

# B-BANK: An Integrated, Advanced IT Solution for Enhancing Fund Flow to Borrowers with Financial and Goods Traceability and Transparency

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## Abstract

The primary reasons for the rise in bad loans are asymmetric information, poor monitoring of projects, and a lack of detailed profile evaluations of borrowers. Hence, it is necessary to improve the quality of information available to the lenders for monitoring both the project as well as profile details of the borrowers. The present study describes the usability of a blockchain-secured system (B-Bank™) for easily availing loans along with secured loan repayments, wherein the complete inventory, cash flow, and project progress can be monitored on a real-time basis. B-Bank™ enables the optimisation of credit risk capital and empowers economic development. Pilot testing of the software also indicated a high degree of construct, usability, and reliability. Hence, this tool complies optimally at both theoretical as well as practical levels to bring about a positive change for loan borrowers and lenders along with ample opportunity for the government to gain tax through the GST payments.

**Keywords:** Traceability, Monitoring, Blockchain, Security, GDP, Finance

## Abbreviations

API: Application Programming Interface; BRN: Batch Registration Number; CRM: Customer Relationship Management; CVI: Content Validity Index; CVR: Content Validity Ratio; DHFL: Dewan Housing Finance Corporation Limited; DLT: Distributed Ledger Technology; DMS: Distribution Management System; EFA: Exploratory Factor Analysis; ERP: Enterprise

Resource Planning; GDP: Gross domestic product; GST: Goods and Services Tax; GSTR: Goods and Services Tax Returns; IBC: Insolvency and Bankruptcy Code; KMO: Kaiser-Meyer Olkin; KYC: Know Your Customer; MSME: Micro, Small, and Medium Enterprises; NPA: Non-Performing Assets; OECD: Organisation for Economic Co-operation and Development; PAN: Permanent Account Number; PCA: Principal Component Analysis; PMC: Punjab and Maharashtra Co-operative; POS: Point-of-Sales; VAT: Value-added tax; WMS: Warehouse Management System; RBI: Reserve Bank of India; SME: Small and Medium-sized Enterprises.

## Highlights

Despite multiple technological and regulatory initiatives, there has been a substantial build-up of non-performing assets in the banking sector, owing to asymmetric information, adverse selection, and moral hazards.

A real-time finance traceability system (B-Bank) can be adopted for ethically selecting the worthiest loan beneficiaries based on the real-time cash flow and real-time project progress.

A blockchain-secured tool (B-Bank) also enables borrowers by managing their accounts, inventory, and project details.

B-Bank empowers economic development by ensuring timely returns of revenue.

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Pilot testing indicated a high degree of construct, content validity, and reliability of the said instrument (B-Bank). Hence, this tool complies optimally at both theoretical as well as practical levels in the banking industry.

## Introduction

The economic condition of a country depends on the proper functioning of the banking sector. In addition to a flourishing banking sector, efficient resource allocation, timely payment of loans, and symmetric information of borrowers are critical factors for increasing the economic gains of a nation. The banking sector often faces some critical issues (Khilenko, 2020). The biggest challenge for the banking sector is the rising levels of non-performing assets (NPA), due to which the overall profit and revenue of banks are on a decline. Due to the ever-increasing NPA levels, the bank is skeptical of lending loans even to eligible borrowers (Wójcik & Ioannou, 2020). Financial institutions are also facing many problems in verifying eligibility as no competent system is available for the validation of the borrower. On the other hand, business entities including retailers/entrepreneurs, manufacturers, and traders do not have any comprehensive and user-friendly software for conducting business with transparency and getting credit easily for running their business (van Gestel & Baesens, 2008). In this regard, the former RBI governors, Jairam Ramesh and Bimal Jalan also suggested the enforcement of traceability and transparency at each level of the supply chain for settling growth conflicts, if any (PTI, 2016).

Complete financial traceability is often not merrily accepted by MSME entities, retailers, and entrepreneurs, as they have the notion that technological advances will enable the government to get hold of complete financial transactions leading them to pay higher taxes. Researchers believe this to be a false notion. It is so because complete financial transactions give a clear picture of businesses to the government and increased tax paid to the government is lent to small businesses through easy loan schemes (Muirhead & Porter, 2019). In this review paper, we have discussed the challenges faced by financial institutes and

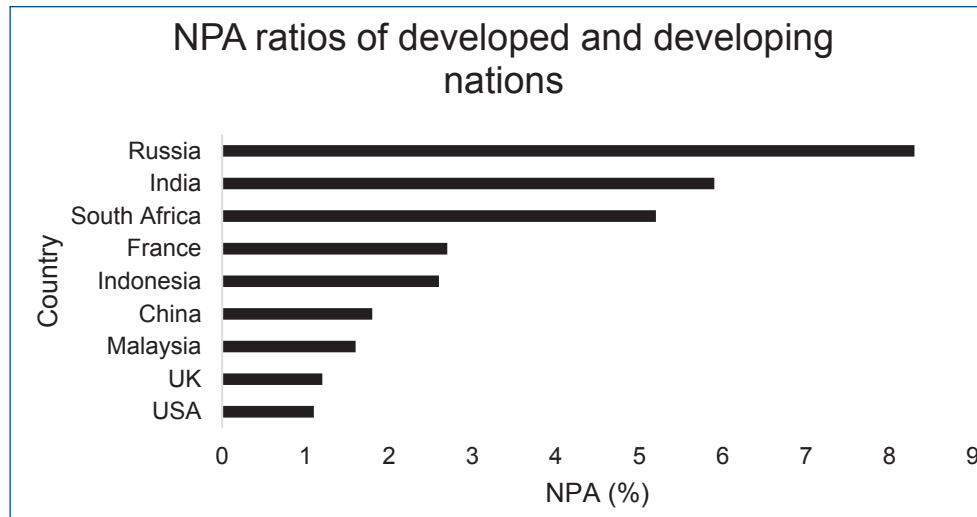
retailers followed by a proposed solution for the problems along with a pilot scale study.

## Challenges Faced by Financial Institutes

### The Global Prevalence of Bad Loans

The existing problems of bad loans and non-performing assets have been draining factors for major economies and it has the power to wreak havoc even in the future (Santha Kumari et al., 2020). Countless people and companies who take loans but do not pay them back rub financial institutes of money thereby creating fund shortages that can lead to financial crises across the globe. Some of these NPAs existed before the financial crisis of 2008, some of them have increased even further, and the COVID-19 pandemic has further intensified this problem (Zemla, 2020). Due to this, the ex-vice-chairman of NITI Aayog, Arvind Panagariya had earlier stressed immediately addressing the problem of NPA to control the decline of economic growth of the nation. He proposed the effective and stringent implementation of the Insolvency and Bankruptcy Code (IBC) for reducing the NPA to improve the health of India's financial institutes (Nair, 2020).

