



Comparative Analysis of Digital Rupee and Digital Dollar Projects.

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Abstract- The purpose of this research paper is to explore the Digital Dollar and the Digital Rupee project and draw a comparison between the two projects. The research paper will introduce the concept of digital currency along with the various models and benefits. Subsequently the research paper does a data analysis of the important data sets on the topic of Digital Dollar and Digital Rupee.

Keywords- India, USA, CBDC, Cryptocurrencies, Digital Rupee, Digital Dollar, Blockchain, Distributed ledger technology, Monetary and Fiscal Policy.

Introduction- Interest around the subject of a CBDC is a global phenomenon and all the major economies of the globe are planning to introduce a digital version of their own Digital Currency which will in turn help in digitizing the economy and introduce major developments in the payment landscapes as well give a new definition to money as a medium of exchange.

Many of the banks across the globe are examining the viability of the and feasibility of Digitizing their currency. In the year 2020, Bahamas became the unlikely pioneer in the introduction of their own digital currency known as the 'Sand Dollar' - for retail use. In India the Central Bank Digital currency has been introduced to the public by the Reserve Bank of India in their Pilot Project from the 1st of December, 2022. Currently the banks have a rupee and a bond account with the Reserve Bank of India. Now under this scheme the banks will be opening a CBDC account that will be connected to the RBI's CBDC node/server. The banks can then transfer the CBDCs to their account in exchange for cash. United States of the America being the biggest economy in the world is also exploring ways to introduce their own CBDC or the Digital Dollar to its citizens as well as the world. US dollar being the reserve currency of the world must explore many more considerations while introducing a digital currency when compared to countries like India.

In this context, we should start by discussing what are CBDCs in terms of the designs and underlying technology.

Definitions and Designs

What are CBDCs? The definition is provided by the Bank for International Settlement (BIS). Defines the CBDCs as 'a digital form of central bank money that is different from balances in traditional reserve or settlement accounts. To put it simply, CBDC is money in digital form and a legal tender issued by a central bank. A CBDC is the same as a fiat currency and can be easily exchanged with the fiat currency such as cash or bank deposits. There are four main reasons for introducing the CBDC are-

1. Financial Inclusion- One of the foremost advantages of CBDCs is that it will promote financial inclusion. In today's day and age, the advantage of financial services is not accessible to people who are an uneducated or do not have any means to enjoy the new payment mechanisms. The low-cost payment system will facilitate the transfer between individuals and customers and to businesses as well as with the banks. The benefits of a CBDC can ensure that people could experience new perspectives on accessing new financial services.
2. Reduction in cost associated with the Physical cash management – Cost of cash management in a country like India has continued to be significant. The total expenditure the total expenditure incurred during printing paper money during April 1, 2021 to March 31, 2022 was ₹4,984.80 crore as against ₹4,012.10 crore in the previous year (July 1, 2020 to March 31, 2021). This is an example of a major problem faced by economies all over the

world. The introduction of the CBDC will mean that countries do not have to print paper money thus not only saving the time and effort is printing notes but also cutting the huge amount of cost that it incurred in the traditional economy. When we talk about costs, it is imperative that the major cost for all the economies will be in the managing the technology for these digital tokens.

3. For supporting competition, efficiency, and innovation in payments- The world is being taken over by digitisation and the arena of payments has felt its huge impact with the introduction of Payment systems like the UPI in India and companies like venmo, PayPal and Paytm taking over charge governing our payment systems.

4. For improvement in cross border transactions- The present state of the art payment systems that govern the world are not very efficient and convenient, as per the world bank India is the world's largest recipient of remittances and the USA is the biggest source for the same. The cost of sending this is extremely important to consider and it is also important to consider that this remittance is not sent by illegal sources.

5. Enables currency tokenization- Tokenization is an essential term in understanding the core value of the CBDC. Tokenization is the act of turning an asset, right or currency into a representation that can be easily transferred from one person to another. To draw an analogy to this, cash is a physical token. Tokenization can provide a very high level of portability, efficiency, ease of handling, and programmability and has the power to completely change the financial infrastructure.

