IMPACT OF MAJOR PUBLIC POLICIES ON COTTON PRODUCTION IN PAKISTAN

Irfan Ahmed Baig, Sami Ullah, Shoaib Nasir &

Wakeel Ur Rehman

(CGP #02-011)

2ND RASTA CONFERENCE

Wednesday 1st & Thursday 2nd June 2022

Marriott Hotel, Islamabad

This document is unedited author's version submitted to RASTA.

RESEARCH FOR SOCIAL TRANSFORMATION & ADVANCEMENT

Pakistan Institute of Development Economics

Islamabad

ABSTRACT

Pakistan having an agro-based economy with agriculture contributing around 19.2 % in the GDP and almost 39% in employment. While the share of major crops is around 4.32% to the GDP. Cotton is one of the major crop and has immense importance in generating employment and foreign exchange earnings. However, during last two decades' cotton production in the country is under decline. Current study is focused to identify financial, and economic benefits/ profitability and costs associated with the production of cotton and its competitive crops in cotton-wheat zone. And also to investigate the impact of various factors that affect farmers' crop choices. For the purpose, data is collected from 831 farmers of three provinces (Punjab, Sindh and Balochistan) of Pakistan. Policy Analysis Matrix is employed to evaluate the impact of set of agricultural policies on cotton production. We have observed that cotton producers across Pakistan are not protected, while sugarcane and rice producers are protected under current set of policies. However, cotton has strong backward linkages and it generates more income of rural labour as compared to other major crops.

TABLE OF CONTENT

LIST OF TABLES

INTRODUCTION

1.1 Background and Context of the Study

Agricultural sector is protected and supported by state institutions in the world through various policies to make it more productive and competitive so as to ensure food security for masses, livelihoods for farming entities and meet the requirements of agro-based industries (GOP, 2019). These policies broadly deal with farm input and output prices, trade facilitation / restrictions, mechanization of cropping systems, and investment in rural & agricultural infrastructure like water channels and R&D. Government interventions have resulted in various benefits for specific crops and whereas have also created social and economic externalities. Pakistan has also adopted several policy measures to cater the needs of farming communities in changing global scenario. These policies are sometimes crop specific but most of the times focus to increase total crop productivity.

Pakistan having an agro-based economy with agriculture contributing around 19.2 % in the GDP and almost 39% in employment (GOP, 2019). Share of major crops in GDP is nearly 4.32 percent of which cotton accounts for 0.6 % to GDP and 3.1 % of total value addition in agriculture (GOP, 2021b). However, cotton has the longest value chain among all crops with major contribution in Pakistan's foreign exchange earnings. Pakistan exports $836 million (4.7%) worth of raw cotton and yarn while cotton based products exports are $9.5 billion making more than half of the total exports of the country (GOP, 2020). Though cotton is considered as the main cash crop in the country with its strong backward and forward linkages, yet past couple of decades have observed a dismal cotton performance on many instances whereas last five years can be considered as devastating in-terms of cotton area, production, and profitability. Table 1 below reflects the reduction in cotton area in Punjab (which contributes around 70% of the total cotton acreage) but also the cotton production and yield which has gone down drastically.

Table 3: Major crops area in Cotton-Wheat Zone of Punjab

Year	Area (000 hectares)			
	Sugarcane	Rice	Maize	Cotton
2013-14	293.4	225.4	78.9	1840.88
2014-15	282.88	277.61	75.9	1930.29
2015-16	293	279.23	80.8	1864.74
2016-17	338.72	295.83	158.6	1554.36
2017-18	395.37	294.2	140.4	1791.53
2018-19	338.9	313.61	204.1	1686.3
2019-20	309.8	380.4	146.2	1699.16

Source: Economic Survey of Pakistan (Various Years).

