Adoption of cashless transaction by the farming households in Coimbatore District of Tamil Nadu, India

ABSTRACT

Aims: Theresearchstudyaimstostudythe level of adoption and factors influencing the adoption of cashless transaction by the farming households in farming and non-farm activities

Study design and Methodology:A development index for Tamil Nadu districts, prioritizing e-infrastructure, was crafted from secondary data on agriculture, health, infrastructure, and telecommunication. Coimbatore, with a high development index, was selected using a three-stage stratified random sampling approach involving 120 households. Utilizing tools like the development index, econometric models, scoring/ranking techniques, and non-market valuation methods, values ranged from 0 to 1, indicating low to high development. An adoption index classified respondents into low, medium, high, and very high adopters, evaluating cashless transaction adoption. The logit model pinpointed factors influencing cashless transaction adoption among farm households.

Results and Conclusion: This study shows a gradual shift towards cashless transactions among farmers, primarily driven by government policies promoting bank account usage for subsidies and loans. In Coimbatore, a developed district in Tamil Nadu, the adoption index is 63 per cent for non-agricultural and 44 per cent for agricultural transactions, highlighting a significant difference. The slow adoption is attributed to incomplete sales portal transformation and farmers' limited awareness of online platforms for input purchases. Despite challenges, farmers exhibit a positive attitude, emphasizing the importance of addressing issues such as financial literacy, internet connectivity, and infrastructure for successful cashless transactions.

Keywords: Cashless transaction, Adoption Index, Farming Households, Non-farm Activities.

1. INTRODUCTION

Creating physical infrastructure facilities has a latent impact on people's aspiration. So, people especially rural people look forward to have cutting edge technological advancement to make their efforts easier and more foolproof one. As cashless transactions are easily traceable, it will leave less scope for tax evaders and bringing more transaction or business production activities into national income accountable framework. The success of this effort depends on the availability of physical and e-infrastructure and penetration of cashless transaction especially in case of rural and remote villages where 80 per cent of the farming activities are carried out. The present research addresses the level of adoption and factors influencing the adoption of cashless transaction by the farming households in farming and non-farm activities.

Creating physical infrastructure facilities has a latent impact on people's aspiration. So, people especially rural people look forward to have cutting edge technological advancement to make their efforts easier and more foolproof one. As cashless transactions are easily traceable, it will leave less scope for tax evaders and bringing more transaction or business production activities into national income accountable framework. The success of this effort depends on the availability of physical and e-infrastructure and penetration of cashless transaction especially in case of rural and remote villages where 80 per cent of the farming activities are carried out. The present research addresses the level of adoption and factors influencing the adoption of cashless transaction by the farming households in farming and non-farm activities.

The adoption of cashless transactions among farming households represents a transformative shift in the agricultural sector, marking a departure from traditional cash-based economies. As technological advancements continue to reshape global financial landscapes, the agricultural community is increasingly embracing digital payment systems for a multitude of reasons. This shift holds the promise of enhancing efficiency, transparency, and financial inclusion within the farming sector.

Historically reliant on cash transactions, farming households are now recognizing the benefits of embracing cashless alternatives. The integration of digital payment methods, such as mobile banking, online transfers, and electronic wallets, not only streamlines financial transactions but also mitigates risks associated with handling physical currency. The ease and speed of digital transactions empower farmers to engage in seamless financial activities, from purchasing inputs to receiving payments for their produce.

Moreover, the adoption of cashless transactions addresses longstanding challenges faced by farming communities, such as access to formal financial services and the vulnerability to theft or loss of cash. This transition has the potential to unlock financial opportunities for farmers by connecting them to banking services, credit facilities, and government subsidies, thereby fostering economic growth and resilience in the agricultural sector.

This paper explores the motivations behind the increasing adoption of cashless transactions within farming households, examining the impact on financial inclusion, risk management, and overall economic development. Through case studies and analysis, we delve into the experiences of farming communities worldwide, highlighting success stories and

identifying key factors influencing the adoption of digital payment solutions. As the agricultural sector embraces the digital era, understanding the dynamics of cashless transactions is crucial for policymakers, financial institutions, and stakeholders seeking to support sustainable and inclusive development in rural economies.