Token-based systems- These kinds of systems rely on the object transferred. They allow various degrees of decentralization since transactions can occur upon the bilateral transfer of the token rather than relying on a centralized account of ledger.

For example- when you purchase something, while the transaction the receiver of the token (for e.g., cash) will check the authenticity of these bank notes as the receiver's bank will not accept the bill if it is a counterfeit, so in this case the transfer is a token-based transfer and the token is the bank note that has a legal tender to transfer value from one party to another. When we integrate a Distributed ledger technology (DLT) based system to a token-based system then it ensures a uniqueness to each token.

Account-based system- rely on the authentication to authorize an instruction to update on a ledger. Most account-based system rely on a trusted third party to maintain a single ledger for example- Federal Reserve or the Reserve Bank of India.

Account-based systems are in existence as the because of the limitations which are posed by the physical tokens like bank notes can be difficult to transmit, store and handle anywhere other than in face-to-face transactions.

Further a pertinent question may arise that what will be the respective role of the central bank in facilitating the access to a CBDC. There are three major models for the issuance of as well as the management of CBDCs around the world.

A. Single-tier model- This is also known as the direct CBDC model. This is a model in which the Central Bank will control and manage all aspects of the CBDC system including its issuance, book-keeping, transaction verification etc. In this the central bank server will be involved in all the transactions and the central bank will keep a master ledger to maintain the records. A plus of this model will be that the central bank will be in charge of all the accounts and therefore the chance of a failure in transaction or a malpractice can be curtailed to a large extent, but a major disadvantage will be that the innovation that is empowered by the private sector and its investment will not render itself to the Digital currency.

B. Two-tier model- This requires that the CBDCs are designed as a part of a two-tier model with central bank playing its role while the other service providers playing their own role. A further division of this topic gives us two models-

1. Indirect Model- In this model the consumers will hold their CBDCs in an account or a wallet with a service provider and the obligation of the service provider will be to provide the customers with CBDC on demand. The job of the central bank will only be to monitor the wholesale ledger of these service providers. Such a model would mean a more robust ecosystem of digital currency where the payment method is on par with the technological advancements in the world and also is more efficient as the private money will be the caretaker of the system.

2. Hybrid Model- The central bank will have the direct claim on the CBDC with a layer of private sector. The central bank will issue a CBDC to other entities which shall make those entities responsible for all the customer related activities. In this system the service providers will be responsible for all the customer related activities but the central bank will maintain a master ledger of the retail transactions. Such a model takes the good aspects from

both models above, it not only ensures that the digital currency is safe and under the monitoring of the Central Bank but also that the private sector is involved in a way that they can empower the efficiency with their investments.

The Technology behind the CBDCs

CBDC being a digital product, technology is certainly the at the core of its existence. The technical principles that form the underlying in successful deployment of the CBDC to achieve the intended objective includes-

- a. Strong Cyber network and strong Cybersecurity.
- b. Sound technological governance
- c. Technical stability
- d. Resilience to Cyberattacks

The two major infrastructures selected for implementing CBDCs worldwide are Conventional Centrally Controlled Database, or a Distributed Ledger.

A distributed ledger technology refers specifically to the infrastructure that allow a simultaneous access, validation and updating of records that characterize the distributed ledger. This is a done through a network spread over multiple entities and locations. In simpler words lets take the example of Ethereum a famous cryptocurrency, whenever someone purchases an Ethereum or facilitates a transaction using Ethereum as the currency, the transaction ID in the form of numbers is displayed on the website of Ethereum therefore letting us know who executed a transaction using Ethereum and when. Ethereum and other cryptocurrencies use smart contracts which a self-executing code and no single entity is in control of that ledger but it is a decentralized ledger that can be seen by anyone on that network.

To draw a difference between a DLT and a Centrally controlled database let us take the example of a normal bank transfer from our day-to-day life- A Reserve Bank lends money to a Merchant Bank which in turn ends the money to a retail person. This means that the Central bank or the Reserve Bank control a master ledger that has all the data of the money that is lent to other banks, this makes a normal bank transfer a part of the Centrally Controlled Database system.

