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Enhancing Agriculture Efficiency: The Differential Impact of Communication Technologies and other Modernisation Techniques

ANNUS AZHAR, M. AVAIS TAHIR, KHAWAR ATA, and SHAHID ADIL

Farm level inefficiency using four major crops grown in Punjab have been calculated. The crops chosen have immense domestic importance and export potential as well. Our study focuses on various agro-ecological zones of Punjab with a particular focus on estimating the role of non-traditional use of communication technologies especially the use of Information and Communication Technologies (ICTs) in reducing agricultural inefficiency. The analysis is based upon a survey conducted in 2017 by Punjab Economic Research Institute (PERI) of over 500 farms located in various agro ecological zones all over the Punjab. Data Envelopment Analysis (DEA) using Bootstrap technique is applied. DEA technique ensures reliability of results since it is nonparametric in nature and is therefore, free from specification bias. Farm level inefficiency is calculated using variables such as farm output value along with inputs such as land, labour, machinery, capital and fertilisers. Determinants of inefficiency are also calculated by focusing on various modernisation techniques, based on this analysis, we investigate if a case can be made for promoting the role of communication technologies especially ICTs in enhancing agricultural productivity. Enhancing agriculture efficiency (or reducing inefficiency) will entail additional benefits by spurring growth in the multiple processing industries linked with agriculture and developing agro-based industrial development in Punjab.

JEL Classification: L25, O13, Q16, Q18, Q55
Keywords: Agriculture Inefficiency, Innovative Techniques, Communication Technologies, ICTs, Credit, DEA

1. INTRODUCTION

According to documents of government of Pakistan more than 60 percent population of Pakistan and Punjab lives in rural areas.[1] It is a historical fact that people in these rural areas are predominantly dependent directly and/or indirectly on agriculture[2] and its related activities for deriving income. Pakistan is growing by more than 2 percent, thus implying that as time progresses, the country will have more mouths to feed. Therefore, stable performance of agriculture sector has grown in importance now more than ever since agriculture sector is linked with food security (see Appendix for

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[1]Population Census, Pakistan Bureau of Statistics (2017).

[2]Agriculture accounts for 19.5 percent of the Pakistan's gross domestic product (GDP).

performance of agriculture including crop sector over the last five years). It is important to see how governments' targeted efforts in modernising agriculture can lead suitable, stable and sustainable growth in agriculture sector. This can be a means to remain competitive changing global economy.

Reliance of Pakistan on agriculture has grown once one looks at the indirect opportunities that agriculture has generated. In Punjab, during the last couple of years, many small and medium enterprises (SMEs) have sprung up that manufacture and supply capital equipment in the form of agriculture implements.[3] This has lead to creation of backward/forward value chains. Furthermore, agriculture is linked with industry because produce of agriculture is used in industrial sectors e.g. textile, apparel, food industry etc. Exports of these connected sectors are important for earning precious foreign exchange.

Within agriculture itself it is important to study about food policy related matters that positively affect agriculture efficiency (or reduce its inefficiency) and this is important in two ways, Firstly, rise in efficiency of farms increases food supplies and reduces food prices. This in turn makes it possible for poor households, which are more likely to suffer from nutritional deficiencies, to be able to afford food items. Secondly, most poor household especially in rural areas are dependent on food as their source of livelihood. Hence any positive shock in agriculture efficiency will positively affect households' accessibility to food in particular, and also their consumption of all other goods through the effect on household budget constraint as income of farmer increases.

This research will directly help both federal and provincial government in achieving its aim of promoting agriculture sector. Pakistan's recent draft National Food Security Policy[4] (2017) states: "*agriculture and food security policy aims to create a modern, efficient and diversified agricultural sector that can ensure a stable and adequate supply of basic food supplies for the country's population, and provide high quality products to its industries and for export...*" The draft policy also talks about different constraints faced by agriculture in terms of credits, technology adoption, efficient input use, the need for governance and intuitional reforms to improve sustainability of farms etc. The document specifically focuses on the use of technology adoption to raise farm productivity. It lists the use of Information and Communication Technologies (ICTs) as the main driving force in achieving this higher efficiency goal. This research will cover all these aforementioned important points highlighted in draft food security policy by providing specific advice based on empirical data on how government can enhance agriculture efficiency by using modernisation techniques such as role of electronic and print media along with the use of ICTs (mobile phones). We will also highlight how the use of institutional credit affects farm inefficiency and will mention the constraints in adoption of formal credit use.