The case of area replacement of cotton crop with its competitive Kharif crops i.e. Sugarcane, Maize and Rice primarily, has many interesting insights from policy perspective as well. There are diverging opinions at the policy level whether the downfall of the cotton crop is due to the adverse climatic conditions, development of pest pressure in cotton growing areas or prevalence of diseases in main cotton belt thus growing cotton and ensuring profitability has become very difficult. Though several causes of low cotton production have been reported in literature including increasing cost of production, climatic changes, pest attacks, poor seed quality, adulterated inputs, conventional farming practices (Aslam, 2016; Khan & Damalas, 2015; Zulfiqar & Thapa, 2018). There are several other reports / studies which have also indicated several policy divergences which have significant impact on the decision of the farmers to grow a specific summer (kharif) crop in specific context of Pakistan. These policies include certain incentives for the competitive crops including ensuring a consistent supply chain with the support to the private business forms to procure from the farmers, indicative / support price, subsidizing the input(s) etc. (GOP, 2019, 2018; UNDP & GOP, 2021).

A significant number of stakeholders do believe that there is a gradual drift of policy initiatives away from the cotton while supporting the competitive crops has actually resulted in developing less conducive environment and aggravating multiple stresses (both biotic and a biotic) including the reliance on out dated seed technology, meagre investments in agriculture especially for cotton (which is protected in major growing countries of the world), old chemistry for IPM, volatile farm prices, primitive ginning technology, less favourable terms of trade for cotton in comparison of its competitor crops like sugarcane, rice and maize etc. Table 2 below gives global comparison for cotton support policies among producing countries:

Table 4: Support to Cotton Sector among Major Cotton Producing Countries

Country	Cotton Subsidies* (% of Value of prod)	Assistance to growers	MSP	Seed Technology
China	33%	$4.7 billion	No MSP	Fusedg Cry1Ab Cry1Ac Stacked CpTi (1999)
India	About 10%	$600 million**	Up to 150 % of Co	Bollgard-II (2006)
USA	Nearly 9 %	$2 billion	No MSP	Bollgard-III (2017)
Pakistan	1% **	-	No MSP	Bollgard-I (2010)

Source: ICAC (2020).
** No direct assistance, most subsides are provided in terms of Minimum Support Price.

Keeping in view the importance of cotton crop and challenges being faced a holistic analysis of impact of set of policies on competitiveness and efficiency of cotton (w.r.t its competitive crops) is need of time to strengthen the rural communities and ensure raw material for the largest export-oriented sector (textile) of Pakistan. The economic practicality, competitiveness of production systems, technology adaptation, cost of farm inputs, productivity of cropping practices, degree of product differentiation, share in the market, market distortions and government interventions in economic activity are various factors those are reported in the literature (Kennedy et al., 1998; Pahle et al., 2016; Williams, 2010). However, to evaluate the impact of agricultural policies on crops, Policy Analysis Matrix (PAM) is used. To evaluate the impact of crop production patterns on the economy, input output analysis will be carried out. While Linear Probability Model (LPM) will be used to evaluate the various factors those affect cropping decisions.

1.2 Purpose and Scope of the Study

The objectives of the study are:

- To synthesise the major trends in the production (area and yield) of the cotton and competitive crops.
- To identify financial, and economic benefits/ profitability and costs associated with the production of cotton and its competitive crops in cotton-wheat zone.
- To evaluate the impact of production of cotton and its competitive crops on the economy.
- To evaluate the impact of major public policies related to the agriculture sector on the competitiveness of cotton and competitive kharif crops, comparative advantage / profitability for farmers and willingness to adapt new technology in cotton.
- To investigate the impact of various factors that affect farmers' crop choices.

Moreover, it will assist policymakers in addressing the challenges to cotton production by designing policies based on empirical findings. This study is limited to five districts (2 from Punjab (one from each cotton growing zone i.e. Bahawalpur and D.G. Khan), 2 from Sindh (One from each Cotton growing zone)

and Baluchistan (1 district) provinces of Pakistan. Moreover, 4 FGDs will also be conducted to with Stakeholders (including Sindh Agriculture Dept., Academia, Researchers, and Industry etc.).

