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Practical Approach to Identifying Indicators for Measuring Efficiency of Agent Banking System in Bangladesh

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Practical Approach to Identifying Indicators for Measuring Efficiency of Agent Banking System in Bangladesh

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Abstract

This paper looked into measuring efficiency of Agent Banking System in Bangladesh using Data Envelopment Analysis (DEA), which is one of the main approaches of efficiency test. We linked our definition of efficiency of agent banking with financial efficiency, social efficiency and risk management efficiency models. In this light, satisfying the criteria of these three models, we identified indicators that are important for measuring efficiency of the Agent Banking system. However, due to paucity of data we could not empirically test efficiency of agent banking system using Data Envelopment Analysis (DEA). Therefore, we concentrated on investigating degree of data paucity of the indicators and explored the existing data sources, in order to assess how we can overcome this data paucity to finally estimate efficiency of the agent banking system. Since Agent Banking is relatively new among the financial inclusion tools in Bangladesh and capacity of collecting relevant data is limited, we recommended steps for making the collection of necessary data feasible to measure efficiency of agent banking system in near future. In order to bring out the best delivery of banking services from Agent Banking system, policymakers need to make plans for near future regarding how it should be measured to fully understand its impact on our economy and society.

Keywords: Agent Banking, Data Availability, Efficiency Indictor, and Measure of Efficiency.

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1. Introduction:

Over the years Agent Banking has become a widespread idea for our country, given our large proportion of population lacking access to formal financial services. To provide banking and financial services to the people who lack access to formal banking channel and live in geographically dispersed locations, Bangladesh Bank introduced Agent Banking. Agent Banking provide financial services to the underserved population through engaged agents who conduct banking transactions on behalf of a bank. Studies such as Kilonzo et al. (2017), Lomosi et al. (2015), Malek et al (2017) and Mas (2009) discussed that, over the years Agent Banking has shown revolutionary success for developing countries with a large proportion of population lacking access to formal financial services. Among the developing countries, Brazil, Columbia, Peru, Malaysia and Kenya have already launched successful Agent Banking services. In Bangladesh, 19 scheduled banks are conducting Agent Banking successfully.

Agent Banking is a comparatively new concept in the context of different instruments of financial inclusion in our country. There is no doubt Agent Banking will have significant effect on financial inclusion of Bangladesh. In order to bring out the best delivery of banking services from this system we should take measures and make plans for near future regarding how it should be assessed or examined to fully understand its impact on our economy and society. As we attempted to test efficiency of agent banking system empirically, we could not find sufficient amount of data. Therefore, we concentrated on investigating degree of data paucity of the indicators and explored the existing data sources, in order to assess how we can overcome this data paucity.

In this study we focused on the definition of efficiency of Agent Banking System, indicators that represent efficiency of the Agent Banking system and whether we have sufficient data to assess efficiency of the Agent Banking system, as it is operating in Bangladesh. In this context, the arising question is: how to conduct an efficiency test for Agent Banking in Bangladesh? We decided to explore theories that are well established for measuring efficiency of other institutions like Agent Banking with similar or nearly similar characteristics and objectives. We then worked to identify the important factors or indicators for examining the efficiency of Agent Banking. Lastly we investigated whether the basic data on those indicators is available for Bangladesh and are those enough to perform an efficiency assessment proposed by our preferred efficiency test model, the Data Envelopment Analysis (DEA). In conclusion we offered a number of recommendations regarding availability of data for the efficiency indicators to finally estimate efficiency of the agent banking system for Bangladesh.

2. Concepts and Definitions:

2.1. Agent Banking

Agent Banking is a system that enables the underserved population to avail limited scale banking through agents engaged under a valid agency agreement instead of a

teller/cashier. In Bangladesh, the system is open for use by both Conventional and Islamic mode of banking subject to a number of prerequisites. Bangladesh Bank defines Agent Banking in its Prudential Guidelines for Agent Banking Operation in Bangladesh, *"Agent Banking' means the business of providing banking services through agent's network."* Here, 'Agent' means an entity that has been contracted by a bank to provide the services in a manner specified in the Guidelines, either in a single Agent Banking outlet or having branch offices or outlets owned or otherwise engaged legally by it, in a manner specified in Bangladesh Bank's Prudential Guidelines for Agent Banking Operation in Bangladesh.

Brazil in Latin America holds the pioneering role in adopting Agent Banking system. According to AFI Discussion Paper (2012), Kenya, South-Africa, the Philippines, Uganda and India are pioneers of Agent Banking in their respective regions. Several other economies such as Peru, Colombia, Mexico and Pakistan, have experience with operation of Agent Banking in their banking systems. Bangladesh Bank issued the Guidelines for Agent Banking Operation in Bangladesh in 2013, 2014 and 2017.

According to Bangladesh Bank's Prudential Guidelines for Agent Banking Operation in Bangladesh (2017), Bangladesh Bank may "Seek any information from any agent at any time." Banks are required to publish, and update on regular basis, the list of all its agents and outlets and disseminate it to agents. Both banks and agents are required to make the list visible in their branch and office premises as well as their respective websites (for bank branches), similar other publications where the bank finds it appropriate. Agent Banking outlets are required to operate at least the whole duration of usual business hours. In addition, agents are allowed operate more than the usual business hours if the bank allows it considering the security and risk issues.

2.2. Concepts in the Title

I. Efficiency Indicator: Efficiency indicators are measures, which demonstrate how well the Agent Banking system is fulfilling criteria of efficiency depicted in the study. In line with the conventional concept of efficiency in economics, we have aligned the definition for efficiency of agent banking in our study. (see Appendix: 1: A-1 & title 3.2)

II. Agent Banking System: The Mechanism through which banks provide Agent Banking services through agents.

III. Data Availability: When and where the data is needed, the data is available to Central Bank for policy making and evaluation purpose in series format.

