraud or that their personal information may be at risk, they are less likely to use the app. Perceived relative advantages are another factor that may influence consumer behavior. If consumers perceive that a particular UPI app offers them more advantages than other similar apps, they are more likely to use it. For example, if a consumer believes that a particular UPI app is more user-friendly or offers more features than other apps, they are more likely to use it. Perceived risk is also likely to influence consumer behavior. If consumers perceive that there is a risk of fraud or that their personal information may be at risk, they are less likely to use the app. Perceived security is also likely to influence consumer behavior. If consumers perceive that a particular UPI app is more secure than other similar apps, they are more likely to use it. For example, if a consumer believes that a particular UPI app uses encryption to protect their personal information, they are more likely to use it.

One of the main reasons why perceived safety, perceived relative advantages, perceived risk, and perceived security influencing the behavior of intention to use UPI apps & fraud prevention consumers is because they are all important factors that can affect a person's decision to use UPI apps. If a person perceives that a UPI technology is safe to use, they are more likely to use it. Similarly, if a person perceives that a UPI app has advantages over other services, they are more likely to use it. On the other hand, if a person perceives that a service is risky or insecure, they are less likely to use it.

There are many reasons why consumers may be reluctant to use UPI apps, or may not be aware of the potential advantages of doing so. One reason is perceived safety. Consumers may be concerned about the security of their personal information and the safety of their money if they use UPI apps. Another reason is perceived relative advantages. Consumers may not be aware of the potential advantages of using UPI apps, such as the ability to make payments without sharing their bank account details. They may also be concerned about the potential risks associated with using UPI apps, such as the possibility of fraud or the loss of their money. Finally, consumers may be concerned about the perceived security of UPI apps. They may not be confident that the apps are secure and may not trust the companies that offer them.

The result also explores that the internal attacks and external attacks awareness not influencing behavior of intention to use UPI apps & fraud prevention consumers. It indicates that there are several reasons why internal attacks awareness and external attacks awareness may not be influencing the behavior of intention to use UPI apps & fraud prevention consumers. First, it is possible that consumers are already aware of the risks of internal and external attacks and are taking steps to protect themselves. Second, it is also possible that consumers believe that the benefits of using UPI apps outweigh the risks. Finally, it is also possible that consumers feel that the risks of internal and external attacks are low and are not concerned about them.

Implication and Conclusion

The digital payment system known as UPI payment has gained immense popularity in India primarily due to its convenient nature, high level of security, and versatility across various platforms. The decision-making process of customers regarding the use of Google Pay, PhonePe, Paytm, and other payment apps for UPI transactions highly depends on factors such as their perceived safety and risk associated with using these services along with any relative advantages they may offer compared to other means. Moreover, customer ease-of-use is linked directly to how much effort would be required from them while performing a transaction whereas customer-perceived advantage pertains solely toward effectiveness. As an effective countermeasure against fraudulent activities surrounding UPI payments, both banks and service providers have adopted strict authentication processes that include real-time monitoring systems that ensure swift identification and rectification whenever suspicious activity takes place—this not only boosts consumer confidence but also builds trust among users. With so many features already offered by these secure methods like convenience during the payment procedure itself and availability over multiple devices; it is no wonder people find them appealing enough thus altering user behavior tendencies even further. Customer perceived ease-of-use (CPEOU) defines just how easy digital payments applications are when used by consumers alongside allied aspects relating back into navigation simplicity providing quick responses too making all involved steps stress-free overall—A worthwhile consideration indeed! Businesses who

invest time gathering feedback related specifically around CPEOU can fine-tune pertinent areas within their own setups, improving satisfaction levels between clients/customers alike and leading us right up until present day where companies must now provide more advanced experiences rooted deeply inside each aspect catered direct preferences themselves remaining competitive forevermore despite ever-changing markets requiring constant evolution driven purely via innovations generated internally and borne out through trial/error cycles occurring frequently nowadays, fostering creativity manifold and pushing boundaries beyond previous limits that were set years ago.

To summarize, a user's inclination toward using UPI payment and fraud prevention choices like Google Pay, PhonePe, Paytm, and other payment apps is significantly influenced by perceived relative advantages, perceived safety, perceived security, and perceived risk. The popularity of digital payment applications within one's social group can increase the likelihood of their adoption as it establishes trustworthiness. To prevent fraudulent activity in the system, banks have instituted various solutions, such as reliable authentication methods and assessing systems for an added layer of security, which bolsters users' confidence in this method. Furthermore, the ease with which people can employ UPI payments coupled with their relative advantages makes them more appealing to potential consumers, thus increasing uptake rates. Therefore, it is anticipated that increased intentionality will be observed from patrons to use these services, given these preventative actions are taken.

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Article

Impact of Digital Marketing on Micro, Small, and Medium Enterprises (MSMEs)

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Abstract

The micro, small, and medium enterprises (MSMEs) in India produce a varied collection of goods. The rapid changes in technology and consumer preferences have a huge impact on marketing techniques. In contrast to large industries, MSMEs do not have any proper tools for marketing so it is one of the weakest areas wherein small organizations face problems. This article explores the digital marketing prospects of MSMEs. These industries are major sources of employment, growth, and economy so digital marketing of SMEs is important. The various benefits of digital marketing with different tools available are highlighted in this article. This article will also help small industries in creating effecting websites so that they can take advantage of digital marketing. Web analytic tools for analysing website traffic are also discussed in this article so that companies can monitor the effect of digital marketing.

Keywords

MSMEs, digital marketing, affiliate marketing, web analytics tools, search engine optimization

Introduction

The micro, small, and medium enterprises (MSMEs) in India produce a varied collection of goods. New challenges and prospects have arisen for MSMEs with globalization and changes in communication technologies. The rapid changes in

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technology and consumer preferences have a major impact on marketing techniques. In contrast to large industries, MSMEs do not have any proper tools for marketing so it is one of the weakest areas wherein small organizations face problems. Digital marketing is used to promote products and with the help of this; maximum customers can be reached. It includes cell phones (both SMS and MMS), marketing using social media, display advertising, search engine marketing (SEM), and many other forms of digital media. Consumers can gain information at any time and at any place with the help of digital media. Customers not only rely on the brand promotion but they are also able to check what other people say about this brand using digital media. Companies these days wish to connect with the maximum audience using online platforms which is an essence for organizations these days. Consumers now not only look for basic websites but also prefer blogs, Facebook pages, online shopping, etc. Overall, 92% of the small industries want to attract more customers using digital media.

This article explores the digital marketing prospects of MSMEs. These industries are the major source of employment, growth, and economy so digital marketing of SMEs is important. This article highlights the various benefits of digital marketing with different tools available. This article will also help the small industries in creating effecting websites so that they can take advantage of digital marketing. Web analytic tools for analysing website traffic are also discussed in this article so that companies can monitor the effect of digital marketing.

Objective of this Article:

1. To discuss the importance of MSMEs in the Indian Economy.
2. To give an idea of digital marketing.
3. To show the benefits of digital marketing to MSMEs.
4. To highlight the marketing-related challenges faced by small industries.
5. To study the impact of social media on small and medium business entrepreneurs.
6. To discuss various digital marketing tools.
7. To compare traditional marketing with digital marketing.
8. To discuss various analytic tools for monitoring the effect of digital marketing.

Literature Review

Dury (2008) is his research explored that digital marketing not only shows information but also receives maximum involvement in a short time.

Kiran et al. (2013) studied that enterprises are now focusing on the global market in comparison to local markets with the trends of globalization (Kula & Tatoglu, 2003).

Todd and Javalgi (2007) showed that SMEs in India are now focusing on creating a market globally which can be achieved with the help of digital marketing (Basri, 2016).

Lin et al. (2007) found that SMEs can be expanded and can have worldwide connectivity with the growth in Information and Communications Technology (Srinivas, 2013).

Esselaar et al. (2008) studied that the main barrier for Small Industries is the lack of computer knowledge and with the help of digital marketing, maximum revenue can be generated.

Lin et al. (2007) studied that SMEs have some trouble in understanding the costs, benefits, and risks associated with technology, but once they are able to use it they can excel in business (Madsen, 2008).

Galloway and Mochrie (2005) concluded that the economic performance of businesses can be decreased if they are very slow in adopting digital marketing.

Mochoge (2014) explored that digital marketing effects the decision of a customer in choosing a product (Morris, et al., 2007).

Centeno and Hart (2012) studied that different messages can be communicated by using different marketing tactics, depending upon time and customers.

Moen and Madsen (2008) showed in their study that a transactional approach for marketing is generally used by SMEs. In such a situation ICT is useful for the market information search and to create long-term customer relationships (Shabbir & Ghazi, 2016).

Kütahyali (2017) pointed that sales, consumer reach can be enhanced by SMEs by using social media.

Al Bakri (2017) conducted a study in which 80% said that products and services are improved by using social media but adopting it is a major challenge.

Shabbir and Ghazi (2016) motivated small organizations to use social media as it has a positive impact on sales (Mangold & Faulds, 2009).

Basri (2016) conducted a study in Arab countries to show the relationship between digital media and the market on different factors like expenditure, profit, etc. (Web Analytics Terms, 2017).

Bin Saad (2015) concluded that brand awareness can be enhanced with the help of digital media which will have a huge impact on customer engagement (Aruna, 2015).

Chaudhary and Ahalawat (2014) studied the various challenges faced by SMEs and also showed the impact of MSMEs on various factors like employment generation, contribution to national income, etc.

Dubal (2015) studied the issues related to the financing of MSMEs and then further explored the reasons why these companies should adopt digital marketing (Bin Saad, 2015).

Morris et al. (2007) argued that the flow of credit can be increased by improving the quality of financial information as it effects loan finance (Dubal, 2015).

Green et al. (2006) examined that poverty can be reduced if proper ways are used to support the growth of MSMEs.

Nanda and Kerr (2009) highlighted that the biggest concerns that impact entrepreneurs across the world are the financing constraints (Patil & Chaudhari, 2014).

De Sankar (2009) showed the various challenges that are faced by the small industries in India.

Majumdar and Krishna (2012) stated that different models of sustainable SMEs are slowly evolving which are now essential for countering universal problems like global supply chain sustainability (Kiran et al., 2013).

Srinivas (2013) concluded that MSMEs play a significant role in the Economy of a nation (Strauss & Frost, 2009).

Mwobobia (2012) conducted a study in Kenya to show different challenges like lack of education, competition, and planning faced by SMEs.

Aruna (2015) explored the technology, marketing, and skilled manpower-related problems faced by MSMEs (Garg, 2014).

Mathai (2015) first identified different problems faced by MSMEs and then suggested that proper training and technology awareness programs must be organized for MSMEs so that they can know how to use digital marketing in promoting their businesses online.

Garg (2014) studied the various opportunities and problems that MSMEs have to face. He found that many opportunities are finance and subsidies provided by the government; competitive technology; skill development, etc. (Pyle, 2010).

Patil and Chaudhari (2014) and Lin et al. (2007) studied that MSMEs in the rural sector face technology-related issues while adopting digital marketing (Seo Administrator, n.d.).

Hanna et al. (2011) explored the importance of social media and online marketing in the growth of new MSMEs (Heck, 2005).

Zhang et al. (2013) studied that sales revenue has increased if companies use blogs as a tool for digital marketing because customers can read reviews and write comments about personal experiences.

The Impact of MSMEs on Indian Economy

Employment and economic development are provided by the MSMEs which help in the growth of developing nations (Lin et al., 2007). According to a study in Ayyagari et al. (2011), it is estimated that MSMEs contribute to 95% of organizations globally and 60% of employment is generated by these Ayyagari et al. (2011). The MSME sector plays a vital role in economy development, and the reduction of poverty in developing economies Hanna et al. (2011).

Today, every type of product from simple to classy is produced by this sector which has a broad impact on economic growth. MSMEs not only provide support to large industries but they also help in the generation of employment which leads to the development of States. Six major States of the country, namely, Uttar Pradesh, Maharashtra, Tamil Nadu, West Bengal, Andhra Pradesh, and Karnataka contribute 55% of these organizations. It is assumed that the economy of our country will grow by over 8% per year by 2020. There are varieties of enterprises, services, products, and levels of technology so this sector is heterogeneous. The MSME sector helps in developing more industries in rural areas. National income is equally distributed through this sector which helps in reducing regional imbalances.

In India, there are approximately 30 million SMEs and this sector is expected to provide jobs to 12 million in the next three years. So, opportunities are there for the SMEs to boost their businesses in major areas. The SME Sector in India is contributed by many factors which are:

- Financial support by international and national finance providers.
- Technology advancement.
- The rich database of different MSMEs is available online.
- Minimal investment is required to start and maintain these units.
- The Greatest contributors to domestic production as well as export earnings.

Marketing-related Challenges Faced by SMEs

The major constraint for SMEs is access to marketing because many producers are in remote rural areas or high-population low-income urban areas so transport costs are also added which results in limited sales. The key challenges are:

- Less information regarding digital marketing.
- Lack of skilled persons that can deal with digital marketing.
- The inability to identify new markets.
- Low budget in using technology for marketing.
- The ineffective strategy used for marketing.
- Lack of networks so they can lose from large competitors.
- The inefficient method used for analysing markets.
- Organization-level constraints on modernization.
- Lack of sales promotion.
- Competition by new entrepreneurs.

Digital Marketing and its Impact on SMEs

Digital marketing is the type of marketing that is used to promote products using digital channels. It includes all types of marketing like cell phones; marketing with social media; online advertising; marketing using search engines, etc. Consumers can gain information at any time and at any place with the help of digital media. Customers not only rely on the brand promotion but they are also able to check what other people say about this brand using digital media. Digital marketing is very cost effective and it has broad reach ability if we compare it with traditional marketing. If we want to reach a thousand customers by the newspaper the budget is more but with online marketing the cost is much less (Bhargava, 2015).

Digital Marketing Versus Traditional Marketing

Print Media, post mail, telephone, etc. are included in traditional marketing. On the other hand online advertising, marketing using E-mail, social media, SMS,

affiliate marketing, marketing using search engines, etc. are included in digital marketing. We can interact with the consumers with the help of digital marketing but we cannot interact with the audience using traditional marketing. It takes a long time to plan advertising campaigns using traditional marketing while advertising campaigns can be planned shortly using digital marketing. Digital marketing is a cost-effective and fast method of marketing as compared to traditional ones. Advertising campaigns can be changed easily and innovations can be made in advertising in digital marketing which is not possible with the help of traditional marketing. Traditional marketing has limited customer reach but on the other hand, digital marketing has a wide reach to customers. One problem with digital marketing is that the advertisements can go viral which is not possible with the old ways of marketing.

Reasons for Adopting Digital Marketing

Various reasons for adopting digital marketing can be summarized as

- Majority of the people these days are using the Internet and Internet users are increasing day by day and even the average time they spend daily on the Internet is increasing so advertising with digital media will have a high impact.
- It is very cost-effective to use digital marketing.
- Entrepreneurs can create advertising content themselves and they have full control over the content; they are not dependent on any external media.
- It is the quickest method of marketing; advertisements can be created quickly.
- Advertisement using social media is very effective because our country is a young nation and 85% of young people are connected with social media.
- Interaction with the customers is very effective and timely; complaints, if any can be responded in fast way.
- Feedback can be monitored efficiently with the help of digital marketing and there is always a chance to improve your products or advertising channels.

Advantages of Digital Marketing to SMEs in India

The various advantages of digital marketing to SMEs in India are:

1. Using digital marketing, SMEs can have access to global markets all across the world. They can promote their products anywhere by this.
2. Productivity can be enhanced by using digital marketing.
3. By using digital marketing, information about any product can be distributed very easily and in a fast manner.
4. Digital marketing is very eco-friendly because paperwork is reduced if we promote our product online.

5. Interaction with the customers is very effective and timely; complaints, if any can be responded in fast way.
6. Feedback can be monitored efficiently with the help of digital marketing and there is always a chance to improve your products or advertising channels.
7. Businesses will always be connected with their customers and based upon the interest of the consumers; they can have innovation in their advertisement strategies.
8. Brand awareness will be increased with the help of this type of marketing.

Digital Marketing Tools

(a) *Online advertising*: It is the method by which a company promotes its products or services using the Internet. Companies create interactive advertisements and then place these advertisements on their websites or blogs so that consumers can get the latest information about any product. The Company has full control of the budget and time while creating advertisements online.

(b) *Email marketing:* In this method, a message about any product or service is sent through E-mail to the consumers. It is a very easy and cost-effective method of promoting a product or service. Complete attention of the consumer can be brought, if there is a creative and attractive message which is a mix of graphics, text, and links.

(c) *Text messaging:* In this method, information about products or services is sent on cell phones in the form of SMS, picture, audio, or MMS. This method is very effective because companies can send information in a real-time and they are confident that their message will be seen.

(d) *Affiliate marketing:* It is also known as reward-based marketing in which each visitor or customer is rewarded if they make any marketing effort on behalf of the company. The company can either offer an affiliate program to others or it can become another company's affiliate. In this type of marketing, every person who helps in promoting the company's product is paid a commission fee. So with the help of this method, the company can reach untapped markets.