1.3 Relevance to Public Policy

Public policies are often designed by the Government to drive the economies / societies in the direction to obtain desirable impacts. However, it is also quite interesting to evaluate that whether the policy instruments have worked in desired direction or have created undesired externalities. The case of the cotton failure in Pakistan often refers to the outcome of the misspelled public policy instruments. Governments have started shaking the balance in cotton-wheat zone by providing certain incentives to the competitor crops especially sugar industry particularly through massive licensing in the cotton zone. Moreover, the policy failures on the front of acquisition of the new technology for cotton breeding and not declaring / fixing indicative pricing has also contributed to overall decline in the cotton area and production. Therefore, the theme of this study is to evaluate the impact of agricultural policies on farm level profitability of cotton and its competitor crops, their impacts on the economy and the determinants of farming decisions while choosing alternative kharif crops.

REVIEW OF LITERATURE

Dwindling cotton sector performance in last many of years has actually started an unrest among farming community and relevant governmental organizations especially in Punjab to work out any doable recipes to cure the situation. A couple of good policy reports have also been worked over like (GOP, 2021) where national land international experts compiled the review of the prevailing condition in cotton, gauged the institutional strengths and weaknesses and evaluated the policies related to the cotton and cotton industry and framed a set of recommendations for the policy makers to being a structural change on cotton production canvas. However, all these recent endeavours coupled with few international studies like ICAC's Cotton Vision 2030 (ICAC, 2020) has undermined to correlate the impact of policy variables in shaping farmer decisions to invest in the cotton crop being rational producer.

Policy Analysis Matrix (PAM) is a Computational Frame Work developed by Monke & Scott R., (1989) for measuring the input use efficiency in production, the degree of government Interventions and comparative advantage. Many studies in the past have utilized PAM to evaluate the policy effects (Anwar et al., 2005; Kannapiran & Fleming, 1999; Mohanty et al., 2003; Najafi, 2005). Nelson & Panggabean (2011) investigated the efficiency of both agricultural price policies and public interventions on sugar industry in Indonesia. They found that the consumers incurred losses because domestic prices were set higher than world prices even substantial government and consumer transfers to producer's, sugarcane cultivation declined in Jawa. Salam (2012) and Salam & Tufail (2016) reviewed the effect of policies on cotton and rice production in Pakistan by employing secondary data from 2010-12. They found that competitiveness of cotton production is sensitive to fluctuations in cotton prices and those of farm inputs. Gürer et al. (2017) studied the impact of agricultural policies on cotton production in Turkey by employing PAM and found that current set of policies doesn't provide satisfactory support to increase the competitiveness of the cotton sector. There is a rich body of literature which highlights the use of discrete choice modelling for evaluating the farmer's decisions in specific context of socio-economic conditions, availability & access to information, available set of policy incentives / disincentives and political support arguments (Caviglia & Kahn, 2001).

Fang & Babcoc (2003) have quantified the impact of China's agricultural and accession to WTO on cotton production and area in the country. China's cotton policy focuses on supply and demand of cotton, prices and textile output. The results suggest that WTO accession would result in increase in cotton imports by 670 thousand metric tons. Suresh et al. (2014) have studied the impact of technology and policy on cotton sector performance in India. They have concluded that better agricultural policies and modern technologies resulted in decrease of input use. Sadiq (2015) have investigated the impact of India's economic policies on cotton production before and after liberalization and concluded that better performance witnessed during liberalization period is mainly attributed to adoption of modern technologies and sound political and economic policies. Macdonald et al. (2016) have concluded that support prices to Chinese's cotton farmers resulted in lower cotton production, which resulted in policy shift: direct subsidies to cotton producers. They have concluded that lower Chinese' import quotas would reduce the world cotton prices. Gürer et al. (2017) have investigated the impact of Turkish agricultural policies on cotton production in the country. By using Policy Analysis Matrix this study has measured policy transfers, resource utilization, and costs, private and social profits and concluded that ongoing agricultural policies have turned cotton production a profitable enterprise, and resulted in giving comparative advantage to Turkey. ELsamie et al., (2020) evaluated the impact of agricultural policies on Egyptian cotton production by using Policy Analysis Matrix. They have concluded that financial performance was less than economic performance of cotton growers. However, Egyptian cotton producers have comparative advantage and earn foreign exchange for the country. Wang et al. (2021) have analysed the impact of targeted price policy on cotton production in China. The studies show that implementation of targeted price subsidies have stimulated cotton production by increasing the area, but yield has decreased over the period of time. They suggested that policies should focus on

comparative advantages between different crops. Body of literature has also considerable set of evidence which reflect that different cotton diseases and pests flourish in humid environment while application of excessive water to the crop may also lead to the excessive vegetative growth thus hindering in crop protection operations and rotting of lower fruit. Based on the above studies, it can be inferred that agricultural policies play a major role in crop competitiveness, profitability and efficiency. This study is aimed to investigate the impact of major agricultural policies on cotton and its competitive crops, and also impact of production of these crops on overall economy.