3. Agent Banking in Bangladesh:

3.1. Current Scenario of Agent Banking in Bangladesh:

The bank branch who holds the license of agent banking, opens a current account in the name of their licensed Master Agent/Agent and deposits the fund allocated for the agent. The Master Agent/Agent then himself takes up the role of Direct Sales Representative (DSR) and provides Agent Banking services to general clients using the deposit amount or outsources to a third party for the task. The third party appointed though outsourcing then works as the DSRs/licensed Sub-Agents/Outlets of that Master Agent/Agent's network. In the later case, the DSRs/Sub-Agents/Outlets provide Agent Banking services to general clients. (See Appendix: Figure 3)

Up to March, 2019, 21 banks have been granted approval to provide Agent Banking services. Out of the 21 banks, there are 19 banks currently operating in market. These banks have appointed a total of 4,866 Master Agents/Agents and 7,838 DSRs/Sub-Agents/Outlets.

3.2. Why and how we define efficiency for Agent Banking:

Agent Banking has became one of the essential financial services for customers to access financial products and services at a location nearest to the customer. This breaks down certain barriers to financial inclusion such as cost and accessibility. Stephen Ross (1973) and Barry Mitnick (1974) independently were the first scholars to propose, the theory of agency. Ross is responsible for the origin of the economic theory of agency and Mitnick for the institutional theory of agency.

In agency theory there are two parties involved, principal and agent, both of whom behave rationally with the objective of increasing net gain. The problem arises in the form of information gap, where the principal cannot know with certainty whether the Agent fulfills their end of the contract. In relation to our discussion of the concept of efficiency (see Appendix) in Economics, we would expect an efficient system to make use of its existing resources in such a manner that it extracts the optimal result while creating minimum of externalities.

The Agent Banking system in Bangladesh can be said to be efficient when its operation serves the purpose it was designed to serve. With the concept of efficiency and theory of agency in context, Merton et al. (1995)'s definition of Financial efficiency as a measure of organizations' ability to translate to its financial resources into mission related activities and to the extent of the profitability, liquidity, productivity and capital strength is evidence enough for the above definition. According to the Prudential Guidelines for Agent Banking Operation in Bangladesh, "Bangladesh Bank has decided to promote Agent Banking as a complimentary channel to reach to the poor segment of the society as well as existing bank customer with a range of financial services, especially to geographically dispersed locations;" through a safe, secure and sound delivery channel. Analyzing each aspect of the above mentioned purpose the following four criteria can be extracted and we can say the Agent Banking system is operating efficiently when it:

- Establishes agents as a channel for delivering banking services in a cost effective manner, i.e. with available resources, by decreasing costs agents should provide the maximum amount and quality of service.
- Works within an established framework and conduct activities according to BB's plan of carrying out Agents Banking as branchless banking services;
- Extends banking services and promotes financial inclusion while maintaining a safe and sound financial system environment; and
- Conducts the branchless banking services by providing a set of minimum standard of technological data and network security, customer protection and risk management, complying to BB's requirements.

In order to examining whether the Agent Banking system in Bangladesh meets the above four criteria of efficiency we have explored and investigated different variables and identified the ones with the potential to be efficiency indicators.

3.3. Practical Approach to Measures of Efficiency of Agent Banking

There are numerous literatures on measuring efficiency of banking system, microcredit institutions or other financial institutions, but there is no such work done for Agent Banking system in the context of Bangladesh. Therefore, an important question arises; whether we should assess efficiency of Agent Banking by taking the models used for microcredit and other financial institutions or do we need a new model. The question may be answered by running efficiency tests using several models and comparing their performances against each other. Given the lack of prior studies testing efficiency of the Agent Banking system in Bangladesh, we will start with the assumption that existing models for efficiency test of microcredit and other financial institutions may provide effective results for the efficiency test of Agent Banking.

According to British politician and author Benjamin Disraeli, "There can be economy only when there is efficiency." While this statement means efficiency is a very important concept in economics, the measure of the efficiency appeared in Koopmans's (1951) work who was interested in the production analysis. According to Bozec, Dia et al. (2006) it is important to select appropriate method for efficiency to avoid measurement bias in the result. As Berger and Humphrey (1997) put it, there are two main approaches to efficiency test: Parametric Frontiers and (non parametric) Data Envelopment Analysis (DEA). Data envelopment analysis (DEA) is a technique used to compare the performances of several units. Several studies explained the advantage of using DEA (non parametric) over parametric approch to assess efficiency of any decision maker unit; that is, the DEA helps to analyse when conventional cost and profit function fails. Berger and Humphrey (1997) argued that DEA performs multiple comparisons between a set of homogeneous decision maker units. Therefore, DEA may be an appropriate model for assessing the efficiency of Agent Banking. Gutiérrez-Nieto et al. (2008) showed theoretical model on measuring efficiency in two ways: financial efficiency and social efficiency. (See Appendix-7: A-7) This segment of our study will reflect on a model for measuring efficiency of the Agent Banking system.



In the model above, there are input variables that express characteristics of an Agent Banking system and the output variables that are indicators of efficiency of the system. Identifying the output variables in such a manner that, those can quantify the efficiency criteria of Agent Banking is a necessary condition for using this model. This model in the form of a simple production function is rather very adaptive. It can incorporate the DEA approach and filter out least important variables allowing a parsimonious model to test the efficiency of the Agent Banking system.

