



Agricultural Inputs and its Productivity in Pakistan: An Empirical Analysis

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Abstract

Article based on one model in which we move around the productivity of agriculture and its determinants in the case study of Pakistan. The output of cultivation is determined through the agricultural land, labor force participation of the population in agri-business, tractors, manure consumption, credit and electrical consumption. The study has hired the ARDL and Granger causality test for the selected interval sequence data from 1972 to 2016. Findings of the study, in which tractor use in the production purposes of the agriculture has more important and show the positive impact on the productivity. Similarly, fertilizer takeoff is more significant with positive signs and labor force participation in agriculture, credit supply; energy consumption, agricultural

land and tractors used in agriculture are also positively significant in the long run.

Keywords: Agricultural Inputs, Agricultural Productivity; Pakistan, Unit Root test, Long Run Co-efficient Results, ARDL Approach, Granger Causality Test

1. Introduction

Farming stands mix of two arguments ager, "a ground" plus culture, "enlargement". It stays Latin expression. Main individuals who rely on cultivating to catch the nourishment remained popular in Israel and Jordan cutting-edge close to 80000 B.C. Through the entries of the period, rural areas develop a noticeable then fundamental aimed at the development of the economy. The improvement of Horticultural needs ideal and appropriate contributions of homesteads. We talk about usefulness development then it is all in all correct to approximately that rural area is the pre-condition for development in the direction of the ideal economy. Similarly, expansion of rural agricultural development or significant results of its productivity will compensate for the deficit payment but also lead to improvement in the economy. The significant job of the farming area aimed at any country can be justice via three dissimilar behaviors (1) Provider nutrition to shoppers and crude workings toward homegrown ventures (2) Foundation of outside trading receipt. (3) Obtainability of marketplace services for manufacturing things. It is more right than wrong to say that the horticulture area is moving near industrialization. Since the earnings rate is advanced in the up-to-date area and secret joblessness is eliminated in the agribusiness area because of the excess shift to the modern area as the said in Lewis Model. Agrarian development and advancement aimed at the economy of any state are vital particularly for the emerging nations. For the decision of development and advancement of one economy, we realize the regular assets, developed region, an assortment of periods and the inorganic bases and so forth of that nation. The plot takes its significance in the farming area since horticulture yield relies on the usefulness of land. The land as well as works accessibility, capital limit and

innovation additionally assume a fundamental part there. Farming creation gives the result of food material to case crops. The effect of created and non-industrial nations was not the same because both have varied normal assets, circumstances and natural changes.

1.1. Objective of the Review

To analyze the upgrades in farming data sources. For example, horticultural land, the workforce in rural, motorization, composts utilization, credit appropriation and energy utilization in the rural creation and toward to see the same time effect of these contributions on the efficiency of agribusiness in Pakistan.

2. Review of Observational writing

In this piece, we propose the writing audit on horticulture info and its efficiency by the various articles on farming. Here, we arranged the writing audit into six hi unique segments, for example, (1) Studies on horticulture inputs-yield (2) Studies on agribusiness inputs-all out factor usefulness (3) Studies on farming information sources development (4) Studies on agroindustry inputs-specialized expertise (5) Studies on farming sources of info credit (6) Studies on horticulture inputs-manure.

2.1. Studies on Horticulture Input-yield

Here writing an audit of various articles on farming info - yields have taken. Yield is the single ward variable while autonomous factors that were generally utilized were substance manure, composts, seed, credit, channel water, tube well, work vehicle, land income, compensation, hardware, specialized effectiveness, schooling, ranch size, downpour fall, family size, pay size, age, soil quality, employed work and bullock work accessible per crop section of land and so on Salam (1981) analyzed the utilization of present day apparatus as contributions to Pakistan's farming. Information remained taken from the creation year 1972 to 1973 that was gathered from authentic sources. Factors were remembered for the concentrate like substance manure - P, composts – N, seed, credit, channel water, tube well, farm truck, land income, compensation, recruited work and bullock work

accessible per crop section of land. Results showed that the utilization of present day apparatus in the creative work was critical and that ranchers which utilize the cutting edge hardware in the creation cycle additionally have utilized the greater of manures. It was an examination of the advanced apparatus is a critical job in the creation (Ali et al.2005).

LAU and Yotopoulos (1989) detected the specialized change by the meta-creation work tactic in biosphere horticulture in 1960-70 and 1980. The Cobb-Douglass Creation work was utilized for the assessment of results. The information from 43 distinct nations in multi decades was utilized in the review. The factors utilized in the review were land, work, animals, manure, apparatus and specialized training. It was tracked down that re-visitation of scale isn't consistent yet in addition increments as expansion in the apparatus as information.