(e) *Search engine optimization (SEO):* These days search engines are used in a great deal. If we want to search for any product or service we search from search engines like Google. The main challenge before companies is that how their products or services appear on the top in the search engine results so SEO must be used by any company that wants to use digital marketing. With the help of SEO, the ranking of a website is increased (Pate & Adams, 2013).

(f) *SEM:* This is the method in which traffic to a business website is increased with the help of search engines through paid efforts. There are different methods available like pay-per-click, cost-per-click, etc. The platforms that are mostly used for this type of marketing are Google Ad Words, Bing Ads, etc.

(g) *Mobile marketing:* This method is becoming common these days because most of the users now have smartphones and they use mobile apps. The product or service can easily be promoted with the help of mobile apps (Zhang et al., 2013).

(h) *Viral marketing:* In this type of marketing, creative content is spread online rapidly because the content has been shared, liked, or appreciated by the majority of people (Majumdar & Krishna, 2012). In this method, huge traffic is diverted to the company's website.

(i) *Social media marketing:* It is a type of marketing in which products or services are promoted using social media like Facebook, Twitter, Google+, LinkedIn, etc. The company can create his social profile, Facebook page, etc. Most people now have Facebook accounts and the company can take advantage of Facebook to promote products or services as it offers paid advertisements. The company can also increase the knowledge of its brand through Twitter. Some common features of social media are Interactive Web 2.0 Internet-based applications (Aral et al., 2013; Bennett, 2012); different types of content like text posts or comments, photos or videos, can be generated (Aral et al., 2013; Bennett, 2012); user's profile can be connected with individuals or groups (Bennett, 2012; Bashar et al., 2012). Social media is very different from paper-based media in terms of reach, availability, usability, and interactivity (Bashar et al., 2012; Ioanăs & Stoica, 2014). Social media has many sources and many receivers but traditional media has one source and many receivers (Sparkes & Thomas, 2001). Social media is the most effective digital marketing tool so businesses must know how to take advantage of this media effectively; if they want to have a successful marketing campaign (Mochoge, 2014).

Developing Digital Marketing Strategy

(a) *Digital marketing plan:* To use digital marketing effectively company must prepare a plan (Chaffey et al., 2009; Man, 2012) which includes various steps that are discussed in this section. The various steps are:

1. The company must analyse its strengths, weaknesses, opportunities, and threats which will help in understanding the position of the company among other competitors.
2. The second step is competitive analysis in which the company must analyse its competitors; the products or services they offer; and their marketing strategies; their strengths and weaknesses.
3. After knowing about its competitors, the company must create a strategy to differentiate itself from the competitors.
4. The company must know about its objectives while making a digital marketing plan and the objectives should not be ambiguous. In the case of digital marketing, the most common objectives are creating brand awareness and increasing sales.

5. After knowing its objectives, the company must know how to achieve these objectives. For this, the proper strategy should be made which should identify the target customers. Then the company must take advantage of digital marketing tools which have been discussed earlier in this article.
6. The last step is to monitor the performance of digital marketing tools with the help of which the company can get an idea of any advantage that it is getting by using tools. Number of Clicks; Hit ratio of Page; Subscription information, etc. are the various performance indicators.

(b) *Planning website (promoting business online):* The various steps are:

1. The first step in planning a website is to choose and register a domain name for the website. The company must keep its domain name simple so that will be remembered easily by the people. After choosing a domain name, domain name registration is required. It is preferred that longer registrations for five to 10 years are proved beneficial. After registering the domain, it is suggested to use the domain for E-mail.
2. The next step after registering the domain is to build the website. The website should be user-friendly and it should be properly planned. The company must plan the type of website that it needs and then can hire professionals for building the website because a professional website will have more impact.
3. The next step is to make your website search engine-friendly. These days search engines are used in a great deal. If we want to search for any product or service we search from search engines like Google. The main challenge for companies is how their products or services appear on the top in search engine results so SEO must be used by any company that wants to use digital marketing. With the help of SEO, the ranking of a website is increased.
4. After creating a website and SEO, your website will be up and running. You should take advantage of social media so that you can interact with more consumers. So company must create an online community.
5. The final step is engaging the community. The company can either create a blog to share ideas and news or the company can publish a newsletter to highlight new products or services, sales promotion, etc. to the consumers.

(c) *Monitoring digital marketing using web analytics:* The user behavior about the web pages can be analysed using web analytics (Man, 2012) which will help to improve marketing activities by analysing important data like web traffic, sales transactions, etc. (Chaffey et al., 2009). Web analytics collects data not only about the website but also data of visitors of the website (Nanda & Kerr, 2009). With the help of web analytics, reports can be generated which can be used for making good marketing policy later. Every type of data including visitor's behavior, and campaign-related data can be collected by using web analytics (Websadmin, n.d.). According to the official definition of (Burby et al., 2007; Clifton, 2010; Web Analytics Association, 2008; Waisberg & Kaushik, 2009), web analytics refers to a combination of: (a) measuring; (b) acquisition; (c) analysing; and (d) reporting of data collected from the Internet with the aim of understanding and optimizing web experience.

(i) *Metrics:* The different type of information that can be collected by using Web Analytics tools is termed metrics (Burby et al., 2007). The following are the key metrics:

- Visitors: The total number of visitors helps to understand the interactivity of the website.
- Page views: This metric helps to find the content that is most popular on the website.
- Referring sites: This metric helps to identify the referring sites which will help to find where the traffic is coming from and then you can place interactive advertisements on those sites.
- Bounce rate: It is used to find the number of visitors including web pages that visit a webpage and then immediately leave that page. This will help to take the proper attention to those web pages.
- Keywords and phrases: This metric finds out the Keywords and phrases that people use while searching your website in search engines. You should have proper keywords in your website to get maximum traffic.

(ii) *The benefits of web analytics tools for SMEs:* Some of the major web analytics usages are:

- Website information can be optimized by identifying user interest areas.
- Website traffic can be increased.
- Revenue can be increased.
- The success of actions can be measured and tracked.
- Problems with the existing web pages can be identified.

(d) *Website analysis tools:* Website analysis tools can be classified into two categories: Free tools and paid tools. Google Analytics is the most popular free analytic tool which collects information from visitors of a site by using page tagging. With the help of Google Analytics, many types of metrics that were previously discussed can be easily collected (Dodoo, 2006). Another common free web analytic tool offered by Microsoft is Gatineau (Thomas, 2007). The paid tools available are Coremetrics, WebTrends, Omniture, and WebSideStory (Howard, 2010). Special configurations for retail travel and financial services are offered by Coremetrics. A broad range of performance indicators is offered by the WebTrends tool but it is expensive compared to others. The various reports can be provided by Omniture which is an ASP reporting application. WebSideStory has the highest ratings in reporting, administration, ease-of-use, and support which is used by many different types of companies as it is easy to use.

Conclusion

Digital marketing is used to promote products and with the help of this; maximum customers can be reached. It includes cell phones (both SMS and MMS), marketing using social media, display advertising, SEM, and many other forms of

digital media. Consumers can gain information at any time and at any place with the help of digital media. Customers not only rely on the brand promotion but they are also able to check what other people say about this brand using digital media. The major constraint for SMEs is access to marketing because many producers are in remote rural areas or high-population low-income urban areas so transport costs are also added which results in limited sales. The various advantages of digital marketing to SMEs in India are: With the help of digital marketing, SMEs can have access to global markets all across the world. They can promote their products anywhere with the help of digital marketing; productivity can be enhanced by using digital marketing; with the help of digital marketing, information about any product can be distributed very easily and in a fast manner. The businesses will always be connected with their customers and based upon the interest of the consumers; they can have innovation in their advertisements strategies. This article first discusses the reasons for adopting digital marketing and then in detail, the various tools that are available for digital marketing are also discussed. The various guidelines for creating effective websites and SEO are also discussed in this article. Then finally this article concluded the web analytic tools with the help of which entrepreneurs can monitor the performance of the website effectively.

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Article

Review of Regulatory Mechanism on Crypto Income

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Abstract

Some countries are actively considering taxing income from cryptocurrency exchanges. In addition to this, in many national and international policy decisions related to Cryptocurrency, regulators also focus on issues such as customer data, money laundering schemes and supporting terrorism. This article intends to examine the regulatory regime of cryptocurrency regulators—from a country-specific perspective.

Keywords

Bitcoin, cryptocurrency, crypto income, regulatory mechanism, tax policy

Objectives

1. To understand the global perspective of regulatory mechanisms concerning cryptocurrency in general.
2. To make aware of the tax regulatory system on crypto income in a select country view.

Introduction

Some countries are actively considering taxing income from cryptocurrency exchanges. In addition to this, in many national and international policy decisions related to Cryptocurrency, regulators also focus on issues such as customer data, money laundering schemes and regulating terrorism. Digital currency can be

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purchased with fiat money and sold with conventional funds. It can be used to obtain various goods and services. In 2015, in a report entitled 'Virtual Currency Initiatives: Further Analysis', The European Central Bank offered a 'second' and substantially updated definition of virtual currency.

Review of Literature

Studies on Cryptocurrency/Digital Finance

The idea of cryptocurrency as an open-source platform, a central issuing authority or the seat of a state is new (King & Nadal, 2012). Every investor should have some questions answered (Rogojanu & Badea, 2014): Is bitcoin the oldest particular private currency? Also, how long will it run alongside traditional currencies? In a context of growing discontent generated by the many imbalances emerging in the economies of different countries, is bitcoin able to benefit from a higher level of confidence than it currently has?

Although cryptocurrencies cannot substitute legal currencies, they could influence the global markets, removing hurdles to regulating national currencies and exchange rates (DeVries, 2016). The technology behind cryptocurrency can improve the operations of banks and provide a platform to commence their operations (Raskin & Yermack, 2016).

Bitcoin has shown the way to success, and as of 13 January 2020, the number of bitcoins has reached 5,025 (Caporale et al., 2018). Digital finance comprises of new financial instruments, financial transactions, software used for finance-related transactions and new modes of interaction with customers provided by financial institutions (Gomber et al., 2017). The financial transactions have progressively embedded with technology with the opening of the payment gateway (Gonzalez, 2004). Changes in the prices of bitcoin and the dynamics of mining properties are examined by Corbet et al. (2019).

Indian digital currency exchange is preparing to initiate bitcoin futures. It may be integrated with cryptocurrencies like Bitcoin Cash, Ripple and Ethereum. In addition to bitcoin, there are nearly 1,000 alternative coins (altcoins) of which 'ether coin' is the most accepted. Altcoins were introduced after the success of Bitcoin (Rajesh Kurup, 2017).

The price behaviour of cryptocurrencies reveals that the efficient market hypothesis is rejected. However, over the past few years, significant steps towards the effectiveness of cryptocurrencies have been detected. This can lead to speculators adopting less gainful trade strategies (Kyriazis, 2019).

The persistence of the cryptocurrency market, indicating a correlation between its past and future value, is examined by Chaim and Laurini (2018). This study projected a volatility model with discontinuous jumps in cryptocurrency.

Malady (2016) states that 'while clients may have digital banking for online financial transactions, in many emerging markets they must become online consumers due to a lack of trust in new channels'.

Michael Sockin and Wei Xiong's (2020) model states that cryptocurrencies are members of a digital platform designed to help users. Cryptocurrency prices must

compensate for membership demand, especially the significant complementarity of membership demand, with token supply from speculators, which could lead to a stock market crash.

Yates (2017) points out that the combined turnover of all cryptocurrencies exceeds $100 billion, which can pose a likely hazard to replacing fiat currency issued by banks.

Marian (2015) explains the regulatory regime that imposes anonymity outlay to limit the potentially illegal use of cryptocurrencies. The regulatory authority should restrict various illegal activities like tax evasion, Ponzi schemes, terrorist financing, and so on.

Nara Kim and Jang Mook Kang (2018) analyse blockchain and digital authentication technologies. A digital authentication system is proposed to address the high cost of the existing digital authentication technology.

Dewey & Holland & Knight LLP (2019) examine how governments regulate cryptocurrencies and blockchain technology. It was observed that the blockchain had shown its impact irrespective of geographic boundaries.

However, despite all the attention, visibility and media interest, many have needed help understanding the underpinnings and implications of the technology for policymakers and other officials. The widespread technology adoption across many industries exacerbates this difficulty.

China

Susan and Howard (2010) note, 'China's monetary regulatory framework has undergone unprecedented changes in a few relatively short years, and more changes are coming. Chinese banks are large and efficient. China's monetary framework is generally isolated and not directly affected by global currency issues, although the global slowdown has weighed on trade.

Cai Esheng noted, 'Relevant laws and guidelines guide China's financial supervision authorized by the Securities Law at the end of 1998.' The banking institutions increased from 3,639 in 2007 to 8,721 in 2010, but the value doubled from 51 MB to 6,000 billion.93.2 trillion yuan. In addition, the number of non-bank monetary institutions increased from 690 in 2007 to 782 in 2010, accounting for about 33.1% of GDP, and total resources are estimated at 1,344,442 billion yuan. This has two consequences. First, the number of banking financial institutions has decreased significantly. Second, the increased emphasis on resources reflects the more excellent added value and effectiveness of foundations in the Chinese financial sector.

Russia

Vladimir I. Soloviev (2018) describes the composition and quality of the Russian fintech environment. The results show that the fintech push has yet to cause extreme changes in the Russian economy. This technology is used for online banking, shift management, crowdfunding, blockchain and related activities.

Ponomareva et al. (2020) state, 'In Russia today, fintech is applied to improve the monetary aspects.' The respective authorities are assessing the promotion of innovation in artificial intelligence, blockchain and other technological aspects.

Promoting Russia's fintech development in 2019 involves many issues, including needing an advanced cryptocurrency mining framework, data security issues and the possibility of illegal off-the-shelf transactions due to blockchain innovations.

India

Income on cryptocurrency is taxable in India. The Indian government introduced the Cryptocurrency and Regulation of Official Digital Currency Bill, 2021. This bill was formed to create digital currency issued by the Reserve Bank of India (RBI). On 1 November 2022, the RBI launched the Central Bank Digital Currency in the wholesale and retail market as a pilot project. It is being issued in the same denominations as the paper currency and coins. It is being distributed through the banks.

Crypto Income: Global Tax Regulations

Each country imposes different taxes on digital assets, including cryptocurrencies. Switching from one cryptocurrency to another may be taxable. Spending cryptocurrency on low-value items also is taxable, as it is treated as a sale of cryptocurrency. In the United States, 'House Financial Services Committee met with the CEOs of major crypto firms to talk about the future of digital assets.' In South Korea, the regulators have postponed a 20% crypto tax until 2023, citing errors in tax-related data. In Russia, the activities of cryptocurrency are partially regulated.

Table 1 depicts the genesis of crypto income regulation during 2010–2020, and Table 2 presents the global tax regulations for cryptocurrency.

Review of Regulatory Mechanisms in Select Countries

China

China is considered the most favoured country for blockchain administration. An administrative order of China, 2013 is 'Notice to Prepare for the Risks of Bitcoin'. This order granted legal status to cryptocurrency, and it is considered a digital commodity asset.

East Africa

East Africa, as a developing economy, targets digital currencies. Digital currency is similar to mobile protocols useful for lowering transaction costs and accessible

Table 1. Genesis of Crypto Income Regulation: 2012–2020.

Year	Regulation
2013	Financial crimes enforcement network: guidance on crypto anti-money-laundering/know-your-client processes, United States of America
2014	IRS guidance on crypto taxation
2015	CoinFlip order: Commodity Futures Trading Commission for regulatory oversight of Bitcoin as a commodity
2015	New York State issues BitLicense: for firms conducting cryptocurrency business in the state
2017	SEC issues DAO report, clarifies many initial coin offerings are securities offerings
2017	Regulated bitcoin futures launch on Cboe, CME: In December 2017, both Cboe and the CME Group launched regulated futures contracts
2019	The Financial Action Task Force guides AML
2020	OCC clarifies that all national banks can custody of crypto assets

Notce: IRS, Internal Revenue Service; SEC, Securities and Exchange Commission; DAO, Decentralized Autonomous Organization; CME, Chicago Mercantile Exchange; Cboe, Chicago Board Options Exchange; AML, Anti Money Laundering:. OCC, Office of the Comptroller of the Currency.

Table 2. Global Tax Regulation for Crypto Currency/Digital Asset.

Country	Tax Regulation
Argentina	Taxable as income tax
Bulgaria	Taxable as a financial asset
Denmark	Taxable under income tax after deducting related losses
India	Taxed as capital gain as per income tax
Spain	Taxable under income tax
Switzerland	Taxable as foreign currency
United Kingdom	Three types of taxes, corporate tax, income tax and Capital gains tax

to all. Digital payment gateways are helpful to solve challenges further. In particular, virtual currencies may reduce issues relating to the maltreatment of market monopolies caused by fintech companies.

