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Approach to ATM Network Spread Using Big Data Analytics

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ABSTRACT: ATMs are one of the strong channels of customer service delivery and it is the only channel that serves on cash requirement of customer. The growth of plastic cards and relevant technology enables financial institutions to make the ATM cards usage to the great level of reach among their customer base. As the user base grow exponentially, the ATMs requirements at every area, based on the population, vicinity increased multifold. Financial Institutions, gradually, increase the number of ATMs, systematically from urban areas to rural and ensuring every area will have fair number of ATMs to reduce the customer crowds at branches, which are legacy places of cash withdrawals for customers. This paper focuses on the big data analytical approach to predict additional number of ATMs in an identified location, considering the various factors of usage.

KEYWORDS: ATM, ATM Switch, National Financial Switch, Big data analytics

I. INTRODUCTION TO ATM

ATMs are synonyms of Automated Teller Machine, which does the role of 'Teller' in typical bank branch. Teller does the task of Cash collection / payments from / to customers and so ATM has the name. "An automated teller machine (ATM) or cashpoint (British English) is an electronic telecommunications device that enables customers of financial institutions to perform financial transactions, such as cash withdrawals, deposits, funds transfers, or account information inquiries, at any time"[1]. ATMs are high precision electronic equipment with suitable hardware and software. These ATMs are designed to store, dispense and retain cash. They are tailor made to process the cash request of the customers. ATM has inbuilt 4 to 5 cash trays which are cash filled every day in a short window and post the window, they are released for customer service. This window is used replenish cash by doing reconciliation of cash levels, opening balance to closing.

The Graphic User Interface(GUI) software of the ATM interacts with customer through screen display and take inputs. ATM cards, primarily, are used to identify the right customer. The secret code, Personal Identification Number(PIN) is used by ATMs to authenticate users to use the device. At the advent of ATM, in Indian financial industry, ATMs are attached to branch computerization server, as core banking level has not been achieved. ATM services are preferred channels to customer as this offers Trust / Reliability, convenient, Ease of Use, Security & privacy, Fulfillment and Responsiveness" [3].

II. BANK ATM NETWORK

Centralization of ATM were turned out to be need for better control over ATMs. As ATM SWITCHES, does the job precisely, banks started mounting the ATMs to Switch. This pays the way to the Bank's ATM network. Some banks give a banner name to their ATM's network. For the network, ATMs are connected to switch through VSAT (Very-small-aperture terminal). Operating ATM from remote location of Switch such as software upgrade etc from central place is the major benefit. Due to convenience and round the clock service nature of ATMs, customer prefer ATM services as any time service.

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III. RBI – NATIONAL FINANCIAL SWITCH

Banking regulator, RBI, versioned to interconnect all the ATM network of banks and thereby has brought 'ATM network of networks' through high end, high load supportive ATM Switch, called National Financial Switch (NFS). "National Financial Switch (NFS) ATM network having 37 members and connecting about 50,000 ATMs was taken over by NPCI from Institute for Development and Research in Banking Technology (IDRBT) on December 14, 2009. Over the span of few years, NFS ATM network has grown many folds and is now the leading multilateral ATM network in the country. As on 30th June' 20, there were 1,154 members that includes 113 Direct, 984 Sub members, 50 RRBs and 7 WLAOs using NFS network connected to more than 2.49 Lac ATM"[2].

Every circle, in above picture symbolizes individual bank's ATM network. By the introduction of NFS, the restriction or boundary of using bank's ATM by that bank's customers has been broken. Any bank customer can use any bank's ATM, as of now, is facilitated by NFS, making the customer to be the customer of Financial System, instead of a Bank. 'Bank consolidation' by Finance Ministry has been in drive now thereby PSB count comes to 12. Additionally, 'White-color-ATMs' (run by any firm has prescribed sound financial strength, but not a bank) have been permitted by RBI which further strengthens the ATM networks and services.

IV. ATM WORKING ENVIRONMENT

ATM are always tagged to the branch for administrative purposes. If the ATM is kept in the same branch premises, it is called 'On site' ATM. If the ATM is in a mall or in any common place, but not in branch premises, it is called 'Off site' ATM. The transaction done using a bank card at the 'same bank' ATM, it is termed as ON-US transaction and if the bank card and usage ATM are different, it is called OFF-US transaction. OFF-US transaction bring revenue for the transaction to the bank, whose ATM is used. That makes banks, being commercial profit looking organizations, keep on identifying potential areas for ATMs to be introduced as bank's first one or additional one. In case of additional one, the location of ATM may be on the same existing ATM site or different.

