AGRICULTURE DEPARTMENT

GOVERNMENT OF THE PUNJAB

WHITE PAPER ON PERFORMANCE APPRAISAL OF THE AGRICULTURE DEPARTMENT

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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
ADU	Agriculture Delivery Unit
AEZ	Agro-Ecological Zone
BIPP	The Shahib Javed Burki Institute of Public Policy at Netsol
CPEC	China-Pak Economic Corridor
CMC	Collateral Management Companies
CNW	Communication and Works Department
CSA	Climate Smart Agriculture
DA	Department of Agriculture
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GHG	Green House Gas
GIS	Geographical Information System
GoP	Government of the Punjab
HEIS	High Efficiency Irrigation Systems
HQ	Headquarters
ICT	Information and Communications Technology
IP	Implementation Progress
KII	Key Informant Interview
LLL	Laser Land Leveling
MoNFS&R	Ministry of National Food Security and Research
NARC	National Agriculture Research Centre
NGO	Non-Government Organizations
PA	Paradoxical Agriculture
PAM	Policy Analysis Matrix
PARC	Pakistan Agriculture Research Council
PPPs	Public Private Partnerships
PIPIP	Punjab Irrigated Agriculture Productivity Improvement Project
RBI	Reserve Bank of India
SMART	Strengthening Marketing for Agriculture and Rural Transformation
SSCS	Supply and Service Companies
TCP	Trading Corporation of Pakistan
UoF	University of Faisalabad
USAID	United States Agency for International Development
WB	World Bank

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Executive Summary

The Shahid Javed Burki Institute of Public Policy at NetSol was engaged by the Agriculture Department Punjab to conduct an appraisal of the past 1-1.5 year performance of the Department to come up with a white paper embodying, inter alia, the achievements, what worked/what did not, as well as areas of improvements in policy, institutional and operational domains including some on-going projects. The BIPP team followed a bottom up, inclusive and analytical approach based upon five-criteria of relevance, effectiveness, efficiency, impact and sustainability to assess the department's performance especially the evaluation of its policy frameworks, selected projects and major initiatives. A desk review of the major upstream policy documents and position papers was augmented by primary data collection, field visits (though very limited) and focus group discussions and key informant interviews. A round of meeting and discussions was also conducted and envisaged for validation of the final evaluation outcome.

The Report comprises five Chapters: the first one introduces the methodology, approach and major constraints; the second dwells on primary data collection and analysis of the feedback received through focus group discussions and key informants' interviews; the third gives a detailed analysis of the five selected projects identified by the Department; the fourth chapter contains detailed analysis of the policy options which the Department needs to pursue, inter alia, in the critical areas of institutional reform, climate smart agriculture, CPEC potential for poverty alleviation, ceiling on milk price, deregulation of wheat and sugarcane, grain warehouses, water pricing, subsidy removal etc.; and the fifth Chapter embodies the concluding remarks.

Succinctly, Chapter one highlights the importance of agriculture in the overall economic development of the country and the Province. The sector is the mainstay of Pakistan's economy; the sector accounts for 21% of the GDP and provides livelihood to 44% of the rural population. The province of Punjab contributes a major share to the agricultural economy of the country by providing approximately 65% of cotton, 77% of wheat, 51% of fine aromatic rice, 66% of sugarcane and 85% of maize to the national food system. However, the full potential of the sector does not seem to have been harnessed, inter alia, owing to lack of policy and institutional stability, inadequacy of budgetary resources and extractive terms of trade to the detriment of agriculture. The fact that the sector witnessed unprecedented negative growth of .5% in 2015-16 eloquently speaks of the neglect of the sector by the successive governments.

It is heartening to note that the Agriculture Department, Punjab has recently embarked on major policy, institutional and programmatic initiatives to revamp the sector and optimize its potential for sustainable development. A vision "transforming Punjab agriculture to a market driven, diversified and sustainable sector through integrated technologies, transparency and value for money" has been clearly articulated with focus on enhancing profitability, ICT led farmer centric service delivery and private sector led growth. The Department has also formulated agriculture policy for the province which is expected to impact the rich, the poor; the women and rural youth; and small and big famers alike.

Chapter 2, while analyzing the data and information generated by desk review of the policy and position papers, field visits to the three selected districts of Punjab. Chakwal, Sukheki and Bhakkar, focus group discussions (FGDs) and key informant interviews (KIIs), attempts to identify specific policy and operational issues, gaps and major challenges confronted by the sector. These include: policy and institutional fragmentation, inefficient water use, detrimental impact of climate change, lack of crop diversification, obsolete technology, inefficient market system and weak value chain, research and development deficit, absence of training and skills development, lack of effective communication etc., which cumulatively impact the productivity and profitability of agriculture. It may here also be pointed out that the upstream policy and programmatic interventions that have recently been introduced (which are quite robust, substantive and aim at bringing about major transformative change in the agriculture sector to make it sustainably profitable) do not seem to have so far reached the farmers, the stakeholders and even the lower echelons of the Department. This is largely due to, inter alia, lack of a well concerted communication strategy.