Europe

The European Union released regulations entitled ‘Markets in Crypto Assets’ (MiCa). These regulations are useful to examine the effect of blockchain in financial transactions and assess how to cope with risks relating to crypto-assets. These regulations are encouraging reinforcement of the potential of cryptocurrency. The European Central Bank classified cryptocurrencies as a subset of virtual currencies and it is called unregulated digital money.

South Africa

Darul Uloom Zakariyya of the Islamic Fatwa Centre in South Africa believes that digital currency is allowed by law. The decision meets the property and money criteria and conditions because: (a) it is considered as an asset, (b) it is a medium of exchange, (c) it measures value and (d) it is trading as an account.

India

The RBI has warned investors and traders of digital currencies. Given the cited risks, it has been decided that the entities regulated by RBI shall not deal with or provide services to any business entities dealing with or settling venture capitalists. RBI will study the opportunity of introducing non-mineable bitcoins.

The United Kingdom

The United Kingdom law includes rules laid down in European law. Key considerations are (a) whether the company's activities related to cryptocurrencies will cause the person to engage in regulated activities that require authorization or registration with the Financial Conduct Authority and possibly the prudent regulator and (b) are there any restrictions on how these cryptocurrencies can be traded and issued in the United Kingdom.

The United States of America

Cryptocurrencies are on the agenda in the United States. The focus is on regulators and agencies within the federal government, including (a) the Securities and Exchange Commission, (b) the Commodities and Futures Trading Commission, (c) the Federal Trade Commission and the Internal Revenue Service and (d) the Department of the Treasury from the Financial Crimes Commission. Despite the significant contributions of these organizations, very little legislation has been enacted. Many state governments have proposed legislation regarding cryptocurrencies and blockchain technology, and it has gone through with most of the work done in the legislature.

The United Arab Emirates (UAE)

The UAE is an advocate of blockchain technology and announced its regulations in April 2018. The UAE Blockchain Strategy 2021 aims to have 50% of all

government transactions through blockchain platforms within three years. The program aims to save $11 billion per year, print 398 million documents, travel 1.6 billion kilometres and 77 million man-hours. In Dubai, His Highness Sheikh Hamdan Bin Mohammed Al Maktoum launched the Dubai Blockchain Strategy in October 2016, which aims to make Dubai the first blockchain-powered city by 2020.

Taiwan

Taiwan has not issued any laws or special regulations regarding the rise of certain blockchain technology applications, such as so-called 'virtual currencies' or 'cryptocurrencies'. Taiwan's financial regulator has issued several publications to educate and inform the Taiwanese people as well as to promote its work on development and behaviour. On 30 December 2013, the People's Bank of China and the Bank of Taiwan issued a joint press release outlining the government's stance on bitcoin for the first time.

Venezuela

The Venezuelan government does not approve of cryptocurrencies. He was also responsible for promoting the use of cryptocurrencies and created his own cryptocurrency 'Petro'. Venezuela has taken additional steps to promote cryptocurrencies, such as special facilities for payments with other cryptocurrencies and special authorizations to ensure that contracts can be paid in their own currency.

Switzerland

The Swiss government's attitude towards cryptocurrencies and especially the technology behind them is very positive. The Swiss Federal Government and FINMA recognize the potential that blockchain/distributed information technology can provide to the financial services industry and other industries. Switzerland sees an opportunity to become a world leader, and leaders and managers are often open to innovation.

Spain

The Spanish government has been very cautious concerning digital currencies. Spanish law is highly protective of the rights of investors and consumers. Cryptocurrency cannot be legally treated as money for legal tender.

Summary

The following are essential insights observed relating to crypto income regulations across the globe:

- Cryptocurrencies are on the agenda in the United States.
- China has gone away from the open-minded move towards speculation activities while avoiding a total prohibition on digital currency activities. European Union announced its MiCa, examining the effect of blockchain and assessing how to mitigate crypto-asset risks.
- In India, the RBI has warned traders of virtual currencies regarding various risks associated with dealing with such virtual currencies.
- The United Kingdom's regulatory framework towards digital currencies consists of various individual frameworks, sure of which flow down from European legislation.
- The UAE is a staunch supporter of blockchain technology. The Emirates Blockchain Strategy 2021 aimed to handle most federal government transactions over the blockchain platform.
- Taiwan has not issued any laws or special regulations regarding the rise of certain blockchain technology applications.
- The Venezuelan government has had an ambivalent attitude towards cryptocurrency. It has taken on obligations to promote the use of cryptocurrency and created its cryptocurrency, called 'Petro'.
- The Government of Switzerland's attitude towards the fintech for cryptocurrencies is very positive. The Spanish government has been very cautious concerning digital currency.

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Article

Tax Administration Reform: End of Tax Disputes in India?

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Abstract

A long-due Indian direct tax administrative reform for removing the taxpayers' plight and widening the tax base gained momentum by introducing the faceless assessments and appeals scheme coupled with taxpayers' tax charter. Following a descriptive approach, the study assesses whether the reform would end the tax disputes. Albeit, ideally, any tax system should be simple, efficient, transparent, and free from conflicts. The Indian taxation saga indicates an infamous tug-of-war between the taxpayers and the revenue-seeking tax officers. Serving strange tax demand notices and retrospective amendments of the tax laws created a phobia of 'tax terrorism' in honest taxpayers' minds. Considering this, the government followed the digital route with no physical interaction between the taxpayers and tax officers for tax assessments and appeals. Moreover, fixing the responsibilities of the taxpayers and tax officers would minimize tax disputes substantially if addressing the apprehensions and teething problems appropriately, addressing the apprehensions and teething problems.

Keywords

Tax reform, tax administration, tax terrorism, tax evasion, FAS

Introduction

The World Bank's Paying Taxes Study Report, 2020 ranked India at 115th, indicating poor tax compliance, albeit the rank improved compared to 2019 (PWC, World Bank Group, 2020). Tax literature concedes that the simple tax system positively correlates with high tax compliance. Per contra, high compliance

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costs coupled with stringent regulations and harassment could likely impede investments and encourage tax evasion. Again, tax structure changes significantly impact the growth engine through multiple proxies such as investment decisions, overall productivity, and work-leisure behaviors (Neog & Gaur, 2020). Tax collections are essential for providing welfare and security to any country's citizens besides carrying out development activities. The tax administrator should collect taxes like a bee used to collect nectar from the flowers, that is, painlessly. However, the Indian taxation saga paints an infamous face-off between the taxpayers and the revenues. Media reports and increasing trends of income tax litigation report that the tax officers exert pressures on the taxpayers to collect additional revenues for fulfilling their targets or harassing them by enforcing different provisions of the harsh tax laws, tantamount to so-called 'tax terrorism'. Interestingly, the taxpayers are largely risk-averse and rational. Still, the tax officials treat them as potential evaders and apply legally permissible coercive actions (Alm, 2012), keeping the faith of the honest taxpayers with the tax administration. Fixing unrealistic fixed money-value targets per geographical area for the tax officers instead of any data analytic by the Ministry of Finance (MoF) has its roots in the United Progressive Alliance (UPA)-II regime. It continues in the National Democratic Alliance (NDA)-I & II periods. In June 2019, the MoF amended the provisions of section 276CC of the Income Tax Act, 1961, by an upward revision of the compounding fees to INR 2,000 per day for non-filing the returns within the due date. Furthermore, the retrospective amendments in Sections 132(1) and 132(1A) of the Act, respectively, during the Union Budget 2017, by redefining the terms 'reasons to believe' and 'reasons to suspect' further create phobia in the minds of the honest taxpayers. Considering the honest taxpayers' hardships and as a damage control measure against the infamous tax terrorism stigma, the Prime Minister (PM), on 13th August 2020, launched a platform for 'Transparent Taxation—Honoring the Honest' with faceless assessment and tax charter for the taxpayers and tax officers having rights and responsibilities with immediate effect while faceless appeal, with effect from 25th September 2021, is a commendable step indeed.

The direct tax amnesty scheme 'Vivad Se Vishwas (VSV)' launched in the Union Budget 2020 and subsequently extended up to 31st August 2021, reported over 1.32 lakh declarations covering tax disputes worth INR 99,765 crore settling long-pending tax disputes substantially (Punj, 2021). Considering the significant amount of blocked tax revenues in litigation, the government attempted to rationalize the income tax system and introduced the VSV and Faceless Assessment Scheme (FAS). Still, during the last decade, direct tax revenue as a proportion of the gross domestic product (GDP) reported a significant downfall. As progressive taxation, direct tax as a proportion of GDP should consistently grow. In contrast, the proportion of indirect tax should decrease, and the latter should not exceed the former. Surprisingly, from the financial year 2013–14, the indirect tax proportion exceeded the direct tax proportion, although, in 2021–22, both remained equal to 5.4% and estimated that from the 2022–23 fiscal the direct tax would reach 5.5% while indirect tax would reduce to 5.2%. Notably, in 2017–18, the total tax revenues as a proportion of GDP were reported at 11.2%, which

was reduced to 10.8% in 2021–22 and in 2022–23, estimated to reduce further to 10.7%, likely giving a clarion call for immediate action by the government (Mishra, 2021). Expressing his deep concerns and criticizing the government's tax policies, the former union Finance Minister (FM) Mr P. Chidambaram stated that this trend indeed indicates that people are accumulating wealth and evading income taxes while people at large are paying indirect taxes and bearing the burden of the mass, indicating loopholes in the existing direct tax system and poor tax base (Roy, 2022).

The tax literature indicates that personal income tax (PIT) choice consists of a choice of tax base and tax rate schedule. At the same time, the former depends primarily on the earnings ability of the assessee, albeit having wider variations. Interestingly, earnings ability is unlikely to be monitored for tax purposes, and labor income proxies for the tax base. Subsequently, the tax schedule derives from the tax base. Apart from labor income, other demographics as predictors of tax collection documented in the literature include age, gender, and height (e.g., Best & Kleven, 2013). Research also paints multinational firms'general corporate income tax (CIT) avoidance practices and strategies, particularly by tax rate avoidance, tax base avoidance, and even combining both (Sikes & Verrecchia, 2020). The saga of global tax reforms suggests a reduction in tax rates coupled with tax base widening policies. The US tax reforms witnessed a significant decrease in the marginal tax rates with tax base-broadening measures. At the same time, Canada pictured reductions in both—PIT and CIT rates with simultaneous tax base widening (Sancak *et al*., 2011). Germany introduced tax reforms for fiscal consolidation, reduced rates of both CIT and PIT and even depreciation allowances. Latin America has evidence of high inflation, triggering tax reforms for consistent revenue flows (Focanti *et al*., 2013), while Sweden reduced PIT significantly by broadening the value-added tax base. Again, politically motivated tax reforms implemented for fiscal needs, reduced marginal tax rates, and intense lobbying for tax exemptions result in varied equilibriums (Ilzetzki, 2018). Admittedly, only 1.5 crores Indians pay income tax in a country of more than 140 billion, that is, merely 1.07% of the population pays income taxes. At the same time, the figure in the USA is 22%, in China 10%, in Mexico 15%, and in Germany 14% (Chakravarty, 2020). At the same time, India is an exception since her per capita income is INR 1.40 lakhs while people with more than INR 5 lakhs effectively pay income taxes. India's high-income inequality refers to a low tax base since only 3% of the working class pays income taxes while that of the USA is 5% and the UK is 4%, respectively. Again, when the income tax threshold is much higher than the country's per capita income, many people stay beyond the income tax, indicating a lower tax base (Chakravarty, 2020).

The newly launched FAS would likely accelerate tax revenue collections by disposing of the tax disputes expected by the government, welcomed by the tax experts but with reservations. Due to the Covid-19 pandemic, the government rippled with a sluggish economy and contraction in tax revenue collection, planned to collect revenues from the untapped or under-tapped sources by introducing tax administration reform. This maneuver becomes a stratagem for financing mammoth health expenditures with simultaneous multiple planned and

non-planned expenditures. While launching the FAS, faceless appeal, and the taxpayers' charter, the Hon'ble PM referred to the tax administration reform as 'honoring the honest taxpayers' and reinforced that the future of the Indian tax reforms would be on 3Ts: trust, transparency, and technology. Ironically, scrutiny of the facts shows that the substantial reductions in the number of taxpayers in the 2019–20 fiscal year were due to the tax exemptions extended up to INR 5 lakhs in the Union Budget of 2019, along with the varying demographic profiles of the tax base (Lokeshwarri, 2020). The apprehension of the PM is unlikely to be refuted entirely, as tax noncompliance is the biggest hurdle for the revenues of developing countries (IMF, 2015). Accordingly, the study motivates to assess whether the Indian income tax administration reform, as envisaged, would reduce tax disputes.

Tax Disputes

Income tax is the most equitable and complicated among current taxes. The determination of taxable income is an arduous process. Accordingly, the system's success depends on the cooperation between the taxpayers and the tax officials. Tax compliance is taxpayers' decisions informed by their perceptions. If the tax administration relies on fully exploiting fiscal illusion, it would be unlikely to mobilize large amounts of tax resources. The tax officers presume that most rational taxpayers either underreport their incomes or claim deductions not subject to independent verification. The taxpayers are unlikely to be caught and penalized for cheating and tax evasion. In contrast, an effective tax administration should ideally require setting an environment that would motivate spontaneous and voluntary tax compliance. Surprisingly, the Indian tax saga has remained controversial over the last few years, where tax officers, by and large, emphasize excessively in tax collections rather than computing the taxable income accurately. Taxpayers remained burdened in justifying their claims for deductions and exemptions, which often end with litigation and tax revenues stuck for several years. Tax literature concurs that complexity and procedural justice contributed to higher tax noncompliance and enhanced tax evasion (Deb & Chakraborty, 2017). The taxpayers are unlikely to be placed at the mercy of tax inspectors and even confronted with administrative proceedings unchecked by judicial review. In January 2014, the then Gujarat Chief Minister, Mr Narendra Modi, asserted that every taxpayer is unlikely to be dishonest. Still, in a U-turn, the former Union FM Mr Arun Jaitely, under his leadership in 2017, had defended the government's decisions that the opposite of tax terror is unlikely to be a tax haven. This locution is self-explanatory and reveals how the government was adamant about collecting taxes. India's image of a 'hub of doing business' further deteriorated worldwide when it served INR 40,000 crores in Minimum Alternate Tax demands to Foreign Institutional Investors during the NDA-I regime. Moreover, the Income Tax Department (ITD) commenced serving strange tax demand notices and surprisingly amended the tax laws retrospectively; all those created a phobia of 'tax terrorism' in the taxpayers' minds. International experience also compelled us to acknowledge that tax risk management as a part of the corporate risk management strategy

significantly affects the strategic planning and operations of the corporate assessees (Neuman et al., 2020). Allegedly the line of demarcation between honest and dishonest taxpayers is blurred as assessed by the attitudes of the Indian tax officers. The taxpayers refer to such attitudes as tantamount to the infamous 'tax terrorism'. The tax officers argue that they have yet to leave any stone unturned in scrutinizing the tax assessments and deductions claimed by the taxpayers before disallowing a few of those as bogus or irrelevant. Per contra, taxpayers report that the tax officers misinterpreted the laws despite their simple interpretation. Such a tug of war consumed the tax administration's substantial amount of time and resources, creating an unnecessary diversion from detecting and dealing with instances of tax evasion. Tax experts argue that the government is responsible for 'tax terrorism' by setting unrealistic tax targets for the tax officials, who, in turn, have exaggerated their powers to harass the taxpayers for fulfilling their stiff targets. The tax officers' attitudes were punitive, resulting in accelerated tax terrorism.

Table 1 presents the age-wise pendency of the total arrears of direct taxes under the categories of 'disputed demand' and 'undisputed demand'. The data shows that total disputed demand pending between 1 and 2 years constituted 64% of the

Table 1. Age-Wise Pendency of the Total Arrears of Direct Taxes under the Categories of 'Disputed Demand' and 'Undisputed Demand' Separately for Corporate and Non-Corporate Taxpayers as on 30 September 2019 [INR in Cr.].

Tax Revenues Raised but Not Realized	>1 Yr and ≤2 Yrs	>2 Yrs and ≤5 Yrs	>5 Yrs and ≤10 Yrs	>10 Yrs	Total
Corporation tax under dispute	287017.8	190279.1	19504.06	5356.8	502157.8
Income tax under dispute	351414.1	122375.7	12058.72	8823.1	494671.6
Total disputed demand	638431.9	312654.8	31562.79	14179.9	996829.4
Corporation tax not under dispute	80625.4	39186.09	4386.26	1932.86	126130.6
Income tax not under dispute	66152.71	22527.57	3375.46	986.8	93042.54
Total demand not under dispute	146778.1	61713.67	7761.72	2919.65	219173.2
Corporation tax not realized	367643.2	229465.2	23890.33	7289.66	628288.4
Income tax not realized	417566.8	144903.3	15434.18	9809.9	587714.1
Total tax revenues not realized (disputed + undisputed)	785,210	374368.5	39324.51	17099.56	1,216,003

Source: Standing Committee on Finance (2019, p. 25).

disputed demand. Similar information for more than 2 years but less than 5 years stood as 31.36%, whereas the figures for more than 5 years but less than 10 years is 3.16%, and for more than 10 years, the figures show as 1.48% respectively. Regarding total demand not under dispute, the figures for the stated period stood as 66.96%, 28.15%, 3.54%, and 1.35%, respectively. Furthermore, the total unrealized revenues (disputed + undisputed) concerning the outstanding amounts in relative terms for the stated timeline stood at 64.57%, 30.78%, 3.23%, and 1.42%, respectively. The data reveals that around 81.97% of the blocked amount is under litigation (disputed), which is unlikely to be recovered soon, albeit the VSV scheme launched on 1st February 2020, is likely to recover its substantial portion. Consequently, the tax administration should take appropriate measures to collect the blocked revenues, earmarked as 'Total Demand not under Dispute'.

