

Analysis the Relationships of Arable Land Use in Bangladesh, India, and Pakistan

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Abstract:- This study's objective is to examine how Bangladesh, India, and Pakistan use their farmland and compare their agricultural practices and policies. The idea behind the study is that land use and farming are very different in the three countries, even though they are all in similar places and have similar climates. In this study, the research was done using both quantitative and qualitative methods and also used several tests like the Johansen cointegration test, the Granger causality test, the Augmented Dickey-Fuller (ADF) test, the Phillips-Perron (PP) test, and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. The information used in this study came from both first-hand and second-hand sources, like government reports, academic journals, and other relevant literature. The study's findings show that, while Bangladesh, India, and Pakistan have similar meteorological and geographical qualities, their approaches to land use and agriculture are vastly different. Bangladesh has a more diverse cropping pattern and has had great success in increasing agricultural production by implementing new technologies. India, on the other hand, uses more fertilizers and pesticides, resulting in environmental harm and health issues. Pakistan has a more limited farming strategy, as well as water shortages and insufficient irrigation systems.

Keywords: Arable land use, Causality, Cointegration, IRFs

1. Introduction

The land is an important natural resource because it provides space for people to live, grow crops, and do other things. It is a limited resource that can't be replaced if it gets used up or lost. In other words, arable land is needed to grow food and is the foundation of human civilization. Arable land is a big reason for economic growth, less poverty, and food security. It is a very important resource for many developing countries, where farming is often the main source of income and food. In addition to carbon sequestration and reducing greenhouse gas emissions, arable land can also help reduce the effects of climate change. Arable land is important from a cultural and historical point of view. It has been the center of human civilization for thousands of years. It was the foundation on which agriculture and the growth of society were built. Access to good soil has also been a source of war and trouble throughout history. Among the most crucial things for a nation's social and economic development is how it uses its arable land. Arable land is needed for farming and is a major source of food production, economic growth, and jobs in rural areas. But because of growing populations, more individuals relocating to urban areas, and other things, the amount of land that can be used for farming is going down quickly around the world. This trend is especially common in developing countries, where a lot of people depend on agriculture for their main source of income.

Three South Asian countries that depend a lot on agriculture are Bangladesh, India, and Pakistan. They have some of the most fertile farmland in the world and a total population of more than 1.7 billion people. These countries also have big problems with how they use their arable land. Bangladesh, for example, has a small amount of arable land and a population that is growing quickly, while India has problems with land degradation and soil erosion. Pakistan, on the other hand, has problems with a lack of water and farming methods that are not sustainable. Given how important arable land use is in Bangladesh, India, and Pakistan, this study will look at how it is used now in those three countries. The study will look at how much arable land each country has, how it is used for different kinds of crops, and how it has changed over the past few decades. The analysis will also focus on the things that are changing how these countries use arable land. Population growth, urbanization, government policies about farming and land use, climate change, and other environmental factors may be some of these factors. The study will also look at how using arable land affects the environment and the people who live nearby. It will look at the effects on soil health and water quality of farming methods that aren't sustainable, like using too many chemical fertilizers and pesticides. The study will also look at how farming affects biodiversity and ecosystems in the area.

Finally, the study will suggest policies for using land in a way that is good for the environment based on an analysis of how arable land is used in Bangladesh, India, and Pakistan. Some of these suggestions could be to encourage farmers to use bio-dynamic farming methods, improve irrigation, set up land-use zoning policies, and give farmers incentives to use sustainable farming methods. Overall, the study seeks to show how arable land is used in Bangladesh, India, and Pakistan now and to suggest ways to use land in a sustainable way. By doing this, the study hopes to help come up with policies that can help these countries reach their economic and agricultural goals while keeping their natural resources safe for future generations.

2. Objectives of the study

The possible objectives for the study of Analysis the Relationships of Arable Land Use in Bangladesh, India, and Pakistan include the following:

The main objective of this study is:

- Examine the current trends and patterns of arable land use in Bangladesh, India, and Pakistan, and identify any parallels or differences between the three countries.