Profitability, Total amount of transactions, Number of clients, Number of dormant accounts, Volume of Cash Deposits, Daily Turnover of Outlet's and Agent's Account and Service Coverage are indicated as the output variables for measuring financial efficiency of Agent Banking (See Appendix-5: Figure A-5). As it can be seen, Agent Banking provides affordable alternatives for financial services in cost effective manner. Financial efficiency model seems to satisfy our first criteria, establishing agents as a channel for delivering banking services in a cost effective manner, definition of efficiency for Agent Banking.

1. Profitability: Financial institutions seek to maximize their profit. As explained by Al-Jafari et al (2012), profitability refers to the net income or surplus remaining after costs are deducted from gross revenue. Musau et al. (2015) said, profitability reflects the earnings or interest income on loans and advances. Goddard et al. (2004) stated

that, a bank's profitability can be measured by ROA (Return on Assets). Seiford et al. (1999) explored a number of other studies and concluded that ROE (Return on Equity) is also a measure of profitability along with ROA. In Bangladesh, Agents earn different amounts of commission from (a) different types of financial services such as, opening current account, Fixed Deposit Receipt, Deposit Plus Scheme, Cash transactions etc. (b) transfer of funds in own territory or other territory etc. (see Appendix-4: A-4 for the questions asked to quantify the variable)

2. Total Number of transactions: The transaction in agent banking takes place in the form of cash deposit and cash withdrawal, foreign remittance collection, received salary, small loans, DPS services, collection of utility bills, taxes etc. This variable may include all types of transactions via Agent Banking. (see Appendix-4: A-4 for the questions asked to quantify the variable)

3. Number of Clients: Number of clients or customers plays a vital role in the amount of revenue earned by the Agent Banking system. (see Appendix-4: A-4 for the questions asked to quantify the variable)

4. Number of Dormant Accounts: Banks should mark or identify accounts as dormant as per Bangladesh Bank policy. Dormant account is the account which becomes inoperative due to absence of activities by the account holder for a given period of the time decided by the regulator. Banks will maintain a system which will classify the accounts if there is no customer made transaction for the defined period. (see Appendix-4: A-4 for the questions asked to quantify the variable)

Number of employees, Assets, Operating Cost, Volume of Cash Deposits, Turnover of Outlets' and Agents' Account, Agent Experience and Customer Service are used as input variables for measuring financial efficiency of the Agent Banking system.

5. Service Coverage: As Agent Banking was introduced with the purpose of taking banking service to the unbanked population, it is expected to provide complete banking facilities to its clients. The extent to which a client can access banking services through Agent Banking is an important indicator of whether Agent Banking is able to offering branchless banking services and establish agents as a channel for delivering banking services in a cost effective manner to the unbanked people. Therefore, the variety of services available in any outlet is an indicator of how effectively that particular outlet serves the purpose of Agent Banking system. This variable is concern of both financial and social efficiency concepts. (see Appendix-4: A-4 for the questions asked to quantify the variable)

6. Volume of Cash Deposits: The growth in the volume of cash deposits occur due to increase in the confidence of the customers in the Agent Banking system. If a customer trusts the services and the personnel of an Agent Banking entity then that customer is more likely to avail the Agent Banking system. This signifies that the increased efficiency of the Agent Banking has in return helped the volume of cash deposits to grow. (see Appendix-4: A-4 for the questions asked to quantify the variable)

7. Number of Agents: The number of Agents is defined as all existing agents, as per the structure of Agent Banking, approved by Bangladesh Bank. According to the structure of Agent Banking; number of Agents include: 1. Master Agent-Agent Banking

Outlet, 2. Unit Agent and 3. Support Service Providers (Definitions are exactly as same as described in guidelines on Agent Banking by BB). (see Appendix-4: A-4 for the questions asked to quantify the variable)

8. Fixed Assets/Initial Endowment: Agents hold a very small portion of total fixed assets in banking system. How efficiently an agent can use its small endowments/asset is an important question. In CGAP (2003) loans, investment and other fixed assets which are expected to produce income are termed as asset. The balance which is deposited in master agent's current account to run the Agent Banking should also be included as asset of the Agent Banking. (see Appendix-4: A-4 for the questions asked to quantify the variable)

9. Operating Cost: Jansson et al. (2003) define operating expenses as "expenses related to the operation of the institution, including all the administrative and salary expenses, depreciation and board fees". Operating cost of Agent Banking must include salary paid to the employees working under agent, transaction cost (variable cost) and fixed operating cost of the agent banking. Since, agents are not exclusive, they have some other businesses as well, we can not derive the operating cost of the agent banking services directly. However, Transaction cost and average fixed operating cost per agent is available at Bank's end. If some agents can not provide their data series on average fixed operating cost, we may derive the opportunity cost of capital invested by the agents. Moreover, some expenditures are also expected for occupying any person or other utilities for liquidity Management, Transportation and Security purposes to be included in operating cost as well. (see Appendix-4: A-4 for the questions asked to quantify the variable)

10. Agent Experience: Malek et. al. (2017) found that Agent experience is the main factor that contributes to financial inclusion performance, Agent core business is the second most important factor and Agent Attitude the third. They found that agents with prior experience in retail have performed better because there was a positive sentiment attached to a retail service provider or vendor from the clients. They explored Mahmood's (2013) work where it was found that retail service providers and vendors had explicit entrepreneurial management talents and better acquaintances with people. Agent experience is measured by Agents' prior profession and tenure. (see Appendix-4: A-4 for the questions asked to quantify the variable)

11. Customer service: Reliability is considered as the essential core of service quality. In addition, other dimensions will matter to customers only if the service is reliable, as those dimensions for example, responsiveness and empathy from service staff cannot compensate for unreliable service delivery. Malek et. al. (2017) argued that the ease and proficiency of agent's performing services builds clients' perception of agents' attitude towards commitment. Rahman (2016) tested the impact Agent Banking has in development of SME where he used clients' satisfaction as an indicator or impact, the dependent variable. (see Appendix-4: A-4 for the questions asked to quantify the variable)

Financial inclusion through Agent Banking will not be fully possible if we exclude the poor and women of the society. The third criteria of the definition of efficiency of Agent

Banking, extending banking services and promoting financial inclusion while maintaining a safe and sound financial system environment, relates to Social Efficiency. Number of women clients, Number of poor/unbanked/underserved Customer and Territorial Coverage are used to indicate the output variable to measure the social inefficiency. The same input variables of the financial efficiency model can be used to indicate the input variables to measure the social efficiency.