The average global NPA percentage in 2021 based on an analysis of 41 countries was reported to be 5.5% (*Non-Performing Loans by Country, around the World* | *TheGlobalEconomy.Com*, n.d.). The highest NPA of 31.72% was reported for Ukraine and the lowest was 0.64% for Macao. While the NPA issue exists in all countries, it is more pronounced in developing nations. For instance, developed nations like the United States of America, Germany, Australia, and Hong Kong have an NPA ratio of 1.2, 1.09, and 1%, respectively as of June 2022 (CEIC, 2021). In comparison, India has an NPA of 5.9% as of March 2022 which is higher than all other comparable countries except Russia with an NPA of 8.3%. The bad loans in countries with a large market are all lower than that of India including China (1.8%), Indonesia (2.6%), and South Africa (5.2%) (TNN, 2022). A comparison of NPAs in different nations as per the latest data available is shown below in Fig. 1.



**Fig. 1: A Comparison of NPA Ratios of Different Countries**

The NPAs of public sector banks in India have doubled within seven years from 2.24 lakh crores in 2014 to 5.40 lakh crores in 2021 (Chadha, 2021). As a consequence, stringent monetary policies have been implemented in Asia and throughout the world, however, such an implementation is not enough to ameliorate the financial turmoil during the current coronavirus pandemic situation (Manzi et al., 2022; Tanzi, 2020).

While it is well understood that various countries are facing the problem of bad loans and rising NPAs. It is also important to realise the reasons for the increasing NPA. They may be classified as external and internal factors. First, the internal factors have been discussed.

### Lack of Robust Due-Diligence Mechanism

The symmetry of information of the borrowers is critical for the banking sector. Even though most banks go out of their way to validate the information of borrowers, defaults still take place. Sometimes borrowers are unable to share detailed information due to a lack of understanding of the loan underwriting process. While disclosure of identity, CIBIL score, details of employment, etc. form some of the basic mechanisms for due diligence before loan disbursement. Once the loan is disbursed, there exists a severe dearth of post-disbursement due diligence (Birindelli & Ferretti, 2017). There does not exist a framework for monitoring of cash flow of businesses to whom loans have been disbursed (Park, 2020).

### Technological Lag

Despite various advancements in the information technology field, there is still no existing technology to monitor the credit profile of the borrower and investigate cash flow as well as project progress on a real-time basis (Wang et al., 2019). Due to this, there is a lack of transparency in the flow of information available within peer-to-peer banking networks. As a result of this, bad loans are continuously rising (Bhatore et al., 2020).

### Poor Credit Appraisal System

Credit appraisal is still done manually without regular monitoring. Due to this, loans are offered to unworthy borrowers. Some such borrowers are unable to pay back their loans while some willfully do not. This too leads to losses for the banks and instability of the economic system (Adzobu et al., 2017).

Along with the above factors, the external factors are also included like:

### Inefficient Loan Recovery Procedures

Countries like Germany, Switzerland, and Austria have set up third-party debt recovery agencies. India has 39 Debts Recovery Tribunals (DRTs) and 5 Debts Recovery Appellate Tribunal (DRATs) set up under the Recovery of Debts and Bankruptcy (RDB Act), 1993, for expediting the recovery of loans to banks and financial

institutes. However, they are not very efficient due to their carelessness and lack of stringency in loan recovery procedures (Schelo, n.d.).

### Moral Hazard

Due to the increasing rate of corruption, some borrowers do not pay their debts even though they can pay. They are the willful defaulters and, in such cases, it becomes impossible for banks to assess their credibility even after thorough due diligence (Błaszczczyński et al., 2021; Zhan & Yin, 2018).

### Natural Disasters

In the event of a natural disaster such as a cyclone, flood, earthquake, volcano, etc., enterprises or businessmen may lose their property and hence, the source of income. Loss of movable as well as non-movable assets often leads them to bankruptcy. In such cases, borrowers either take more time for repayment or are completely unable to pay their debts. In both such situations bank is unable to recover its money (Harnowo, 2020).

### Negligence on Behalf of Industries

In some cases, industrialists are not able to estimate the demand and supply aptly, due to which the extent of production is often more than the demand. In such cases of excessive production, there are chances of low product sales, and hence, the industrialists would not be able to earn a reasonable profit (Gilchrist, 2018). If such loss-facing industrialists take hefty amounts of loans, they would usually be unable to repay the loan amount (Jayaraman & Bhuyan, 2020; Mittal, 2019). Therefore, it is certain that due to improper project handling and management, the borrower may have to suffer heavy losses, as a result of which the number of bad loans might increase drastically (Ng et al., 2020).

### Unsound Middlemen in the Financial Sector

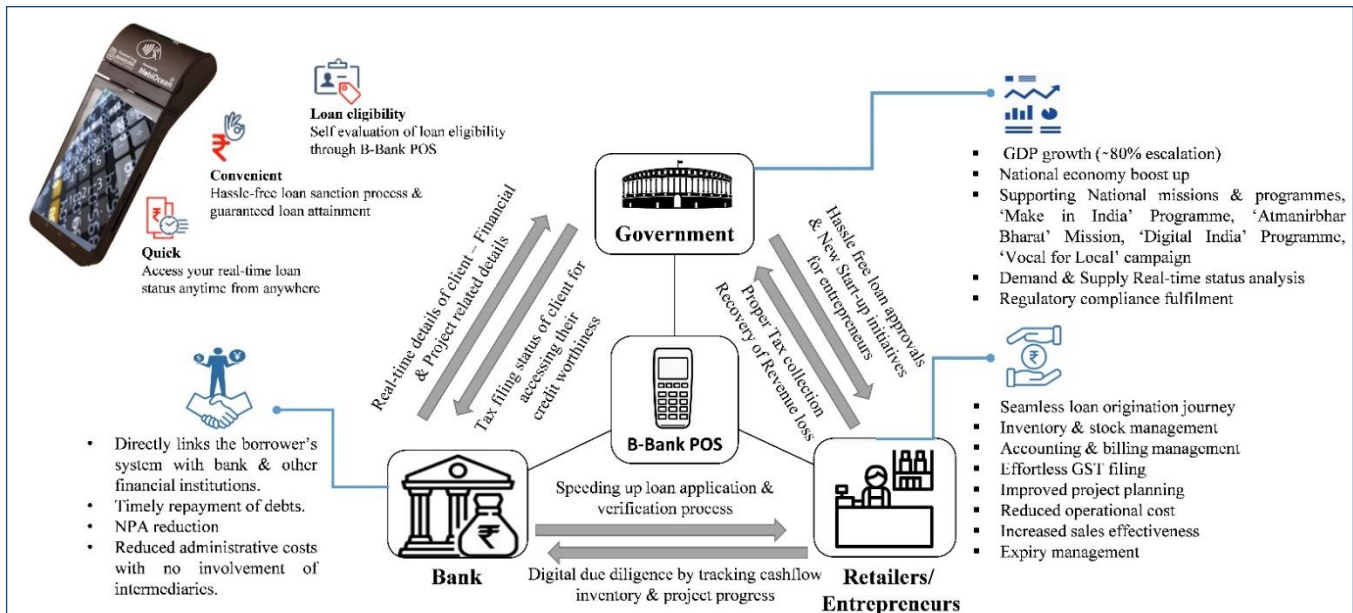
Small businessmen and enterprises are dependent on chartered accountants and financial advisors for the maintenance of financial statements and tax payments. In