Other objectives of this study are:

- To measure the relationship between agricultural output and arable land usage in each nation and to determine the degree to which land use influences agricultural output.
- Assessing the effectiveness of government programs in the three countries meant to promote sustainable land use practices and prevent land degradation.
- Investigate the possibilities of increasing crop yields and agricultural production through enhanced land management practices such as soil conservation, crop rotation, and irrigation.
- Assess impediments to the sustainable use of arable land in the region, such as land tenure concerns, lack of access to credit, and inadequate infrastructure, and provide solutions.

3. Literature review

Arable land is a vital resource for the agricultural economy of South Asian countries like Bangladesh, India, and Pakistan. The increasing population and changing food habits of the people have led to an increased demand for food, which has put immense pressure on the available arable land. This study aims to analyze the current status of arable land in South Asian countries and suggest measures for its sustainable use.

This literature review will provide an overview of the existing research and studies on arable land in South Asia. Overview of Arable Land Use in South Asia According to the World Bank (2017), South Asia has around 184 million hectares of arable land, with India accounting for the largest share. However, despite the abundance of arable land, the productivity of agriculture in the region remains low due to several factors such as soil degradation, water scarcity, and inadequate infrastructure. Factors affecting arable land use in South Asia is soil

quality. Soil quality is one of the most significant factors affecting arable land use in South Asia. A study by Kumar et al. (2018) highlighted that soil degradation and nutrient depletion have led to decreased productivity in the region. The authors emphasized the need for sustainable land management practices to improve soil quality and enhance agricultural productivity. Water Scarcity Water scarcity is another major challenge in arable land use in South Asia. A study by Molden et al. (2010) emphasized the need for efficient water use in agriculture, particularly in countries such as Pakistan, India, and Bangladesh, where water scarcity is prevalent. The authors suggested adopting practices such as drip irrigation, rainwater harvesting, and water-efficient crops to improve water productivity. Land Tenure Systems Land tenure systems are another crucial factor affecting arable land use in South Asia. A study by Gopal and Bharati (2018) suggested that the absence of clear and secure land tenure systems hinders investment in agriculture, leading to suboptimal use of arable land. The authors recommended developing and implementing appropriate land tenure policies to encourage investment in agriculture. Agricultural Subsidies are a popular policy intervention to support farmers in South Asia. Shariff et al. (2022) conducted a study to investigate the elements that influence the adoption of contemporary technology agricultural techniques and adaption in Asian farmer communities. The study's findings indicated that some elements have the potential to influence and transition traditional agriculture practices among Asian farmers to modern agricultural methods. Additionally, the study suggested that government strategies and policies should be implemented to boost the future agriculture sector.

In South Asia, agriculture is the primary source of livelihood for a large proportion of the population, and arable land is a critical resource for food security and economic growth. However, land use patterns in the region are characterized by intensive and extensive farming practices, which have resulted in land degradation and soil erosion. A study by Kumar et al. (2020) found that agroforestry practices possess the capacity to grow crop yields, enhance soil health and generate more revenue streams for farmers. Another potential solution is to improve access to credit and agricultural inputs, such as fertilizers and seeds, for smallholder farmers. A study by Rahman et al. (2018) found that providing smallholder farmers in Bangladesh with access to credit and inputs resulted in increased crop yields and improved soil health.

Technology transfer is another popular policy intervention to improve arable land use in South Asia. A study by Goyal and Singh (2017) suggested that technology transfer should be accompanied by capacity building and extension services to ensure its effective adoption by farmers. The authors emphasized the need for a farmer-centric approach to technology transfer, considering the local context and needs of farmers. The entire amount of arable land in South Asia, the Food and Agriculture Organization (FAO) claims, is approximately 316 million hectares (ha), which accounts for 28 Percent of the region's total land area (FAO, 2022). However, the availability of arable land per capita is significantly low in these countries. As per the World Bank report, the amount of farmland per person in Bangladesh, Pakistan, and India is 0.08, 0.14, and 0.07 hectares, respectively (World Bank, 2021). Furthermore, the increasing demand for high-value crops, such as fruits and vegetables, has resulted in the expansion of non-traditional agriculture, which requires more arable land than traditional crops (Kumar and Singh, 2019). Several studies have suggested measures for the sustainable use of arable land in South Asian countries. One of the key strategies is the adoption of precision agriculture. It makes use of contemporary tools like remote sensing (RS) and geographic information systems (GIS), to optimize the use of arable land (Kumar and Singh, 2019). Other measures include promoting agroforestry, conservation agriculture, and organic farming practices, which enhance the soil's fertility and improve its water-holding capacity. Moreover, land-use planning and zoning can also help to ensure the sustainable use of arable land. The implementation of policies that regulate transfer of agricultural land to non-agricultural uses can help to preserve the available arable land (Kumar and Singh, 2019). Additionally, the promotion of alternative land uses, such as urban agriculture and rooftop gardening, can help to reduce the pressure on arable land and enhance food security in urban areas (FAO, 2019). Bhujel and Joshi (2023) demonstrated that the utilization of organic farming in sustainable agriculture was associated with positive attitudes. The majority of participants held the belief that governmental assistance is necessary for the widespread implementation of organic farming. The participants also recognized the beneficial impacts of vermicomposting. The investigation revealed that vermicomposting confers significant benefits to the health and growth of plants and crops. The utilization of resilient crop selection has been recognized as a strategy to mitigate the impact of weather changes.