12. Number of women clients: In Bangladesh, Agent Banking services can be a significant tool for women empowerment through financial inclusion. Distance and location of the financial institutions as well as financial ignorance of women can be obstacle to women empowerment. As a major proportion of rural women are beneficiary of remittance, number of women availing Agent Banking service is an important indicator of financial inclusion. The more unbanked rural women clients are brought under the coverage of Agent Banking, the more socially efficient the Agent Banking system is. (see Appendix-4: A-4 for the questions asked to quantify the variable)

13. Number of poor/unbanked/underserved Customer: It is essential to know the number of poor clients coming under the coverage of Agent Banking services if we want to assess the social efficiency of Agent Banking. As Gutiérrez-Nieto (2008) states, poverty is a relative and complex concept to be used as an indicator of efficiency of Agent Banking. As we know the main objective of the Agent Banking is to provide limited scale banking services to the underserved or unbanked people. We define poor or unbanked or underserved for the efficiency purpose of Agent Banking system as, people who are not in a condition to avail the formal banking facilities for financial reasons or lack of financial literacy or transportation cost or a combination of those. (see Appendix-4: A-4 for the questions asked to quantify the variable)

Small business owners often tend to shy away from participating in formal banking. There are several reason behind this such as; the volume of each of their transaction is very small therefore, visiting a bank branch for each transaction is more costly than operating outside formal banking channels, given their educational background and financial literacy most of the small business owner find the lengthy paper work of opening bank account and bank transaction procedure very inconvenient, in almost all of the instances the employees of small business owners do not own bank accounts and therefore small business owners cannot make transaction with employees through formal banking channels. Similar circumstances prevail for population with a lower level of income living in remote areas and city outskirts.

Number of women clients and Number of poor/unbanked/underserved Customer are reflecting the output variable of social efficiency model of the Agent Banking. Agent Banking will be efficient if it extends banking services and promotes financial inclusion to the underprivileged people of the society like rural women and poor people.

14. Territorial Coverage: As, Agent Banking aims to provide banking services especially to the geographically dispersed locations. According to Ivantury and Timothy (2006) Agent Banking is beneficial to the clients in the following ways; long opening hours, closer to their homes which implies lower transaction cost and is better

accessible by the poor who might feel intimidated in branches compared to Agent. Chiteli (2013) explains that increasing the territorial coverage is one of the main objectives of Agent Banking. (see Appendix-4: A-4 for the questions asked to quantify the variable)

The data on distance from client's home/work will reveal the average threshold level of distance which the clients in general may perceive as convenient.

Even with coverage and good quality of services, a system can be inefficient due to risks generated by poor management. Therefore, managing risks or challenges effectively is imperative to ensure efficiency of Agent Banking. One of the criteria for efficiency of Agent Banking is 'providing as a set of minimum standards of data and network security, customer protection and risk management to maintain the branchless banking services by implementing measures and supervising all types of risks to be created by agents and clients.' Now, in order to fulfill the criteria of Agent Banking efficiency four variables such as, Network failure, Financial Literacy, Liquidity problem and Customer Protection are taken as input variables. Output variables can be taken as the same as the variables of the financial and social efficiency model both have used.

15. Network failure: Uninterrupted network connection with server can be a significant challenge for Agent Banking. Network failure is defined by the number of hours per day clients or agents experience network problem while doing transaction. In rural area, sometimes the lack of internet access may create problem to the business. Some agents may lose clients for network problem as Atandi et al. (2013) points out. (see Appendix-4: A-4 for the questions asked to quantify the variable)

16. Financial Literacy: The more qualified the hired agents are, the more they will be efficient and therefore, the productivity of the Agent Banking system will increase. As Charles and Agnes (2014) describes, high quality of agents increases the efficient performance of Agent Banking while poor quality of agent will do the opposite. According to Huston (2010), financial literacy or financial knowledge indicates the skill and knowledge that allows an individual to make effective decisions with all of their financial resources or to improve welfare through better decision making. (see Appendix-4: A-4 for the questions asked to quantify the variable)

17. Liquidity problem: Liquidity problem may arise when an agent is out of cash in his account to conduct transaction. Liquidity problem may be the reason for losing customers who are willing to take the services from Agent Banking. (see Appendix-4: A-4 for the questions asked to quantify the variable)

18. Risk management: According to prudential guidelines by BB, it can be seen in article 23 that 'Banks should pay special attention to credit risk, operational risk, legal risk, liquidity risk, reputation risk and compliance with rules for combating money laundering and financing of terrorism. Agent's credit worthiness should be assessed and proper limit structure for agent's various activities commensurate with this assessment should be in place'. In light of this risk management guide, Banks should be responsible for technology risks regarding information and data security in wireless networks. Although there are many types of risk, for the convenience we are keeping it simple and

dividing it in three categories: Agent related risks; Client related risk; Technological risks.