Scalability-

It is clear from the Pilot project of Digital Rupee by the RBI that the project has started from a very limited scale in the four major cities of the country namely- Mumbai, New Delhi, Bengaluru and Bhubaneshwar. The Reserve Bank of India used a two-tier model for its distribution, and issued e₹-R while distribution and payment services were delegated to banks who were the service providers in this case. A total of 8 banks were identified for phase-wise participation in retail pilot project of the Digital Rupee, in the first phase banks including SBI, ICICI Bank, YES Bank and IDFC First Bank took part, while other four banks including Bank of Baroda, Union Bank of India, HDFC Bank and Kotak Mahindra Bank joined the project subsequently. The e₹-R is issued in the same denominations as that of the normal paper currency. Users get a digital wallet offered by these participating banks and stored on their mobile phones.

Meanwhile in the United States the Federal Reserve Bank of New York partnered with nine U.S. Financial Institutions including Citibank, Wells Fargo, BNY Mellon, HSBC, Mastercard, PNC Bank, TD Bank, Truist and U.S. Bank. The Pilot project included a Distributed Ledger Technology, the same Technology that was used behind Bitcoin to test the viability of the system in a 12-week effort to test the feasibility of the digital money platform called regulated liability network (RLN).

Recoverability- Recoverability is one of the important aspects of the CBDC as it is a tech product that can be a possible subject to all sorts of cyber-attacks. Keeping this in mind we can bring our attention to two major models of wallets-

- a. Custodian Model- Token Service Provider is responsible for managing the keys to the wallet of the customer and in case the user forgets the key to the wallet or it is subjected to a cyber-attack, it is beneficial that a custodian is present to protect the interests of the customers. However, it is pertinent to note that appointment of a custodian will result in anonymity being hampered and compromise on the wealth in terms of the tokens.

b. User Held Model- Token is in control of the user completely and in the result of a loss of the key, wallet will not be recoverable.

Risk Analysis of the Central Bank Digital Currency

These risks can be-

1. Risk of Financial exclusion

The number of people that do not have an internet connection are in huge numbers in a country like India, which is not the case in a country like the United States. The implication is that the people who do not have a smartphone will never be able to use a digital currency. The central banks will have to consider some other method to cater to the needs of these people who are excluded.

2. Privacy Risk

With CBDC, payment transaction privacy will not be guaranteed. The central banks will have a ledger which will contain the transaction ID of people transacting on that network and eventually this will lead a more stringent hand of the government on our daily lives as well as transactions. Many people who simply want to make some private transactions will not use the Digital Currency at all, yes it would also help in tackling the issues of money-laundering and black money but the confidentiality of the users will be compromised with.