In summary, this paper contributes to the literature in three aspects. Firstly, we used most recent data gathered in 2017 by the Punjab Economic Research Institute[5]

[3]According to Punjab Small Industries Corporation (PSIC) farm agriculture machinery/implements cluster for Small firms is located in Daska, Punjab

[4]Retrieved from: http://www.mnfsr.gov.pk/mnfsr/userfiles1/file/12%20Revised%20Food%20Security%20Policy%2002%20June%202017.pdf

[5]PERI is a statutory research body under the umbrella of Planning and Development (P&D) Department of Government of the Punjab. PERI conducts research on important socio-economic issues as maybe desired or authorised by the government, compile data and publish results of the research conducted to advise and make recommendations to government, as and when required with regard to various economic policies.

(PERI). Secondly, this dataset has a sample of over 500 rural farms which is representative of the entire farm/cropped areas of Punjab. Thirdly, the dataset used is an extremely rich and harmonised source of microeconomic data with detailed information on many important variables related to agriculture inputs and outputs. Thus, this dataset is ideal for running efficiency analysis.

Farm level inefficiency (input oriented) is calculated using Data Envelopment Analysis (DEA) with bootstrap technique. This calculation is performed in **R** software. DEA technique ensures reliability of results since it is nonparametric in nature and is therefore free from specification bias. Using insights from this nonparametric econometrics, we reveal which factors influence farm level inefficiency. This yields insights for policy makers in identify factors that will lead to rise in agriculture efficiency through modernisation in agriculture.

Objectives of the Study

Main objective of the study is to examine the inefficiency of farms and to find determinants of this inefficiency. The specific objectives of the study are:

(i) To investigate the farm level inefficiency and its determinants in Punjab.
(ii) To check the impact of modernisation techniques adopted by the government to spur agriculture growth.
(iii) To test whether Information and Communication Technologies (ICT) affect inefficiency of farms in Punjab.
(iv) To see the role of institutional credit in reducing farm level inefficiency.

The rest of the paper is organised as follows. Section 2 presents literature review. Section 3 discusses data and methodology, whereas Sections 4 and 5 talks about results and analysis respectively which is followed by conclusion in Section 6. We conclude the paper in Section 7 by providing policy implications.

2. LITERATURE REVIEW

Efficiency calculation is an important tool used in various disciplines. Its calculation involves many different types namely: technical, allocative, economic, scale efficiency etc. In agriculture this efficiency has been measured for different crops and for different farms. It can be measured for major inputs as well, for e.g. irrigation water use efficiency. Coelli, *et al.* (2002) defines technical efficiency as "the ability of the farm to use feasible amounts of inputs to produce a given level of output". For details on how output has been estimated in literature [see Burki and Khan (2011); Ray and Ghose (2014) and Ndlovu, *et al.* (2014)].

Efficiency calculation can involve both parametric and nonparametric approaches. Parametric technique involves the use of Stochastic Frontier Analysis (SFA) and non-parametric technique involves the use of Data Envelopment Analysis[6] (DEA). DEA uses linear programming techniques to generalise the quantification of the technical efficiency [Farrell (1957)]. These non-parametric empirical techniques like DEA do not prescribe an underlying functional form for an efficient frontier [Fried, *et al.* (2008)]. Benefit of

[6]For details on the use of DEA in measuring efficiency in agriculture see Skevas, *et al. (*2014) Beltrán-Esteve, Reig-Martínez (2014); Houshyar, *et al.* (2012), Nabavi-Pelesaraei, *et al.* (2014), Balcome, *et al.* (2008).

nonparametric model is that they do not require a priori assumption or too many assumptions for that matter as compared to the deterministic model. The downside is that the nonparametric technique assumes that there is no noise or atypical observations in the sample [Daraio and Simar (2007)]. To overcome these aforementioned problem, DEA with bootstrap technique has become famous which unlike simple DEA does allow for testing the significance of the results. After estimating efficiency in first step using DEA researchers normally run a second step whereby determinants of efficiency are measured, which makes sense and provides more information than just doing first step only [Witte and Marques (2010)].