METHODOLOGY

The primary data is collected through multistage stratified sampling technique from 831 farmers through well-structured questionnaires from cotton farmers in Punjab, Sindh and Balochistan provinces. In Punjab, data was collected on cotton and its competing crops from four tehsils, two from each district, Bahawalnagar and Muzaffargarh (To represent 2 divisions of newly defined AEZs which are suited for cotton production (FAO, 2019)). While from Sindh - two tehsils of Mirpur Khas and one tehsil of Sukkar districts and Sibi district from Balochistan. Though sample size is distributed generally on the basis of share of provinces/ areas in the total production, however, in this study, respondents from Balochistan are included to investigate the policy impacts in new areas (and potential areas) of cotton production. The data is collected from 411 respondents from Punjab, 297 and 55 respondents from Sindh and Balochistan respectively. This study will also utilize secondary data for policy analysis which be collected from various published sources. Likewise, four focused group discussions (FDGs) will be conducted with other stakeholders of the cotton value chain including academia, researchers, pesticides and seed companies, and members of textile industries to better interpret the results and generate implementable policy recommendations.

1. Data analysis is being carried out after the initial tabular presentation of the data, to achieve the objectives of the study as under:
2. Policy Analysis Matrix will be used to analyse the competitiveness of the local cotton production in comparison with the international cotton using a mix of primary and secondary data.
3. Input-output analysis of the cotton crop with other sectors of the economy will be performed to analyse the contribution of the cotton in other sectors of the economy (especially affecting rural economy) while efforts will be made to compare these estimates with other Kharif crops depending on data availability.
4. Input use efficiency (especially the water use efficiency) will be estimated across the crops so that sustainable use of resources and climate smart aspect of these crops can be determined.
5. Linear probability models will be employed to investigate the determinants of change in cropping patterns.

3.1 Data Collection

A detailed questionnaire was developed by keeping in view research objectives and pre-testing was carried out in Kot Addu Tehsil of District Muzzafargarh. After corrections and modifications, questionnaire was digitized on Kobocollect (https://www.kobotoolbox.org/) android application. Services of consultant for digitization of the questionnaire, setting up the data server and imparting training to the data collection teams were hired and three sessions of the trainings were conducted.

To collect data, we selected three teams to serve in each province. To overcome the linguistic barriers and to bridge the communication gaps, team members were belonging to respective provinces were involved to ensure smooth collection of data by reducing cultural barriers. Similarly, to ensure quality of data, teams were given training on survey techniques, and data collection methods.

DESCRIPTIVE ANALYSIS

We have collected the data from 831 farmers of three provinces and five districts of Pakistan (table 3)

Table 3: Province/ District/ Tehsil Wise Data Collection (n=831)

Punjab				Sindh		Balochistan	
Muzzafargarh		Bahawalnagar		Mirpur Khas		Sukkar	Sibi
Kot Addu	Ali Pur	Chistain	Haroonabad	Kot Ghulam Mohammad	Digri	Rohri	Kurak
122	125	105	99	115	115	95	55

Table 4 describes the socioeconomic characteristic of farmers. It shows that average education, age, farming experience, cotton cultivation experience is 5.42, 42.6, 23.5, and 22 years respectively in the study area. While the average distance from metaled road is 2.58 kilometers.