Hussain and Ishfaq (1997) investigated cultivating yield in Pakistan. Sources of info, for example, ranch crop yield (Q), ranch collect zone (HZ), laborer (E), water (W), insect spray (I), farm hauler source (T) and absolute credit flowed (L) utilized in the review. Testing involved the CDP work in this review for the assessment of the result. Results bring up that ranch gather state; manures and absolute farm vehicle sum show a focal part in the purpose of food creation.

Raza and Siddiqui (2014) assessed the farming factors and their consequences in Pakistan. In review, time series information from 1972 to 2012 was utilized. Farming measurements of Pakistan were selected from the Annual Book plus Pakistan Economic Study which are the code wellsprings of information. Johansen Co-combination methodology consumed to compute the outcomes. Factors utilized in the review were the horticultural result, compost utilization, further developed seeds, work utilized in the area, amount of farm haulers, number of cylinder wells and water accessibility. Results showed that motorization wherein the utilization of farm haulers in the creation of information was huge. The update additionally concluded that further developed seeds,

water accessibility, number of cylinder mines and effort utilized affect the creation of farming areas.

2.2. Studies on Agribusiness Information - Absolute Component Efficiency

In this segment, various articles on agribusiness input - absolute element efficiency must be taken. All out aspect efficiency is the unrestrained variable which is impacted by the distinctive precise factors, for example, plot, trenches, physical work, intuitive work, farm trucks and peat and so on

Evenson (1992) developed creation besides wellsprings of improvement. Share of India, which was thirty present enclosed in Tornqvist-Theil TFP record, 1956 to 87. The factors utilized in the concentrate like sea-going, water system, business, actual work, farm vehicles and enricher. Research determined that extra examination plays an essential part in absolute variable efficiency. The outcomes demonstrated that exploration expansion critically affects TFP. Decidedly sway by the store of investigation, delay costs, a home far off manifestations, and reception of modern changes on the Absolute Variable Efficiency .this, yet the expansion in business sectors and progress in carrying consumes emphatically impact.

Rosegrant (1993) investigated nearby cultivating yield development. Tornqvist-Theil TFP utilized aimed at supposition about outcomes. Tornqvist-Theil TFP records processed 271 locale top 13 statuses of India. On behalf of Pakistan; the same segments covered 35 regions which discover in similar passé. Factors utilized, happening review were work vehicles, manure, plot, water system, work, visceral, civic speculation, proficiency, expansion consumption per homestead and load of examination venture. Consequences presented, item elevation remained communicated by TFP, trendy harvests area for every one of nations. Productivity development is based on continued local area revision, initially available reception for current assortments, extension reign of the water system, upgrading in social resources through the extension of proficiency and isolated examination (the last option in India).

2.3. Studies on Agribusiness Info Development

This part has taken the writing survey on various articles on agribusiness input - development. Development is a needful variable that is impacted by the different data sources, for example, seeds, insect poisons, manure, water system, credit, land, work, capital and crop creation and so forth

Chaudhary, Chaudhary and not set in stone the Pakistan's development and creation in agribusiness. Information was covered from 1950 to 1995 in the review. The factors utilized in the review were seeds, bug sprays, manure, water system, credit, land, work, capital, crop creation and efficiency per bowman. Results displayed to dispatch the open market by the participation of various gatherings and people and brake down the restraining infrastructure of enlisted recorded shippers there.

Nyangito (2003) examined Kenya's rural results. Full scale, meson and miniature sort information were utilized in the review. Service of Farming was the principal wellspring of information in the review. Cobb-Douglas and steady versatility of replacement creation capacities utilized for the valuation of results. Factors utilized in the review were manures, further developed seeds, and herbicides. The study showed research, and examination expand in the utilization of control procedures in rural usefulness was there present and information sources likewise were not dependable in Kenya.

2.4. Studies on Agribusiness Information Specialized Proficiency.

In this segment, writing surveys have been taken on horticulture contribution to specialized effectiveness. Here specialized proficiency is the uncontrolled variable that shows the difference by the various factors like land, work, capital (farm trucks, diesel and power tube wells and draft animals) and so on

Ajibefun (2002) investigated the examination of the specialized effectiveness and strategy issues in minor size of cultivation in Nigeria. Information on 200 little area cultivating was taken in the

review. Stochastic wilderness creation, Cobb-Douglas stochastic bond model and capacity utilized in the review. Factors utilized in the review were oldness, level of tutoring, cultivating ability, ranch scope, homegrown size, complete Work, recruited work, worth of seed, Carries out and Manures. The outcomes showed that expanding the rancher's schooling and their encounters in development had a critical effect on work on the specialized productivity in the farming field.