3. Cybersecurity risks

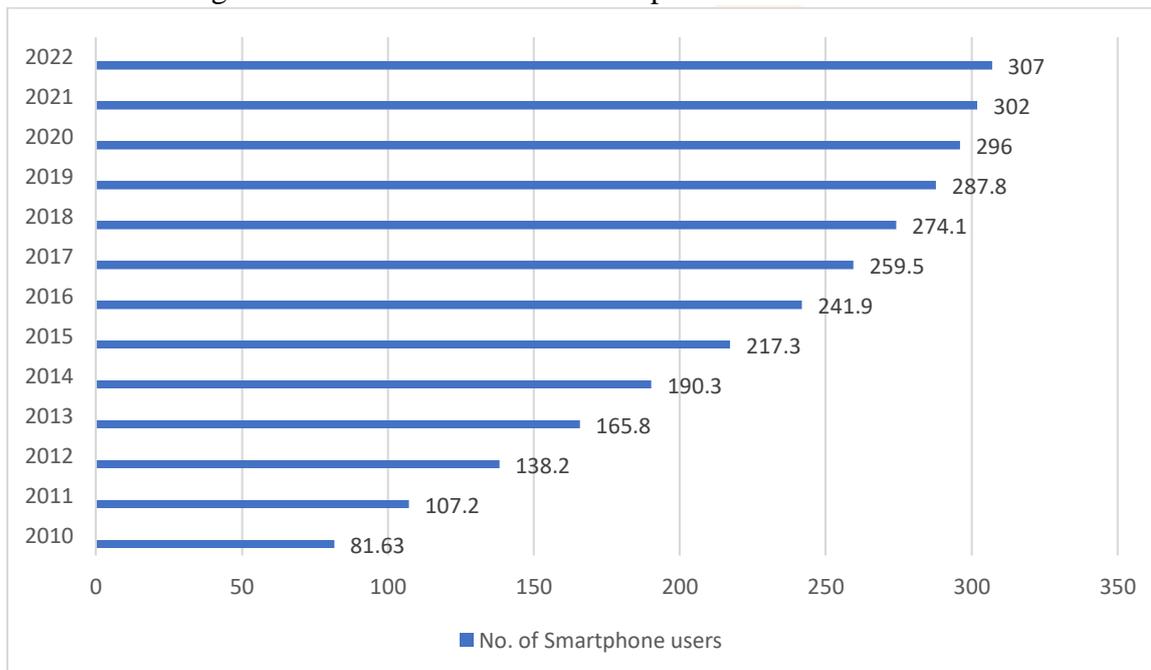
CBDC may face threats such as hacking which will lead to many server blockages as well as service declines.

Data Analysis-

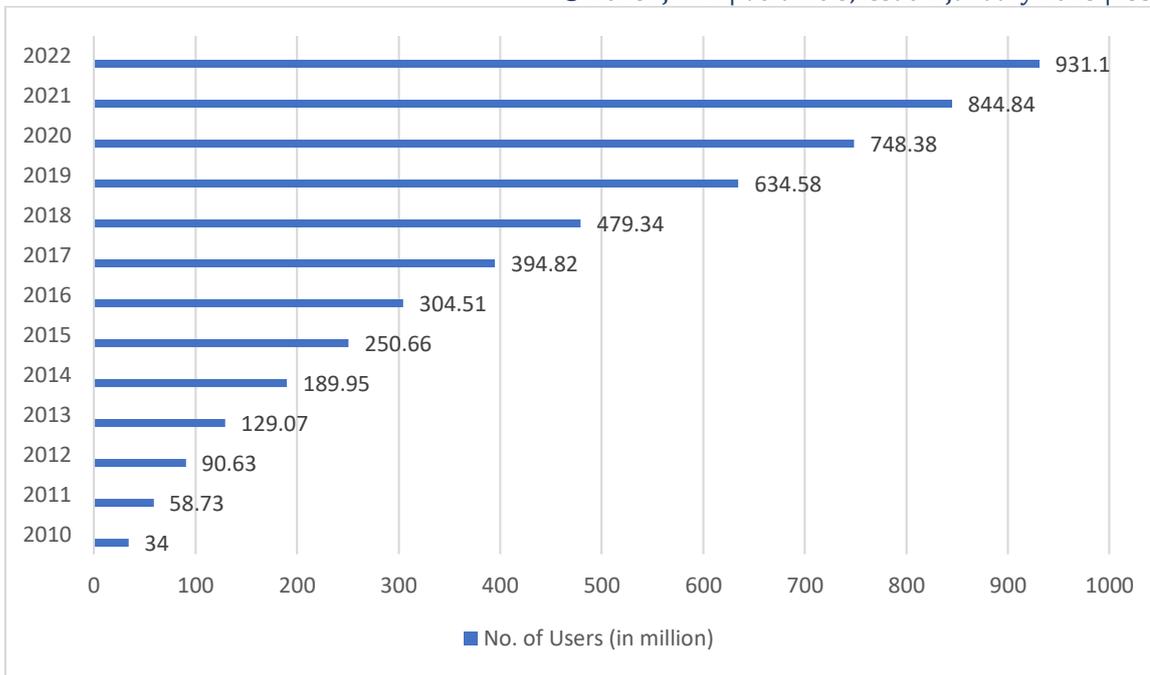
Methodology

Internet searches for both the India and the United States were taken from the Google Trends Database. The data was collected for the whole of 2022.