Table 4: Socioeconomic Indicators of Cotton Producers

Variables	Mean	Median	St. Dev.	Min.	Max.
Education (years)	5.42	5	5.01	0	18
Age (years)	42.62	40	13.24	18	80
Farming experience (years)	23.55	20	13.12	2	60
Cotton cultivation experience (years)	22.01	20	13.13	2	60
Distance to agricultural market (km)	11.78	10	7.66	0	35
Distance to city (km)	11.89	10	7.58	1	35
Distance to metaled road (km)	2.58	2	2.32	0	15

We have observed that 20.8% of the farmers are registered with agriculture department, and 35.5% of the farmers receive message from agriculture department through SMS. Only 14.4% of farmers have received training regarding agricultural practices and 30% of farmers have access to loan (Table 5).

Table 5: Extension Services / Access Statistics

Services / Access	Yes	No
Registered	173 (20.8%)	658 (79.2%)
Kissan Card	85 (10.6%)	718 (89.4%)
Subsidy	88 (10.6%)	743 (89.4%)
Subsidy on Machinery	13 (1.6%)	818 (98.4%)
SMS	295 (35.5%)	536 (64.5%)
Access to weather information	383 (46%)	448 (54%)
Training on cultivation practices	120 (14.4%)	711 (85.6%)
Training on cotton cultivation	87 (11.3%)	681 (88.7%)
Access to Loan Facilities	233 (30.3%)	530 (69.7%)

Table 6 describes the farmers' response towards various policy interventions. It has been observed that availability of water, low cost energy, and pest/ insect resistant varieties are important factors to enhance cotton area under cultivation.

Table 6: Farmers' Responses to Various Policy Intervention in Cotton Sector

Policy Intervention	Mean	Median	Standard Deviation	Minimum	Maximum
If Govt. Subsidize 10% of the Cost	4.67	2	8.11	0	100
If Govt. Subsidize fertilizer	4.22	2	7.1	0	100
If Govt. Subsidize diesel and electricity	4.68	2	16	0	400
If Govt. Subsidize pesticides/ insecticides/ weedicides	4.09	2	7.17	0	100
If pest and insect resistant varieties are introduced	4.42	2	7.28	0	100
If water availability is Enhanced	4.81	3	6.79	0	80
If training and extension services are properly provided	4.13	2	7.13	0	100
If crop insurance is Introduced	4.34	2	7.79	0	100

We have observed that access to water and extension services are major issues reported in cotton production. While high prices of fertilizers, seed and energy are other important factors in producing cotton. Similarly, quality of seed and pesticides are causing hindrances in cotton production.

Table 7 Farmers' Perception about Issues in Cotton Production

Factors		Major Issue	Minor Issue	No Issue	No Response
Access to	Water	483	150	128	70
	Seed	305	251	206	69
	Fertilizer	258	305	193	75
	Pesticides	304	256	188	83
	Electricity	117	305	337	72
	Diesel	294	229	232	76
	Machinery	274	216	266	75
	Labour	112	232	417	70
	Market	281	233	242	75
	Extension	364	295	83	89
	Weather Info	195	291	252	93
High price of	Water	414	210	115	92
	Seed	599	127	15	90
	Fertilizer	614	120	5	92
	Pesticide	592	137	6	96
	Electricity	233	258	246	94
	Diesel	558	144	34	95
	Machinery	398	170	165	98
	Labour	200	230	302	99
Quality issue of	Seed	501	182	55	93
	Fertilizers	381	206	149	95
	Pesticide	547	169	21	94
	Machinery	136	272	331	92

Average area, production and yield of the cotton, sugarcane, rice and maize farmers are reported in the table 8. It shows that in study area average area of cotton and sugarcane is almost same.

Table 8: Area, Yield and Revenue of Crops

Variables	Cotton	Sugarcane	Rice	Maize
Avg. Area (acres)	6.49	6.5	3.22	2.66
Avg. Yield (Mounds)	19.2	994	53	81
Avg. Price of output (Rs./40kg)	5887	277	1583	1500
Avg. Cost of Production (without land rent)	43933	136498	52563.58	65673
Avg. Revenue	112830	276220	115751.5	117000
Avg. Profit	68897	139721	63187.96	51326

RESULTS

To find out the backward and forward linkages of the major crops, we have employed the techniques given in the table 9-12. We have estimated that cotton generates Rs. 40175/ha in terms of labour income and in total it injects Rs 100 billion rupees into rural economy. While Rice produces Rs. 37209/ha of labour income and it adds Rs. 113 billion to rural economy. Sugarcane generates Rs 57100/ha in terms of labour income and it injects Rs 416 billion into rural economy. Cotton is the crop that adds more to the rural economy in terms of per hectare of labour income generated (Table 9 - Table 12).