Ludena (2010) inspected the development of farming items, modification, expertise, and advancement; specialized regions remained in the midst of 1961 and afterward in 2007. Malmquist list strategy useful toward accomplish rankings. Learning talked about substantial stock, design, sustenance, farm vehicles also business factors. Marks acquired determined from these data sources have the pinnacle farming yield development in Latin America and the Caribbean. Schoolwork likewise presumed that the greatest advancement has emerged in the ranches because of the explanation of the start of the know-hows in it.

2.5. Studies on Farming Information - Credit

This part has continued to take the writing survey on horticulture input through credit. At this time credit is reliant on variable though free factors that influence the farm size, formal instruction of homestead, credit, compost, wellbeing, conveyance and cost and so on.

Croppenstedt, Demeke, and Mesachie (2003) expected the restricted innovative changing and manure interest in Ethiopia. The information was covered by the participation of USAID (1994). The review utilized the twofold obstacle (DH) model for the assessment of the outcomes. The factors utilized in the review were ranch size, formal training of the homestead, credit, compost, wellbeing, transport and cost. The creators inferred that improvement in the foundation had decidedly reacted to the creation and government assistance. The sponsorship of compost was additionally huge in Ethiopia.

Faruqee et al (2003) observed credit conditions and their influence on the rural economy of Pakistan. The review utilized information from various sources. Dual associations AERC and PERI made reviews information. Factors, for example, land claimed by family, female training, male instruction, time, proper praise, ripeness, and mass of town were utilized in the study. SLS model utilized used for assessment. Tobit relapse second phase to show the well-ordered factors, although root test is the first step and displays accurate qualities. Effects recommended that certified credit is hard for the scope of little ranchers. Assuming that overabundance of credit is in the span of little ranchers at the easiest condition then it could be useful for the development of the economy (Ali, Aslam & Ali 2012).

2.6. Studies on Farming info - Manure

Here the writing survey of horticulture information sources and their usefulness has been taken from the articles on agribusiness inputs sway on agrarian manure. Compost is reliant on a variable that shows the variety of the distinctive farming information sources factors unfamiliar.

Croppenstedt and Demeke (1996) explored determinants in Ethiopia to endorsement and phases of compost's interest for breakfast muesli rising ranchers. The information is acquired after a manure promoting review task via a share of the advancement of sensible business sectors modified, financing over the USAID . Study directed altered areas. Probit model, Log it model utilized for assessment. Factors utilized were age, manure, sex, developed region, cost of harvests and schooling. Results proposed that the impact of the endowment on compost utilization is little than that giving credit would be should more viable in terms of raising reception, utilization of manure and in this way becoming horticultural result.

3. Model, Data and Approach

3.1. Data History

A data form is secondary. Autonomous factors, for example, Agrarian Land, Workforce of Farming, Farm trucks in Horticultural creation, Manure Utilization/Take off, Credit Dispersion in agribusiness and Energy Utilization in agriculture are choice, Which are successful and wanly affect the conditional factors which is the agrarian worth added as a level of Gross domestic product.

3.2. Source

A numerical record of selected variables in this work is achieved from the Pakistan Monetary Survey (different issues), WDI (2013) and WB.

Econometric Form

$$AVAt = \alpha_0 + \beta_1 AGLt + \beta_2 LFAt + \beta_3 TRACTt + \beta_4 FTt + \beta_5 CDt + \beta_6 ECt + \epsilon t$$

Anywhere:

Data is a time series from 1972 to 2016

$AVAt$ = Agrarian worth additional on period t

$AGLt$ = Farm Plot on period t

$LFAt$ = Employment power (proxy as workforce) of Agriculture at period t (%)

$TRACTt$ = Tractor as Proxy of Modern Technology in Agrarian

FTt = Nourishment's Feasting/Departure by period t

CDt = Credit Delivery at period t

ECt = Energy Intake on period t

4. RESULTS AND EXPLANATION

4.1. Unit Root

By unit root, we check stationarity of variables at the different level.

Table 1: Unit Root

Variables	Intercept	Lags	Intercept's Trend	Lags	None	Lags	Conclusion
AGL	-2.0222	1	-2.3844	0	1.5944	0	I (1)
LFA	0.3933	1	-2.5454	0	2.9559	1	I (1)
TRACT	-5.5903	0	-6.0800	0	-4.8248	1	I (0)
FT	-1.1983	1	-2.9970	0	1.8157	1	I (1)
CD	-4.9296	6	-4.7061	9	-4.6241	6	I (0)
EC	-1.5366	0	-1.3856	0	0.2345	0	I (1)
AVA	-3.0276	1	-2.3846	0	2.5948	0	I (1)

Source: Author's calculation

The result of the table shows that certain variables remain stationary at the level and selected are stationary on the difference of 1 (1). As we see here that TRACT and Credit Are stationary at the level and others are at the 1st. So we decide that data is suitable for the bound test to show the long run and short run relation between variables.