some cases, such advisors use illegal methods to evade tax by showing a loss for the business. This ultimately leads the business to come under scrutiny and lose rewards or take advantage of various schemes and policies. Even after repeated appeals by respected prime minister Shri Narendra Modi to such financial advisors to enforce transparency, such things continue to occur (Ng et al., 2020; *Prosperity: Better Business Makes the Greater Good* | Saïd Business School, n.d.).

### Reluctance to Adopt New Technologies

It was been seen through research that large- and small-scale enterprises are reluctant for adopting new technology with traceability mechanisms (*EBSCOhost* | 144293771 | *Stressed Assets in Indian Scheduled Commercial Banks.*, n.d.; Inman & Nikolova, 2017). Incomplete knowledge of such technological advances, a lack of time to invest in the adoption of new technology, and fear of higher tax deductions due to greater financial transparency are three of the primary reasons for the reluctance to accept new technology.

The background of this paper has made it quite clear about the problems involved with financial lending, the hassles of borrowers, the money loss of banks, and the increasing NPA levels. With this background information, we hereby propose the desired amendments to give a holistic solution to the existing problems. One such integrated solution, namely, B-Bank™ has been proposed in this manuscript. The ensuing sections provide the consolidated benefits of implementing B-Bank™ in diverse business scenarios. This software can help financial institutions easily network with clients, thereby driving business growth for the customers and generating loan volumes for the banks (Patent Application No. 202011050665). It will also aid in remunerating revenue losses by ensuring ethical tax payments, thereby aiding the government in sustaining economic growth. To date, there has been no such 3-tier system for integrating financial institutions, retailers/entrepreneurs, and the government. B-Bank™ will serve as one such unique technological solution for benefitting the banks, retailers as well as the government as a whole, by providing a broad range of services and solutions relating to business execution, operations management, financial conveyance as well as economic growth (Fig. 2).



**Fig. 2: Value Addition by the Adoption of B-Bank in Diverse Scenarios - A 3-Tier System for Inter-Connecting Financial Institutions, Retailers/ Entrepreneurs, and the Government**

The salient features of this proposed platform are as follows:

#### *Integration with POS for Financial Monitoring*

B-Bank<sup>TM</sup> is a user-friendly, patented software that directly links banks and financial institutes with borrowers' systems showing all financial transactions through the integrated Point of Sale (POS) device. The POS device not only shows the financial transactions but also enables users to account for Goods and Sales Tax thereby saving time for business operations. Complete financial transparency to banks and financial institutes makes it easy for them to lend money to needy businesses, thereby maintaining the cash flow and overcoming the hurdle of unavailability of funds.

#### *Integration with ERP for Project Monitoring*

It is not simply a POS device but is also integrated with an ERP system, enabling users to manage inventory, track stock transfers and stock in transit, as well as demand forecasting based on available stock inventory. Such real-time information gives insights into the active status of the business and allows banks to assess the credibility of the borrower. The overview of inventory, stock, and expiry of items can be reviewed using the B-Bank<sup>TM</sup> dashboard, by virtue of which the government authorities can also foresee and forecast the demand and supply of given

merchandise, thereby managing excess and shortage of supplies, if any.

#### *Geo-Mapping-Based Project Status Monitoring*

B-Bank<sup>TM</sup> provides real-time tracking of the project performance of the loan borrower. This tool can store all the project and cash flow data digitally and makes it available for financial institutions. Hence, this tool ultimately aids in the seamless execution of the digital due diligence process for borrowers. Additionally, the retailers and entrepreneurs get an extensive system for the real-time tracking of their projects by using the Geo-tracking, fencing, and tagging features available in the B-Bank<sup>TM</sup> software.

#### *Symmetrical Information through Blockchain Technology*

Blockchain-secured platforms are the most secure systems when it's banking and finance. The key features of this software include Warehouse Management System (WMS) and Document Management Systems (DMS) mediated inventory tracking, POS mediated cashflow monitoring, geotagging mediated project monitoring and ERP mediated report automation for business process analysis offering maximum security while providing complete financial transparency. This software primarily works as an API-based digital data ecosystem wherein the lenders can easily examine the real-time financial as well

as project-related information of the borrower, thereby speeding up the loan application and verification process.

#### *Hassle-Free Loan Sanctioning Process*

Due to the integration of various security measures and its offering of a transparent financial system, the B-Bank™ system not only offers financial institutes to judge the eligibility of the borrowers but also lets borrowers pre-assess their eligibility for loans as well as the amount that they can claim based on their business status. In this way, banks find it more convenient to offer loans to worthy borrowers only with the least chance of default. The loan sanctioning process becomes completely hassle-free over a digital platform without the need to visit the bank and is much less time-consuming.

#### *Due-Diligence Post Loan Disbursal*

B-Bank also can monitor the upward and downward fund flow even after the sanctioning of the loan amount. Real-time inventory details can also be visualised along with geo-synchronised data of project details. Such post-sanction finance and project deliverables visualisation can aid in facilitating the early detection of fraud and mitigate risks. Robust risk management practices and audits by B-Bank™ will hence aid in mitigating losses for both MSME as well as financial enterprises by providing an early warning.