1. The following data shows the number of Smartphone users in the United States



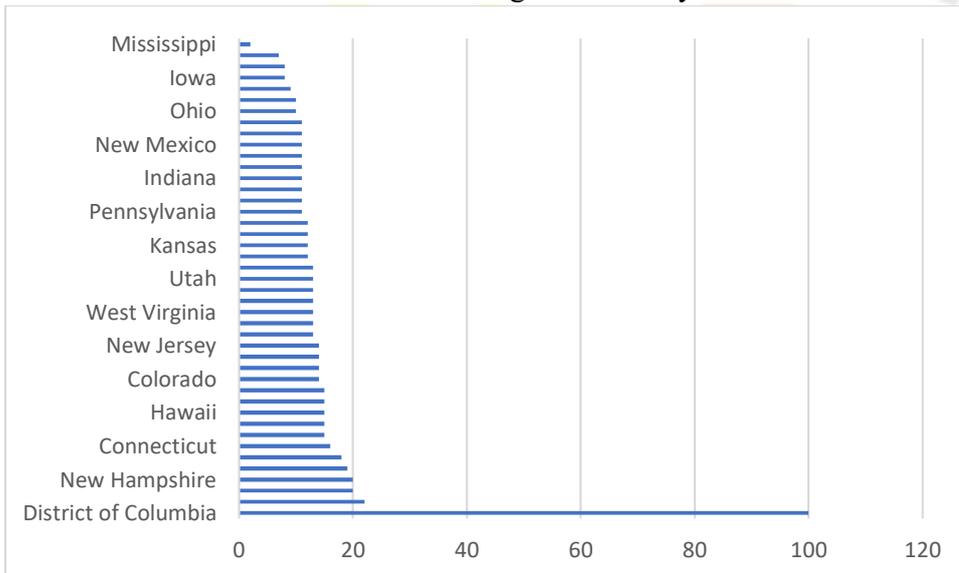
The following data shows the number of Smartphone users in India



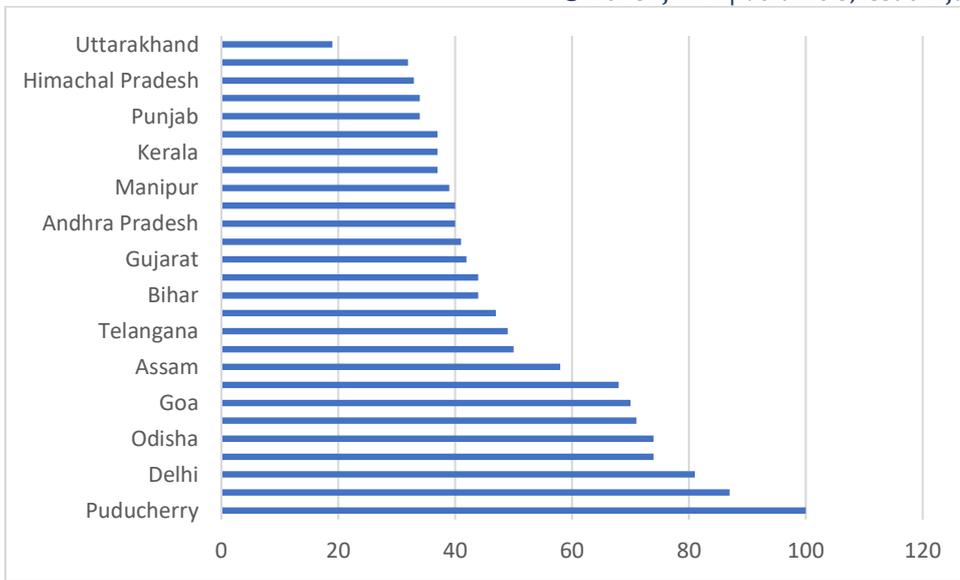
Inference-

The trend shows that a greater number of US Population uses Smartphones as a percentage compared to India. In order for a person to use the Central Bank digital Currency, a basic necessity is that of a Smartphone. Even though India is one of the fastest growing smartphone markets in the world, it still has a large part of its population yet to use a smartphone. The other problem is that not every district in India is as efficiently connected to the Internet as in the United States. For the Reserve Bank of India this is a major roadblock as the whole functioning of the Central Bank Digital Currency would depend on the smartphone users and internet connectivity.