4.2. Bound Test

In the light of unit root results, that variable in the model is stationary and non-stationary at the level. The first difference of those variables will take so that they become stationary. As we get the mixture of the stationary level so we use the ARDL approach.

Table 2: ARDL Outcomes

Significance	10 Bound	11 Bound
10%	1.98	2.93
6%	3.26	4.27
3.5%	3.56	3.62
2%	2.86	3.95
	F-Statistic	143.8196

Source: By the calculations of Author

Results of the bound test show that the critical values of (11) upper bound that is 2.93 and lower bound value 1.98 are less than F-statistical value then we can say there is exist long run correlation among variables.

4.3. Long Run coefficients

Test results declare dependency between explanatory and explained variables. It also shows significance and non-significance results values and also explains the direction of variables by the positive and negative signs. Impact show, in what way, change arises in the dependent variable owing to the autonomous variables.

Table 3: Results of Coefficients

Variable	Coefficient	t-Statistic	Prob.
AGL1	0.312970	0.619218	0.7437
LFA	0.430178	6.182920	0.0567
TRACT1	0.087872	8.836284	0.0369
FT1	0.725324	11.135377	0.0184
CD1	0.21368	13.801475	0.0151
EC1	0.210174	8.862721	0.0064
C	5.352405	2.560704	0.3257

Source: Calculate by Author

Results of the table declare that all variables have significant values with positive signs, Land also has a positive value at 0.74 probability with 0.31 percent change in production but less weighty than other variables.

ARDL Co-integration Results

Results show the interdependency of variables at a different level of approach. This approach is most suitable and flexible for the results of time series data in the short and long run with both stationary and non-stationary.

Table 4: Results of ARDL approach

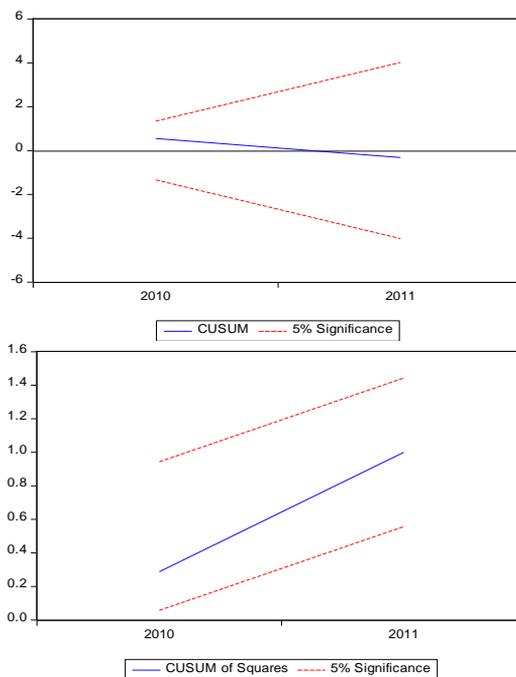
Variable	Coefficient	Prob.
AVA(1)	2.287049	0.0003
AGL(1)	-1.326616	0.0030
AGL1(-1)	0.708799	0.0011
AGL1(-2)	-0.041788	0.2155
AGL1(-3)	-0.067159	0.1011
D(LFA)	-2.040900	0.0001
LFA(-1)	-0.674413	0.0004
LFA(-2)	0.125470	0.0037
LFA(-3)	-0.161063	0.0076
TRACT(1)	0.001528	0.0002
TRACT1(-1)	0.064976	0.0001
TRACT1(-2)	0.055108	0.0011
TRACT1(-3)	0.070240	0.0012
FT(1)	0.091005	0.0005
FT1(-1)	-0.190968	0.0012
FT1(-2)	-0.202979	0.0003
FT1(-3)	-0.205008	0.0007
CD(1)	0.041778	0.0010
CD1(-1)	-0.062501	0.0003
CD1(-2)	-0.105148	0.0001
CD1(-3)	-0.154459	0.0011
D(EC1)	-0.162127	0.0010
EC1(-1)	0.002482	0.0017
EC1(-2)	-0.031493	0.0010
EC1(-3)	0.003790	0.0244
Co int Eq(-1)	-0.530798	0.0001

Source: Writer's outcomes

Here variables are highly significant with the negative and positive coefficient values in a different order.