Table 2 documents the number of direct tax appeals pending with the multiple judicial fora. It indicates that appeals pending with the Commissioner of Income Tax (Appeal) registered an increasing trend for the 5 FYs. Appeals pending with the Income Tax Appellate Tribunal (ITAT) report a decrease in the FY 2015–16 vis-à-vis 2014–15. After that, they registered an increasing trend for the consecutive 2 FYs and then marginally dropped in the FY 2018–19 by 0.65%. Pending appeals sub-judice with the High Courts (HCs) decreased by 6.25% in 2015–16 compared to 2014–15 and registered increasing trends consecutively for 3 FYs. In 2018–19, the numbers dropped by 0.78% vis-à-vis 2017–18. Appeals pending with the Supreme Court (SC) report a fluctuating trend where in 2015–16, the number of cases dropped by 4.62% compared to 2014–15 and after that registered an increasing trend. In 2018–19 it reported a hike of 2.08% year-on-year basis. The blocked direct tax revenues and pending cases indicate that tax litigations substantially increased in recent years. Even the Direct Tax Expert Committees identify multiple factors breeding tax disputes like unrealistic revenue maximization approach catalyzing setting stiff tax collection targets, extreme conservative attitudes by the tax officers fearing vigilance inquiries, the complete absence of accountabilities of the actions by the tax officers, inadequate or lack of knowledge about the assessees' complex business models in the dynamic business world and even reluctant attitudes of the top officials in releasing clarification/notification at the outset of any controversial tax treatments unless litigants approach the Tribunals/Courts. The Standing Committee on Finance Report 2019

Table 2. Direct Tax Appeals Pending Before Different Judicial For a [in Nos.].

Financial Year (FY)	CIT(A)	ITAT	HC	SC	Total
2014–15	232,126	103,238	34,281	5,661	375,306
2015–16	258,898	91,971	32,138	5,399	388,406
2016–17	290,227	92,386	38,481	6,357	427,451
2017–18	321,841	92,817	39,066	6,224	459,948
2018–19	341,484	92,205	38,758	6,354	478,801

Source: Vivad Se Vishwas Scheme, Government of India, Ministry of Finance, Department of Revenue, Lok Sabha Unstarred Question No. 1678, p. 2, dt 02/03/2020.

also pointed out that as of 31st August 2019, INR 1,217,749 crores were 'difficult to recover' and stuck in litigation since frivolous tax demands raised by the revenues (Standing Committee on Finance, 2019, p. 24).

Tax Administration Reform

The modern-day tax administration is a complex system with multiple objectives—from raising tax revenues to achieve social and economic objectives. Attainment of those objectives is likely to introduce amendments to the tax laws, restructure the organization, impart rigorous training to the tax officers for implementing the tax laws and policies, and expedite the assessment procedures for collecting revenues. Since the tax policy and administration are closely linked, the tax administration should, therefore, comprehend the internal mechanism having flexibility for promoting the practical application of the said tax policy to correct fiscal imbalances, especially in developing countries (Ahmad & Stern, 1991). In developing economies like India, the tax administration is confronting several challenges, including a shortage of staff, inadequate compensation, increasing numbers of taxpayers, and inadequate support from the accounting and legal fraternities. The challenge seems magnified by the pressures to achieve the target tax revenue collections and explore the untapped avenues. The poor state of tax administration remains a stumbling block for lower levels of tax compliance coupled with higher compliance costs and increasing trends of filing litigation. Several Committee recommendations guided tax reforms in a post-liberalized India. These include the Tax Reforms Committee of Raja J. Chelliah (1991, 1992 & 1993), Advisory Group on Tax Policy, and Tax Administration for the 10th Plan led by Dr. P. S. Shome (2001), Report of the Task Force on Direct and Indirect Taxes led by Vijay Kalkar (2002), and Reports of Tax Administration Reforms Commission led by Dr. P. S. Shome (2014 & 2015).

In the past 33 years, the Indian tax system attempted to simplify the tax assessment procedures, moderating the tax rates in conformity with international standards and widening the tax base with better enforcement. Still, taxpayers will likely perceive only some of those attempts in the same tune. The thrust and direction of the tax reforms were motivated mainly by accelerating revenue collections with minimal distortions and plugging the loopholes. The term 'simplification of the tax system' is a relative term for taxpayers as it is the ease of filing returns for most of them. In contrast, others presume it simple to explain the jargon, provisions, rules, and notifications, albeit; practical implementation is more significant than the theoretical simplification. The FAS and tax charter indicated the Modi government's commitment towards a transparent people-centric robust tax system, reinforcing that the future of the Indian tax system reform rests upon 3Ts.

The FAS process consists of serving notices to the taxpayers and transferring all the assessment-related documents post-assessment to the assessing officers (AOs) through 26 steps that would record centrally with the National E-Assessment Centre (NEAC). The scheme empowers the NEAC to assign verification units, or

technical units, to redress tax officers' queries regarding any such assessment matter, which would likely expertise the tax officers with the mechanism for its smooth implementation. The assessment procedures would be de-linked from the location of the taxpayers. They would be distributed randomly to tax officers nationwide, substantially minimizing corruption. The nomenclature 'faceless appeal' is self-explanatory and dynamic based on the artificial intelligence (AI) technique which would ultimately replace the territorial and manual appellate proceedings before CIT(A). Digitally all the documents related to taxpayers' appeals would be verified electronically by the tax officers of any jurisdiction. This action would bring more transparency in the tax dispute resolution process by minimizing the chances of taxpayers' grievances. The formal procedure of serving show-cause notices through NEAC having an audit trail ensures that the taxpayers have sufficient time to respond to last-minute rush for tax demands and unprecedented additions in the assessments. The system would arrange a video conference (VC) for the taxpayer whenever requested instead of any personal appearance could be a game-changer as the conversion is supposed to record in the system, which, like an affidavit filed in a Court, is unlikely to be alerted subsequently. Unsatisfied taxpayers could approach the Principal Commissioner of Income Tax of the concerned zone if they violate any right(s) of the charter or if any assessment issue arises. The recent order of the Central Board of Direct Taxes (CBDT) indicating that the income tax surveys, an intrusive action, would be carried out 'with utmost responsibility and accountability' likely to substantially minimize the harassment and choirs of the tax officers the so-called 'tax terrorism'.

Earlier, the CBDT introduced a mandatory document identification number, quoting the same in all its communication with the taxpayers towards its gradual process of bringing transparency in dealing with taxpayers. Whenever the Revenues are, the returns would choose to apply AI and data mining tools without any human interference, likely to eliminate the possible corruption of the system. If implemented effectively, the system will be unique worldwide and could be the global benchmark in the compliance mechanism process. The FAS also introduces structural changes in the tax administration by dividing the tax authorities into assessment, verification, technical, and review units. These steps could lead to specialization and efficiency in terms of time, costs, and resource savings and improved assessment quality. Moreover, as envisaged, the FAS would also bring more transparency, efficiency, and accountability to the tax administration. Regarding the tax charter containing 14-point obligations for the revenue and 6-point duties of the taxpayers, the Revenues will be more accountable. This accountability is likely to permeate all its operations ranging from real-time decisions, collecting the right amount of taxes, maintaining the privacy of the taxpayers' details, and respecting their dignities, in line with the prevailing tax charters of a few Western economies.

The Challenges

Almost a year after abolishing the Tax Ombudsman Institution, the central government, in line with the UK and Australia, introduced the taxpayers' charter,

which is unlikely to have stemmed from any legal provisions of the Income Tax Act 1961. Tax experts came out with several areas for improvement of the accord. Zone-based steep revenue targets assignments to tax officers likely impede its successful implementation. The voluminous online submission of returns and explanations of deductions and exemptions would be claimed primarily by the corporate taxpayers having complex business models, which could require clear communication to shun misunderstanding, ambiguity, and even litigation. Further, small taxpayers must have exposure to the FAS mechanism to capitalize on its embedded benefits. Since the FAS is a fully digitalized mechanism, robust system support and a mammoth capacity-building exercise would be indispensable for its seamless implementation and successful operation (Memani, 2020). As the domestic tax laws have inadequate provisions on the taxation of some business models, conflicts are likely to emanate during the successful execution of the FAS. Tax officers apprehended that the FAS could create a logistical problem, and they wondered whether the existing pending cases would be put on hold or reach a settlement in the current system. The faceless appeals are likely to increase demands as the taxpayers are unlikely to get any fair chances to explain their standpoints, which could reach the IT Tribunals.

The tax consultants with vast experience have cautioned that by and large, assessees prefer to argue physically before the IT Commissioners. In the FAS appeal proceedings, they are unlikely to get fair chances. The risk of confirmation or enhancement of tax demands would be substantial. It also apprehended that the taxpayers, whenever any faceless order is challenged and disposed of in any faceless appeal, are unlikely to get any relief. On the contrary, it would compel them to carry forward the matter in the subsequent levels of judicial proceedings. Historically, tax inspectors showed excessive meticulousness. Even in minor cases having marginal revenue involved substantially destroyed the credibility of the tax administration with a simultaneous setback to the honest taxpayer's morality and confidence. Accordingly, the success of the FAS depends mainly on the tax culture and mindset of the taxpayers and tax inspectors, which, in the Indian taxation context, probably be a Herculean task on both fronts (Lavi, 2020). The Faceless Appeal Scheme, 2021, mandates the Commissioner (Appeals) to allow requests for personal hearings via VC with predetermined schedules communicated through the National Faceless Appeal Centre (NFAC), where the faces of the authorities would remain blurring. Still, the scheme's success must be tested soon in a country like India with low bandwidth.

Historically, the Indian tax administration introduced an e-filing system with effect from September 2004, initially voluntary for all categories of assessees, subsequently became mandatory for all the corporate assessees from July 2006, and from the assessment year 2012–13, it became compulsory for those with an annual income of more than INR 10 lakh. Extant literature demonstrates that multiple influencing factors play significant roles in e-filing adoption, such as perceived credibility, behavioral control, attitude and subjective norms, and the catalyst role of the tax advisor (see Lu et al., 2010). Adopting Information and Communications Technology (ICT) in tax filing depends on several theoretical underpinnings, such as the theory of planned behavior, technology acceptance

model, innovation diffusion theory, model of personal computer utilization, and unified theory of acceptance and use of technology. E-filing research applies some of these theories worldwide, for example, in India, Australia, Malaysia, Taiwan, and the UK (Lai & Choong, 2010; Ojha et al., 2009). Research further suggests that strengthening state capacity and collecting tax revenues are central agendas, especially in developing economies (Pomeranz & Vila-Belda, 2019). Accordingly, the role of ICT becomes paramount in cracking down on instances of tax evasion (Slemrod et al., 2019). Albeit e-filing services are accessing measurable benefits to the taxpayers and tax administration in terms of convenience, time and cost-saving, accuracy, security, reduced processing time, and efficiency. Studies report that taxpayers are primarily reluctant to access the online filing system (Venkatesh et al., 2013). Moreover, trust in the government and technology is critical for e-filing success. An online tax-filing system remains valid till the users can access the net benefits (e.g., minimal errors, lower communication costs, real-time information processing, and faster refund processing) and assay the risk assessments.

A close review of the related literature indicates that multiple challenges in the e-filing mechanism have become impediments. Studies have pointed out that the e-filing mechanism has suffered due to inconsistency in the information used in different tax filings, conflicting tax laws in multiple jurisdictions, selection of appropriate income tax return (ITR) satisfying the conditions for selection, computation of deductions, and taxable income, risk of hacking the personal data while filing the returns accessing cyber centers, filling the correct tax deducted at source in the ITR, presence of multiple Form 16, stuck in getting documents for claiming the house rent allowance exemption, unable to provide timely submission of tax proofs to the employer, nonpayment of advance tax and even forgetting the required password for filing the returns. To counter the stated e-filing challenges, the government should chalk out strategies and efforts for promoting the usefulness of the e-filing by investing in a campaign, adding more web-based tutorials and videos, extending 24×7 online services in the month of filing, enhancing security features, and installing sophisticated firewalls. Furthermore, the tax authority should encourage early payment with minimal rebates or letters of appreciation to avoid the last-minute rush and associated traffic jams. The management must ensure that the system can absorb the high traffic volume.

The Way Forward

A good tax administration generally should reflect three essential components: determination, calculation, and payment. The system requires information, knowledge, and a modus operandi of treating the assessees (Shome, 2019). Considering tax administration features and for smooth implementation of the FAS, the tax inspectors dealing with the assessments, scrutiny, refunds, and technicalities should be rigorously trained with the complex provisions of the Act to minimize the litigation chances substantially. Furthermore, the provisions of the Act, rules, and notifications should be made taxpayers-friendly and rationalized

for higher tax compliance. Interestingly, the FAS system itself is based on trusting the taxpayers, which would likely influence the tax morale aspects; hence tax administration should emphasize the four key drivers of trust to improve the tax morale: fairness, equity, reciprocity, and accountability, in line with the literature (Prichard *et al*., 2019). A tax administration is unlikely to work in a vacuum. It has a close association with the public at every stage, and accordingly, the people's attitudes are likely to reflect in a good tax administration. For effective implementation of the tax policies, tax administration should substantially improve the information-sharing network and access the database of banks and financial institutions for tracking the financial transactions of the taxpayers well in advance before commencing the assessment. Apart from accessing financial data, there should be enhanced coordination between the direct and indirect tax administrations and central and state tax administrations.

Undoubtedly the tax officers' stringent tax assessment procedures created a lousy image and phobia of the tax administration in the minds of honest taxpayers, which probably induced a belief of discriminatory treatment. Accordingly, tax noncompliance precedence likely accelerated. Instances of the FAS and appeal endeavors primarily depend on the modalities and rules framed with the simultaneous robust technological support system. In the last couple of years, the Indian tax administration tremendously improved its taxation aspects, such as online filing, automation of withholding tax, real-time assessments, and issuance of refunds. Still, it must work regarding taxpayers' confidentiality and privacies, noncoercive measures for tax collections, and hassle-free refunds with a quick disposal of disputes without any judicial inferences. To manage litigation and tax disputes, the government took several steps *inter-alia* by enhancing the monetary limit for filing appeals, setting up a Dispute Resolution Panel (DRP), and resolution mechanisms through Advance Pricing Agreements, Double Taxation Avoidance Agreements, and Safe Harbor Rules. Moreover, to reduce litigation, the government decides not to file appeals in matters involving specific questions of interpretation of the law, akin to any pending case before the HCs and SC (Bajaj, 2022).

The ICT-based new technologies revolutionized the business world and tax administrations by decreasing information collection costs and providing real-time information, emphasizing digitalization, robotization, machine-to-machine technologies, and blockchain (Vishnevsky & Chekina, 2018). Tax administrations are applying big data analytic-based sophisticated techniques and tools to improve taxpayers' services and tax compliance and implement new audit mechanisms. Such an online audit mechanism produces multiple benefits, from minimizing face-to-face interactions between taxpayers and tax inspectors, reducing tax compliance costs, and increasing tax collections to enhancing global transparency in automatic information-sharing networks. Research validates the significance of information in tax enforcement, albeit it remains concentrated in the developed nations but developing economies recently joined the rally (Almunia & Lopez-Rodriguez, 2018). These network effects significantly improve the cost-effectiveness of the tax enforcement policy by increasing voluntary tax compliance.

Albeit the current study is conceptual and assesses the efficacy of the Indian tax reforms in general and FAS in particular, it discusses a few selective taxpayers (users) of the FAS and some practitioners (tax consultants) for a better understanding of the pertinent issues involved in the practical application of the scheme. During a personal and virtual interview with the taxpayers and practitioners, some exciting facets of the scheme were identified, primarily alleging that it circumvents the principle of natural justice. The CBDT earlier 2019 launched the 'E-assessment Scheme, 2019', which contained detailed procedures for the conduct of faceless assessment proceedings not confined to scrutinizing assessment proceedings for assessing income but even extended to proceedings carried out before the DPR, penalty proceedings (Patnaik et al., 2021). The scheme assigned a new title as FAS, 2019, and applicable for best judgment assessments under the Income Tax Act. During personal interviews, the users and tax consultants admitted that the faceless assessment had made the assessment process and even other proceedings faster, ensuring adequate time utilization. Apart from high-speed internet, which has a challenge for remote areas such as large parts of the northeastern states, and hilly areas of Himalayan regions, those taxpayers seeking a personal hearing with an AO must make their requests approved by the Chief Commissioner or Director General of Income Tax in charge of the concerned Regional Faceless Assessment Centre (RFAC). The sample taxpayers argue that their rights to a hearing could be seriously prejudiced in case they are denied or left in the discretions of the tax authorities. Furthermore, most respondents indicated that since the hearing under the scheme took place under VC mode and without a physical hearing, they confronted a herculean challenge to present their arguments in tax matters involving complex business models.