Literature suggests that the way arable land is used in South Asia is impacted by several factors, such as the quality of the soil, the lack of water, and the way land is owned. Policy interventions like targeted subsidies and technology transfer can increase agricultural productivity, but they need to be paired with capacity building and extension services to make sure farmers actually use them. To make better use of the arable land in the area, it is also important to use water wisely and take care of the land in a way that is good for the environment.

4. Methodology:

The following econometric instruments are used in this study's data analysis. The unit root tests ADB, PP, and KPSS are first used to determine whether or not the selected data are stationary. The Granger causality test is then employed to establish the relationship between the variables' causation. The Johansen cointegration test referred by Johansen and Juselius (1990) is then used to determine whether there is any long-run relationship between the variables. To get this conclusion, econometric software called Eviews 12.0 was employed.

Unit root tests:

Unit root time series, is not stationary, it can be determined using unit root tests. A unit root is a value in a time series that stands out so much that it's hard to tell if it's just a random change or a real trend. There are three common unit root tests: the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test, the Phillips-Perron (PP) test, and the Augmented Dickey-Fuller (ADF) test.

The popular augmented Dickey-Fuller (ADF) test is used to test the null hypothesis that a time series has a unit root. This study can use the ADF test with data that stays the same and data that changes. The test statistic is given as a t-distribution based on the augmented Dickey-Fuller regression equation. The "null hypothesis" of the ADF test is that the time series has a "unit root" (i.e., it is non-stationary). The null hypothesis is rejected if the test statistic's p-value is less than the level of significance. This means that the time series is stationary. The Phillips-Perron (PP) test is similar to the ADF test, but it also looks at any correlations between the data in a certain order. Based on the augmented Phillips-Perron regression equation, the test statistic is given as a t-distribution. The "null hypothesis" of the PP test is that the series of times has a "unit root" (i.e., it is non-stationary). The null hypothesis is disproved if the p-value of the test statistic is less than the level of significance. This means that the time series is stationary. The KPSS test is used to check the null hypothesis that a time series is stationary around a deterministic trend. The test statistic is based on the KPSS regression equation and is given out using a standardized random walk. The null hypothesis for the KPSS test is that the time series is stationary. The null hypothesis is disproved if the p-value of the test statistic exceeds the level of significance selected. This means that the time series is not static. You can use the ADF and PP tests to see if a time series has a unit root, and you can use the KPSS test to see if it is stationary around a deterministic trend.

If a series' mean and autocovariance are unaffected by the passage of time, it is said to be (weakly or covariance) stationary. Non-stationary series is considered when it is not stationary. The random walk is a typical instance of a non-stationary series:

$$y_t = y_{t-1} + \varepsilon_t \dots \dots \dots (1)$$

A stationary random disturbance term is where. The projected value for the series is constant, subject to, and the variance rises over time. It is a difference stationary series because the first difference in the random walk is stationary:

$$y_t - y_{t-1} = (1 - L) y_t = \varepsilon_t \dots \dots \dots (2)$$

Incorporating diversity the symbol for a stationary series is I(), where is the order of integration. The number of differencing operations required to make the series stationary or the number of unit roots present in the series determines the order of integration. One unit root denotes the aforementioned random walk, it is indicate an I(1) series. A stationary series is also I(0).