4.4. Stability of the Model

Values of the cumulative sum of recursive residuals and its square lie between the two critical lines with a 5% significant value. We can say our model is stable.



**Figure 1: CUSUM
CUSUM of Squares**

Figure 2:

Source: Author’s development
Writer’s clarification

Basis:
Granger Results

It explains causality in the variables where the value of one variable forecast the value of another independent variable.

Table 5: Pairwise Granger Test

Variables	Observed	F-statistic	Probability	Results
AGL→AVA	41	0.45041	0.6773	Uni-Direction causality
AVA→AGL		1.79130	0.2084	
LFA→AVA	39	0.48148	0.6382	Uni -Directional causality
AVA→LFA		3.13491	0.1231	
TRACT→AVA	41	0.11083	0.8043	No-Direction causality
AVA→TRACT		0.46097	0.6607	
FT→AVA	41	1.90790	0.1795	Uni-Directional causality
AVA→FT		9.06433	0.0113	
CD→AVA	41	0.41672	0.6025	No -Direction causality

AVA→CD		0.69441	0.4898	
EC→AVA	41	1.60782	0.1290	No-Directional causality
AVA→EC		1.41985	0.2525	
LFA→AGL	38	5.22532	0.0155	Uni-Directional causality
AGL→LFA		1.48985	0.5950	
TRACT→AGL	41	0.18572	0.8231	Uni-Directional causality
AGL→TRACT		1.13338	0.4469	
FT→AGL	41	3.54669	0.0760	Uni -Direction causality
AGL→FT		0.71467	0.4958	
CD→AGL	41	0.69933	0.5110	No-Direction causality
AGL→CD		0.29044	0.6979	
EC→AGL	41	1.61640	0.3190	Uni -Direction causality
AGL→EC		0.79878	0.3924	
TRAC→LFA	38	0.41880	0.6145	Uni-Direction causality
LFA→TRACT		1.20987	0.4103	
FT→LFA	38	0.54832	0.4997	Uni -Directional causality
LFA→FT		3.20781	0.0139	
CD→LFA	38	0.31892	0.7464	No -Direction causality
LFA→CD		0.66082	0.3710	
EC→LFA	38	2.59501	0.2997	No -Direction causality
LFA→EC		2.45712	0.3049	
FT→TRACT	41	0.89676	0.3953	Uni-Direction causality
TRACT→FT		1.59251	0.3058	
CD→TRACT	41	1.47831	0.7878	No-Direction causality
TRACT→CD		1.30066	0.9191	
EC→TRACT	41	1.02623	0.9128	No-Direction causality
TRACT→EC		1.46056	0.6285	
CD→FT	41	1.73432	0.0764	Uni-Direction causality
FT→CD		0.47056	0.7426	
EC→FT	41	0.24787	0.6956	No-Direction causality
FT→EC		0.71632	0.7112	
EC→CD.....	41	0.16277	0.8200	No-Direction causality
CD→EC		0.90935	0.5422	

Source: **Calculate by me**

Results show the uni-directional and non-directional relationship between the variables.

5. Conclusion and Policy Recommendation

Study find out the conclusion, labor force in the agriculture, fertilizers feasting in the agriculture and credit have a positive impact to improve the agricultural productivity as the production

increase by the improvement in the mechanization in the form of the more use of tractors in the agricultural sector. Electrical consumption also shows a vital role in the production process and the role of agricultural land may be insignificant if it is not correct to use for cultivation purposes or it may influence any other political, economic, or social factors.

In the end, we summarize the results and suggested some important points that are

- Fertilizer departure in the horticultural area essentially affects the usefulness of the farming with the goal that the administration ought to expand the financial plan design for the stock of manures.
- The accessibility of compost to the rancher ought to be faultless through the government or another area.
- Electronic media should play an important role in the use of fertilizer.
- A supported program should be launched by the government in cost of fertilizer
- A proper ratio of factors of production should be pre-planned.
- More work is required in the research field of the agriculture sector
- Focus is required to train the labor force in agriculture.
- Innovative public and private institutes of agriculture should be unlocked.
- Proper information about the alarming situation of factors of production should be provided through print and electronic media.

- Credit issues that are facing the farmer should be resolved at the right time.
- A fixed fund should be spent on the agriculture sector in the annual budget.
- Modern technology can raise the production in the trivial area of production so there needs moderate technology.
- There should be secureness of local and private new inventions by the Government.
- Consumption of energy in the agricultural sector should be introduced to increase productivity.

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