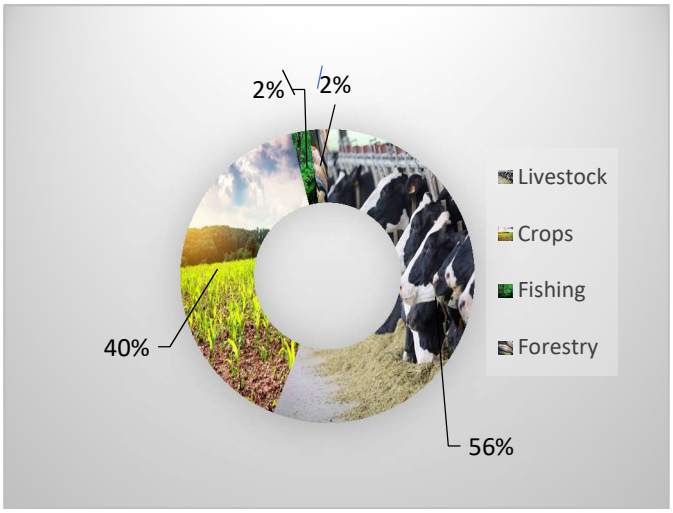
Be that as it may, the Department has to address through policy, programmatic, institutional and operational adjustments the identified gaps and challenges. It has to ensure that the new agriculture policy fully harmonizes with, both vertically and horizontally, and complements the Federal as well as provincial frameworks. It needs to redefine, rectify and clearly delineate some of its priorities manifested through adequate budgetary allocations such as supporting subsistence farmers versus promoting corporate farming; price support system versus competitive farming sector; traditional cropping system versus crop diversification to high value crops; transforming subsistence agriculture to profitable commercial venture. The policy must lead to efficient agricultural growth, higher-value products and higher total factor productivity for profitable agriculture.

Chapter 3 and 4 comprise the main body of the report as they provide key analytical insights on the five currently run programs/projects of the department and also look deep into the recently approved agriculture policy of the province and some key areas around which the policy environment of the agriculture sector of Punjab is being consolidated. Most of the projects currently run by the department have been recently commissioned and are either in their inception or pre-inception phase. As such, one constraint in doing the project analysis was lack of adequate implementation results to match against the intended objectives. To address this deficit, an attempt was made to assess the preliminary results against the comparable international best practices and programs and responses obtained from the field, both though KIIs and FGDs. The results seem to indicate that some projects do directly respond to the felt needs of the farmers and agriculture sector while others are less relevant or promise a lower impact than the intended one.

Chapter 1: Introduction

Agriculture is the mainstay of Pakistan's economy; the sector accounts for 21% of the GDP and provides livelihood to 44% of the rural population. Agriculture GDP is derived from four major subsectors. Livestock is the most prominent contributor accounting for 56% of the total value, followed by crops 40%, and fishing and forestry, accounting for 2% respectively (Figure 1).

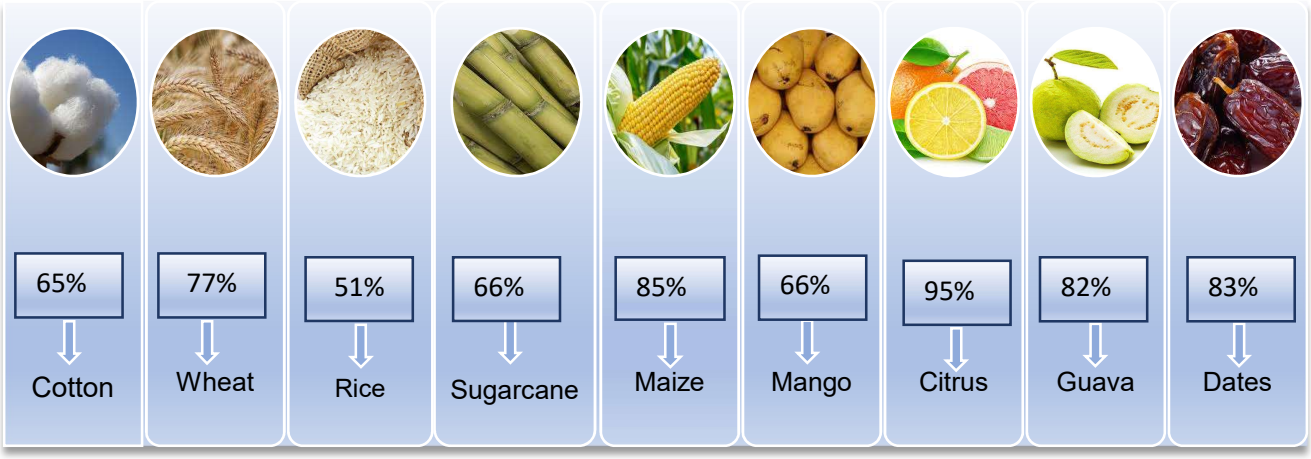
FIGURE 1: AGRICULTURE SUBSECTOR CONTRIBUTION