Studies in agriculture have looked at the determinants of efficiency using different models and using data from multiple countries**.** For example, Mukherjee and Khan (2016) looked at the agriculture efficiency in the thirteen selected villages of Raipur district. They used per hectare agriculture production as output. One of the main findings of the paper was that irrigated farms had positive correlation with efficient farms. Pereira and Marques (2017) conducted review of more than thirty studies with regard to efficiency measures in agriculture and found that large farm size, high education level and having access to credit increases efficiency of farms. Most studies reviewed by the researchers used DEA methods to understand efficiency. Other researchers like Shrestha, *et al.* (2016) also talked about how credit given to a farmer can improve agriculture efficiency. Similarly Burki and Shah (1998) are of the view that irrigation is expected to have a positive impact on efficiency since it reduces the risk to inputs and tend to increase mean yield. According to Pereira and Marques (2017) land, fertilisers and seed are important variables in improving farm efficiency.[7] Mechanisation is another important determinant of agriculture efficiency. Hormozi, *et al.* (2012) looked at the Impact of mechanisation on technical efficiency by building a mechanisation index based on machinery operational costs. Using this variable and using various other controls they found that for rice producers in Iran there was strong impact of mechanisation on the technical efficiency.

Due to changing world economy and various modernisation techniques the literature for determinants of agriculture efficiency has evolved as well. Agriculture scientists and researchers increasingly are looking at how use of modern technology can bring about positive changes in agriculture sector. One such solution is the use of communication technologies especially the use of Information and Communication Technologies (ICTs). ICTs have significant potential effect to overcome some of the challenges such as high transaction costs and constraints on information faced by the agricultural sector [Nakasone, *et al.* (2014)]. These constraints are particularly relevant to developing countries. ICTs are, therefore, playing an instrumental in discovery of market price information and in enhancing agricultural productivity by enhancing farmers' knowledge about innovative agricultural practices [Nakasone, *et al.* (2014)]. Tijani, *et al.* (2017) determined the impact of Information and Communication Technologies (ICTs) on farmers' knowledge in Orlu Agricultural Zone, Imo State, Nigeria by sampling 130 respondents. Results show that radio was the most readily available ICT device (99.2 percent) followed by mobile phone (97.7 percent). ICT use was linked to improved use of the equipment, increased water

[7]For details on the types of inputs used in calculating agriculture efficiency see Nargis and Lee (2013), Nassiri and Singh (2009), Atici and Podinovski (2015).

management knowledge, increased knowledge of the use of improved seeds, and increased use of fertiliser and pesticides but due to socio-economic background of farm owners and other constraints, farmers may be hesitant in using technology which might hamper their efficiency. The resource constraints along with socioeconomic attributes and capabilities of farmers cause variations in the adoption of agricultural technologies. Based upon this analysis, Tijani, *et al.* (2017) recommended providing financial support to farmers in the form of interest free loans in order to aid them in acquiring and implementing technology.

3. DATA AND METHODOLOGY

Data used in this study is a part of the larger dataset collected by PERI to analyse the rural economy of Punjab. This survey which is representative of rural economy of Punjab, was conducted on more than 500 farms. Survey collected information on the output and inputs used by the farm. Information was also collected on the use of capital, fertilisers, and pesticides. This questionnaire gathers information on both agriculture and livestock. However for the purpose of this study we only used only agriculture portion of the questionnaire.

A new variable was added for this survey which checked for the modernisation of farms. In this, farmers were asked regarding the use of Information and Communication Technologies in any of the farm activities related to agriculture.