Table 9. Income Generated by Rural Labour Engagement in Cotton Production Practices

NC	Activity	(1) Labour employed (Man days/ha @550/ day)	(2)=(1)*550 Labour charge (Rs./ha)	(3)=(1)*(2.51 M ha) Labour mar days (Million)	(4)=(2)*(2.51 M ha) Income to labour (Rs. Billio
1	Planting	8	3600	20.1	9.036
2	Weeding	10	4500	25.1	11.295
3	Spraying	6 sprays by 15 man day	6750	37.65	16.943
4	Picking	50 pickers @Rs.480/40 kg/p	25325*	125.5	63.566
Additional Total		40175	208.35		100.84

*Calculate as (Rs. 480*52.76 md/ha) yield of seed cotton
(Author's calculation based on Govt. of Punjab, 2020)

Table 10. Income Generated by Rural Labour Engagement in Rice Production Practices

NO	Activity	(1) Labour employed (Man days/ha @550/ day)	(2)=(1)*550 Labour charges (Rs./ha)	(3)=(1)*(3.04 M ha) Labour man days (Millior	(4)=(2)*(3.04 M Income to labour Billion)
1	Planting	12	6600	36.48	20.064
2	Weeding	4	2200	12.16	6.688
3	Spraying	4 sprays by 10-man day	5500	30.4	16.72
4	Harvesting	21 man days @Rs.550/hec	22909*	63.84	69.645
Additional Total			37209	142.88	113.117

*Calculate as (Rs. 280 *81.82 md/ha) yield of rice
(Author's calculation based on Govt. of Punjab, 2020)

Table 11. Income Generated by Rural Labour Engagement in Maize Production Practices

NO.	Activity	(1) Labour employed (Man days/ha @550 /day)	(2)=(1)*550 Labour charge (Rs./ha)	(3)=(1)*(1.40 M ha) Labour man days (Million)	(4)=(2)*(1.40 M ha) Income to labou (Rs. Billion)
1	Planting	8	4400	11.2	6.160
2	Weeding	2.47	1359	3.5	1.902
3	Spraying	4 sprays by 9-man day	4950	13	6.930
4	Harvestin	21 man days @Rs.550/he	14820*	29.4	20.748
Additional Total			25529	57.1	35.74

*Calculate as (Rs. 100 *148.2 md/ha) yield of maize
(Author's calculation based on Govt. of Punjab, 2020)

Table 12. Income Generated by Rural Labour Engagement in Sugarcane Production Practices

NO.	Activity	(1) Labour employed (Man days/ha @550/ day)	(2)=(1)*550 Labour charges (Rs./ha)	(3)=(1)* (6.01 M ha) Labour man days (Million)	(4)=(2)*(6.01 M ha) Income to labour (Rs. Billion)
1	Planting	16	8800	96.16	52.89
2	Weeding	2.47	1359	14.85	81.68
3	Spraying	4 sprays by 9-man day	4950	54.09	29.75
4	Harvesting	21 man days @Rs.550/he	41990*	126.21	252.36
	Additional Total		57099	291.31	416.68

*Calculate as (Rs. 25 *1679.6 md/ha) yield of sugarcane
(Author's calculation based on Govt. of Punjab, 2020)

5.1 Competitiveness and Economic Efficiency Indicators of Cotton, Sugarcane, Rice and Maize under Export Parity Prices

Policy Analysis Matrix provides some important indicators to analyse the competitiveness and efficiency of the economic systems which describes the degree of protection or (implicit) taxation resulting from country's overall policies towards the agriculture sector. These policies affect the input and output markets and trade of the sector. Some selected indicators are measured in this research.