2. LITERATURE REVIEW

AB Patil *et al., (*2021) calculated the awareness in three continuum as low, medium, high awareness about cashless transaction means as well as documents required for cashless transaction. Regarding the awareness about cashless transaction means, 19.16 per cent respondents had low awareness about cashless transaction, 56.67 per cent respondents had medium awareness about cashless transaction and remaining 24.17 per cent respondents had high awareness about cashless transaction means. It could be seen that majority of the farmers has only medium level awareness about the cashless transaction in Kolhapur district of Maharashtra.

Chaturvedi D *et al*., (2013) study underscores India's efforts to transition to a cashless economy, citing factors such as convenience, ease, and social influence as driving digital payment adoption. However, challenges persist, including concerns about fraud, identity theft, and the need for a bank account. The study advocated for government initiatives to address these challenges and promote awareness for a successful transition to a digital India

Gyata, *et al*., (2013) suggest that there is the need for the three tiers of government to put in place a legal and institutional framework which enhances a full take off of the internet usage in the agricultural sector especially among farmers and extension workers. They insisted that there is the need for the establishment of Internet centers in the rural areas. Such Internet centers will necessarily need to be equipped with computer hard ware, operating system, software, laptop and moderns. All these should be powered by car batteries or solar panels which should also be provided.

Haruna, S.K *et al*., (2013) the study reveals that the majority of farmers owned and use mobile phone for making call, view time and used it for calculation frequently. As regard farmers' perception of mobile phone as an effective means of sourcing information regarding extension service delivery, many of the farmers agreed that it's an efficient and effective facilities for extension communication. High cost of subscription, Poor quality of mobile phone and its accessories and electricity problems were the top ranked constraints against effective usage of mobile phone among farmers in the study area.

Igwe Ikenna UKOHA *et al*., (2017) studied on cashless transactions in farming households, findings reveal a preference for digital payments among the younger age group, contrasting with the older demographic. Additionally, a higher proportion of females correlates with increased preference for cashless transactions, possibly due to the convenience it offers amid household responsibilities. The study emphasizes that higher educational qualifications positively influence the adoption of online transactions among farmers.

Ragaventhar R (2016) the study mainly concentrated on the meaning of cashless economy and their major challenges in implementing it and also the current position of India in the scenario of cashless economy. The major suggestions of the study where abolishment of government fees on credit card transactions, reduction of interchange fee on card transactions, increase in taxes on ATM withdrawals

Soundar R *et al., (*2017)explored the impact of demonetization on agriculture, emphasizing a comprehensive approach for rural stakeholders. The study advocates door-to-door awareness campaigns to address cyber fraud concerns, stressing the importance of robust internet connectivity and informed loan deductions. Anticipated outcomes include a strengthened economy, improved transparency, and increased financial inclusion as rural areas transition from informal to formal cashless transactions

3. METHODOLOGY

The secondary data on agriculture, health, infrastructure, telecommunication etc were collected from District Human Development Report for constructing development index for all the districts of Tamil Nadu by giving more weightage to e-infrastructure. The district high development index namely Coimbatore district was selected for the present study. Three stage stratified random sampling was followed, Total sample size is 120 households. The analytical tools used are development index, econometric models, scoring/ranking technique and non-market valuation methods. The development index values for each of the indicator would range between 0 and 1. 0 indicating low development and 1 indicating high development. The adoption index was constructed and the respondents were classified as low adopters, medium adopters, high adopters and very high adopters if the adoption index was 1-25, 25-50, 50-75 and 75-100, respectively to assess the adoption level of cashless transaction.The logit model was used to determine the factors influencing adoption of cashless transaction by the farm households.

3.1 Adoption Index

Adoption Index is calculated on following dimensions

Dimension	Indicators
Access and adequacy	• Having smart phone and other electronic gadgets • Know how to online transaction
Agricultural transaction	• Agricultural inputs purchase through online (Seeds, fertilizers, plant protection chemicals and others) • Online transaction for transporting the produce • Marketing of agricultural produce through online • Payment of wages through online • Online transaction of maintenance of animals (Feed, fodder and veterinary expenses) • Online transaction on sale of milk and other products
Non-farm transaction	• Non farm business transaction (procurement of raw materials, other inputs and sales and marketing etc) • Online receipt of wages, custom hiring charges of farm implements other cash

Household transaction	• Online Household food expenditure • Online Household non food expenditure • Online transaction with relatives and friends

To find out the factors influencing the adoption of cashless transaction by the farm households the logit model is used.