Variables Construction

Output Value

$$Output\ Value = \sum_{j=1}^{N} \sum_{i=1}^{4} h_{ij} + b_{ij}$$

$$h_{ij} = \frac{\text{Total Area Harvested (Acres)} * \text{Yield (40Kgs)} * \text{Rate per 40 Kgs (Farmgate)}}{Total\ Area\ Harvested\ (Acres)}$$

$$b_{ij} = \frac{\text{By-Product (40 Kgs)} * \text{Rate per 40 Kgs (Farmgate)}}{Total\ Area\ Harvested\ (Acres)}$$

Where i represents crop and takes value from 1 to 4 (four major crops to calculate farm level output). These include wheat, rice, cotton and sugarcane. Per acre yield is taken to control for variation in yield due to farm size. By product is included in yield since it adds to farmers' overall yield. Farm gate prices are taken to control for variation in market prices.

And j represents particular farm

Labour Value for family members is taken based on how much work a family member works on farm in a year. We then add number of permanent male workers to this figure.

Land Value is taken in Pak. Rupees

Capital Value is taken as the sum of present values of tractors and other farm implements owned. Farm implements include cultivator, thresher, trolley, kharif/rabi drill, m.b. plough, rotavator/disc plough, reaper, combine harvester, planter, sprayers, leveler, cane crusher, fodder cutter, motors, and bullock carts and other implements.

Fertilisers Value is taken as the sum of expenditure on all the chemical fertilisers used including Urea, DAP, Nitrophous, Potash, SSP, NPK, Gypsum etc.

Energy Cost is taken as sum of cost on owned tractor, rented tractor and tube wells.

Institutional Credit is a dummy variable that equals 1 if institutional credit is obtained and 0 otherwise.

ICTs is a dummy variable that equals 1 if mobile phone is used by a farmer in any one of the farm activity and 0 otherwise.

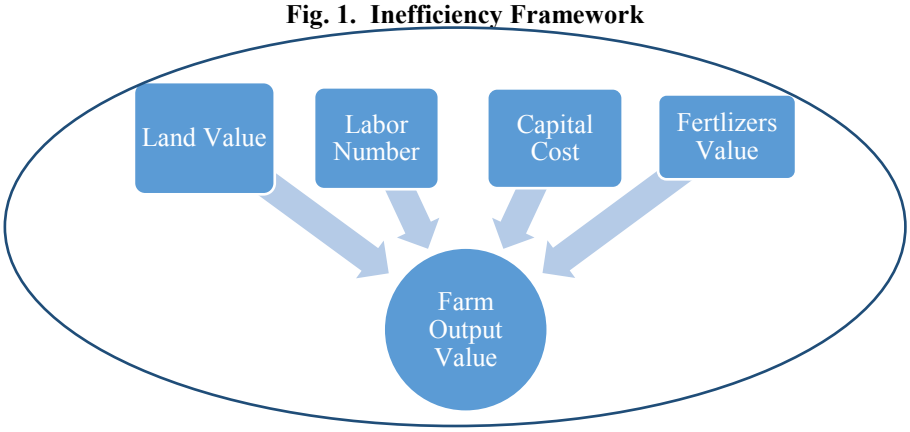
Communication Technologies is dummy variable that equals 1 if a farmer utilised the help of agriculture departments or used radio, television and newspaper to acquire help for any one of the farm activity and 0 otherwise.

Econometric Specification:

$$Y_i = B_1X_i + B_2X_i + B_3X_i + B_4X_i + \propto_1 + .. \propto_n \varepsilon_i$$

Where dependent variable is the farm level inefficiency, which is calculated using the framework mentioned in Figure 1.

Fig. 1. Inefficiency Framework



Source: Authors own rendering.

Notes: Output value of farm is determined by the four inputs. These inputs and output are used within the Inefficiency framework to calculate inefficiency scores of all the farms present in sample using DEA bootstrap method calculated in **R** software.