Regarding the automatic exchange of information (AEOI), India signed the inter-governmental agreement with the USA on 9th July 2015 to tackle tax evasion by obtaining information regarding US residents' and citizens' offshore financial accounts. Surprisingly, prior studies document that although the US is unlikely to be a tax haven, it is a preferred destination for wealth accumulation by foreign individuals requiring secrecy and tax-evasion opportunities having a high degree of bank secrecy and tax exemptions for nonresident individuals (Cotorceanu, 2015). Further, the complexities of setting up shell companies in the United States have been relatively comfortable vis-à-vis other tax havens. As per the agreement, the Indian financial institutions would provide necessary information to the Indian tax authorities, who would share it with the US counterparts and vice-versa. Moreover, countering the challenge of offshore tax evasion and stashing unaccounted money abroad required cooperation among the tax authorities. Accordingly, India, a leading member of other G-20 and The Organization for Economic Cooperation and Development members, developed a Common Reporting Standard (CRS) on AEOI. Notedly, on an annual basis, being a signatory member, India accesses information about the account holders having statuses of nonresident Indians and persons of Indian origins. With such consistent reporting by the various financial institutions, India could significantly evade tax evasion attempts. For implementing the CRS and IGA, Section 285BA of the Income Tax

Act and relevant rules and forms were accordingly amended. India signed tax information exchange agreements with 21 countries (tax havens), which would enable the exchange of information, including banking and ownership information, between the signing countries for tax purposes.

Even though many countries, including India, entered multiple treaties regarding the exchange of tax information to minimize tax evasion, related literature indicates that these treaties are unlikely to reduce tax evasion (De Simone et al., 2020). Transferring capital by opening bank accounts with a minimal fee from a nontax heaven nation to a tax heaven nation (outbound deposit) is a simple matter likely to accelerate tax evasion significantly. Considering this gravity, Indian tax authorities should frame stringent rules for evading tax evasion and amend the tax treaties accordingly. In conclusion, the FAS is a significant tax reform that has taken place in recent years and is an aptly appropriate step in improving the ease of doing business and bringing more transparency to the tax system. However, its success largely depends on the stakeholders' joint responsibilities.

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Article

Technology Revolution along with Sustainability: A Pathway for Growth

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Abstract

Examining an industry's technological upgradation is unexpected and unavoidable. The subsequent technical innovation is driven by the expectations and wants of the consumer for each product. History shows that switching from one technology revolution to another usually takes longer than the current trend. The industrial sector is currently faced with several risks, and it will take some time for management and staff to become used to new technology. This article presents the characteristics of both Industrial 4.O and Industrial 5.O and sustainability by using secondary data from various sources like journals, website, etc. The world has framed Sustainable Development Goals to know their pathway toward the sustainability of all living organisms and monitor their activities which will boost the countries to travel on a sustainable path and this article provides the keynotes about the goals. This article concludes that innovation in any domain should consider sustainability as the main theme.

Keywords

Sustainability, economic growth, industry evolution, upgradation of technology

Introduction

An industry's evaluation will pave the road for the growth of the economy. The fifth Industrial Revolution is now underway in developed nations. Mass transmission of goods and services and the use of artificial intelligence in most industrial processes are key goals. As every customer has a unique preference, the

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industry is moving more toward mass customization of goods and services. For every product consumer serves as the impetus for innovation and the technological revolution, as it paves the way to national progress along with sustainable development. Even economically prosperous nations will struggle to adopt manufacturing and educate their workforce in new technologies, so growing nations should analyse the factors that might act as barriers to adopting the new technology revolution. India is in the initial stage of 4.O technological adoption, whereas industrialized countries are in the initiation process of 5.O. India is exporting to developed countries like the UK, the US, and EU-27 even by lagging in technological advancement while comparing their local manufacturing domain. The main advancement in the 5.O is mass customization which is more in demand in foreign countries. India is in the practice of customization in the product but not in the mass volume of production. To compete in the global market, it is crucial to comprehend the technological advancements and industry revolution in the relevant sector. The higher levels of the industry are not feasible without any improvements and Industrial Revolution. Setting up new objectives and innovations on the worldwide market can draw customers and keep them loyal to innovative goods. The factors that cause the Industrial Revolution are new inventions, access to raw materials and rectifying the errors that occurred in the current era, trade routes, partners, social changes, a stable government, desire to get new things, customers need, etc.

Need for the Study and Structure

In the Industrial Revolution, industrialized nations are in the pre-phase of Industry 5.O, whereas the non-industrialized nations are in the Industry 4.O phase. The nations' technological differences make the exporters face intense rivalry. Due to intense rivalry in the modern period, the companies are struggling in both the local and export markets. Analysing the factors, exporters find it difficult to upgrade the technology and solve the current problems. The following research questions (RQ) are attempted to be addressed by this study, which gives an overview of the problems with technological upgrades and sustainability measures.

RQ_1. What are the elements that exporters face difficulty in competing in the global market as a result of technological advancement?

RQ_2. What is the initiative taken for sustainability?

This article provides the answers to the RQ in two sections. The first section discusses the factors that make it difficult for exporters to compete in the global market as a result of technological improvement. The second discusses the government's sustainability plan to ensure the continued expansion of the sector.

Research Methodology

Precise literature research was conducted to determine the overview of the industrial-technological revolution and the changes that were made in the process

of producing goods and services. In Google Scholar, Research Gate, Scopus, and Web of Science, the phrases Industrial 4.O, Industrial 5.O, technological revolution, creation of new technology, and so forth were used to locate the pertinent articles. It should be emphasized that the research does not contain all the relevant articles; rather, it is limited to covering the most recent and significant advancements in the field and summarizing and giving readers an overview of the current situation and potential directions for the future. This article employs a descriptive research format.

Overview of the Technology Revolution

The entirety of the Industrial Revolution began in the early 1780s. The first revolution focused an emphasis on elements like railways, water and steam power, and automation. This forces the nations to produce the items at a rate that will satisfy half of the global demand. The second Industrial Revolution, which followed, began in the 1870s and brought advances like mass manufacturing, assembly lines, and the electrification of machinery to meet much of the demand. This was followed by the third Industrial Revolution, which began in the 1970s and brought about changes in machine automation, the use of computers in manufacturing, and the production of electronic devices in order to reduce labor requirements and better meet consumer demand. The fourth Industrial Revolution, which focuses more on the digitization of the entire process, the influence of the internet, and the introduction of artificial intelligence in the production process, is currently taking root in emerging nations. In the future, people will focus more on the fifth Industrial Revolution, which will emphasize mass-scale customization of manufacturing, the use of cobots in the production process, and the integration of cognitive systems across the whole process (Ahmad et al., 2020).

The time span for technological advancement is quite short when compared to the existing pattern of revolution. And because of the population and the need for distinctive items, there is more conflict than usual in the global market. Developing nations should keep pace with developed nations in terms of technology in order to capture a larger proportion of the global market (Figure 1). Developing nations

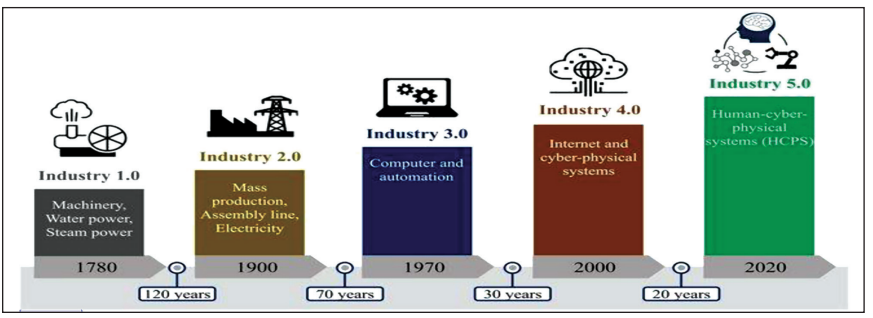

Figure 1. Time span for Technological Advancement.

Source: Research Gate (2021).

should keep speed with developed nations in terms of technology in order to capture a larger proportion of the global market. The requirements of customers constantly shift which means they want to upgrade to the next level so they can take advantage of the opportunities (Duarte et al., 2018). Every Industrial Revolution has distinctive traits designed to meet the evolving demands of the global market. To make alterations and upgrades to the company's current technology, it is crucial to identify that special trait. The customer, who rules the market, determines the direction of the Industrial Revolution. Now, consumers are more interested in customized products since it allows them to stand out from the crowd and attract attention. The nations with a sizable global market share began advancing toward the next stage of the Industrial Revolution in order to meet consumer demand. Whenever there is an Industrial Revolution, manufacturing companies struggle to adapt new technology in their workplaces and teach their staff how to operate them. In order to rectify them and to spice up the new implementation that offers benefits in all dimensions, it is of the utmost importance to assess the issues.

Industry 4.O

Industry 3.O revolution processed out automation of manufacturing machinery, which further paved the way for Industry 4.O. This progression (Industry 4.O) focuses increasingly on the digitization of every step of the manufacturing process, which transforms how people connect, communicate, and do business. Literally, this revolution is causing an exponential and severe change in how people use technology, such as computers, to assist in their daily lives. Industry 4.O involves the development of 3D printing, intellectual property, artificial intelligence, smart robotics, and automation, as well as quantum computing, the Internet of Things, drones, the blockchain, and the utilization of big data (Faridi et al., 2020). The two main pillars of Industry 4.O are DIGITALIZATION and AUTOMATION IN MANUFACTURING (Happonen & Ghoreishi, 2021). Investors and international leaders became interested in this fourth Industrial Revolution due to its major keyways (Figure 2).

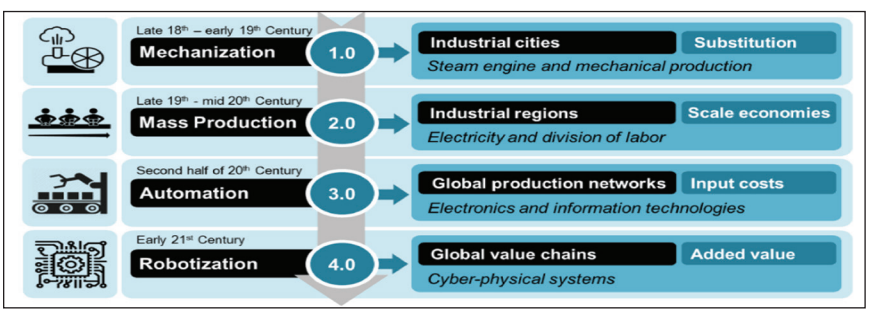

Figure 2. Major Break through in Industrial Revolution Pathway.

Source: Research Gate (2020).

Challenges in Adopting 4.O.

Lack of technology abilities is the main obstacle to adoption 4.O. To compete in the worldwide market, it is common to embrace the global situation in accordance with technological advancement. In the modern period, the manufacturing sector depended entirely on labor for most of its tasks. When the manufacturing sector begins to automate its processes, both the industry and society must go through a complete transition (Bongomin et al., 2020). Exporters must employ emerging technologies effectively if they want to prosper both domestically and internationally (Küsters et al., 2017). If a nation hindered technological advancement, it would lose market share both domestically and abroad. Among the risk factors for exposure to automation, the low level of adoption of automation may be the most significant. The minor obstacles to adoption in 4.O include concern regarding data security and privacy, lack of funds to adopt early, lack of appropriate digital infrastructure, requirement of specialized skills, training the employees and employers, unavailability of technological raw material, Credit facilities for technological upgradation, changes in the human working pattern, survival of small scale industries, need and want of the consumer identification process, competing with earlier adaptors, value chain integration, high investment requirements, uncertainty about economic benefits, lack of IT infrastructure and lack of internet coverage.

Highlights of Industry 4.O.

The core notion of 4.O is that humans can acquire and analyse data and make better judgments with the help of cutting-edge sensors, embedded software, and robotics (Rathore, 2022). The outcomes of using digital technology include increased automation, preventative maintenance, self-optimization of process improvements, and most crucially, a new level of efficiency and customer responsiveness (Chen & Xing, 2015). The Industrial Revolution, therefore, concludes with the following highlights in section 4.O IoT, IoS, Machine learning, Digitalization, Automation, Smart Industry, Cyber-physical system, Cognitive computing, made for me (Customization), Virtualization, Decentralized decision, Real-time capabilities (Ghoreishi, 2020).

Technology 5.O

The introduction of intelligent goods and automated machinery with robotics support is the main technical development of the fourth Industrial Revolution. Since artificial intelligence is being used for generating technology more than human contact, there will be several drawbacks. This is the key justification for switching to the fifth Industrial Revolution right now. With human assistance, the next revolutions will be more interesting, like those in business. In practical settings, automated AI systems cannot control the human experience. Undoubtedly, AI systems will help people, but they should not replace humans. The top technology enablers of Industry 5.O, are technological blockchain, drones,

exoskeletons, additive technology, 5G and beyond, and mixed reality. Every invention in technology 5.O will have 5G connec tivity and robotics plays a vital role in the upcoming days. The 5.O enables smart infrastructure along with clean energy and intelligent transportation.

Highlights of 5.O

Industry 5.O will focus on

- ❖ Delivering customer experience rather than the focus on connecting machines.
- ❖ Hyper customization rather than mass customization.
- ❖ Responsive and distributed supply chain rather than the Intelligent supply chain.
- ❖ Experience activated (interactive) products rather than the smart products.
- ❖ Return of manpower to factories rather than the manpower distracted from factories.

Sustainability

As everyone considers the development of technology, sustainability should also be given the same weight without fail. Only an ecologically sound environment throughout the world makes it feasible for humanity to move further in the direction of sustainable progress (Rathore, 2023). Even though new technology sped up production and made work easier, industrialization also brought forth new issues. Everyone should consider the mantra that SOUND GROWTH IS SUSTAINABLE GROWTH. Some of the negative effects included soil contamination, water pollution, and air pollution, all of which significantly reduced life expectancy and quality of life. All industries, from production to consumption, see sustainable growth as a result of technological advancement. In order to compete in the market, development is impossible without technological advancement. Every business, whether it is new or already established, wants to remain competitive for a longer period. The world is in an era where items may be customized, and consumers are going toward this trend. The only way for industrials to survive in the global market is to adapt to the world and to client wants. The manufacturing process should be expanded as the product's demand rises, and the product's shelf life should be examined. The market's demand and preferences for the product will last for a certain amount of time before shifting to the next one. In order to fill the market with a product that meets the current need, the maker should identify the market, seize the moment, and seize the opportunity. Technology development plays an important role in this transaction, from acquiring the raw materials to gathering user feedback. Due to the free movement of commodities inside the nation, the product cannot survive in the market for a longer period without technological advancement within the organization. The

points to be considered whenever the revolution happens in the aspect of sustainability (Faridi et al., 2020).

- ❖ Damage to the environment.
- ❖ Health and safety hazards to squalid living conditions for workers and their families.
- ❖ Climate changes.

Global Sustainable Measures (SDGs)

The new inventions are moving forward with the primary purpose of sustainability for the environment, even as the world established the Millennium Development Goals and Sustainable Development Goals for the welfare of the people, to reduce poverty, and to ensure the people's lifestyle (Ahmad, 2020). Recent innovations like cheap energy storage, long-term storage, plastic recycling, LED light efficiency, and public electric transportation create pollution-free environments daily. Only the countries that balance both technological upgradation and sustainability of the environment at the same ratio will move in the positive direction of economic growth. The Rio+20 conference on sustainable development produced the global sustainable development report, which is structured so that it will be examined once every four years to track how well a nation is doing in terms of achieving its sustainability goals. An impartial team of scientists chosen by the UN Secretary-General initially prepared the preceding global sustainable development report. The present study, which has been largely compiled by a committee of independent scientists, will be made public by September 2023. According to the 2023 report, the world has halfway completed the 2030 agenda, and everyone should hurry up their efforts that were delayed by COVID-19. According to the 2030 SDGs' intended agenda goal, countries should focus more on realizing their goals. The report conveys that 89% of the least developed countries, 93% of landlocked developing countries, and 94% of small island developing states had food inflation above 5%. SDG's goals like economic growth, industry innovation, and infrastructure, sustainable cities, and communities, responsible consumption and production, climate action, life below water, and life on land are inviting new inventions of technology upgradation. Technology should upgrade along with sustainability for steady economic growth.