#### *Transparent Tax Collection for the Economic Growth of the Nation*

The lack of transparency in the tax payment system of the nation immediately calls for the digitisation of tax payments with synchronisation between the State and National GST portal to minimise the gap in GST payments (Kumar et al., 2018). OECD countries and the United States have reported a high GDP growth ranging from 80-85 percent upon adoption of technology business incubation as a strategy for SME development (*New Approaches to SME and Entrepreneurship Financing: Broadening the Range of Instruments 2*, 2015). The B-Bank™ software brings transparency to the accounting system as well as analyses the real source of income of borrowers via live project progress and cashflow monitoring, thereby identifying the worthy taxpayers and tax-paying limits thereof (Patent Application No. 202011050665). This tool aids in ethically analysing both the economic status as well as the industrial performance of a said retailer/entrepreneur. Such real-

time tax evaluation employing financial tracking ensures proper tax collection and recovery of revenue losses if any. As a consequence, the national economy will also be escalated, thereby strengthening the financial funds of the government. Moreover, B-Bank™ conforms to several National missions and programs. It supports the Atmanirbhar Bharat Mission by promoting self-reliant banking solutions thereby aiding in the overall economic development of the nation. It also conforms with the Digital India Programme by facilitating the digitisation of documents & maintaining the digital identity of clients. B-Bank™ also accords with the Make in India Programme as it fosters an advanced and digitally secured banking facility that provides an enterprise-grade distributed ledger framework and easy loan underwriting services.

#### *End-to-End Tracking of Raw Materials and Goods Along with Adulteration Check*

B-Bank™ can track the amount of supply of raw material and volume of finished goods. Additionally, the cash flow involved in buying raw materials and selling finished goods can also be traced. Hence, B-Bank™ can track the adulteration practices and duplicate goods production by assessing the mismatch between supply and production volume (both item and cash volume) at all levels of the supply chain (Patent Application No. 201911046328). Along with this, the one-of-a-kind integration of an e-way portal, counter less POS (for cashflow tracking), WMS and DMS for inventory tracking allows B-Bank™ to provide compliance at all levels of the supply chain along with providing traceability and visibility of raw materials, goods, cash flow, and transport vehicles.

This makes B-Bank™ a vital tool for the manufacturers and entrepreneurs hailing from diverse industries for gaining greater control over product manufacturing and processing, thereby eliminating any chances of substandard product manufacturing, hoarding practices, untraceable export/import frauds, and illegitimate GST return claims. On the other side, it enables the government to keep a track of false production practices or chances of evading tax payments.

#### *Future Developments*

B-Bank™ is a continuously evolving software that will be getting updated with every upgradation in technology. Further future developments in B-Bank™ include the

integration of Vahan portal data (<https://vahan.parivahan.gov.in/vahan/vahan/ui/login/login.xhtml>) with the database of B-Bank<sup>TM</sup>, thereby enabling easy tracking of every transport vehicle carrying good and finished products for business operations. Photo identification-based truck tracking system and face recognition system will soon be integrated with B-Bank<sup>TM</sup> software. Such integration will aid in introducing further tax transparency. These integrations will also contribute towards providing valuable information to the available government databases and aid in pattern matching for out ruling the chances of any fraud or illicit practices.

## Study Design

### Preliminary Study – Expert Validation

As part of a preliminary study, we identified 20 experts from the banking sector, IT industry, and academia who were closely associated with blockchain-related initiatives in the banking sector across India. The selected expert panel included 12 males (60%) and 8 females (40%). Identified experts hailed from varied backgrounds, including the vice president of sales and marketing, business head of core banking, academicians, technical experts, and senior consultants. Each expert was asked nine open-ended questions that were directly or indirectly linked with varied domains such as customer service, cost-effectiveness, efficiency parameters, remittance measures, and regulatory compliance.

Experts were interviewed via face-to-face conversations, wherein at the beginning of the interview, we briefed each panel expert in detail on the study's purpose and objective. The experts were instructed to rate each of the nine items for their importance and necessity in measuring the efficiency of B-Bank<sup>TM</sup> software on a 4-point Likert scale (1 – Not relevant, 2 – Somewhat relevant, 3 – Quite relevant, 4 – Highly relevant). The experts were also asked to provide feedback on the content and clarity of the questionnaire. The content validity index for the questionnaire was calculated. Both item-content validity (I-CVI) and scale-content validity indices (S-CVI) were calculated (LAWSHE, 1975). Furthermore, CVR was calculated by using the following formula;

$CVR = (N_e - N/2)/(N/2)$ ; where  $N_e$  is the number of experts indicating an item to be 'essential' and  $N$  is the

total number of experts. Moreover, to validate the internal consistency and reliability of the tool Cronbach's alpha coefficient for the data set was evaluated. The value of Cronbach's alpha is acceptable if it is greater than 0.7, and as a general rule a higher value indicates more internal consistency as well as reliability of the tested tool (Taber, 2018a; Tavakol & Dennick, 2011)

### Pilot Study and Data Analysis

This study aims to validate a comprehensive financial & project traceability tool, namely, B-Bank<sup>TM</sup> which is a blockchain-secured system, mainly employed for easy loan attainment and repayment. A set of 9 descriptors were identified from the existing literature and were categorised into 5 categories, including customer service, cost-effectiveness, efficiency parameters, remittance measures, and regulatory compliance. As part of a preliminary study, we identified 4717 respondents from the retail sector and entrepreneurship who needed a financial and project management tool. A significant level of demographic heterogeneity was maintained during the selection of respondents. Each respondent was provided with a demo version of the said software, *i.e.*, B-Bank<sup>TM</sup>. After a period of 365 days of trial, a face-to-face interview session was conducted to know their feedback about the software. Each respondent was asked to answer questions relating to the performance of the software and customer experience. After the successful conduction of the interview, qualitative content analysis was performed to assess the efficacy and usability of the tested software. The data was processed through a statistical package for the social sciences (SPSS 25) for factor analysis. Likewise, the variance among the collected data was also estimated, followed by the conduction of exploratory factor, and correlation matrix designing. The factor analysis was used to refine the item pool and remove those items (questions) that have a factor level of less than 0.5 (Lloret et al., 2017). Furthermore, the overall performance of the said software was assessed by evaluating the chi-square value-based goodness-of-fit index (Seeboth & Möttus, 2018). The null hypothesis for the present questionnaire-based study was assumed as 'B-Bank is not effective in customer service provision, business productivity escalation, cost-effectiveness, remittance provision, and regulatory compliance. This analysis would ultimately help in understanding the dimensionality of the underlying