Heteroscedasticity Test: Group wise heteroscedasticity was checked for by using Modified Wald test in the Fixed Effect regression model using Stata. The same answers were also obtained by applying the Breusch–Pagan (1979) and Cook–Weisberg (1983) test for heteroscedasticity

H_o: Errors are homoscedastic

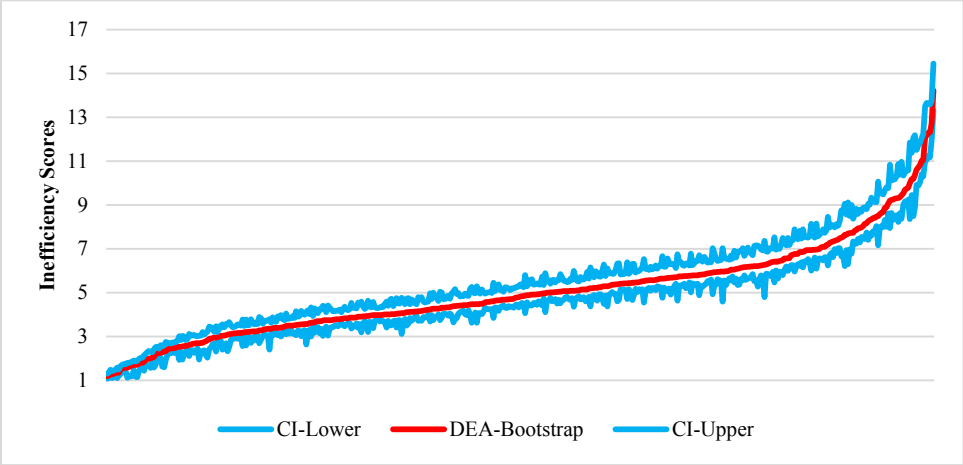
H_a: Errors are not homoscedastic

Probability > chi2 = 0.0000. Therefore null hypothesis was rejected which implies that heteroscedasticity exits. To counter this problem, we have used heteroscedastic robust standard errors.

4. RESULTS

Farm level inefficiency scores are calculated which are then used as dependent variable in the regression model. Farm inefficiency scores are shown in Figure 2.

Fig. 2. Line Plot of Inefficiency Variable along with Confidence Intervals



Source: Authors own rendering using data from PERI.

Notes: Inefficiency is calculated using Data Envelopment Analysis (DEA) with Bootstrap technique performed in R Software.

Diagram shows how input oriented inefficiency is spread over the sample size. Least inefficient farm is represented by the value of 1. Inefficiency scores increase as we move to the right side of graph. Values to the right extreme of graph showing the most inefficiency belong to Barani Zone.

Agro Ecological zone wise DEA was also run which gave input-oriented technical inefficiency as shown in Table 1. After taking inverse of the inefficiency figures we obtained efficiency scores. The mean level of technical efficiency in irrigated Zone was 55 percent, suggesting that an estimated 45 percent of the output is lost due to technical inefficiency The mean level of technical efficiency was 40 percent in Parial Barani Zone suggesting that an estimated 60 percent of the output is lost due to technical inefficiency. Where as in Barani Zone, mean level of technical efficiency was 30 percent, suggesting that an estimated 70 percent of the output is lost due to technical inefficiency within this zone.

Table 1

Zone-wise Average Inefficiency

Irrigated[8]	1.81
Partial Barani	2.50
Barani	3.26

Source: Authors own calculations using data from PERI.

Notes: Inefficiency is calculated using Data Envelopment Analysis (DEA) with Bootstrap technique using *R* software.

[8]Irrigated Zone shows the average of Rice, Mix and Cotton Zones whose inefficiency values are 1.43,1.72 and 2.28 respectively.

Irrigated Zone has the least average inefficiency (i.e. 1.81) followed by Partial Barani Zone (i.e. 2.5). Barani Zone has the greatest average inefficiency with value of 3.23.