Conclusion and Future Directions

The market and industry should adopt the most recent technology in the early adoption stage itself because technology is developing quickly. The company could only survive in the market for a longer period if it did this. The government should evaluate the pros and downsides of the technology that a specific industry is adopting, set sustainable goals, and monitor the industry to ensure that it is adhering to those goals. Currently, primarily a few nations have witnessed Industrial Revolution development 4.O, as the few developed countries are

transitioning to Industry 5.O, which is mass customization of the products, and the need for product modification is currently at its pinnacle. High-market nations ought to be aware of technical advancements occurring elsewhere, and such nations ought to produce products for their domestic markets to prevent losing market share because doing so would cause their economies to inflate. Every citizen of developing countries and underdeveloped countries should be aware of the SDGs to support their country in achieving its vision that would be effective for the nations.

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Article

An Analysis of the Use of Cryptocurrency in Chennai City, Based on the Perception of Its Technology, Awareness, and Use

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Abstract

Cryptocurrency is a way of exchanging value over a computer network without having to go through a central authority like a bank or government. Globally, there are more than a thousand different cryptocurrencies. Eventually, cryptocurrency will be used to buy/sell goods and services, just like conventional currency. Crypto-stock exchanges are popular in India, despite cryptocurrencies being illegal. The value of virtual currencies is solely determined by supply and demand, unlike government-backed money. This article studies awareness and perceptions of cryptocurrency among people in Chennai. Convenient sampling is used to collect data from general population through a structured questionnaire. The results of this study are expected to provide valuable insights into the current gaps and challenges in terms of cryptocurrency adoption in Chennai.

Keywords

Cryptocurrency, blockchain technology, cryptography, Chennai, Bitcoin, crypto market, investments

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Introduction

Cultural, Socio-economic Background of Chennai

Chennai is renowned for its strong ties to the Tamil language and literature, as well as its rich cultural heritage, which is reflected in its traditional arts and music (Krishnamurthy & Desouza, 2015). The city is home to a variety of religious communities, including Hindus, Muslims, Christians, and others, which all contribute to the city's diverse religious landscape. The city is also home to a few traditional industries, such as automobile manufacturing, which have had a positive impact on the economy. Chennai's IT sector has enabled the city to attract a younger, more tech-literate demographic. This group may be more open to investing in technology-based financial products, such as stocks and cryptocurrencies. Additionally, Chennai is a major educational hub, with a range of institutions providing students and professionals with access to education, as well as a vibrant film industry, Kollywood, which is a powerful economic and cultural force. Despite the city's economic strengths, it is important to note the socioeconomic disparities that exist.

These cultural and socioeconomic factors play an important role in analyzing the usage of innovations like cryptocurrencies in Chennai. Chennai's conservative outlook on investing may lead to a preference for stability and security over riskier, higher-return options. Fixed deposits and government savings plans may be more favored.

History of Currency

Cash has been a fundamental part of human life since the caveman era, when it was used in barter systems to exchange commodities and services. However, its influence diminished as it was exposed to a variety of drawbacks, including the inability to match with people's needs, the absence of a unit of measure, the inability for all goods to be divided or separated, the inability for items to be easily transported, and more. After recognizing its inadequacies, the currency underwent several iterations, including the minting of an official currency in 110 BC, the introduction of gold-plated Florence in 1250 AD, and the widespread use of paper currency from 1600AD to 1900AD. This is the origin of modern currency, which includes paper money, coins, credit, digital wallets, Apple Pay, and PayPal, all under the control of banks and the government. However, there are some drawbacks to this approach, like technical issues at banks, the ability to take control of users' accounts, and each account having a limit on how much can be transferred.

Cryptocurrency

Ten years have passed since the world's first cryptocurrency[1], Bitcoin, was created by Satoshi Nakamoto in 2008. Over the past few years, Bitcoin and

other digital currencies have become increasingly popular in various industries due to their potential benefits (Singh & Raj, 2022). Cryptocurrencies work in a way that is easy to understand[2]. Think of it as a digital, decentralized ledger that records all transactions. Digital coins or tokens are used to represent value, and each type of cryptocurrency has its own set of features and uses. Bitcoin, Ethereum, and other cryptocurrencies are decentralized, meaning they are not controlled by a single person or government. *Blockchain technology* records transactions on a digital chain, which is a list of each transaction, and then adds a new block to the chain (Shukla, 2019). This creates a secure chain, making it hard to change past transactions without affecting all the subsequent blocks—something that takes a lot of computing power to do. To make sure transactions on the blockchain are legit and not fraudulent, "miners" need to be used to verify them. These miners have powerful computers that solve complex math puzzles, and the first one to solve them gets to add a new block of transactions. They are rewarded with new coins.

When you own crypto, you have two keys: one is a public key, like an address, and the other is a private key, like a password. The public key is public and can be seen by others and used to get your cryptocurrency, while the private key is private and needed to access it and spend it.

On the other hand, P2P transactions[3] take place directly between people without any middlemen like banks, which can make transactions go faster and cheaper, especially when it comes to international transfers. You create a transaction, sign it, and then broadcast it to the network. Once it is added, it is irreversible. Cryptocurrencies have a finite supply, such as 21 million Bitcoin, which can have an impact on their value. Additionally, cryptocurrencies can be used for a variety of purposes, such as digital money, cross-border value transfers, smart contracts, and more.

There are infinite number of studies exploring awareness about cryptocurrency, but studies concentrated in Chennai city are really few. This study seeks to address this gap in research, which may be due to the city's unique socioeconomic and cultural characteristics. Previous studies on cryptocurrency typically focus on global or financial centers, and thus there is a lack of localized studies. This study seeks to fill this gap by examining the factors that affect cryptocurrency adoption in Chennai and its potential as a form of payment. Additionally, the findings of the study will be used to make recommendations for the success of the cryptocurrency industry in Chennai, which can be used as a basis for policy decisions and can provide a framework for the adoption of cryptocurrencies in other cities, as well as for venture capitalists and stakeholders to make informed decisions when investing in cryptocurrency.

Objectives

To compare the perception, awareness, and usage of cryptocurrency across different demographic factors such as age, gender, education, and income levels.

Review of Literature

1. Jenita et al. (2022): This study found that both men and women invested in cryptocurrency with the goal of making money in the short and long term. The idea is to use the extra money saved by salaried employees to invest in better options with less risky strategies, so that the money can be rolled back and still make a good return.
2. Scott et al. (2022): This study wanted to get an idea of how people feel about these new digital currencies. People are really interested in them, and the results show that the majority of people know about them and want to invest in them. However, they are scared of the risk and do not trust the government or regulators to keep an eye on them.
3. Khakhar (2018): The use of Bitcoin is not popular among individuals. Although there is a general understanding of virtual currency, its use is limited due to the fact that it is not legally accepted in India.
4. Shukla (2019): It is evident that the general public is cognizant of the potential of cryptocurrencies to generate high returns; however, they are hesitant to invest in them due to the lack of regulatory oversight from the government and its regulatory bodies. If the government of India is willing to regulate the use and transactions of cryptocurrencies in the financial sector, it can have a significant impact on the overall investment portfolio.
5. Rejeb et al. (2021): Cryptocurrencies offer tangible benefits by facilitating more efficient online transactions, reducing costs, and simplifying payment processes. An ecosystem based on cryptocurrencies has the potential to offer opportunities for new market entrants and aid startups by streamlining the fundraising process.
6. Kyriazis (2020): Bitcoin continues to be a major influence on the cryptocurrency markets, although the extent of this influence and the periods in which it produces herding effects are not universally agreed upon. Generally, bearish conditions are more conducive to the occurrence of herding effects in digital currency markets.

Significance of the Study

Investments in unregulated cryptocurrencies have shown an upward trend since 2020, despite uncertainty surrounding their future in India (Umair, 2023). This study seeks to gain a comprehensive knowledge of the perception, understanding, and utilization of cryptocurrencies in Chennai, taking into account the technological, economic, social, and other factors that influence people's decisions. The findings can be used to inform educational initiatives and regulate the local regulatory climate. The objectives of the study are to gain a better understanding of how people perceive and adopt cryptocurrencies in Chennai and to provide practical applications for policymakers, businesses, and educational institutions in the region.

Methodology

It is an exploratory and descriptive study based on primary and secondary data. The general public constitutes the universe of the study. The number of respondents in the study is 95. A convenient sampling method was used for data collection.

1. Primary data

A five-point Likert scale questionnaire is employed to collect data from the general population; Google Forms is used to create it.

2. Secondary data

The secondary data was collected from articles, research papers, online sources, and so on.

Data Analysis

The primary data collected were coded, calculated, and statistically processed, classified, and tabulated using appropriate methods. Tables and statistical results were derived using Statistical Packages for Social Sciences (SPSS).

Research Hypothesis

1. Null hypothesis (H_0): Opinions regarding statements about awareness and understanding of cryptocurrency are equal to the average level.
2. Null hypothesis ($H_{0)}$: There is no significant relationship in terms of gender with respect to all factors of cryptocurrency.
3. Null hypothesis (H_0): There is no significant difference in categories of education with respect to all factors of cryptocurrency.

Data Analysis

From Table 1, we can infer that most of the respondents are female, and many of them fall under the age group of 25–35 years. The education background of the respondents shows that most of them pursued master's degree, and most of them are employed in different sectors (57%). Most of the respondents fall under the income group of 1–5 lakhs per annum, and 42% of them are saving their income by investing in various investment avenues.

Interpretation

Table 2 shows the descriptive statistics of different factors of cryptocurrency. The mean score is high, which is 3.27 for the statement "heard of cryptocurrency before (CA1)" in the section "Awareness and Understanding of Cryptocurrency". In the perception and attitude toward cryptocurrency section (CP), the mean score is high (3.45) for the statement "cryptocurrencies as a speculative investment

Table 1. Demographic Profile of Respondents.

Gender	Men	Women			Total
F	37	58			95
P	38.9	61.1			100
Age	15–25	25–35	35–45	Above 45	
F	27	50	11	7	95
P	28.4	52.6	11.6	7.4	100
Education	High school	Senior sec	Bachelors	Masters	
F	6	6	39	44	95
P	6.3	6.3	41.1	46.3	100
Occupation	Employed	Self employed	Student	Unemployed	
F	54	8	21	12	95
P	56.8	8.4	22.1	12.6	100
Annual income (lakhs)	1–5	5–10	Above 10	No income	
F	39	16	10	30	95
P	41.1	16.8	10.5	31.6	100
Percentage of savings	1%–5%	6%–10%	11%–15%	Above 15%	
F	40	21	19	15	95
P	42	22	20	16	100

Table 2. Descriptive Statistics.

Factors of Cryptocurrency	Mean	SD
Section 1: Awareness and understanding of cryptocurrency		
CA1: Heard of Cryptocurrency Before	3.27	1.364
CA2: Name at least three cryptocurrencies	2.78	1.265
CA3: Understand the basic concept of blockchain technology	2.55	1.118
CA4: Understand how cryptocurrencies are created and obtained	2.42	1.208
CA5: Aware of risk associated	3.13	1.424
CA6: Know the difference between centralized and decentralized crypto	2.75	1.255
Section 2: Perception and attitude toward cryptocurrency		
CP1: Believe cryptocurrencies can revolutionize the financial industry	3.17	1.294
CP2: Safe and secure means of conducting financial transactions	2.88	1.228
CP3: View cryptocurrencies as a speculative investment rather than a stable store of value	3.45	1.286
CP4: Cryptocurrencies are more prone to fraud and scams	2.05	1.133
CP5: Believe government should regulate cryptocurrencies	3.24	1.269
CP6: Optimistic about the long-term future of cryptocurrencies	2.98	1.139
Section 3: Usage and investment in cryptocurrency		
CUI1: Used cryptocurrency to make purchases or payment	2.09	1.073
CUI2: Invested in cryptocurrencies or considered doing so	2.87	1.339
CUI3: Cryptocurrencies will soon become widely accepted payment method	3.15	1.337
CUI4: Aware of the existing government regulations related to it	3.29	1.219
CUI5: Concerned about the security risks associated with holding cryptocurrency	3.71	1.081
CUI6: Rely on credible sources for information about cryptocurrency	2.92	1.269
CA total	16.89	3.082
CP total	17.78	3.327
CUI total	18.03	2.904
Overall total	52.71	4.824

rather than a stable store of value (CP3)". In the third section, the statement "concerned about the security risks associated with using and holding cryptocurrency (CUI5)" has a high mean score of 3.71. The overall total usage and investment in cryptocurrency (CUI) factor has a high mean score of 18.03, followed by the perception and attitude factor, with a mean score of 17.78.

Hypothesis Testing

1. Null hypothesis (H_0): Opinions regarding statements that measure awareness and understanding of cryptocurrency are equivalent to the average level.

From Table 3, we can understand that the null hypothesis is rejected at a significance level of 1% for statements of respondents' awareness about the basics of blockchain technology (CA3) as well as how cryptocurrencies are generated and acquired (CA4). Therefore, the opinion on these statements does not equal the average level (3).

The null hypothesis is accepted at a magnitude of 5% for the statements of the respondent's knowledge about cryptocurrency—"I've heard of cryptocurrency before" (CA1), "I can name at least 3 cryptocurrencies" (CA2), "I'm not sure what the risk of the currency is" (CA5), and "The difference between centralized vs. decentralized cryptocurrencies" (CA6) (the average level of awareness). Based on the average score, the statement "I've heard about cryptocurrencies before" is more significant.

2. Null hypothesis (H_0): There is no substantial difference in opinion in terms of gender among respondents when it comes to all aspects of cryptocurrency.

From Table 4, since all the *p* values are above .05, we accept the null hypothesis at 5% significance. Therefore, there is no difference in opinion regarding all aspects of cryptocurrency in terms of gender. According to the mean score, male respondents are better at understanding, perceiving, and using cryptocurrency than female respondents.

3. Null hypothesis (H_0): There is no discernible distinction between levels of education with respect to all aspects of cryptocurrency.

According to Table 6, there is no significant difference in terms of education when it comes to cryptocurrency factors. The *p* value is higher than .05, so the null hypothesis is acceptable at a 5% level of significance for all factors. Based on the Duncan Multiple Range Test (DMRT), bachelor's and high school categories in education significantly differ from the senior secondary category at a 5% level of significance. The master's category in education does not differ from any other category of education.

Findings

1. Many of the respondents are female (61.1%).
2. A total of 52.6% of the respondents fall under the age group of 25–35.
3. Of the respondents, 42% have completed a master's degree and 56.8% are employed.

Table 3. t-Test for Specified Value (Average = 3) of Statements on Awareness of Respondents.

Statements About Awareness and Understanding About Cryptocurrency	Mean	*SD*	*T* value	*p* Value
CA1: Heard of cryptocurrency before	3.27	1.364	1.956	.053
CA2: Name at least three cryptocurrencies	2.78	1.265	1.704	.092
CA3: Understand the basic concept of blockchain technology	2.55	1.118	3.945	<.000**
CA4: Understand how cryptocurrencies are created and obtained	2.42	1.208	4.671	<.000**
CA5: Aware of risk associated	3.13	1.424	0.865	.389
CA6: Know the difference between centralized and decentralized crypto	2.75	1.255	1.963	.053

Note:** denotes significant at 1% level.

Table 4. *t*-Test Represent Significant Differences in Gender of Respondents with Respect to Cryptocurrency Factors.

	Gender					
	Male		Female			
Factors	Mean	*SD*	Mean	*SD*	*T* Value	*p* Value
Awareness and understanding	16.95	3.240	16.86	3.006	0.127	.900
Perception and attitude	18.35	3.048	17.41	3.469	1.384	.170
Usage and investment	18.19	2.747	17.93	3.020	0.430	.669
Overall	53.49	4.759	52.21	4.840	1.269	.208

Table 5. Education and Cryptocurrency Factors: Significant Differences Revealed through ANOVA Analysis.

	Education					
Factors of Cryptocurrency	High School	Senior Secondary	Bachelors	Masters	*F* Value	*p* Value
Awareness and understanding	17.33 (3.61)	18.67 (2.25)	16.18 (3.01)	17.23 (3.094)	1.603	.194
Perception and attitude	15.83 (2.787)	18.50 (2.58)	17.82 (2.78)	17.91 (3.881)	0.797	.499
Usage and investment	18.83 (1.32)	19.33 (5.125)	17.67 (2.639)	18.07 (2.929)	0.756	.522
Overall	52 (5.44)	56.50 (5.320)	51.67 (3.786)	53.20 (5.307)	2.112	.104

Note: Value in brackets refers to *SD*.

Table 6. Duncan's Multiple Range Test Table.