The nominal protection coefficient (NPC) represents the unit domestic price (DP) and the foreign price ratio (PP), with both prices expressed in national currency. The value of NPC greater than 1 shows that policies regarding crop under consideration protect the farmers (implicit subsidy), vice versa. Table represents the NPC of 1.01, 1.41 and 1.05 for cotton, sugarcane and rice respectively. Which shows that cotton crop is least protected under the existing set of policies while sugarcane is highly protected crop. While level of protection of cotton among provinces is same. However, sugarcane is more protected is Sindh as compared to Punjab. While rice is equally protected in Punjab and Sindh.

The effective protection coefficient (EPC) is the measure of private value added (PVA) compared to the social or economic value added. If the value of EPC is greater than one, it shows that the producers generate a value added higher than under the optimal situation. Due to protection farmers are economically efficient while the less than one shows that producers are implicitly taxed. Table 13 shows that cotton producers across Pakistan are not protected, while sugarcane and rice producers are protected under current set of policies.

The domestic resources cost (DRC) is the indicator of opportunity cost of the domestic resources and the social value added per unit of crop. Country has comparative advantage in the product under consideration if the value of DRC is lower than one, vice versa. Pakistan has comparative advantage in producing all the crops as the country has required resources for the farming with DRC of 0.47, 0.30 and 0.34 for cotton, sugarcane and rice respectively. In this scenario, sugarcane has less DRC which means it consumes PKR 0.3 of domestic resources to produce output worth about PKR 1. While we have observed DRC of 0.47, 0.75, 0.30 and 0.26 for Pakistan, Punjab, Sindh and Balochistan respectively. Which shows that Balochistan has more comparative advantage in producing cotton crop while Punjab has less comparative advantage.

Table 13: PAM Indicators of Cotton, Sugarcane, Rice and Maize under Export Parity Prices

Economic Efficiency	Region	Cotton	Sugarcane	Rice	Maize
NPC	Pakistan	1.01	1.41	1.05	-
	Punjab	1.01	1.36	1.05	1.04
	Sindh	1.01	1.49	1.05	-
	Balochistan	1	-	-	-
EPC	Pakistan	0.94	1.55	0.98	-
	Punjab	0.89	1.45	1.17	0.96
	Sindh	0.97	1.57	1.07	-
	Balochistan	0.96	-	-	-
DRC	Pakistan	0.47	0.3	0.34	-
	Punjab	0.75	0.36	0.69	0.33
	Sindh	0.3	0.17	0.39	-
	Balochistan	0.26	-	-	-
Cost of DR to earn/save Forex	Pakistan	80.5	52	57.9	-
	Punjab	126.7	64	117.1	56
	Sindh	51.6	30	66.7	-
	Balochistan	44.5	-	-	-

BIBLIOGRAPHY

Anwar, T., Qureshi, S. K., & Ali, H. (2005). Landlessness and Rural Poverty in Pakistan. The Pakistan Development Review Part II, 43(4), 855–874.

Aslam, M. (2016). Agricultural Productivity Current Scenario, Constraints and Future Prospects in Pakistan. Sarhad Journal of Agriculture, 32(4), 289–303. https://doi.org/10.17582/journal.sja/2016.32.4.289.303

Caviglia, J. L., & Kahn, J. R. (2001). Diffusion of Sustainable Agriculture in the Brazilian Tropical Rain Forest: A Discrete Choice Analysis*. Economic Development and Cultural Change, 49(2), 311–333. https://doi.org/10.1086/452504

ELsamie, M. A., Ali, T., & Eliw, M. (2020). Impact of Agricultural Policies on the Egyptian Cotton Sector Using Policy Analysis Matrix. Asian Journal of Economics, Business and Accounting, May, 50–59. https://doi.org/10.9734/ajeba/2020/v15i130207

Fang, C., & Babcoc, B. A. (2003). China's Cotton Policy and the Impact of China's WTO Accession and Bt Cotton Adoption on the Chinese and U.S. Cotton Sectors. http://www.card.iastate.edu/publications/dbs/pdffiles/03wp322.pdf

GOP. (2019). Pakistan Economic Survey 2018-19. https://www.finance.gov.pk/

GOP. (2020). State of Pakistan's Climate in 2020.

GOP. (2021). Economic Survey of Pakistan 2020-21. https://www.finance.gov.pk/survey/chapters_21/16-Climate change.pdf

GOP, G. of P. (2018). Pakistan Economics Survey-2017-18.