The logit model of adopting cashless transaction is

$$Pi = E(Y = 1|Xi) = \frac{1}{1 + e^{-z}}$$

Where Xi factors influencing cashless transaction and Y =1 means the farm households adopts cashless transaction. This can be written as

$$Pi = \frac{1}{1 + e^{-z}} = \frac{e^{z}}{1 + e^{-z}}$$

Where Zi = $\beta_0 + \beta_1 Xi$

Li =In(Pi/1-Pi)= $= \beta_0 + \beta_1 AGE + \beta_2 EDU + \beta_3 SOP + \beta_4 ASS + \beta_5 FSIZE + \beta_6 FINCOME + \beta_7 KOEG + \beta_8 MOBILE + \beta_9 EEXP + \beta_{10} DIST + \mu 1$

Probability of adopting cashless transaction is given by:

Where,

Y	=	Probability of adopting cashless transaction. Y was coded as 0 for non adoption if the adoption index is less than 10%, 1 for otherwise;
AGE	=	Age of the farmers in years
EDU	=	Scale variable for education; 0=Illiterate, 1= Primary, 2= Secondary, 3= Collegiate
SOP	=	Social participation of the farm household (%)
ASS	=	Asset holdings value (`Rs/household)
FSIZE	=	Farm size (Ha/Household)
FINCOME	=	Proportion of farm income to total household annual income (`%/household/)
KOEG	=	Knowledge on operating electronic gadgets (other than mobile)
MOBILE	=	Having Android mobile (Dummy variable No=0 and yes =1)
EEXP	=	Amount spent on internet connection, Wi Fi and mobile data etc (Rs/Household/month)
DIST	=	Distance to bank/ATM/Browsing centres (in Km)

β_0 = Constant

$\beta_1 \ldots\ldots \beta_{10}$ = Regression coefficients

Table 1. Adoption Index for Various Districts

LOW (0.3202-0.3740)	MEDIUM (0.3741-0.4556)	HIGH (0.4557-0.5371)
Ariyalur	Theni	Namakkal
Chennai	Ramnad	Erode
Dharmapuri	Krishnagiri	Tiruppur
Perambalur	Cuddalore	Thiruvarur
	Karur	Nilgris
	Sivagangai	Tiruchirapalli
	Kanyakumari	Vellore
	Virudhunagar	Thoothukudi
	Dindigul	Thiruvallur
	Thiruvannamalai	Thanjavur
	Nagapattinam	Thirunelveli
	Pudukottai	Coimbatore
	Villupuram	
	Madurai	
	Kanchipuram	
	Salem	

4.RESULTS AND DISCUSSION

Most of studies indicated that education status of the farm households has played crucial role in adoption of modern technologies. The level of education is categoried into four classes namely iliterates, primary, secondary and collegiate. The results in Table 2 showed that 93 per cent of the farmers are educated. Among the educated farmers, 22 per cent of the farmers had college education.

Table 2. Education status of the sample farm households

S.No	Educational status	Farmer
1	Illiterates	8 (6.67)
2	Primary (I-V std)	35 (29.17)

S.No	Educational status	Farmer
3	Secondary (VI-XIIstd)	50 (41.66)
4	Collegiate	27 (22.50)
	All	120

(Figures in parentheses indicate percentage to total)

Based on the size of landholdings farms are classified as marginal farms having less than one ha, small farms having more than one and less two ha and large farms having more than two ha of land. Majority of famers (50.83 per cent) are small farmers followed by marginal farmers (32.50 per cent). Among the sample farmers, 16.67 per cent of them are large farmers. The average size of marginal farms is 0.69 ha and in case of small farms, the average size of landholding is 1.50 ha. The average size of landholdings of the sample farmers in Coimbatore district is 2.11 ha as shown in Table 3.