	Education					
Factors of Cryptocurrency	High School	Senior Secondary	Bachelors	Masters	*F* Value	*p* Value
Awareness and understanding	17.33 (3.61)	18.67 (2.25)	16.18 (3.01)	17.23 (3.094)	1.603	.194
Perception and attitude	15.83 (2.787)	18.50 (2.58)	17.82 (2.78)	17.91 (3.881)	0.797	.499
Usage and investment	18.83 (1.32)	19.33 (5.125)	17.67 (2.639)	18.07 (2.929)	0.756	.522
Overall	52[a] (5.44)	56.50[b] (5.320)	51.67[a] (3.786)	53.20[ab] (5.307)	2.112	.104

Notes: Value in the brackets refers to *SD*. Different alphabets in education denote significance at a 5% level using the Duncan Multiple Range Test (DMRT).

4. A total of 41.1% of the respondents fall under the income group of 1–5 lakhs per annum.
5. Based on one sample *t*-test, we can infer that most of the respondents have basic knowledge and understanding about cryptocurrency. Respondents are able to name at least some of the cryptocurrencies, but they cannot understand the basic concepts of blockchain technology and its function. This could be improved by providing resources and educational materials to help people understand how cryptocurrency really works and its potential benefits.
6. The *p* value of .05 indicates that there is no significant relationship in terms of gender with regard to the factors of cryptocurrency, which assess awareness, perception, and usage. Additionally, there is no significant relationship in terms of education with respect to the factors of cryptocurrency.
7. According to the mean score, male respondents are better at understanding, perceiving, and using cryptocurrency than female respondents in Chennai city.
8. The mean score is high for the statement "concerned about the security risks associated with holding cryptocurrency" (3.71). This indicates that people are aware of the risks associated with holding cryptocurrency, as it is not legalized, and are taking the necessary steps to protect their investments.
9. Socioeconomic factors can contribute to risk aversion. A conservative mindset regarding financial matters may make Chennai residents prefer low-risk investment options to protect their wealth.
10. The analysis of the usage and investment factor and mean score indicates that Chennai has a more conservative approach to investing, which may result in a greater focus on stability and security rather than higher-return options such as fixed deposits or government savings plans.
11. Based on the DMRT, bachelor's and high school categories in education significantly differ from the senior secondary category at a 5% level of significance. This implies that respondents who have senior secondary education are better at taking investment decisions. Hence, we can understand that education plays an important role in investment decisions.

Conclusion

According to the poll, 61% of the 95 respondents are aware of cryptocurrencies, which may be viewed as a positive sign that the money is gradually reaching everyone. India's information technology is assisting in this. The improvements and breakthroughs in India's technological industry are assisting cryptocurrencies, particularly Bitcoin, ripple, and Dogecoin, to acquire appeal among Indians. During COVID, the sector saw a boom in both domestic and foreign investment.

The aim of this study is to gain a comprehensive knowledge of the perception, understanding, and utilization of cryptocurrencies in Chennai. We can conclude

from the study that there are concerns about the security risks associated with holding cryptocurrency among respondents as it is not regulated or legalized in India. There will be rapid changes and innovations soon. Human beings know what they need and are good at better defining their wants and quickly transforming this into reality (K S & Kalpana, 2023).

Limitations

1. This study was conducted using Google Survey Forms, which necessitated internet connectivity, thus limiting its scope to internet users.
2. Additionally, some respondents to the sample were not interested or knowledgeable, resulting in some sampling errors.
3. Lastly, as cryptocurrency is a globally accepted product, this study was primarily conducted in Chennai; thus, it will not be able to provide a comprehensive picture of its acceptance on a larger scale as people are eager to use it as a currency or investment instrument.

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Article

Investigating the Impact of Fintech on Money Supply: A Case of the Indian Economy

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Abstract

The study's primary goal is to determine how the increase in digital transactions has affected narrow money, also known as M1, which serves as a proxy for nominal GDP and national income. The National Electronic Funds Transfer (NEFT), the Immediate Payment System (IMPS), the Unified Payment Interface (UPI) and Mobile Banking (MB) are all used in the study as proxies for digital payment systems. In contrast, M1, or narrow money, is used as a proxy for the money supply in India from July 2016 to August 2022. Every month, the Reserve Bank of India database has served as the source of the statistics. The effect of digital transactions on M1 has been studied using the sophisticated econometric approach known as the ARDL (autoregressive distributed lag model). The presence of cointegration between the variables is further demonstrated by the long-run cointegration bound test. The findings of the diagnostic tests show that serial correlation and heteroskedasticity are absent. According to the results of the CUSUMSQ (CUSUM-square) and Jarque–Bera tests, the model is stable and normally distributed. Digital payments are statistically significant and positively correlated with the money supply, according to the error correction model test. The long-run equation results also demonstrate that the digital payments system might have a long-term positive or negative correlation with M1. Since every other independent variable, excluding IMPS, is positively connected to the money supply and IMPS is negatively related, the two are inversely related. The money supply will shrink as IMPS transaction volume rises, but this will have minimal substitution impact on the M1 monetary aggregate. Thus, the study's findings imply that there might be several changes to the money supply or monetary

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aggregates, which are crucial tools of monetary policy, due to the impudent rise of financial innovations or additional fintech opportunities. Because of this, the demand for money function may become unstable, making it difficult for policymakers to put their plans into action.

Keywords

Fintech, narrow money, ARDL model, error correction model and cointegration, monetary policy, IMPS, UPI, NEFT

Introduction

The terms 'finance' and 'technology' are combined to form the phrase 'financial technology' (fintech). The application of technology in financial services is hence referred to as fintech. In other words, fintech is the use of technological advancements to deliver financial services. These services, created using cutting-edge innovations, provided a fresh approach to transaction facilitation and assisted in advancing customers' access to financial services. (Kim Lien et al., 2020). It is not a unique idea that a cashless society would be more straightforward and economically effective and that actual money is troublesome. A cashless economy is one in which payments for products and services are made by cheque or electronic transfer rather than cash (Tee & Ong, 2016). Further, we can see that India is now one of the world's fintech marketplaces with the quickest growth, as shown. The Indian fintech sector was valued at $50 billion in 2021, and by 2025, it is anticipated to expand to $150 billion. The report also includes the Reserve Bank of India (RBI) Payments Vision 2025, which states that by the year 2025, the RBI hopes to triple the volume of digital payment transactions, double the number of registered customers for mobile-based transactions, improve prepaid payment instruments transactions by 150% and double the amount of card acceptance infrastructure to 25 million. The Indian payment system has altered as a result of technological advancements. The once-cash-driven Indian economy is increasingly moving towards mobile payments.

Moreover, the RBI often creates working groups on a recurring basis to analyse and improve the monetary aggregates to review the ongoing and numerous impending changes in the Indian economy and advancements in the monetary sector. Three working groups have been established so far: the first working group on money supply was established in 1961, the second in 1977 and the third in 1998 under the title 'Working Group on money supply: Analytics and Methodology of Compilation'. India developed four monetary aggregates, known as M0 (monetary base), M1 (narrow money), M2 and M3 (broad money), which are used in the formulation of monetary policy. These aggregates were developed by the recommendations of the first working group (1961) and the Y.V. Reddy Committee (1998) on the money supply. As per the report of (SBI Research & ECOWRAP, 2022), the concept of M1, or narrow money, also includes overnight bank deposits. Thus, to assess the effect of a cashless economy on money supply, the study has gone through the latest reports published on the fintech trends and composition of

money supply present that the demand for cash is decreasing as the number of digital transactions rises through various digital payment systems like Unified Payment Interface (UPI), wallet, Immediate Payment System (IMPS), National Electronic Funds Transfer (NEFT) or mobile banking (MB). At the same time, the amount of money in circulation is rising while the trend is reducing (SBI Research & ECOWRAP, 2022). However, over a few decades, cashless payments have become commonplace, and economies have begun implementing policies to make their country completely cashless. This has raised concerns about how to ensure the security of the payments and make them feasible for all parties, particularly in light of the global pandemic that has altered people's lifestyles and forced changes to government policies. The pandemic has led to a surge in cashless payment methods, highlighting the need for reliable and secure transactions. As demand grows, studies and research are needed to guide policymakers and companies, as the future is cashless, offering advantages over security risks (Jain, 2023). Here's how to determine the effects of these transformations; as a result, the research began discussing the effects that seamless transactions using various digital payment methods are having on the Indian economy. The government of India actively promotes digital transactions through initiatives like Digital India and the demonetisation drive in 2016. The adoption of digital payment methods such as UPI, mobile wallets and other electronic modes has increased significantly. People increasingly use digital wallets, online banking and mobile payment apps for day-to-day transactions, reducing their reliance on cash. The Indian government has launched various schemes and incentives to promote digital financial inclusion, aiming to bring more people into the formal financial system. While digitalisation offers several benefits, challenges such as cybersecurity risks, digital literacy and the digital divide must be addressed. The RBI and other regulatory bodies have been actively involved in shaping the regulatory framework for digital payments and fintech. Accordingly, the escalating utilisation of pre-paid instruments is exerting a profound influence on the constitution of monetary aggregates, particularly M1, which was the focal point of our inquiry. Such a phenomenon may lead to fluctuations in the demand for money function, constituting a formidable hurdle for policymakers in executing their policy objectives.

Therefore, our primary objectives are to investigate the effects of these technical advancements on the money supply of the economy and to tackle the specific challenges that arise, making it difficult for policymakers to execute appropriate policies. Consequently, a comprehensive examination of the aftermath of digital payment systems and fintech on the narrow money or money supply is of paramount importance in the academic discourse to enable the implementation of precise and effective monetary policies.

Review of Literature

The literature on the financial payment system has evolved in a variety of ways as a result of the development of electronic money into a technological necessity, such as Hye (2009) investigates the association between Pakistan's financial

innovation and money demand. The study employed the robust time series approach from 1995–1996 to 2007–2012 on monthly time series data. International Financial Statistics are used to gather information on factors including money demand (wide money M2), narrow money (M1), price level (GDP), interest rate and exchange rate. For co-integration regression, the study used the FMOLS approach. The study's empirical results indicate a long-term link between money demand, interest rates, economic activity, inflation, financial innovation and exchange rates. The findings also show that financial innovation has a favourable impact on money demand over the long and short terms. Meanwhile, Columba (2009) examined the effect of transaction technology on M1 using data from Italy. This study seeks to understand how the proliferation of POS (points of sale) and ATMs (Automated Teller Machines) has impacted the demand for M1 and cash. Innovation in transaction technology was shown to have a favourable influence on M1 but a detrimental effect on the demand for money in circulation. In other research, such as Ugwuanyi et al. (n.d.), the effect of digital finance on Nigeria's money supply between 2009 and 2018 is empirically examined. The study substitutes the POS, online payment system and ATM payment system as independent variables for digital finance.

To conclude, M2 was assessed simultaneously as a measure of the money supply (a dependent variable). According to the findings of the autoregressive distributed lag (ARDL) model, Nigeria's money supply benefited from digital finance over the research period. Using monthly agglomerated data from the period of June 2003 to March 2011 in Uganda, Nakamya (2014) analyses the impact of the number of electronic fund transfers (EFTs) and the number of ATMs on demand for M1. The Johansen–Juselius cointegration model was applied. The study's outcomes demonstrate that, in the long-term model, income positively impacted the demand for M1. Furthermore, ATMs and EFTs—proxy variables for advancements in payment technology—have favourable and substantial effects on the demand for M1. By employing secondary data sources from Indonesia, Bank (Ulina & Maryatmo, 2021) evaluated the effect of ATMs and credit cards as proxies for the volume of non-cash transactions and electronic money on the money supply in Indonesia from 2009 to 2019. The results show a statistically significant positive correlation between the use of credit cards and electronic money with the money supply. Similarly, Song et al. (2022) employed a spatial econometric model to explore the impact of digital finance on the effectiveness of monetary policy and its heterogeneity in the case of China's economic market conditions. The empirical findings show that the digital finance index has a negative effect on economic growth, but the relationship between digital finance and monetary policy is significantly positive. Aminy (2022) uses multiple linear regression tests intending to test the effects of the credit-card-based payments system and electronic money on the money supply. The data have been taken from the period January 2016 to April 2020. The investigations show that debit cards and electronic money have a significant and positive effect on the money supply, whereas credit cards and money supply are negatively related to each other. However, Hasanah and Hasmarini (2023), in their study, want to assess how Indonesia's money supply is affected by non-cash transactions in the present

digitalisation era. The study uses a quantitative technique and gathers time series data from secondary sources between January 2016 and July 2022 from the Central Statistics Agency and Bank of Indonesia. Inflation, interest rates, economic growth, debit card transaction volume and ATM/debit card volume, as independent variables including e-money transaction volumes, were all measured for the study. For the analysis, the Engle-Granger error correction model (ECM) has been used. According to the short-run results, inflation, the number of ATM and debit card transactions, and the gross domestic product all significantly and positively affect the amount of money in circulation. In contrast, long-term results indicate that interest rates, credit card transaction volume, ATM/debit card transaction volume and e-money factors significantly affect Indonesia's money supply. contradictory to this, Jain (2023) in her study, tried to study the impact of cashless transactions on India's money supply. The study gathered yearly cross-sectional data on several variables, M0 and M1, which served as proxies for the money supply, and on credit card payments, debit card payments, NEFTs, UPI payments, pre-paid instruments and inflation, which served as proxies for electronic money, from 2010 to 2021. Financial websites and the RBI handbook of statistics provided the study's data. The amount of money supply, represented as M1(M0), considered the dependent variable, reduces by 1.44 units with every unit increase in cash converted into e-money, according to the study's partial regression coefficients of electronic payment. It demonstrates that, while to a small level, electronic payments do affect the amount of money in circulation.

Research Gap

It is clear from the above survey of literature that a limited number of studies have been conducted in India, and most of these pertain to the pre-COVID period. We need more such studies using recent data to confirm the results. Therefore, further research is required to fully understand how the fintech sector or an increase in digital transactions affects the demand for M1 and thus impacts the monetary sector in particular and the economy in general.

Methodology

This section explicitly shows the research design and model to define the relationship among the variables and various tests conducted to know the causal relationship among the variables and further to check the stability of the model.

Research Design

This study is an example of a case study on the Indian economy. It uses experimental research to know the causal link between the dependent and

independent variables. The study collected data on M1 as a dependent variable and on IMPS, MB, NEFT and UPI as independent variables. The time series data were obtained monthly from July 2016 to August 2018 from the publications of monetary statistics and payment systems of the RBI databases for the study. As far as the methodology is concerned, the ARDL model and the long-run bound test for co-integration, as well as the ECM model for the short-run causal link, were used in the study's data analysis. In addition, certain diagnostic tests were performed to determine the model's stability.

Model Specification

The basic model specified following the Cobb–Douglas production function is presented as follows:

$$f(\mathrm{L},\mathrm{K}) = \mathrm{YAL}^{\alpha}\mathrm{k}^{\beta}$$

$$\mathrm{M1} = f(\mathrm{MB},\mathrm{NEFT},\mathrm{IMPS},\mathrm{UPI})$$

where M1 = narrow money; MB = mobile banking; NEFT = national electronic funds transfer; IMPS = immediate payment system; UPI = unified payment interface.

Moreover, transforming the variables into a natural logarithmic algorithm form can be shown as follows:

$$\mathrm{LnM1}_t = \beta_0 + \beta_1 \ln(\mathrm{MB}_t) + \beta_2 \ln(\mathrm{IMPS}_t) + \beta_3 \ln(\mathrm{NEFT}_t) + \beta_4 \ln(\mathrm{UPI}_t) + \mu_t$$

Unit Root Tests

It is necessary to perform stationarity tests to determine whether the data are stationary before beginning the study. There are a variety of test statistics to check this; however, this study utilised the augmented Dickey–Fuller (ADF) and Phillips Perron test (PP) to assess the stationarity of the data.

Cointegration Test

To evaluate the long-run relationship in this study, we adopted the ARDL model and the bound testing method suggested by Pesaran et al. (2001). The ECM has also been used to examine the short-term correlation and rate of adjustment among the variables.

Diagnostic Tests

Numerous diagnostic tests have been used to evaluate the resilience of the estimated ARDL model, including the Jarque–Bera normality test, the serial correlation test, the heteroskedasticity test and the CUSUM of squares stability test.

Results and Interpretations

The analysis of the data used in the study is presented below, together with the empirical findings of the econometric methodologies utilised.

Data Statistics Description

It is crucial to look at the descriptive data and statistics that provide an understanding of the maximum, minimum, mean, median, skewness and standard deviation of the study's variables before the regression analysis. The statistics are displayed in Table 1 as follows.

Table 1 shows that all variables are negatively skewed, except MB, which is positively skewed. Each variable's standard deviation is lower than its mean value, indicating consistent changes. Moreover, the Jarque–Bera value is larger than 0.05, demonstrating the stability of the variables.

Testing Stationarity

To ensure all the variables were stable, the study carried out unit root tests, including the ADF and PP tests. This is followed by Table 2, which displays the results.

The results of the ADF and PP-test are shown in Table 2, indicating that both M1 and UPI are stationary at a level integrated of order 0 or I (0), while I (1) integrate MB, NEFT and IMPS. In light of these facts, it is shown that some variables are integrated of order I (0), and some are of I (1). Thus, we used the ARDL model, the most suitable regression technique when it is the combination of both.