- Agent related risks: Agent related risks include: operational risk, Liquidity risk • Credit risk and Compliance risk etc. According to the 'The Pakistan Branchless Banking Regulations (Section 8.1)', an agent produces new operational risks due to lack of capacity, poor training, and lack of necessary tools and systems. T. P. Fitch (2006) defined liquidity risk as unability of a bank to meet the demands of deposit holders who wish to withdraw their funds and to satisfy the needs of willing borrowers. In case of Agent Banking we can say, when an agent is unable to meet the demands of deposit holders and borrowers then liquidity risk arises. There are also other risks like: Agent fraud or theft, Unauthorized fees imposed by agent, Abusive service by agent of customers (i.e., requiring clients to purchase and services to obtain certain goods other services). misrepresentations regarding the agent's role as acting on behalf of a bank, loss of customer assets and records, data entry errors, agent failure to resolve consumer complaints to the bank as described in Lauer (2011). Compliance risk arises when an agent intentionally or unintentionally not aware about laws or regulations and breaks the laws about anti-money laundering and combating the financing of terrorism (AML/CFT).
- **Client related risk:** Credit risk arises when borrower failed to repay loan. Sometimes client may get involved into the AML/CFT) related crime that may occur Compliance risk.
- **Technological risks:** According to Guidelines by BB: '*Technology risks regarding information and data security in wireless networks should be properly identified and addressed*'. Technological risks may arise for both agent and client, sometimes any other third parties. Both agent and client should be well aware about Technology literacy so that they can avoid wireless or electronic banking related risks and other frauds. (see Appendix-4: A-4 for the questions asked to quantify the variable)

Location of the outlet is an important indicator in determining the level of security of Agent Banking transactions; some locations have better security due to their surroundings and structure. Mode of keeping account is of prime interest as accounts' durability is a major factor in customer protection, risk management and network security. Lastly, as agents are trusted with confidential information relating to clients' financial and personal aspects, financial literacy of the agent is vital with regards to data and network security and risk management. Musau (2015)'s work supports regulation as one of the determinants of Agent Banking system's performance.

4. Discussion on available Data Resources:

4.1. Bangladesh Bank quarterly report on Agent Banking: Bangladesh Bank (BB) publishes a report on Agent Banking on quarterly frequency. The publication has a collection of data regarding number of agents, number of outlets, type and number of new accounts, deposit volume, loan disbursement and remittance collection in both rural and urban area from the quarter October-December, 2016. The report also

analyses various issues relating to Agent Banking that have implications to financial inclusion and improving scenario of the agent banking. It contains comparative analysis on some selected variables such as, changing scenario of volume of deposits; this report reflects the disintegrated impact of Agent Banking on both rural and urban areas. The statistical tables/data in the report are collected from the reports submitted by the individual scheduled banks directly to the Financial Inclusion Department of Bangladesh Bank.

4.2. Bangladesh Bank monthly Economic Trends: Bangladesh Bank started to include agent banking data alongside with the data on e-banking, mobile banking in the Monthly Economic Trends, a month-wise regular publication of Bangladesh Bank from the April-June quarter of fiscal year 2013-14. Currently data on Agent Banking is included on quarterly frequency in the monthly publication. It includes data on Number of Agents, Number of banking transactions, Volume of banking transactions and Number of Agent Subscribers.

4.3. Scheduled Banks' Website and their publications/report: According to Bangladesh Bank's 'Prudential Guidelines for Agent Banking Operation in Bangladesh' published in September 2017 article 32 "Bank shall publish the list of all its agents and outlets in a conspicuous place within its branches or agent banking offices (as the case may be), website and such other publications as it may deem appropriate". Following this instruction, every scheduled bank regularly updates the list of all agents and outlets on their website.

4.4. Other publications: Sometimes personal/sponsored study, survey and investigation may contribute the data resources. In case of agent banking there is no such study or survey which may represent any primary data.

(See Appendix-6: A-6)

5. Discussion Regarding the Efficiency Indicators

5.1. Discussion

We have identified variables which can be used to measure the efficiency of Agent Banking using Data Envelopment Analysis (DEA). Although it is one of the most emerging issues in the area of financial inclusion, available data to measure the efficiency of agent banking system is very limited. The prime reason for data unavailability is the fledgling state of the Agent Banking system that started operations as recent as 2013 and formal data collection started since 2014. Other than that, lack of a comprehensive effort towards data collection in this area as well as lack of survey initiatives is the reason of data unavailability.

Table: 1: Summary table of data availability									
	Name of the	Available and	Source	Available but	Potential Source	Available	Suggested		
	Variables	Published		not published		Frequency	Frequency		
1.	Profitability	No	-	Yes	Outlets/ Agents		Daily		
2.	Total number of	Yes (Partially)	Agent Banking	Yes (Frequency	Outlet and Agent	Daily	Daily(Frequency		
	transactions		Activities	of adding			of adding		
			(BB's Quarterly	deposit to			deposit to		
			report on Agent	Master Agent's			Master Agent's		
			Banking)	Account)			Account)		
3.	Number of New	Yes	Monthly	-	-	Daily	-		
	Clients		Economic						
			Trends						
			(Quarterly						
			report on Agent						
			Banking)						
4.	Number of	No	-	Yes	Outlets/ Agents	-	Monthly		
	Dormant				Banks				
	Accounts								
5.	Number of	Yes (Partially),	Agent Banking	Yes	Banks	Quarterly	Monthly		
	employees	number of	Activities						
		support service	(BB's Quarterly						
		provider is not	report on Agent						
		published	Banking)						
6.	Fixed Assets/	No	-	Yes	Outlets/Agents	-	Monthly		
	Initial								
	Endowment								
7.	Operating Cost	No	-	Yes	Banks	-	Daily		
8.	Volume of Cash	Yes	Agent Banking	-	-	Quarterly	-		
	Deposits		Activities						
			(BB's Quarterly						
			report on Agent						
			Banking)						
9.	Number of	Yes	Agent Banking	-	-	Quarterly	Daily		
	women clients		Activities						
			(BB's Quarterly						
			report on Agent						
			Banking)						
10.	Number of	No	-	No	Outlet/Agent and	-	Daily		
	poor/				Bank				
	unbanked/und								
	erserved								
	Customer								
11.	Territorial	No	-	No	Outlet/Agent and	-	Daily		
	Coverage				Bank				