Table 3. Farm Size and average size of Landholding of Sample Households

S.no	Farm Size (ha)	No.	Average Farm Size (ha)
1	Marginal (< 1)	39 (32.50)	0.69
2	Small (1 to 2)	61 (50.83)	1.50
3	Large (> 2)	20 (16.67)	3.86
	Total	120 (100)	2.11

(Figures in parentheses indicate percentage to total)

Annual income of the households helps to determine the economic status of the households. The sources of income earned by the farmers are grouped as farm income, of-farm income and non-farm income. Farmers earn income from cultivation of crops and maintenance of livestock. Earning income from crop cultivation and allied agricultural activities is known as farm income. Some farmers work as labourers in nearby farms and earn income. Farmers with farm machineries such as tractor, power tiller, etc will hire out these machineries and earn income. The income earned in working as labour in other farms and getting income from custom hiring charges are known as off-farm income. Some farmers will do business not related to agriculture or they will earn income by salary. The income earned from doing business, salary is called as non-farm income. Among the sample farmers 42.50 per cent of them depend on agriculture alone for their livelihood. Twenty per cent of the farmers earn income from farm and of farm activities. Nearly 26 per cent of the farmers earn income from doing farming and non-farm activities. Only 14 farmers are doing farming, of farm activities and non farm activities as depicted in Table 4.

Table 4. Sources of income of the farm households

S.no	Source of Income	No.	Average Income (Rs./year/household)
1.	**Farm income**	51 (42.50)	147330
2	Farm & Of-Farm Income	24 (20.00)	314333
3	Farm & Non-Farm Income	31 (25.83)	433816
4	Farm, Of-Farm & Non-Farm Income	14 (11.67)	328429
	Total	60 (100)	265863

(Figures in parentheses indicate percentage to total)

The cashless transaction is one in which all payments are done using cards or payment apps or digital ways. It may be called as online transaction which is regarded instant payment and very convenient way of making payment either to send or receive money. The advantages of using online payment as expressed by the sample respondents are increase in speed of payment and convenience and minimized risk of robbery or money loss. Some disadvantages expressed by them are delayed transaction, internet connectivity problem and fear of cybercrime and money loss. Payment apps used by the sample farmers are IFFCO-Bazar, Agro star, Big Haat, G pay, phone pay, net banking/NEFT, Pay TM, Net banking apps etc.

Ninety five per cent of the farm households used online transaction. But the frequency of using and full online transaction ie cashless transaction varies among the households. Out of total farrmers only seventy one per cent of them were used cashless transaction for doing agricultural activities. More than ninety percent of the farmers are having bank account. But their knowledge on financial literacy or operating procedures are below average and facilities available for transforming to cashless transaction is also not adequate.

To assess the level of adoption of cashless transaction in agriculture, farmers were asked to provide the details of online transaction starting from production activities namely land preparation, purchase of inputs like seeds, fertilizers, plant protection chemicals, labour wages, availing credit and hiring of machineries. transporting the produce to market and other marketing activities.

The findings revealed that percentage of adoption varied according to the size of landholdings. The highest percentage of adoption (95.00 per cent) was recorded among the large farms followed by (73.77 per cent) small farms and (56.41 per cent) marginal farms. Among the farm households doing cashless transaction in agriculture, the overall adoption index is 0.34. The adoption index was the highest among the large farms (0.43) followed by small farms (0.31) and marginal farms (0.27) as shown in Table 5. Farmers are not doing all transaction in online with respect to particular activity. For example, while purchasing fertilizers, farmers are not purchasing all required quantity by online transaction. Part of them they purchase through online payment and remaining quantity by cash transaction.