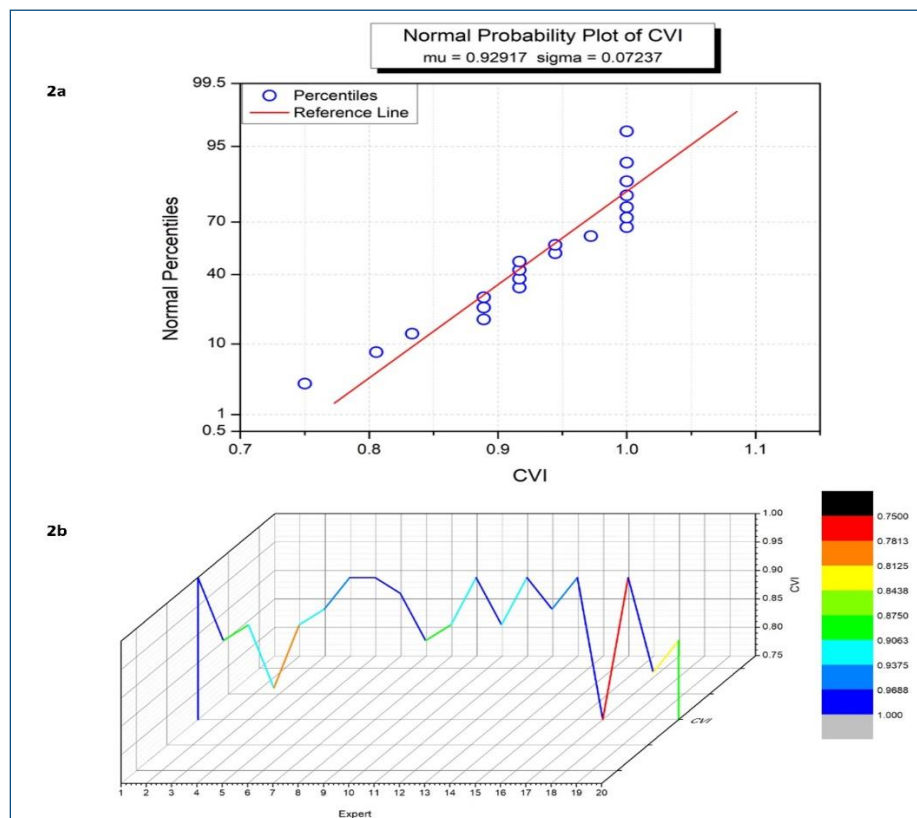
theoretical construct of the tool.

## Results and Discussion

This study aims to validate financial and project traceability software to measure the perceived benefits of adopting a blockchain-secured technology in the banking as well as retail sectors. The study began with an exhaustive literature surge and also included astute reviews of industry experts for gaining better insights into developing the items for conducting an open-ended questionnaire.

### Internal Consistency and Reliability of the Questionnaire

Initial confirmation of internal consistency and reliability of constructs was ensured utilising an expert's interview. This was followed by the factor analysis applied to the collected data obtained from 4717 respondents. The collected primary data was analysed with the help of validated statistical tools and procedures. As obvious from the results of expert validation (Fig. 3a & 3b), it was established that all items had a satisfactory Item-CVI (Item - content validity index, i.e., I-CVI ~ 0.93).



**Fig. 3: Content Validity of Questionnaire – (2a) Probability Plot; (2b) Item-Wise Contribution in Content Validity Index (CVI)**

Similarly, Scale-CVI (S-CVI) was calculated to estimate the average number of questions that had achieved a rating of “highly or quite relevant”. S-CVI in this case was found to be 1, thereby indicating excellent content validity of the questionnaire. I-CVI measures the content validity of individual questions while the S-CVI calculates the content validity of the overall scale. Ultimately Content Validity Ratio (CVR) was calculated for estimating the essentiality of an item in the questionnaire (LAWSHE,

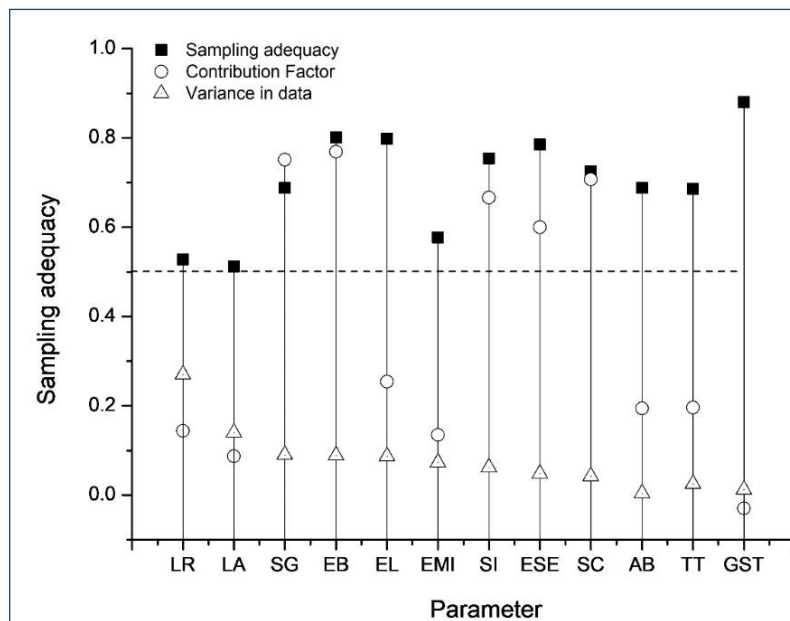
1975; Taber, 2018b). It was found that the CVR turned out to be 1, thereby indicating that each question in the questionnaire was essential and hence included for further analysis. To measure the internal reliability and consistency of the questionnaire, Cronbach's alpha was calculated. Based on Cronbach's alpha value (~0.72), it was found that the questionnaire had substantial reliability and consistency.

### Exploratory Factor Analysis

Upon assessing the responses of various respondents, it was found that there was no missing data. However, certain respondents had intentionally masked their financial data due to either a hesitant attitude or indecisiveness. The minimum amount of data for factor analysis was satisfied, with a final sample size of 4717 respondents. The factor analysis was used to simplify the data along with identifying the correlation between various variables (Lloret et al., 2017). All the item constructs (questions) were subjected to EFA by using principal component analysis (PCA) followed by a varimax rotation. Sampling adequacy was verified by assessing the values obtained in Bartlett’s test and the Kaiser-Meyer Olkin (KMO) test. In the anti-image matrix of correlation among the responses obtained from the respondents for each question, the maximum factor value was found to be  $r = 0.957$  (EMI

repayment easiness).