12.	Network failure	No	-	Unknown	Outlet/Agent	Daily	
13.	Financial	No	-	Unknown,	Outlet/Agent and	-	Monthly
	Literacy			No (Partially)	Bank		
14.	Liquidity	No	-	Unknown	Outlet/Agent	-	Daily
	problem						
15.	Risk	No	-	-	Outlet/Agent and		Daily (a,b,c,d(i)),
	Management				Bank		Need Based
							(d(ii,iii),e)
							Monthly (f,g)
16.	Customer	No	-	Unknown	Outlet/Agent and	-	Daily (a(ii)),
	Service				Bank		Monthly (a(i),
							b,c)
17.	Agent	No	-	Yes	Outlet/Agent and		Need Based
	Experience				Bank		(if and when
							new
							Agents/Outlets
							are licensed)
18.	Service	Yes (Partially),	Websites of	Yes	Outlet/Agent and		Daily (client's
	Coverage	Agent and	Banks		Bank		response),
		Client's					Month
		responses are					(Agent/Outlet's
		not available					response)

We have summarized our investigation relating data on the Agent Banking system in Table-1. We have categorized the required data into two categories: 'Available and Published' and 'Available but not Published'. For the first category, 'Available and Published', we explored whether the data frequency and the existing instrument quantifying a variable is sufficient for measuring efficiency of the system, For the second category, 'Available but not Published', we discussed the potential sources of the data and the appropriate frequency. Other than these two categories, there are a few variables which are not generated as by product of the system; we have suggested questionnaire method and drafted questions for those variables.

6. Recommendation and Conclusion

As we explored data relating to Agent Banking System in Bangladesh we discovered two types of data; published data and unpublished data. Among the efficiency indicators identified in this paper, data for all of them is not readily available to be used in analysis. Survey is widely used and well recognized method for collecting primary data. However, survey is costly, it is time consuming and it usually does not work well in collection of time series data. Following are recommendations for making the necessary data series of the efficiency indicators available for analysis:

- 1. The scheduled banks can be advised to maintain the information regarding biography of the licensed Master Agent/Agent, DSR/Sub-Agent/Outlet, Service Support Provider and anyone employed by the Master Agent in series format.
- 2. One 'Survey-Questionnaire' shall be prepared by Bangladesh Bank and supplied to the banks to provide to the Master Agents/Agents and DSRs/Sub-Agents/Outlets for daily random surveys of clients' and agents' responses. It should be provided in soft/ electronic copy for convenience of delivery and compilation by bank branches.
- 3. The filled 'Survey-Questionnaire' should be sent via email by agent to the bank branch daily for series compilation of the responses.
- 4. A 'General-Query-Questionnaire' shall be prepared to add in the enclosure of the banks' 'account opening form', i.e. Distance of Outlet from home.
- 5. The Master Agents/Agents and DSRs/Sun-Agents/Outlets can be provided with a copy of the 'General-Query-Questionnaire' enclosed with the banks' 'account opening form'. The questionnaire can contain the questions that require clients' responses.
- 6. The filled copy of 'General-Query-Questionnaire' should be sent to the bank branch along with the banks' 'account opening form' for series compilation of the responses.
- 7. The data already being published in the publications of Bangladesh Bank on quarterly frequency can be required at a monthly frequency.
- 8. A 'Data-Template/ format' shall be prepared for the variables which are (a) not included in survey questions and (b) are not being published at certain frequency already i.e. Number of new Clients.
- 9. The 'Data-Template' can be sent to the scheduled banks for compiling the series on their end.
- 10. The forms and related information sent to Bangladesh Bank with application for license of Agent Banking Operations shall be compiled into series. Along with the information, each application should be stored with a status: 'Approved or Not Approved'.
- 11. The banks can be asked to mention the name of the support service provider on their list of 'Agents and Outlets' displayed in the business premises to ensure technological literacy of clients.

This research stemmed from an attempt to identify relevant and potential factors for measuring efficiency of Agent Banking System in Bangladesh to fit into empirically estimate using Data Envelopment Analysis (DEA). However, facing paucity of data this paper concentrated on investigating degree of data paucity of the indicators and explored the existing data sources. The discussion of the paper highlights the point that data availability is a vital component of any research and to measure the efficiency of agent banking we should emphasize on congregating necessary data in a systematic data series. Our recommendations on listing the set of variables and the possible way of sourcing the data would contribute to fix a new data sources which will be helpful in filing the gap in agent banking database and enable us to estimate efficiency of the agent banking system empirically in future.

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A-1 Definition of Efficiency in Economics

efficiency In economics signifies а level of performance of а firm/economy/individual achieving the highest amount of output using the minimum amount of input. A market is called efficient when resources are used in a way that maximizes the production of goods and services at the lowest cost. Economic efficiency is a relative term; Economic efficiency implies to an economic state in which every resource is optimally allocated to serve each individual or entity in the best way while minimizing the cost. The economic efficiency is determined by the combination of technical efficiency and allocative efficiency. According to Farrell (1957), technical efficiency measures the way that a firm chooses the quantity of inputs, which is used in the production process when the factors of production are given. Allocative efficiency based on the gains from exchange shows whether products are sold at a profit. Both components together yield economic efficiency.