Table 5. Adoption of cashless transaction in agriculture by the farm households

S.no	Farm Size (ha)	No. of households adopted	Percentage	Adoption index in agriculture
1	Marginal (< 1)	22 (39)	56.41	0.27
2	Small (1 to 2)	45 (61)	73.77	0.31
3	Big (> 2)	19 (20)	95.00	0.43
	Total	86 (120)	71.67	0.34

(Figures in parentheses indicate percentage to total)

Almost all farmers were involved in online transaction in non-agricultural activities compared to agricultural activities. Non-agricultural activities were grouped as food and non-food expenditure, education, health, social and religious functions and other miscellaneous expenses. As expected, the percentage of adoption was the highest among large farms (100.00 per cent) followed by small farms (95.09 per cent) and marginal farms (92.31). But the adoption index is low compared to percentage of adoption. This is because all the activities are not done through online. Among the farm households doing cashless transaction in non-agriculture, the overall adoption index is 0.53. The adoption index was the highest among the large farms (0.60) followed by small farms (0.52) and marginal farms (0.41) as shown in Table 6.

Table 6. Adoption of cashless transaction in other than agriculture activities by the farm households

S.no	Farm Size (ha)	No.of households adopted	Percentage	Adoption index in agriculture
1	Marginal (< 1)	36 (39)	92.31	0.41
2	Small (1 to 2)	58 (61)	95.09	0.52
3	Big (> 2)	20 (20)	100.00	0.60
	Total	114 (120)	95.00	0.53

(Figures in parentheses indicate percentage to total)

The adoption of cashless transaction is influenced by socio economic factors. In the present study factors namely age of the farmers, education status, social participation, value of assets, farm size, proportion of farm income to total income, knowledge on operating electronic gadgets, having android mobile and using mobile apps, expenditure on availing internet

connection/Wi Fi/mobile data and distance to bank/ATM etc. are included to find out which variables are influencing significantly the adoption of cashless transaction. The factors namely knowledge on operating electronic gadgets, having mobile phone and mobile apps are the highly influencing factors at one per cent level. The variables namely social participation and expenditure on availing internet connectivity/Wi Fi /mobile data are significant at ten per cent level as shown in Table 7.

Table 7. The Factors Influencing the adoption of cashless transaction among Farm Households

Variables	Coefficient value	Marginal effects
Constant	2.3596*** (0.005)	
AGE	0.4269^{NS} (0.264)	0.2832
EDU	-0.0000^{NS} (1.103)	-7.60e^{-06}
SOP	1.1086* (0.055)	0.2458
ASS	0.8758^{NS} (0.426)	0.0602
FSIZE	0.0258* (0.070)	0.0085
FINCOME	0.2543^{NS} (0.501)	0.0823
KOEG	1.6319*** (0.004)	-0.3641
MOBILE	1.3517*** (0.004)	-0.4363
EEXP	0.3302* (0.098)	0.1066
DIST	-6.87e^{-07}^{NS} (0.239)	-5.40e^{-08}

Log likelihood function	**78.92**	
Prob> chi^2	**0.0006**	
N	**120**	

(Figures in the parentheses indicates *P* value)

(*** indicates 1% level ofsignificance and * indicates 10% level of significance level)

5. CONCLUSION

The study revealed that farmers are moving slowly towards cashless transaction. Majority of farmers have bank accounts due to the policy of the government in case of direct benefit transfer, providing subsidy and disbursing loans. The study area Coimbatore district being highly developed district in Tamil Nadu, the adoption index is non agricultural transaction is 63 per cent and in case of agriculture it is 44 per cent. There is significant different in the adoption index between agriculture and non-agricultural transactions. This is mainly due to the lack of complete transformation of sales portals and awareness of the farmers about these online ports for purchasing the inputs and selling their products.

There is a positive attitude among farmers to cope up from the handicaps and join hands with the new policy decision of the Government. Study revealed that majority of farmers are having bank accounts and are using for getting loans, receiving subsidy and other direct benefits transfer. This shows that when enabling facilities are provided at right time, farmers would use it without hesitation. Opening of bank account alone is not going to help in achieving cashless transactions, unless farmers' attitude changes and problems like financial illiteracy, poor internet connectivity and basic infrastructure facilities are solved. Apart from facilities, role of functionaries of line departments are crucial.

6. AUTHOR'S CONNTRIBUTION

Dr. A. Vidhyavathi designed the study, performed the statistical analysis. Dr. S. Padma Rani, Dr. S. Balaji wrote the protocol, the first draft of the manuscript and managed the analyses of the study. Dr. A. Vidhyavathi managed the literature searches.

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