Table 2

Sources of Technical Inefficiency

	Dependent Variable is Index of Technical Inefficiency				
Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Modernisation	.	.	.	.	.
Communication Technologies	-0.9727***	-0.8795***	-0.8159***	-0.9596***	-0.9107***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ICT	-1.0626**	-0.8994**	-0.9301**	-0.8973**	-0.8566*
	(0.012)	(0.028)	(0.022)	(0.037)	(0.058)
Formal Credit		-0.8010***	-0.8251***	-0.7849***	-0.7673***
Farm Size		(0.002)	(0.002)	(0.004)	(0.004)
Size			-0.6792**	-0.9117***	-0.9315***
Cost of Pesticides and Weedicides			(0.014)	(0.001)	(0.001)
Pesticides and Weedicides				- .0000286	- .0000363
				(0.714)	(0.645)
Pesticides and Weedicides^2				0.0000	0.0000
Energy Cost				(0.529)	(0.500)
Energy					0.0000179*
					(0.067)
Energy^2					-0.0000**
					(0.049)
Constant	4.0725***	4.0589***	4.1770***	4.3261***	4.0358***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Zone Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	491	491	491	426	424
R^2	0.195	0.206	0.218	0.251	0.251

Source: Authors own calculations using data from PERI.
Robust p-values in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As can be seen in regression results (Table 2) all variables of interest are statistically significant. We report five regressions to show robustness of results. All the models account for Agro-Ecological level effects through use of dummy variables. Robust Standard errors have been taken to account for hetroscedasticity. Model 1 has only two relevant variables i.e. Communication Technologies and ICTs both are statistically significant. In model 2 institutional credit (formal credit) variable is added and all three variables remain statistically significant. In model 3 and 4, more control variables like farm size, cost of pesticides and weedicides and its squared term has been taken. Final model (Model 5) includes all previous mentioned variables along with energy cost and its squared term. All the signs of variables in the regression are according to theory.

Interpretation of Results

Keeping everything else constant, the dummy variable of communication technologies is associated with negative relationship with farm inefficiency scores. Thus indicating that use of modernisation techniques like radio, television, newspaper and support of agriculture department are associated with decline in farm inefficiency scores.

The dummy variable of use of ICT which involves the use of mobile phone is associated with negative relationship with farm inefficiency scores. Thus showing that use of modernisation techniques like use of mobile phone is associated with decline in farm inefficiency scores, ceteris paribus.

The dummy variable of use of institutional credit is associated with negative relationship with farm inefficiency scores. Hence, showing that use of modern form of obtaining credit like from institutional sources (such as commercial banks, PSIC, NGOs, NRSP etc.) is associated with decline in farm inefficiency scores, ceteris paribus.

Log of cost of pesticides and weedicides is at first associated with declining inefficiency scores and later leads to rising inefficiency scores, ceteris paribus. This is in line with literature related to inputs of agriculture sector.

Keeping everything else constant energy cost has at first positive relation with farm inefficiency scores and later a negative relation with farm inefficiency. Though the exclusion of this variable still leads to robust results, however, sign of this variable needs to be investigated in future studies.