Allocative Efficiency as Coelli, Rao et al. (1998) and Rogers (1998) put it, occurs when firm chooses an optimal combination of inputs, given the level of input price and the production technology. In the article of Rodriguez-Alves, Tovar and Trujillo (2007) allocative efficiency is necessary if the firm maximizes its profits or minimizes its costs at a given level of production. Allocative efficiency generally only occurs in perfectly competitive markets.

Productive Efficiency occurs when optimal combination of inputs results in maximum amount of output at a minimum cost. Productive efficiency is often explained using Production Possibility Frontier (PPF) that shows all the possible combinations of outputs with full employment of factors of production.

Social Efficiency occurs when resources are optimally distributed within an economy, while taking account of external costs and benefits as well. Social efficiency occurs at an output where marginal social benefit is equal to marginal social cost.

X-Efficiency, a term introduced by Harvey Leibenstein in 1996, occurs when a firm has an incentive to produce maximum output with a given amount of input.

A-2.1 Agent Banking Operation Approval Process

Banks that are willing to provide Agent Banking services are required to take prior approval from Bangladesh Bank, individually for each branch that will conduct Agent Banking activities. In addition, each branch requires separate prior approval from Bangladesh Bank for each Master Agent/Agent and each Sub-Agent/Agent Banking outlet. The application is required to be submitted accompanied by proper documents and then the licensed banks are required to initiate Agent Banking operation within three months of getting approval.



A-2.2 Structure of Agent Banking

Bangladesh Bank has recommended adoption of one or a combination of the following three structures for Agent Banking operations in Bangladesh. (1) Master Agent-Agent Banking Outlet: Banks' contract with an entity having multiple branch offices or outlets, either owned or otherwise engaged legally by it. (2) Unit Agent: Banks' contract with one entity providing Agent Banking services exclusively in one outlet only. (3) Support Service Provider: Banks' contract with a party for technological solutions and/or other support services to its Agent Banking operation.

Banks enter into an agreement with Master Agent who have multiple unit agent who working under them. Support service provider, is a third party, outsourced for providing technological solutions to the Master Agents who are contracted by the Banks.



A-2.3 Agent Banking Activities

According to the guidelines of Bangladesh Bank an agent may provide any of the following services as may be specifically agreed between the agent and the bank:

- i. Cash deposit and cash withdrawal;
- ii. Inward foreign remittance disbursement;
- iii. Disbursement and repayment of loans;
- iv. Collections of bills/utility bills;
- v. Collection of insurance premium;
- vi. Payment of retirement and social benefits;
- vii. Payment of salaries;
- viii. Transfer of funds;
- ix. Balance enquiry;
- x. Generation and issuance of mini bank statements;
- xi. Collection of documents in relation to accounts;
- xii. Collect account opening forms, loan application forms, credit and debit card applications;



A-4 The questions to be asked to quantify the variables:

Name of the Variables		Question/s Asked to Quantify the variables						
1.	Profitability	a. Number of times a certain banking service was provided by your particular Outlet/Agent on one day?						
		Р	lease list the	names of the serv	ices (I,II, III)			
				Servic	Frequency			
				е				
			I.					
			П					
			11.					
		 b. The volume of transaction for each of the banking services provided by your particular Outlet/Agent per day? Please list the names of the services (LULULL) 						
				Servic	Volume			
				e				
			I.	-				
			П					
			11.					
		c. Destination of transfers of funds through Agent banking services provided by your particular Outlet/Agent per day? Please list the names of the services (LIL III)						
				Servic	Destination			
				e				
			I.					
			II.					
2	Total	1 How	many transac	tions take place at	an outlet per day?			
2.	number of transactions	2. Numb	per of times F	resh Deposit was	added in Master Agent's acco	ount per day/Capital availability?		
3.	Number of new Clients	How many new clients are opening accounts through Agent Banking system per day?						
4.	Number of Dormant	How many of the existing accounts are unused over one year?						
	Account							
5.	Number of employee	How many employees are working in an outlet per month?						
6.	Fixed Assets/ Initial Endowment	How much is money worth the total fixed assets of an agents' outlet?						
7.	Operating	• How	much is the c	ost per transaction	2			
	Cost	• How	much is the a	verage fixed opera	ting cost?			
		• How	much does he	e pay for employee	s' salary?			
If these data are not available, then agents should provide the answers of the questions below:						the questions below:		
		• How much money had the agent invested?						
		• Wha	t is the agent's	s monthly return fro	om that money?			

8. Volume of Cash Deposits	How much is total volume of deposits through Agent Banking system for each bank?
9. Number of women clients	How many women clients are opening accounts through Agent Banking per day?
10. Number of poor/ unbanked/u nderserved Customer	 Number of small business clients opening accounts through Agent Banking system per day (includes businesses of cottage industry): what is your profession? Number of dwellers of city outskirts and remote areas opening accounts through Agent Banking system per day: Where do you live?Thana/ Upozilla/Union, district, village. Income level of the people opening accounts through Agent Banking system per day: a. How frequently do you receive payments? daily/weekly/months/yearly/random. b. What is your (daily/weekly/months/yearly/random) income level?
11. Territorial Coverage	 Distance of Outlet from home/work of the clients opening account/using banking service through Agent Banking system per day (please put a tick on the one that applies)kilometers Nearest Bank branch from home/work of the clients opening account/using banking service through Agent Banking system per day (please put a tick on the one that applies) Distance in kilometers Of the same bank (Yes/No)
12. Network failure	 How many times an agent failed to complete any transaction per day due to network failure? Daily data of Client's perception of agent's network quality in performing services on a scale of 0-10 (0 being the least and 10 being the most)
13. Financial Literacy	How many agents get proper training before and during the Agent Banking operation per month?
14. Liquidity problem	 Due to liquidity shortage how many clients are turned away without using the services per day? Daily Volume of Turnover of Outlet's/Agent's Account?
15. Risk Management	 How many times Agent related risks took place per daily? How many times client related risks took place per daily? How many times technology risks regarding information and data security took place per daily? Physical Security Number of security guards present in Master Agents' office premises daily
	 7. Network Security Do you share your password with other agents in your network? (Yes/No) Do you know/trust the other agents in your network? (Yes/No) Within last one month period how many new agents have entered into your network? a. As replacement of old agents