Other questions also had a positive  $r$  value, thereby indicating adequate sampling and correlation among the obtained responses. Eigenvalues for all the responses relating to each question were found to be greater than zero. Eigenvalues represent the amount of variance in each item that can be explained by the principal component. It has been assumed that eigenvalues greater than 1 signify that there are as many reliable factors as there are eigenvalues greater than one in the given sample (Rueda-Jaimes et al., 2017). In our case, all the 9 item-constructs had an eigenvalue greater than 1, thereby indicating the test factors to be reliable. Moreover, the estimated value of chi-square was 15943.538 with 66 degrees of freedom, indicating a significance level of  $p < 0.05$ . The KMO statistic of 0.73 is also significant enough, thereby validating the sample size of 4717 respondents responding to 9 questions to be adequate (Fig. 4).



Note: SG: Sales Growth; EB: Ease in Business; EL: Ease in availing loan; EMI: Ease in repayment of EMI; SI: Stock & Inventory management; ESE: Management of excess and shortage of stock; SC: Sales confidence; AB: Ease in accounting and billing; TT: Tax transparency; GST: GST filing.

**Fig. 4: Exploratory Factor Analysis of Sample Size and Reliability of Questionnaire Relating to B-Bank**

### Usability of B-Bank™

Based on the analysis of the statistical results of respondents’ replies to the questionnaire, we defined each of the perceived business benefits of B-Bank™ software for financial institutions as well as retailers/entrepreneurs.

Long-term benefits for the government were also evaluated and compared with the previous results as conducted on other technological solutions.

Primarily, the respondents were asked to disclose their loan requirements. 46.13% of the respondents affirmatively claimed that they require a business loan. However, the

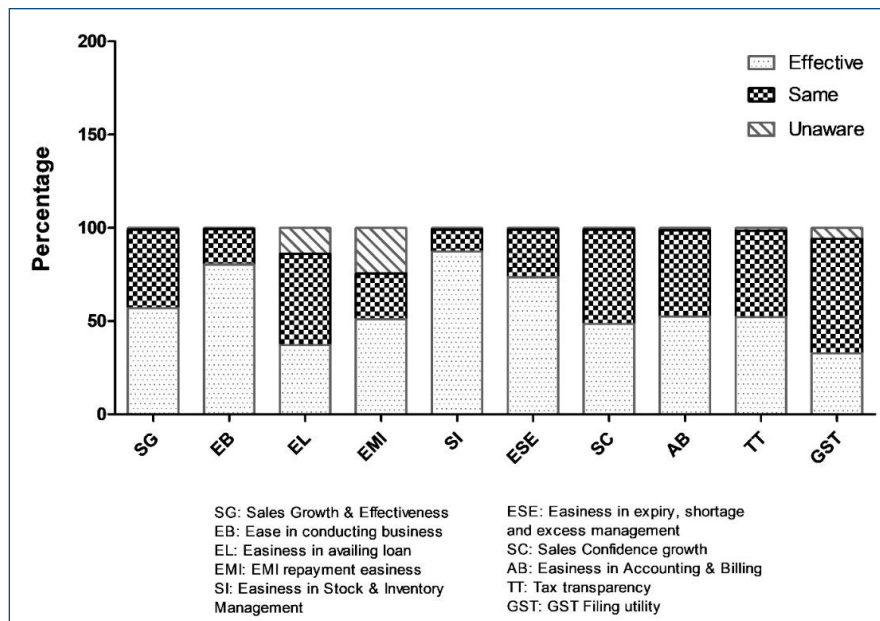
rest of the respondents were either undecided about their loan requirements (~1.71%) or did not disclose their requirements due to their hesitance in sharing financial data (~52.15%). These fearful individuals may also be afraid of adopting any new technological IT integrated solution and hence ultimately defy any kind of financial transparency.

Further, it was assessed that out of those respondents who required a business loan, nearly 29.14% of respondents availed of a loan. However, the rest of the individuals either didn't get a loan (~ 36.81%) or were unaware of business loan benefits (~ 34.05%).

Upon assessing the demographic profile of the respondents, it was found that most of the loans were required by either small distributors (49.16%) or small retailers (44.5%). On the contrary, a large fraction of super distributors (65.71%) and big retailers (~ 65.38%) refused to share their financial data. Respondents also refused to share their nominal bank information (~37.23%) and loan amount (~ 41.01%).

After the qualitative and quantitative analysis of the general demographic profile and socio-economic status of the respondent's, focused questions were asked relating to

customer service provision, efficiency, cost-effectiveness, remittance provision, and regulatory compliance. It was found that B-Bank™ was effective in enhancing sales growth significantly (≥ 55%). Additionally, the tested software could aid in easing the process of conducting business (≥ 80%); EMI repayments (≥ 50%); inventory management (≥87%); management of expiry, excess and shortage of stock (≥ 73.56%); sales effectiveness & confidence (≥ 66%); accounting & billing management (≥ 52%); and tax transparency (≥ 52%). Many respondents did not share their loan status; hence it was difficult to deduce the exact effectiveness of B-Bank™ in easing the process of loan attainment and GST/VAT filing. However, B-Bank™ was still found to be moderately effective in easing the process of loan attainment (37.25%) and GST filing (32.79%). All these results were recorded for the financial year 2018-19. However, the number of people using B-Bank is continually rising and several hundreds of users have now shifted towards employing B-Bank for GST filing and loan attainment. Hence, the percentage of users for the years 2019-20 will show an escalation and will be analysed in the coming future. A summarised analysis of the aforementioned parameters for assessing the effectiveness of B-Bank™ has been elucidated in Fig. 5.