Regressions using integrated dependent variables or integrated regressors do not use standard inference techniques. Because of this, it's crucial to determine whether a series is stationary before utilizing it in a regression. The unit root test is the formal test to determine whether a series is.

Granger causality test

Granger causality is an idea in statistics that tries to figure out whether one time series can help predict another time series. The Granger causality test is a statistical hypothesis test that is used to find out if one time series causes another. The Granger causality test looks at whether the past values of one time series can help predict another time series. If the past values of one time series can help predict the future values of another time series, then the first time series Granger causes the second time series. The Granger causality test is often used in economics, finance, and other social sciences to figure out what causes what between two variables. But it's important to remember that the Granger causality test only looks at the statistical relationship between variables. It can't prove causality in the strict sense of the word. To do a Granger causality test, you need two time series and a lag parameter. The null hypothesis of the test is that the lagged values of one time series don't have a big effect on the other time series. The other idea is that the values of one time series that are behind schedule do have a big effect on the other time series. If the p-value of the Granger causality test is below a certain significance level (usually 0.05), the null hypothesis is rejected and it is decided that the first time series Granger causes the second time series. If the p-value is above the significance level, the null hypothesis cannot be rejected. That indicates there is no Granger causality between the two time series.

Johansen cointegration test

A statistical procedure called the Johansen cointegration test is used to determine if a set of time series data is cointegrated. Cointegration is a property of non-stationary time series that shows a long-term relationship between the series, even though each series may be non-stationary on its own. The Vector Autoregressive (VAR) model is what the Johansen cointegration test is based on. It was made by Sren Johansen. For the test, the time series data are used to estimate a VAR model, and then the rank of the matrix of coefficients is checked. The number of cointegrating vectors in the data is determined by the rank of the matrix. The Johansen cointegration test can be used to look at economic data, such as the relationship between exchange rates, interest rates, and inflation rates. It is often used for analyzing time series and is built into statistical software like EViews. Other cointegration tests, like the Engle-Granger test proposed by Engle and Granger (1987), isn't as good as this one because it can test for multiple cointegrating relationships at once, while the Engle-Granger test can only test for one. The Johansen test also lets you test the significance of the cointegrating vectors, which can be used to figure out the direction and strength of the relationship between the time series.

5. Data

The data set used yearly information about the logarithm of million's total value and total usable arable land in three south Asian countries Bangladesh, India, and Pakistan from 1961 to 2020 total of 60 years it was compiled from a FAOSTAT accessed on 15th December 2022

Table 1: Descriptive the statistics value of arable land use in Bangladesh, India, and Pakistan

	lvalueB	lvalueI	lvalueP
Mean	4.482898	4.489408	4.440928
Median	4.507943	4.492673	4.438643
Maximum	4.516120	4.505460	4.457018
Minimum	4.391977	4.463376	4.423528
Std. Dev.	0.041424	0.013245	0.009147
Skewness	-1.048705	-0.758561	-0.033083
Kurtosis	2.548881	2.203395	1.986779

Jarque-Bera	11.50660	7.340602	2.577487
Probability	0.003172	0.025469	0.275617
Sum	268.9739	269.3645	266.4557
Sum Sq. Dev.	0.101242	0.010350	0.004937
Observations	60	60	60

Notes: Here the *IvalueB* denotes the value of the use of arable land in Bangladesh, *IvalueI* denotes the value of the use of arable land in India and *IvalueP* denotes the value of the use of arable land in Pakistan.