	b. New entrant to the business					
16. Customer Service	 Number of working days or hours it takes to respond to a client query or complaint Agent's Monthly response Client's Daily response Client's perception of agent's attitude regarding commitment/ agent's ease and proficiency of agent in performing services on a scale of 0-10 (0 being the least and 10 being the most) Level of satisfaction of any client regarding their agent's response to a their query or complaint on a scale of 0-10 (0 being the least and 10 being the most) Client's assessment of agents' expertise on using the technology used in providing Agent Banking services on a scale of 0.10 (0 being the least and 10 being the most) 					
17. Agent Experience	 What was the agents' profession before obtaining the license for Agent Banking? For how long were they involved in that work? Does the Agent /Outlet still maintain another profession /livelihood parallel to Agent Banking? 					
18. Service Coverage	Which banking services are provided by your particular outlet/agent? Please list the names of the services (I,II, III) i. Agent's Monthly ii. Client's Daily response response I. I. II. II.					



Sl. No.	Source	Beginning	Name of the	Frequency	Variables	Economy/	Data
		Year	Publication			Area	collection
							Method
1	Bangladesh	2016	Quarterly Report	Quarterly	Number of agents,	Bangladesh	directly from
	Bank website,		on Agent Banking		Number of outlets,		the licensed
	Publications,		Activities		Number of new Accounts,		banks
	Quarterly				Deposit Volume, Loan		
					disbursement, remittance		
					collection in both rural		
					and urban area		
2	Bangladesh	2014	Monthly Economic	Monthly	No. of Agents, Agent	Bangladesh	directly from
	Bank website,		Trends		Banking		the licensed
	Publications,				Transactions in number		banks
	Monthly				and volume, No. of Agent		
					Banking Subscribers		
3	All licensed	Running			Number and location of	Bangladesh	own database
	Bank's website	year			the outlets		

A-6Table: available Data Resources of Agent Banking

A-7 Data Envelopment Analysis

Data envelopment analysis (DEA) was established by Charnes, Cooper and Rhodes in 1978. It is sometimes called frontier analysis. DEA is technique for measuring performance. The DEA technique measures relative efficiency of decisions making units (DMUs). A DMU is a distinct unit within an organization; a DMU performs according to its own decisions however those decisions are not entirely independent of the organization's collective decision making process.

There are three basic steps for performing a DEA study:

- 1. Finding out the specific DMUs that we want to measure performance of.
- 2. Defining the specific input and output variables conceptually.
- 3. Obtaining numeric measures for input and output variables.

The DMUs are compared to one with respect to their efficiency; this is why DEA is said to be a method that measures relative efficiency. For the DMUs to be comparable therefore needs to have similar set of output and input variables and similar kind of operation. For its flexibility the DEA method is used in measuring efficiency of a wide range of organizations; such as banks, police stations, hospitals, tax offices, prisons, defense bases (army, navy, air force, other non-profit making organizations), schools and university departments.

The measurement of efficiency by DEA method can be expressed numerically as well graphically. Given the inputs for all the DMUs, DEA method finds of the most efficient DMU and assigns 100 to that value, then accordingly the values of other DMUs are given a percentage value against that 100. In case of multiple output measures DEA produces a frontier with the value of all the efficient DMUs from the measures of different outputs. DMUs below that frontier are less efficient than the ones on the frontier. In this case, a straight line through the value of any one of those DMUs reaching the frontier gives the best combination of inputs for that certain DMUs for obtaining more efficiency.

The classic DEA method gives relative efficiency rather than absolute efficiency; therefore, the DMUs require having comparable inputs and output. Hence, over time comparison of DMUs from a classic DEA is not possible, as input and output variables rarely are the same over time. However an extension of DEA using the Malmquist Index allows over time efficiency comparison (Henriques et al. 2018).

To measure allocative and scale efficiencies, DEA LP model can be developed from the concept of DEA, these are Linear Programming models. Following Fare et al (1989, 1994), the capacity output given current use of inputs is described as:

$$Max \ \Phi_1$$

s.t.: $\Phi_1 u_{j,m} \le \sum_j z_j u_{j,m} \quad \forall m$

$$\sum_{j} z_{j} x_{j,n} \leq x_{j,n} \quad n \in \alpha$$
$$\sum_{j} z_{j} x_{j,n} = \lambda_{j,n} x_{j,n} \quad n \in \hat{\alpha}$$
$$\sum_{j} z_{j} = 1$$
$$\lambda_{j,n} \geq 0 \quad n \in \hat{\alpha}$$

 Φ_1 is a scalar; it describes the capacity of output depending on the production of each firm. The amount of output 'm' by any firm 'j' is denoted by $u_{j,m}$. $x_{j,n}$ is the amount of input 'n' used by 'j' and z_j is the weight of that input. α and $\hat{\alpha}$ are two sets of inputs: fixed factors and variable factors, respectively.