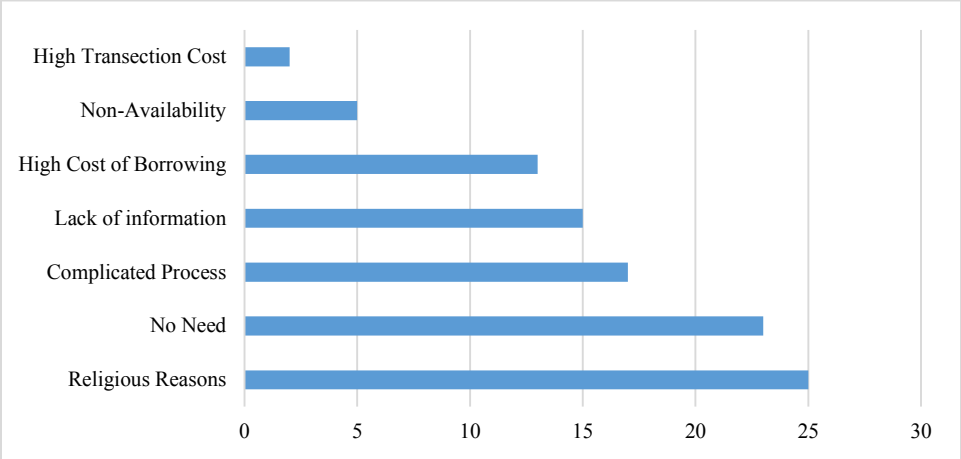
5. ANALYSIS

Interesting results emerge as seen in Table 2. In order to decrease technical inefficiency of agricultural farms in Punjab provincial government has various options. Communication technologies variable in last column of Figure 4 shows that the policy of government to mobilise agriculture department along with the utilisation of modern communication techniques of radio, television and newspaper has as a whole been successful in decreasing inefficiency of agriculture farms in Punjab. This variable is associated with decline in inefficiency of 0.91 ceteris paribus. Therefore, modernisation techniques adopted by government has statistically a positive effect in promoting farm level efficiency (alternately decline in inefficiency).

Keeping everything else constant, role of ICT is associated with decline in inefficiency of farms by 0.86 points and this relation is statistically significant. This shows that government has this channel available in reducing inefficiency of farmers. Under 10 percent of farms in the sample used mobile phone but still those who availed this opportunity have had a positive effect by increasing efficiency of their farms (or decreasing inefficiency). Mobile phone unlike radio, television and newspapers have the unique characteristic of being a two way communication device, meaning that farmers and government institutions can both communicate with each other in real time. For example, use of government agriculture helplines can allow farmer to get advice on any problems from government sources and government on the other hand can get feedback from farmers on any of its agricultural policies and can even get information on the constraints faced by the farmers.

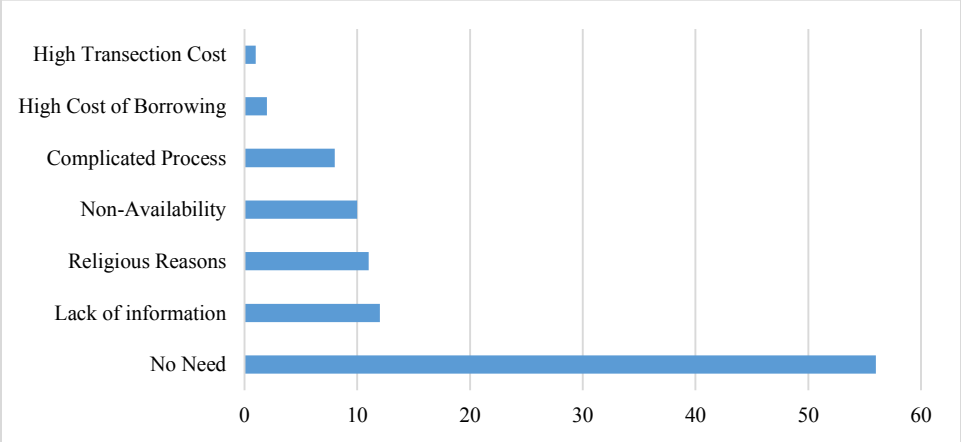
Another form of modernisation in agriculture is the use of credit from formal sources. Use of formal credit is associated with fall in inefficiency of 0.77, ceteris paribus. Despite this positive effect, sample shows that only 9 percent of the farmers borrow solely from institutional source and 8 percent of the sample borrowed from solely from non-institutional sources. Whereas 4 percent of respondents relied both on formal and informal sources in obtaining credit. It is surprising to see that majority of sample (more than 70 percent) do not borrow from institutional or non-institutional source. The principal reason they cited for this was the lack of need for credit. Figures 3 and 4 show the constraints in credit adoption as mentioned by farmers during the survey.

Fig. 3. Constraints of Credit Adoption Mentioned by Farmers that Borrow from Non-institutional Sources But Do Not Borrow from Institutional Sources[9]



Source: Authors own calculations using data from PERI.

Fig. 4. Constraints of Credit Adoption Mentioned by Farmers That Do Not Borrow from Institutional[10] **Nor from Non-institutional Sources**



Source: Authors own calculations using data from PERI.