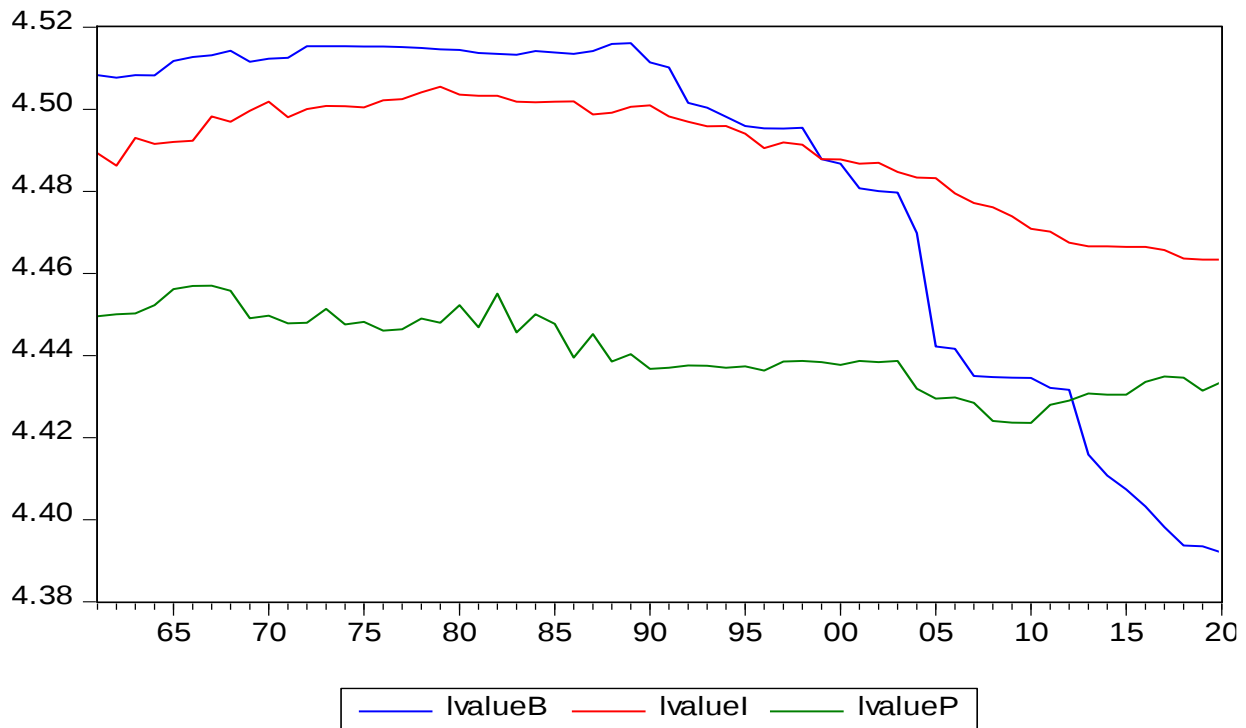


Fig. 1: Total value of using arable in log value Bangladesh, India and Pakistan.

Notes: In this graph yearly observations from 1961 to 2020 are presented along the horizontal axis and the unit of using arable land in three south Asian countries is presented along the vertical axis

From the Figure 1, we see that the vertical line between India and Pakistan is almost stable but Bangladesh has been stable from 1961 to 1990 but after that, it has been continuously declining. From 1990 to 2020, less arable land will be used because of a number of major factors. Some of these reasons are: Deforestation is when forests are cut down for lumber, farming, or other reasons. This can lead to the loss of arable land and the ruin of ecosystems and wildlife habitats. Industrialization, Pollution from factories can ruin farmland, rendering it unusable for farming. Changes in how land is used, including moving from agricultural to industrial or residential usage, can cause arable land to be lost. Population growth, as the number of people on Earth rises, there is a greater need for food and other agricultural products. This puts stress on land that can be used to grow food, which can lead to overuse and land degradation.

6. Empirical Result and Discussion

Unit Root Tests

Table 2: Unit root tests of variables at first difference:

Variables	Test	Level (P-value)	First difference (P-value)	Details
lalb	ADF	1.0000	0.0000	SIC, Int
lalb	ADF	0.9337	0.0000	SIC, Int, Tr
lalb	PP	1.0000	0.0000	NW,B, Int
lalb	PP	0.9325	0.0000	SIC, Int, Tr
lalb	KPSS	0.0000	0.0021	NW,B, Int
lalb	KPSS	0.0000	0.1988	SIC, Int, Tr
lali	ADF	0.9975	0.0000	SIC, Int
lali	ADF	0.5377	0.0000	SIC, Int, Tr
lali	PP	0.9962	0.0000	SIC, Int
lali	PP	0.3934	0.0000	SIC, Int, Tr
lali	KPSS	0.0000	0.0992	NW,B, Int
lali	KPSS	0.0000	0.0633	SIC, Int, Tr
lalp	ADF	0.7765	0.0000	SIC, Int
lalp	ADF	0.0964	0.0000	SIC, Int, Tr
lalp	PP	0.6609	0.0000	SIC, Int
lalp	PP	0.0586	0.0000	SIC, Int, Tr
lalp	KPSS	0.0000	0.5279	NW, B, Int
lalp	KPSS	0.0000	0.7003	SIC, Int, Tr

Note: Here, lalb denotes the value of the use of arable land in Bangladesh, lali denotes the value of the use of arable land in India and lalp denotes the value of the use of arable land in Pakistan. Here, SIC is Schwartz Information, Int means Intercept, Tr denotes liner trend NW is Newey-West band with choice, B is Bartlett kernel and p is p-values.