Regression Analysis

We used an ARDL model of regression, along with the long-run bound test for cointegration, for a long-run estimate and the ECM to determine the short-run outcomes. Tables 4–6 display the regression analysis findings.

Table 1. Descriptive Statistics.

Variables	M1	IMPS	Mobile Banking	NEFT	UPI
Mean	15.10577	5.136052	8.794758	12.10410	5.761054
Median	15.10048	5.225019	9.123215	12.11276	6.785293
Maximum	15.48742	6.203111	22.70498	14.98857	8.761370
Minimum	14.50589	3.454863	4.190605	9.048582	–2.455033
Std. dev	0.256934	0.752982	4.731597	2.517993	2.949673
Skewness	–0.261801	–0.474155	1.842551	–0.009367	–1.443982
Kurtosis	2.197789	2.287367	6.182691	1.040181	4.308496
Jarque–Bera	2.829580	4.338670	73.10430	11.84382	30.99520
Probability	0.242977	0.114254	0.000000	0.002680	0.000000
Sum	1117.827	380.0679	650.8121	895.7037	426.3180

Table 2. Unit Root Tests.

	ADF-Test Statistics		PP-Test Statistics	
Variables	*P*–Values		*P*–Values	
	At Level	At First Difference	At Level	At First Difference
M1	.0163	–	.0386	–
MB	–	.0001	–	.0001
NEFT	–	.0001	–	.0001
UPI	.0035	–	.0001	–
IMPS	–	.0001	–	.0001

Table 3. ARDL Estimations.

Variable	Coefficient	Std. Error	*t*-Statistics	Prob.
Ln M1(–1)	0.576057	0.081141	7.099441	.0000
Ln IMPS	0.112269	0.041487	2.706112	.0091
Ln MB	0.001441	0.001373	1.049310	.2987
Ln NEFT	–0.001293	0.006628	-0.195037	.8461
Ln UPI (–4)	–0.04342	0.016851	–2.566125	.0131
C	5.858019	1.118795	5.236009	.0000
R-squared	0.989386		Mean dependent VAR	15.12204
Adjusted *R*-squared	0. 986437		SD dependent VAR	.254613
SE of regression	0.029652		Akaike info criterion	–4.000925
Sum squared resid	0.047480		Schwarz criterion	–3.486983
Log-likelihood	156.0324		Hannan–Quinn criterion	–3.796781
F-statistics	335.5596		Durbin–Watson statistic	1.560380
Prob(*F*-statistics)	.000000			

Table 4. Long-Run Co-Integration Bound Test.

F-Bound Test		Null Hypothesis: No Levels Relationship		
Test Statistic	Value	Signifi.	I (0)	I (1)
F-statistic	6.032867	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Table 5. Level Equations.

Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	*t*-Statistics	Prob.
Ln IMPS	0.148115	0.066351	2.232302	.0298
Ln MB	0.003398	0.003109	1.093068	.2798
Ln NEFT	0.022624	0.007539	3.000929	.0041
Ln UPI	0.040139	0.017340	2.314817	.0245
C	13.81794	0.200850	68.79723	.0000

Table 6. Case 2: Restricted Constant and No Trend.

ECM Regression				
Variable	Coefficient	Std. Error	*t*-Statistics	Prob.
D (Ln IMPS)	0.112269	0.035313	3.179228	.0024
D (Ln NEFT)	–0.016360	0.006214	–2.632875	.0110
(–2)	0.043242	0.013869	3.117839	.0029
D (Ln UPI) (–3)	–0.423943	0.067413	–6.288783	.0000
CointEq(–1)*				

The results of the ARDL estimation show that the money supply (M1), the dependent variable and the two independent variables, IMPS and UPI, are statistically significant at less than 5%. However, MB and NEFT have *P*-values greater than 0.05, indicating that they are insignificant. Additionally, the *R*-squared value of 98% shows that the dependent variable accounts for around 98% of the variance in the independent variables. However, the remaining 2% may be ascribed to additional factors that were not considered in the model. Additionally, the *P*-value for the *F*-statistics indicates that the entire model fits the data well.

The long-run cointegration bound test has been used to examine the long-term relationship, and the results show that there is a cointegrating relationship between the variables, as shown in Table 4. The resultant value of *F*-stat, or 6.032867, is higher than the upper bound I (1) critical value of 3.49 at a 5% significance level with a 95% confidence level. This validates the long-term relationship between the M1 (narrow money supply) and other explanatory factors.

The above-presented Table 5 shows the results of long-run level equations. The results show that all the independent variables are significant except mobile banking, represented by MB as the probability value depicted as (prob.) in the table of all variables is less than 0.05, but the probability value of MB is greater than 0.05 that is 5% level of significance. This given table represents the long-run equation depicted below as follows.

Long-Run Equation

Ln M1 = 13.8179 -0.1481ln IMPS + 0.0034ln MB + 0.0226ln NEFT + 0.0401ln UPI + ECT

The long-run equation shows that, except IMPS, all explanatory variables are positively connected to the money supply, demonstrating an inverse relationship between the two. The money supply will decrease by 0.14% for every cent rise in the IMPS. The money supply is only little increased by NEFT and UPI payments, notwithstanding the favourable growth of MB.

Following the establishment of the long-run cointegration, the short-run relationship has also been examined using the ECM, which offers the short-run findings between the variables and the speed of adjustment. As all factors are significant and positively correlated with the M1, these findings are consistent with those of Ulina and Maryatmo (2021). Table 6 shows the results during the short term. Additionally, the cointEq (–1) term is highly significant and negative. The adjustment for equilibrium is –0.423. This suggests that the rate of adjustment is 42%.

Furthermore, Table 7 shows the results of conditional error correction regression, demonstrating that the value of all variables is significant, that is, has a probability value of less than 0.05 in both the long run and short run, with the exception of mobile banking, denoted as MB. The results demonstrate conditional regression of long-run and short-run associations. The long-run conditional error correction regression is represented by the variables Ln M1, Ln IMPS, Ln MB, Ln NEFT and Ln UPI with varying lags. The variables displayed as D (Ln IMPS), D (Ln NEFT) and D (Ln UPI) with varied lags demonstrate the variables' short-run conditional error corrections.

The results of the serial correlation test are shown in Table 8 since the *p*-value is higher than 0.05, and the null hypothesis rejecting the existence of serial correlation is valid. Therefore, the model has not revealed any association.

The outcomes of the heteroskedasticity test, which are shown in Table 9 and displayed below, reveal that there is no heteroskedasticity in the model. The Breusch–Pagan–Godfrey test indicates that the residuals are homoskedastic.

Regarding Figures 1 and 2, Figure 1's plot of CUSUMSQ shows that the findings are less than the threshold of a 5% significance level, showing that the model is stable. These results, in contrast to those of Chaudhari et al. (2019), show that the model failed the CUSUM-square test but achieved the stability test based on the CUSUM test.

Figure 2 shows the results of the Jarque–Bera normalcy test in contrast. The results demonstrate that the data follows a normal distribution since the probability value is higher than 5%.

Hence, from the above data analysis, it has been interpreted that all variables, that is, dependent and independent variables, are significantly related to each other, showing that economic digital payment systems impact the money supply of the economy. The long-run bound test and the short-term ECM confirm the two's long-run and short-run relationship. Also, the findings reveal a positive relationship between the money supply and the variables used as a proxy of digital payment systems, except IMPS, which is found to be negatively related to the

Table 7. Conditional Error Correction Regression.

Variable	Coefficient	Std. Error	*t*-Statistics	Prob.
C	5.858019	1.118795	5.236009	.0000
Ln M1 (–1)	–0.423943	0.081141	–5.224758	.0000
Ln IMPS (–1)	0.062792	0.032278	1.945367	.0569
Ln MB	0.001441	0.001373	1.049310	.2987
Ln NEFT (–1)	0.009591	0.003605	2.660821	.0102
Ln UPI (–1)	0.017017	0.006921	2.458872	.0172
D (Ln IMPS)	0.112269	0.041487	2.706112	.0091
D (Ln NEFT) (–2)	–0.016360	0.006689	–2.445813	.0177
D (Ln UPI) (–3)	0.043242	0.016851	2.566125	.0131

Table 8. Serial Correlation Test.

Breusch–Godfrey Serial Correlation LM Test			
F-statistics.	1.574875	Prob. *F*(2,52)	.2167
Obs**R*-squared	3.997887	Prob. chi-square (2)	.1355

Table 9. Heteroskedasticity Test. Null Hypothesis: Homoskedasticity.

Heteroskedasticity Test: Breusch–Pagan–Godfrey			
F-statistics	1.758349	Prob. *F* (15,54)	0.0665
Obs**R*-squared	22.97059	Prob. chi-square (15)	0.0848
Scaled explained SS	18.57435	Prob. chi-square (15)	0.2337

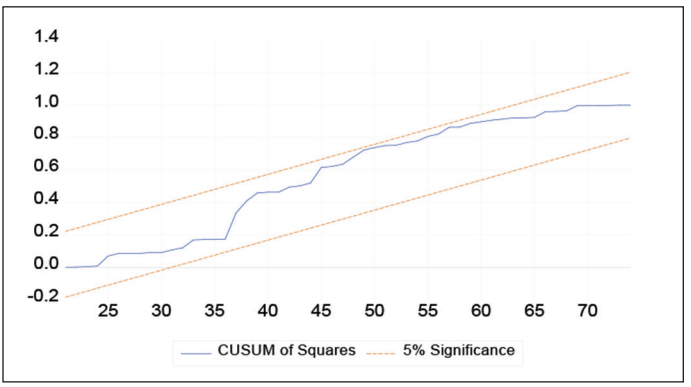

Figure 1. The Plot of CUSUM of Square.

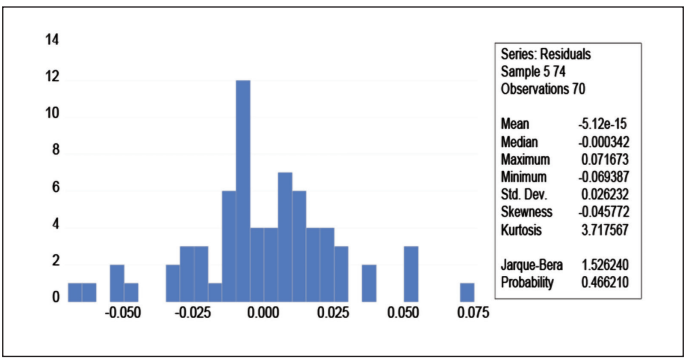

Figure 2. Normality Curve.

money supply. Further, applying some diagnostic tests exhibits the stability of the model by rejecting the null hypothesis of homoskedasticity and autocorrelation, achieving stability through the CUSUM of square test and the Jarque–Bera normality test.

Discussion and Implications of the Study

According to the research study on the impact of fintech on the money supply in the Indian economy, it has been found that most studies conducted on this topic in diverse countries other than India constitute the existing research. Various studies have used different variables based on their economic efficiency and diverse methodologies, such as the study by Columba (2009), which examined the influence of ATMs and POS on demand for cash in the Italian economy and found that the proxies of fintech, that is, ATMs and POS, have a positive impact on M1 align with this study which also revealed that all the variables, except IMPS, positively correlate with money supply, that is, M1, in the long-run cointegration. This finding is also consistent with the previous studies conducted by Mulyani and Davronov (2023) and Jain (2023). The latter study used partial regression coefficients of electronic payment to demonstrate that with a unit increase in cash converted into e-money, the volume of money supply, represented as M1(M0), taken as the dependent variable, decreases by 1.44 units, similar to one of the results of this study, as IMPS is negatively related to the money supply.

Hence, the above findings of this study show that the increment in digital transactions having a positive impact on money supply through UPI, MB and other payment systems implies that the demand for cash is declining, and this may result in a decrease in the money multiplier and consequently can affect the overall composition of the money supply and further impact the central bank's control of money supply. It can also enhance the effectiveness of monetary policy transmission. The central bank can have better control over the money supply and

interest rates, leading to improved economic stability. This suggests that the proliferation and use of fintech services increase the quantity of money in circulation. To improve the efficiency of financial transactions and increase the amount of money in circulation, Indian authorities could find it advantageous to support and encourage the further development of fintech infrastructure.

Moreover, the *F*-statistic value of 339 and the *p*-value of the *f*-statistics shown in Table 3 indicate that the overall model is significant. In light of the short-run results, all variables are found to exhibit a positive correlation with M1. This finding is consistent with previous studies conducted by Ulina and Maryatmo (2021), who examined the influence of ATMs and credit cards on the money supply in Indonesia. Additionally, Nakamya (2014) also reached similar conclusions in her study of Uganda, utilising the Johansen-Juselius model for cointegration. Specifically, she established that ATMs and the volume of EFTs, as proxies for payment technology developments, exert a significant and positive impact on demand for M1. However, the study emphasises how crucial it is to consider a range of variables and research methodologies when examining how fintech affects money availability. It might be important to comprehend the subtle differences between different fintech components to formulate appropriate regulations. Notable among the study's conclusions is the differentiation between long-run and short-run dynamics. Policymakers must acknowledge that how fintech affects the money supply might change in the future.

Further, several diagnostic tests were carried out to ensure the model's stability, including serial correlation, normality, Jarque–Bera, heteroskedasticity and CUSUM-square test. The results of these tests also demonstrate the stability of the study's model. Table 8 presents the results of the serial correlation test using the Breusch–Godfrey model. Table 9 represents the heteroskedasticity test, and both are consistent with the findings of Hasanah and Hasmarini (2023, p. 1105). This is because the prob chi-square is greater than the 5% significance level, indicating the absence of serial correlation and heteroskedasticity.

Analogously, the normal distribution of the data used in the analysis is demonstrated by the Jarque–Bera test results in Figure 2, which are also compatible with the findings of Hasanah and Hasmarini (2023). The model is found to be stable by CUSUM-square, yet the CUSUM test was not passed. Contrary to the findings of Chaudhari et al. (2019), the model passed the stability test based on the CUSUM test but failed the CUSUM-square test. Though the study finds that the model is stable, but it also observes differences in its capacity to pass particular tests compared to previous studies. As far as the limitation regarding methodology is concerned, the restricted time span for data availability creates opportunities for more studies to investigate the causes of these variations and improve the model for a more realistic depiction of methodology and the money supply–fintech relationship.

Further, this study also infers that the positive upsurge in digital payment systems can also improve the country's financial inclusion, that is, it can promote inclusive economic growth and reach underserved and unbanked communities. Further, it suggests that widespread customer education is necessary as fintech

services continue to develop. Fintech may help bridge the economic gap by granting access to digital financial services, especially in underserved and rural regions. The use of fintech may bring about cultural changes in the way people view and interact with financial services. This change might result in a greater percentage of financial transactions being done via the Internet, a shift in public perception of traditional banking, and the development of a more technologically aware financial culture.

Scope and Limitations

Regarding the research's limitations, we know that every study has advantages and disadvantages. As a result, several gaps in this study offer other researchers with a larger gap to perform further research on this broad topic. One of the major drawbacks of the study is the limited time span for data collection. More observations are possible. Furthermore, the variables might be chosen differently depending on the gap or need for future research.

Hence, the future of analysing fintech's influence on money supply is multidimensional, emphasising adjusting to technical improvements, legislative changes and larger economic implications. To stay up with this fast-changing sector, researchers must be adaptable and collaborative. As fintech payment systems improve, there will be a greater need to research how these systems affect the velocity of money and total money supply. CBDCs acceptance and development will be crucial. Researchers can investigate how CBDCs interact with fintech and their future influence on conventional money supply.

Furthermore, the advent of cryptocurrencies, continued expansion in fintech businesses, and legislative changes in fintech can all have a substantial influence on its position in the money supply. As a result, the researchers will need to stay up-to-date on changing legislation and their consequences.

Conclusion

From the study's analysis discussed above, it has been determined that the long-run findings do not allow us to reject the null hypothesis that there is no long-run association between the digital payments system and the money supply, or M1. However, the findings indicate that there is both a long-run and short-run relationship between the two. According to the ECM test, digital payments are statistically significant and positively correlated with the money supply. Additionally, the outcomes demonstrate that it may have positive and negative relationships as well over the time. All factors, including NEFT, UPI and MB, positively correlate with the M1. Even though there is a negative or inverse relationship between the money supply and the IMPS, this relationship shows that as IMPS usage grows, the money supply will decrease. Moreover, the

CUSUM-square test's graphical representation, the absence of heteroskedasticity and the Jarque–Bera normality test value also indicate that the data distribution is normal and our model is stable.

The current study's findings thus represent those numerous changes in the money supply or monetary aggregates, which are vital instruments of monetary policy, could take place with the impudent rise of financial innovations or additional fintech opportunities, leading to an unstable demand for money function and making it challenging for policymakers to implement their plans. As a result, this significant advancement in fintech gives room for future research to use alternative approaches and determine how the digitalisation of the economy will affect the money supply, other monetary aggregates and various economic sectors.

Declaration of Conflicting Interests

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