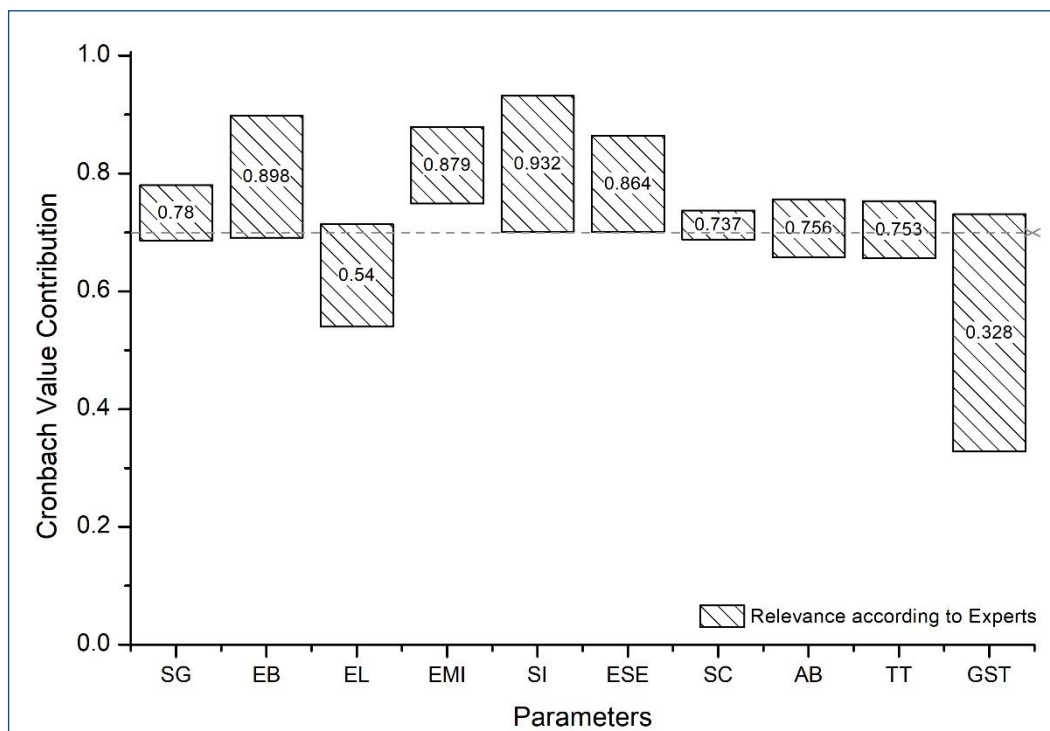
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**Fig. 5: Pilot-Scale Study – Categorisation of Responses Obtained as a Result of the Questionnaire Conducted on Assessing the Efficiency and Usability of B-Bank**

In conclusion, the usability of B-Bank™ relating to the ‘customer service’ domain (ease in business operations, inventory management, and GST/VAT filing) indicated its use in providing quality customer services. These services include increased financial transparency, project progress traceability, operational easiness of business assignments, seamless GST filing, and convenient inventory and stock management. Implementation of B-Bank™ was also found to increase the ‘efficiency’ of a given business. It could facilitate the management of excess, shortage, and expiry of stock, thereby ensuring proper utilisation of resources and avoiding any operational wastage.

Another business benefit of adopting B-Bank™ was found to be the reduction of overhead costs, thereby making the software a ‘cost-effective’ option for diverse business scenarios. Its implementation could lead to the

elimination of middlemen, thereby ultimately reducing administrative and operational costs. As a consequence, the customer regains increased confidence in his business and experiences effectiveness in sales. ‘Secure remittances’ have always been one of the challenges for the banking industry, wherein B-Bank™ can aid in timely payments of EMI, improved financial traceability, immutable account records, and enhanced system resilience. Yet another perspective of analysing B-Bank™ was its role in ensuring ‘regulatory compliance’ for mitigating the fraudulent practices of money laundering by allowing transparency in tax. The said software could mitigate all the illicit practices if deployed on a massive scale along with an influential change in the mindset of retailers/entrepreneurs for the unanimous adoption of a tax traceability system (Fig. 6).

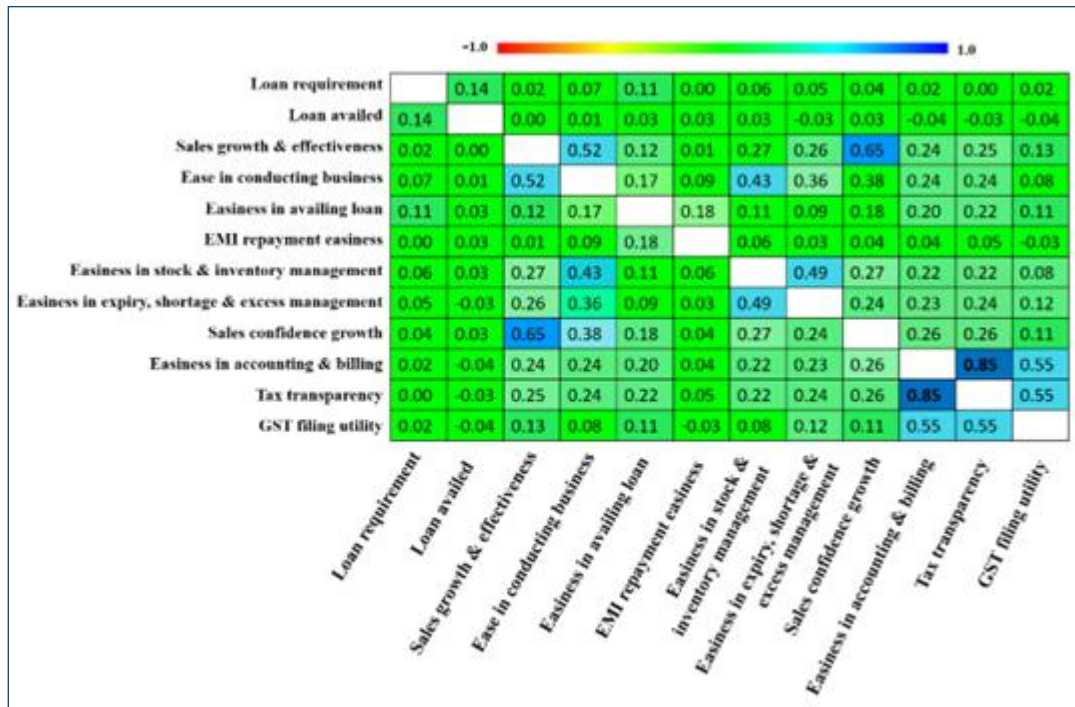


Note: SG: Sales Growth; EB: Ease in Business; EL: Ease in availing loan; EMI: Ease in repayment of EMI; SI: Stock & Inventory management; ESE: Management of excess and shortage of stock; SC: Sales confidence; AB: Ease in accounting and billing; TT: Tax transparency; GST: GST filing.

**Fig. 6: Cronbach Value Contribution – Reliability Index for B-Bank Based on Customer Service Provision, Efficiency, Cost-Effectiveness, Remittance Provision, and Regulatory Compliance**

Our study outcomes offer fundamental insights into the benefits of using B-Bank™ as a holistic solution for streamlining business operations. All these items were

positively correlated with each other, giving an insight into the overall growth of the business upon implementation of B-Bank™ (Fig. 7).