Stationary Test (arable land in Bangladesh):

We need stationary data for this study, for stationary data applied three unit root tests, there is Augmented Dickey-Fuller (ADF) test created by Dickey and Fuller (1981), Phillips-Perron (PP) test created by Phillips and Perron (1988), and Kwiatkowski-Phillips-Schmidt-Shin test improved by Denis Kwiatkowski, Peter C. B. Phillips, Peter Schmidt and Yongcheol Shin (1992). Table 2 shows the three-unit root tests of arable land in Bangladesh. P value is less than 5 Percent in stationary data. Both (ADF and PP) at the first difference in intercept and trend intercept arable land data are stationary. But on the other side, we observe the difference in KPSS (Kwiatkowski-Phillips-Schmidt-Shin), where the trend intercept and intercept are applied and the extended value of both markets is not stationary at that level.

Stationary Test (arable land in India):

In the natural log of arable land in India data we applied the ADF and PP unit root tests. Stationary data is time series data which means the data doesn't change in time. In the level data p-value is more than 5 percent. Level data are more than five percent so the first difference we accepted. P value is considered less than 5 Percent for

stationary data. The arable land in India is the stationary data. But on the other side, KPSS Intercept and trend intercept accept the data of null hypothesis are non-stationary

Stationary Test (arable land in Pakistan):

In the Null hypothesis, a unit root exists. We need an alternative hypothesis. We reject the null hypothesis in case the p-value is less than 5 Percent. Arable land in Pakistan data methods is applied ADF (Augmented Dickey-Fuller), PP (Phillips-Perron). Intercept and trend intercept rejects the null hypothesis that data are stationary. Under the KPSS (Kwiatkowski-Phillips-Schmidt-Shin) model, the result is more than 5 Percent so the Intercept and trend intercept is also not stationary at their level.

Johansen cointegration test

Table 3: Johansen cointegration estimation results of variables:

Number of cointegration	Eigenvalue	Trace	5 Percent Critical value	Probability
None *	0.450940	49.87194	29.79707	0.0001
At most 1	0.228893	15.09818	15.49471	0.0573
At most 2	0.000385	0.022315	3.841465	0.8812

Note: One or more cointegration equation(s) are present at the 0.05 level according to the Mackinnon-Hang-Michelis (1999) p-values for the trace test; the symbol * indicates that the hypothesis is rejected at this level.

Table 4: Maximum Eigenvalue Rank Test:

Number of cointegration	Eigenvalue	Trace	5 Percent Critical value	Probability
None *	0.450940	34.77376	21.13162	0.0004
At most 1 *	0.228893	15.07587	14.26460	0.0371
At most 2	0.000385	0.022315	3.841465	0.8812

Note: Trace test indicates two cointegration eqn(s) at the 0.05 level; *denotes rejection of the hypothesis at the 0.05 level; Mackinnon-Hang-Michelis (1999) p-values.

Tables 3 and 4 first row show the null hypothesis. The null hypothesis stated that the variables do not cointegrate lalb, lali and lalp. The null hypothesis is that at least one cointegration. The null hypothesis is rejected when 0.05 percent level of significance. In Table 3 null hypothesis expresses there is no relationship but the trace value (49.87194) is higher than the critical value (29.79707) and the P value is less than five percent. It alludes to the cointegration and long-term relationships that exist. Table 4 null hypothesis is at least one cointegration, trace value (34.77376) is higher than the crucial factor (21.13162) and P value is less than 0.05 percent means that variables has long run relationship. In Rank Test (trace) Table 3 has three cointegration and Rank Test (Maximum Eigenvalue) has two cointegration. The basis of the Johansen cointegration test assumes that if they're at least one cointegration exists meaning that there is a long-term connection between the variables. So, it can be said that the arable land of Bangladesh, India and Pakistan has a long-run relationship.