Gürer, B., Türkekul, B., Ören, M. N., Abay, C., & Özalp, B. (2017). The Impact of Turkish Agricultural Policy on Competitiveness of Cotton Production. International Journal of Food and Beverage Manufacturing and Business Models, 2(1), 20–30. https://doi.org/10.4018/ijfbmbm.2017010102

ICAC. (2020). Cotton Vision 2030: Vol. XXXVIII (Issue 4). https://doi.org/https://icac.org/Content/PublicationsPdf%20Files/0af264f4_67ee_47c4_98f2_8df5d02693d4/RECORDER-December-2020-V1.pdf.pdf

Kannapiran, C. A., & Fleming, E. M. (1999). Competitiveness and Comparative Advantage of Tree Crop Smallholdings in Papua New Guinea by Chinna A . Kannapiran and Euan M . Fleming. Agricultural and Resource Economics, February, 1–40.

Kennedy, P. L., Harrison, R. W., & Piedra, M. A. (1998). Analyzing agribusiness competitiveness: The case of the United States sugar industry. International Food and Agribusiness Management Review, 1(2), 245–257. https://doi.org/10.1016/s1096-7508(99)80038-x

Khan, M., & Damalas, C. A. (2015). Farmers' knowledge about common pests and pesticide safety in conventional cotton production in Pakistan. Crop Protection, 77, 45–51. https://doi.org/10.1016/j.cropro.2015.07.014

Macdonald, S., Gale, F., & Hansen, J. (2016). Cotton Policy in China (Issue 70863).

Mohanty, S., Fang, C., & Chaudhary, J. (2003). Assessing the competitiveness of Indian cotton production: A policy analysis matrix approach. Journal of Cotton Science, 7(3), 65–74.

Monke, E. A., & Scott R., P. (1989). The Policy Analysis Matrix for Agricultural Development. Cornell University Press.

Najafi, B. (2005). Effects of government policies on wheat production in Iran: the application of policy matrix analysis. Economic Research Forum, 12th Annual Conference.

Nelson, G. C., & Panggabean, M. (2011). Matrix Policy : Approach Analysis. 73(3), 703–712.

Pahle, M., Pachauri, S., & Steinbacher, K. (2016). Can the Green Economy deliver it all? Experiences of renewable energy policies with socio-economic objectives. Applied Energy, 179(642147), 1331–1341. https://doi.org/10.1016/j.apenergy.2016.06.073

Sadiq, M. S. (2015). Impact of India Economic Policies on Cotton Production vis-à-vis Comparison between Pre-Economic Liberalization Policy Period and Economic Liberalization Policy Period. Agro-Economist, 2(1), 57. https://doi.org/10.5958/2394-8159.2015.00010.9

Salam, A. (2012). Review of Input and Output Policies for Cereal Production in Pakistan (Issue July).

Salam, A., & Tufail, S. (2016). Economic Efficiency and Distortions to Incentives in Production of Cotton and Rice Crops in Punjab. NUST Journal of Social Sciences and Humanities, 2(1), 29–49.

Suresh, A., Josily, S., Shwetal, W., & P., R. (2014). Cotton Cultivation in India Since the Green Revolution: Technology, Policy, and Performance. Review of Agrarian Studies, 4(2). http://ras.org.in/cotton_cultivation_in_india_since_the_green_revolution

UNDP, & GOP. (2021). Youth and Climate Change Perception.

Wang, W., Zhang, C., Song, J., & Xu, D. (2021). The impact of target price policy on cotton cultivation: Analysis of county-level panel data from china. Agriculture (Switzerland), 11(10), 1–18. https://doi.org/10.3390/agriculture11100988

Williams, D. (2010). Industrial policy. Local Economy, 25(8), 612–621. https://doi.org/10.1080/02690942.2010.533425

Zulfiqar, F., & Thapa, G. B. (2018). Determinants and intensity of adoption of "better cotton" as an innovative cleaner production alternative. Journal of Cleaner Production, 172, 3468–3478. https://doi.org/10.1016/j.jclepro.2017.09.024