V. CHALLENGE: PROFITABILITY OF RUNNING ATM AND NETWORK EXPANSION

Under this umbrella of ATM network services, now, customers use the ATMs exponentially. This leads to challenges of ATMs running out cash, sooner, it is filled, due the non-presence or less presence of ATMs in that place. This may happen regularly or during peak / seasonal periods. Banks can find the 'cash out' position of ATM from its idle time report of the network. 'Cash out' is an (operational) as the event in which an ATM runs out of money or its balance equals to 0.4 This is handled by banks by advising the cash management service team to replenish as most of banks outsourced this activity to expert vendors. However, this can temporarily solve the issue but may not be a right solution.

If the bank customer uses other bank's ATM there is transaction cost (Rs.20/- for fund based & Rs.5/- for non fund based) paid by Issuer bank to Acquire bank. RBI advises the banks the bear the cost of first 5 such transaction and over 5 transactions, banks can collect the transaction cost from the customer. For example, in a bank with 500 branches and for 500 customers, the expenditure to bank comes $5 \times 500 \times 500 = \text{Rs.}12,50,000$. Hence, stopping own customer using other banks ATM will lead internal generation of revenue. The right choice is bringing in another ATM, which will equalize the load of ATM and extend the service, nonstop. It improves the customer service as well as banks revenue.

VI. CURRENT APPROACH

Today, being various other modes of payments and money transfers initiated through ATMs, banks are looking ATM usage and ATM network as one of the major delivery channels in extending customer service and profits. At present, bringing additional ATM, is considered based on the

(i) Number of customer transactions, taking place in existing ATM there

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(ii) Number of times the ATM goes to 'Cash out' state.

The cash limit increase to the ATM (2nd factor) may not be right option as ATM being a technological product, beyond number of hits, say 300 or 350 (1st factor), there could be chances of ATM's behavior. By the present approach, banks easily locate the necessity for additional ATM in any location from the data from the ATM Switch or even ATM log. However, as banks contract with vendors as fully managing or partly managing ATM network, the add on ATMs are recommended by vendor. Bank many times may have less validation on the appraisal done by vendor.

VII. BIG DATA ANALYTICS APPROACH

Instead of 'reactive' approach, banks have to be 'proactive' approach in arriving decision on ATM network and also from 'wish list' approach to 'necessity' approach. The emerging technological support and banks technological roadmap towards customer service, reduction of transaction cost and high profits, will insists towards analyzing the optimum ATM usage and expansion. Under this pretext, the big data approach will technically share high end support, in terms of voluminous storage and high computing facility through python or R.

As ATMs are in user interactive domains, in road sides (on site) or malls (off site), there are various other factors also to be considered (geographically 1 to 2 km range), such as

- (i). Number of other bank ATMs
- (ii). Number of transactions serviced in those ATMs
- (iii). Number of hits at our existing ATM
- (iv). Number of cash out at our existing ATM
- (v). Number of error transactions at our existing ATM due to 'Insufficient cash in ATM' or cash out. (opportunity loss)
- (vi). Number of 'Off us' transactions, done at existing ATM and thereby Revenue earning.
- (vii). Number of transactions and revenue loss, of our customers using other banks' ATM at that location
- (viii). Location population and location segmental value (residential, commercial, industrial etc)
- (ix). Population segment (High value, NRI, Salaried class, business class etc) composition
- (x). ATM safety at the location

The above factors comprise, vital information on peer-banks [(i) & (ii)], existing ATM / our customers usage pattern [(iii) to (vii)] and market demographic [(viii) to (x)] and are driving points in decision process.

The analytical approach can consider suitable mapping 'weightages' assigned to each factors. The weights, be different from bank to bank based on the operational stand point of the bank such as volume of business etc, may be defined as reasonable discrete values or value to ranges. This approach, as worked on the real time data along with weightages, if used, banks will have provable and scalable decisions in arriving on additional ATMs.

VIII. BIG DATA ANALYTICS

Big Data analytics is the process of collecting, organizing and analyzing large sets of data (called Big Data) to discover patterns and other useful information. "Big Data analytics can help organizations to better understand the information contained within the data and will also help identify the data that is most important to the business and future business decisions. Analysts working with Big Data typically want the knowledge that comes from analyzing the data". Necessary quantum of data can be collected for defined sources, as ATMs are operating under ATM switch and CBS coordination in issuer situation and as such banks have full control on analytics on the transaction data from these sources. Sources include, Central bank, RBI, banks can gather many operation information, data points, to take any strategic decision.



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Market data can be sourced from various trusted agencies and government arms. Availability of data and usage of emerging technology for data analytics will help banks to move scientific approaches in deciding additional ATMs. The challenges are the data gathering and curation and critical success factors are identification of big data components like the storage volume, storing pattern, computability and analytical language like python or R language build-strength and its manageability.

IX. CONCLUSION

The big data analytical approach, enables banks a sound platform

1. Productive use of in-house data
2. Data integration, to extract business intelligence and drive with that.
3. Effective and efficient way of managing ATM networks
4. Time to market concept to streamline ATM functionality
5. Effective vendor management, whether fully outsourced as 'turn key' or partly outsourced for cash management/infra management.

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