Granger causality test

Table 5: The variables' Granger causality test results:

Dependent variable	Independent variable	Probability
lali	lalb —	1.37479 (0.26)
lalb	lali ←	8.20587 (0.00)

lalp	<i>lalb</i>	—	1.83894 (0.17)
lalb	<i>lalp</i>	—	0.58102 (0.56)
lalp	<i>lali</i>	←	17.2658 (0.00)
lali	<i>lalp</i>	—	1.13553 (0.33)

Note: *lalb*, *lali* and *lalp* indicate the natural log sum of the value of arable land in Bangladesh, the natural log total value of arable land in India, and the natural log value of all arable land in Pakistan. Here p-value are in parenthesis.

The granger causality results from the first row of the above Table 5 show that the relationship is not influenced between the arable land in India and the arable land in Bangladesh and the p-value is 0.26, which above the threshold of 0.05. In other words, it means that at a 5% level of significance, the null hypothesis of causality between *lali* and *lalb* is accepted.

From the second row the relationship between arable land in Bangladesh and arable land in India and the p-value is 0.00 indicating that both influence each other and reject the null hypothesis at the level of 0.05 significance. The third row of the Table shows the relationship between the arable land in Pakistan and the arable land in Bangladesh and the p-value is 0.17 which is more than the critical value. So, it represents that the null hypothesis of causality between *lalp* and *lalb* is accepted at a 5 Percent level of significance. In the fourth row, the arable land in Bangladesh and the arable land in Pakistan and the p-value is 0.56. So, it represents that a 5% level of significance, the null hypothesis of causality between *lalb* and *lalp* is accepted. From the fifth row, the relationship between the arable land in Pakistan and the arable land in India and the p-value is 0.00 which indicates that both influence each other and reject the null hypothesis at the level of 0.05 significance. In the sixth row, the relationship is not influenced between the arable land in India and the arable land in Pakistan and the p-value is 0.33, exceeding the threshold of 0.05. In other words, it means that at a 5% level of significance, the null hypothesis of causality between *lali* and *lalp* is accepted.

Impulse Response Functions (IRFs):