Note: Domains assessed: customer service provision, efficiency, cost-effectiveness, remittance provision, and regulatory compliance.

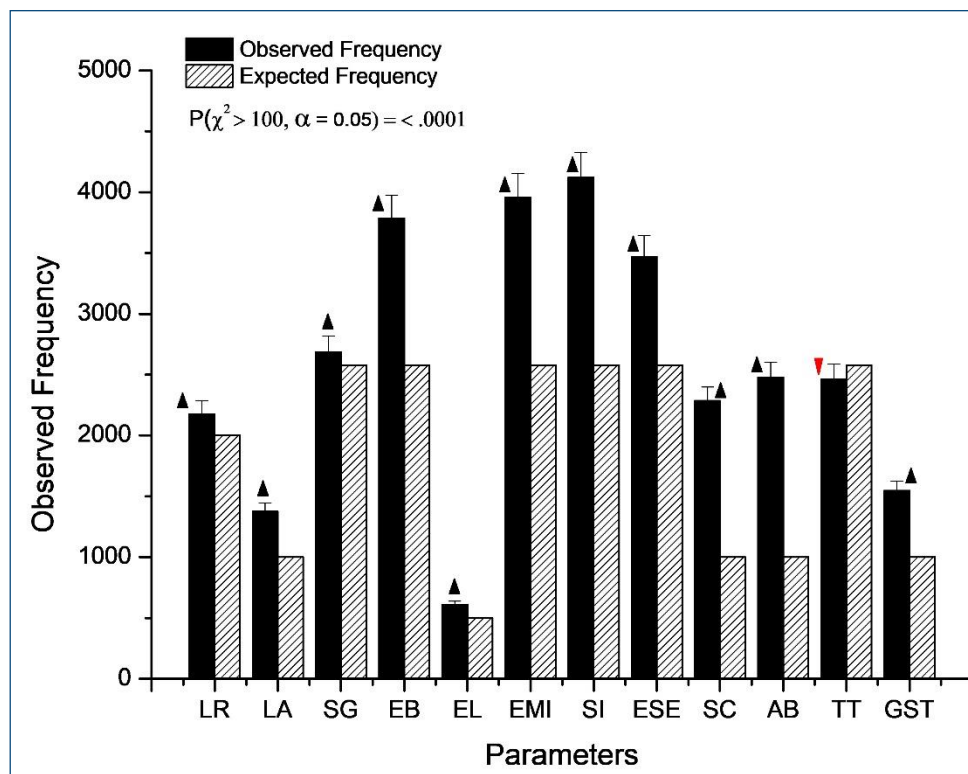
**Fig. 7: Correlation Matrix – Correlation Among Various Study Parameters as Deduced from the Responses of the Respondents Concerning the B-Bank Questionnaire**

Banking professionals can use B-Bank™ for performing customer-centric due diligence activities and providing value-based services. In the era of information and technology, it is imperative to keep track of real-time cashflows as well as stock for enhancing efficiency and productivity in business operations. Retailers and entrepreneurs can hence use B-Bank™ as a far-reaching software for managing every business operation including inventory management, commodity distribution, billing, accounting, ledger maintenance, GST/VAT filing, and credit/loan attainment. Ultimately, B-Bank™ can be utilised by the government as a tool for tax collection and recovery of revenue losses, thereby ensuring GDP growth and national economic boost-up. It is interesting to note that the present study was all-exclusive in assessing the reliability and significance of adopting B-Bank™ software in the banking and retail sector, wherein, the validation of

the instrument was empirically tested using data from all across India, *i.e.*, 29 States & 5 Union Territories. Such a national level testing of the said instrument in multiple states further enhanced its applicability.

### Goodness-of-Fit Analysis

Upon assessing the chi-square value, Bartlett’s and Kaiser-Meyer-Olkin indices, it was found that the observed frequency of most of the study parameters for assessing the effectiveness and utility of B-Bank™ was found to be significantly ( $p < 0.001$ ) higher as compared to the expected frequency. The null hypothesis was hence rejected, thereby confirming that ‘B-Bank is an effective tool for customer service provision, business productivity escalation, cost-effectiveness, remittance provision, and regulatory compliance (Fig. 8).



Note: SG: Sales Growth; EB: Ease in Business; EL: Ease in availing loan; EMI: Ease in repayment of EMI; SI: Stock & Inventory management; ESE: Management of excess and shortage of stock; SC: Sales confidence; AB: Ease in accounting and billing; TT: Tax transparency; GST: GST filing.

**Fig. 8: Summary of Goodness of Fit Assessment: Observed Frequency of Study Parameters was Found to be Significantly ( $p < 0.001$ ) Higher Compared to the Expected Frequency in Most of the Cases (Chi-Square was 15943.538 with 66 Degrees of Freedom, KMO Statistic of 0.73,  $p < 0.001$ )**

## Conclusion

The authors propose that the current regulatory frameworks need to be strengthened by employing new-age technologies like GIS/GPS-enabled project tracking, blockchain technology-mediated information decentralisation, and seamless back-end integrations with available software.

The need of the hour is to develop a finance and project monitoring system to be deployed at the financial institutions for identifying the creditworthiness of clients and timely detect fraudulent activities, if any. Implementation of such a tool will ensure improved governance and regulatory framework with stringent disclosure requirements. Retailers and entrepreneurs will also be benefitted from the adoption of a flexible and scalable system as it will aid in providing details of the inventory, cash flow as well as project progress. Moreover, such a system will be beneficial for the government also as

it will aid in proper tax collection and recovery of revenue losses if any. Such a tool will be highly customisable and can easily be adopted on common platforms across the financial services as well as the retail industry. Government should stringently impose the adoption of such an online traceability system unanimously utilising an application programming interface. Recently, in European Union also a bill corresponding to the establishment of a nationwide goods tracking system has been passed (European Union, 2020).

A similar kind of technological framework, namely, B-Bank<sup>TM</sup>, has been proposed by Bharuwa Solutions Pvt. Ltd. (IT Service & Software Development company) which is capable of self-analysing the financial and operational data of a business enterprise. Moreover, it is a scalable tool that can also be integrated as an API for exclusive data processing. Primarily, it will aid in real-time credit assessment, conclusive due diligence, and detailed post-disbursement monitoring. The said tool has

been tried and tested on a pilot scale. It is assumed that the adoption of an end-to-end financial solution in the form of a technological tool will ultimately aid in assessing a given project and selecting the worthiest beneficiaries for providing loans based upon the real-time cash flow and project details, thereby out-ruling the chances of money laundering and financing terrorism.

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