Other regression coefficients show that keeping everything else constant as farm size increases farm inefficiency goes down showing that in Punjab larger farms are more efficient then smaller farms. Use of pesticides and weedicides decreases farm inefficiency at first and then leads to rising farm inefficiency. This is in line with literature that shows that overuse of pesticide and weedicides can be detrimental to farm health which makes the case for efficient use of pesticides. Government can use the help of ICT to inform farmers on the correct dosage of use of pesticides and weedicides.

[9]Institutional Sources for credit include Agriculture Development Bank. Commercial Banks. Cooperatives, Punjab Small Industrial Cooperation (PSIC), National Rural Support Program (NRSP) etc.

[10]Institutional Sources for credit include Agriculture Development Bank. Commercial Banks. Cooperatives, Punjab Small Industrial Cooperation (PSIC), National Rural Support Program (NRSP) etc.

6. CONCLUSION

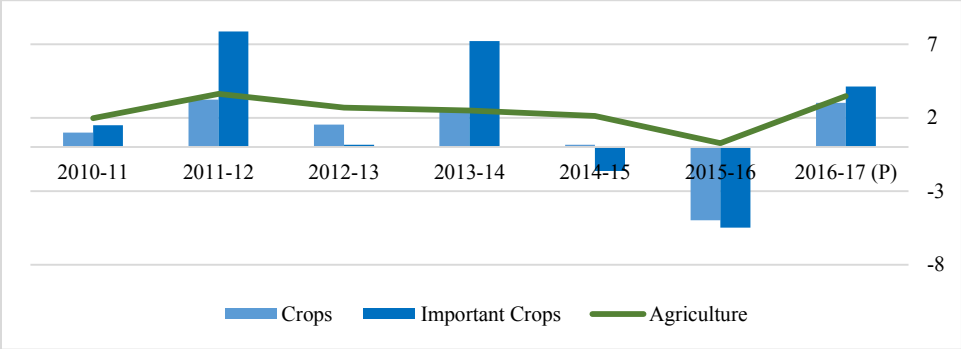
This research is a timely contribution to the literature as a benchmarking study, using most recent dataset that has detailed information of farm level agriculture variables. Additionally this study is based on large sample. This study has contributed to literature by providing interesting insights in to the determinants of farm inefficiency specifically those of modernisation techniques and use of ICTs by using latest and detailed agriculture micro dataset. Furthermore, this research extends the existing literature by controlling for a large number of exogenous factors. So the adjusted inefficiency scores can truly reflect the external constraints that are beyond managerial control of farmers. In addition, it highlights the influence of various exogenous variables on performance of agriculture through the application of recent and robust non-parametric methods. Results show that use of various modernisation techniques is associated with fall in farm level inefficiency. For example, government intervention through various electronic and print media can be used in decreasing farm level inefficiency. Role of ICT and use of credit from institutional sources are also associated with reduction in farm inefficiency Further areas of research might include how specific factors of electronic or print media may effect farm inefficiency. It will also be interesting to see how credit adoption constraints vary with farm size and/or zone wise and how household vulnerability can effect inefficiency of farm.

7. POLICY RECOMMENDATIONS

This paper helps federal government in achieving its food security policy objectives by providing ways in which agriculture farms can become efficient and modern. This will in turn ensure attractive incomes and decent employment for those who live and work in rural area. Government of the Punjab needs to rely on communication technologies especially ICTs (like mobile phone) in educating farmers about the correct use of pesticides and weedicides. Mobile phones with special applications can be used to guide farmers about the correct mechanism in achieving formal credit and it can be used to send real time information on any natural calamity or emergency in case of any disastrous outbreak of crop diseases. Therefore, government needs to come up with agriculture reforms that will streamline the use of these modernisation techniques. It will be interesting to see how results of future studies compare with the results of this study.

APPENDIX

Agriculture Growth Percentages



Source: Author's Illustration using data from Pakistan Economic Survey 2016-2017.

Notes: Agriculture growth rate has shown variation over the years. Within agriculture there is greater variation in important crops. Whereas overall cropping sector follows the trend of important crops but has the lesser growth than that of important crops showing performance of minor crops has diminished the effect of growth of important crops. There is negative growth in important crops in 2015-2016 that was primarily due to the poor performance of cotton crops

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