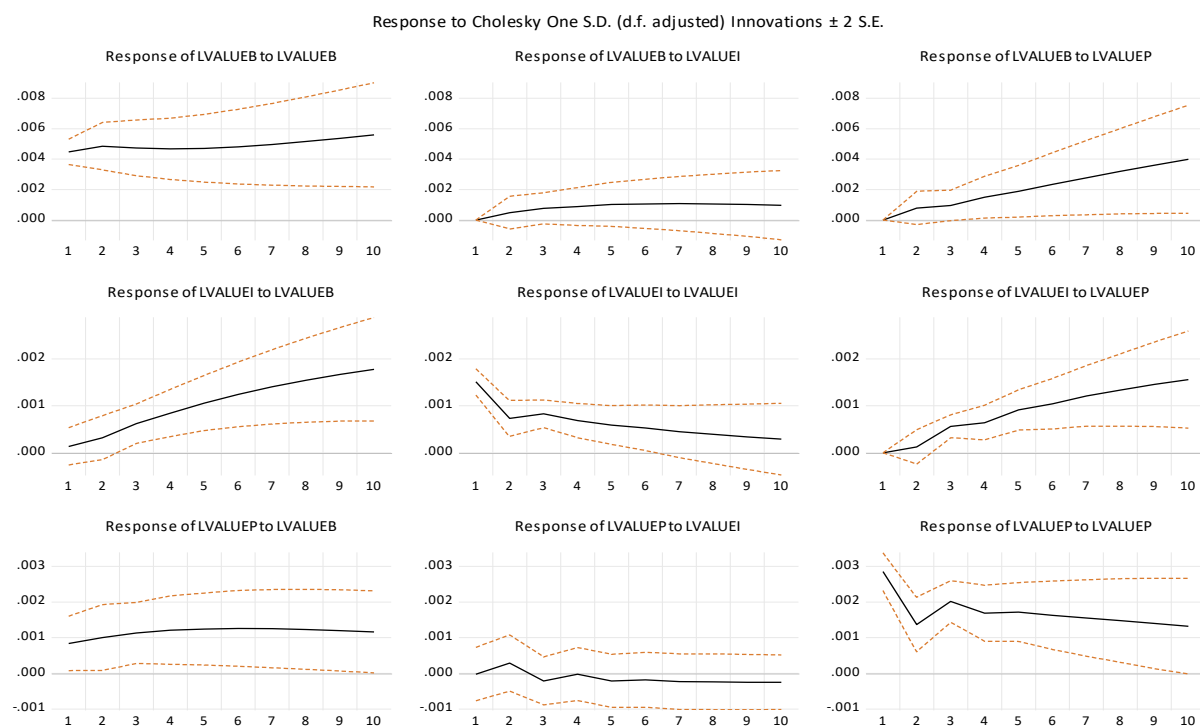


Fig. 2: IRFs comparison of three South Asian countries.

Figure 2's first row displays the impulsive reactions of various variables from a one-unit shock in the use of Arable land in Bangladesh (LVALUEB). This graph demonstrates the favorable impact of a one-unit shock on the utilization of arable land in Bangladesh (LVALUEB) in India (LVALUEI) and the use of Arable land in Pakistan (LVALUEP). The impulse reactions of various variables from a one-unit shock in the use of arable land in India (LVALUEI) are depicted in the first row of figure 2. This graph shows that a one-unit shock the utilization of arable land in India (LVALUEI) positively affects and stable the use of Arable land in Bangladesh (LVALUEB) and the variables' immediate reactions to a one-unit shock in the use of Arable land in Pakistan (LVALUEP) first one to two years it's increasing then two to three years it's stable and three to ten years it should be continuously increasing. In the 2nd row represent the variables' immediate reactions from a one-unit shock in the use of arable land in India (LVALUEI). It is clear from the graph that a shock in a one-unit in the use of arable land in India (LVALUEI) positively affects the use of arable land in Bangladesh (LVALUEB) and the use of arable land in Pakistan (LVALUEP), while it negatively affects the use of arable land in India (LVALUEI) itself. Additionally, this graph demonstrates that within a year of all the variables, the highest responses occur from ten years it should be continuously increasing. In Figure 2 the third row represent the impulse responses of the variables to a one-unit shock in the use of arable land in Pakistan (LVALUEP). According to the graph, a one-unit shock in the use of arable land in Pakistan (LVALUEP) positively affects the use of arable land in Bangladesh (LVALUEB) but negatively affects the utilization of arable land in India (LVALUEI). According to the graph, a one-unit shock in the use of arable land in India (LVALUEI) initially positively affects but after two years it affects negatively in two to three years. Three to four years it should be increasing but after four years it should be stable in negative shock. The other graph of Pakistan shows that in one to two years it's decreasing and in two to three years it should be again increasing but after three years it should be stable in a negative shock.

7. Conclusions:

The goal of this study was to find out how much land in those three south Asian countries could actually be used (Bangladesh, India and Pakistan). The primary goal of this study was the total amount of farmable land in those countries at the time. It tried to figure out the relationships by using stationary tests (KPSS, ADF, and PP), the Granger causality test, and the Johansen cointegration test. After looking at how Bangladesh, India, and Pakistan use their arable land with the EViews software, a few important conclusions were made. During the time period that was looked at, the use of arable land went up in all three countries, but at different rates in each country. India's rate of growth was the highest, and Pakistan's was the next highest. Bangladesh grew at the slowest rate. The study showed that the use of arable land was linked to population growth in all three countries. As the population grows, there is a greater need for food, so more farmable land is used. The study also found that Bangladesh has the lowest cropping intensity of the three countries. Cropping intensity is the number of crops grown on the same land in a year. The analysis also shows that none of the three countries have enough kinds of crops. Most of the farmland in Bangladesh is used to grow rice. The main crops in India and Pakistan are wheat and rice. Monocropping is not a good long-term strategy because it can hurt the soil, use up nutrients, and make crops less productive. The econometric analysis done in EViews tells us more about how different economic and demographic factors affect how arable land is used. The analysis shows that GDP, population growth, and urbanization are all very good for how arable land is used in all three countries. This means that economic growth and population growth are likely to lead to more growth of arable land in the future.

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