2. Interest in the term ‘Central bank Digital Currency in the US

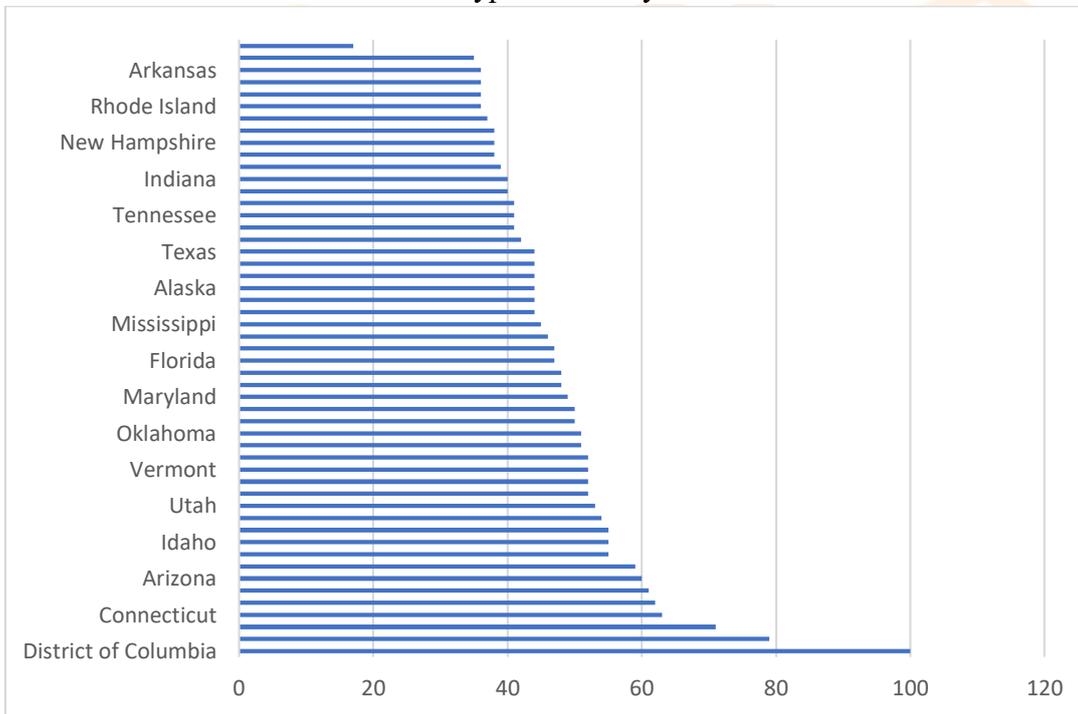


State wise interest in the term ‘Central Bank Digital Currency in India

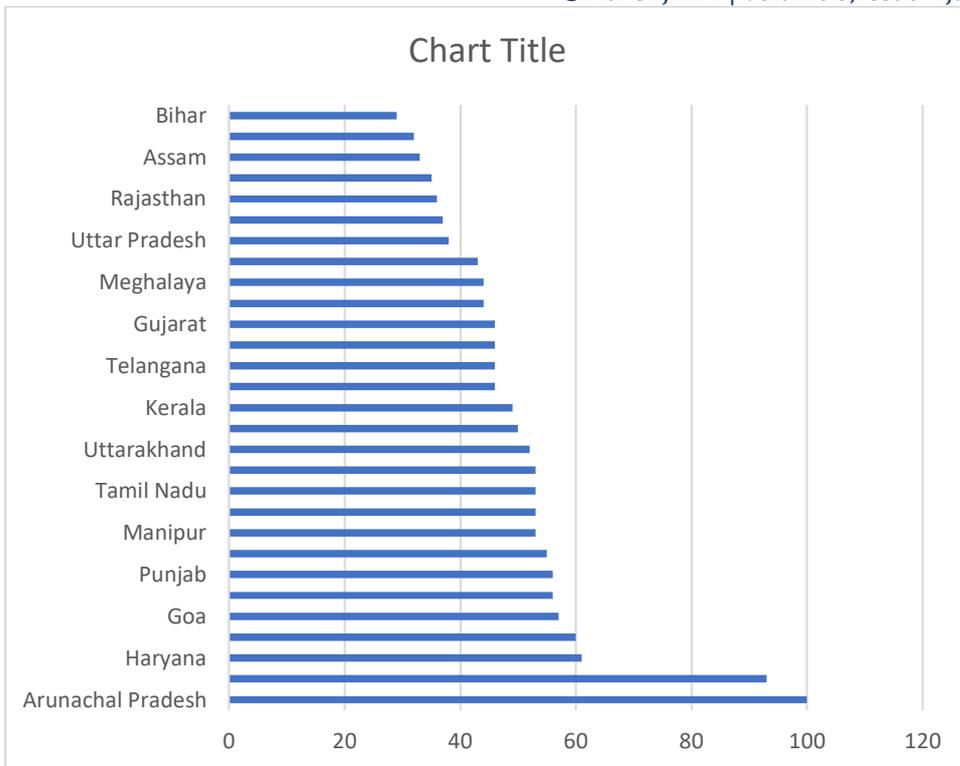


Inference- States like Puducherry, Delhi and Odisha are showing extremely high trend of searches which gives us an idea on the number of people that are willing to research about the topic. Puducherry is one of the most literate Union Territories of India and it is no surprise that the people there are interested in learning on the issue. In the United States the state of District of Columbia and Washington have the highest number of searches on the topic.

3. State wise interest in the term ‘Crypto Currency’ in the US



State wise interest in the term ‘Crypto Currency’ in India



Inference- The reason why this Statistic is so important is that there the correlation between local interest in internet information about ‘cryptocurrency’ as a search term on the internet and local interest in internet information about ‘CBDC’ as a search term on the internet is 0.59 for India. Therefore, this statistic is a good indicator that the people who have interest in learning about Crypto currency will also be interested in learning about the CBDC. The fact that the world is talking about the use of CBDC is due in no small part to the fact that the Crypto Currency phenomenon has taken over the world. It can be noted that the Indian states that have shown the most interest are one of the better economies of the country with a larger percentage of their population being literate. For the United States, the states of District of Columbia and Connecticut have shown the highest amount of interest in the term Crypto Currency.

Conclusion-

The paper draws a comparison between the developments of both Digital Dollar and Digital Rupee and tries to predict the success of both the technologies. After listing down the major plusses and minuses of the CBDC and comparing the Digital Rupee Project to Digital Dollar Project, the researcher has concluded that the Digital Dollar has a higher chance of being successful and being used by the Americans at a large scale as compared to the Digital Rupee. The reasons can be clearly seen in the amount of Internet penetration, the smartphone use and the overall literacy rate. As to sum up an overall analysis of the Digital Currency topic, it is an important step that will provide an alternate method of transactions which will be safe, efficient and work at a faster speed. The importance of the Data Points in the Data Analysis section is that this will give a good idea to the respective central banks to of the countries to strategize the introduction of the CBDCs in those states of the country. The study clearly shows that the interest in the states is dependent upon the economy of the states, which suggests that the direct relation of technological independence is on the economy. The researcher can conclude that the Federal Reserve of the United States has a much better chance of implementing CBDC with faster efficiency, India, being a developing country, still has some roadblocks to fulfil. However, the major success of the UPI in India is a reassurance that the country is ready for this new age method of transaction.

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