Owing to the large production base, Punjab is considered the food basket of Pakistan and comprises around 29% of the total reported national area, 57% of the total cultivated and 69% of the total cropped area.

As per BIPP's estimates, the province contributes a major share to the agricultural economy of the country by providing approximately 65% of cotton, 77% of wheat, 51% of fine aromatic rice, 66% of sugarcane and 85% of maize to the national food system. The horticulture subsector over the years has also achieved some gains; mango accounts for 66%, citrus more than 95%, guava 82% and dates 34% in the total national production (Figure 2).

FIGURE 2: COMMODITY SHARES IN THE PUNJAB ECONOMY



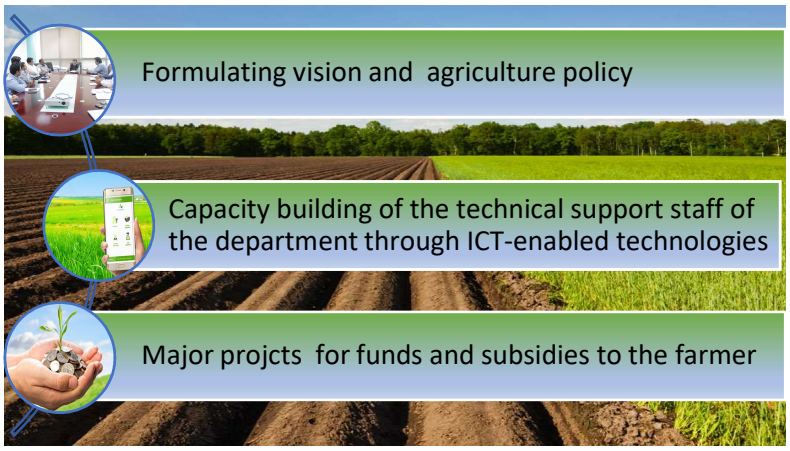
However, the full potential of the sector does not seem to have been harnessed, inter alia, owing to lack of policy and institutional stability, ad-hoc technological interventions, inadequacy of budgetary resources and unfavorable and extractive terms of trade to the detriment of agriculture. Historically, the sector seems to have fluctuated between periods of high and low growth with considerable impact on production, revenues and farmer's

income[1]. Overall, the farmers, especially the small ones, continue to experience poverty and declining income.

Little, if at all, was accomplished to diversify high added value beyond the major crops of wheat, maize, cotton, rice etc., or to make post-production interventions to improve productivity and profitability. It may also be pointed out that even the rise in food crop yields –largely attributable to the use of fertilizer and pesticides – continue to remain, on average, lower than elsewhere in the region and much lower than the developed countries not to speak of significantly low total factor productivity. And then around 80 % of the recent rise in value-added is derived from livestock.

The Agriculture Department has, however, recently embarked on major policy, institutional and programmatic initiatives to revamp the sector and optimize its potential for sustainable development. The Department has already articulated a vision "transforming Punjab agriculture to a market driven, diversified and sustainable sector through integrated technologies, transparency and value for money" with focus on enhancing profitability, ICT led farmer centric service delivery and private sector led growth. Several projects ranging from those that transfer funds and subsidies to farmers to those aimed at capacity building of the technical support staff of the department through ICT-enabled technologies is under implementation.

FIGURE 3: CURRENT INITIATIVES



The Department has also formulated an agriculture policy for the province which is expected to impact the rich, the poor; the women and rural youth; and small and big famers alike.

The policy also attempts to address historical lack of vertical and horizontal integration and linkages of the sector across departments and with external stakeholders as one of its guiding principles. The major challenge for the Department especially now that under the Constitution agriculture is within the exclusive provincial domain, however, is to ensure that the new agriculture policy fully harmonizes with, both vertically and horizontally, and complements the Federal as well as provincial frameworks. It may be noted that import, export, price setting, standardization and national research and inter provincial issues such as rehabilitation come under the direct ambit of the Federal

[1] For detail analysis, please see Chapter 3 of BIPP's Annual Report 2016: The State of Economy: Agriculture and Water www.sjbipp.org/Publications/AR/reports/AR-09-16.pdf

government. The Department has to develop effective linkages to overcome the possible policy fragmentation issues.

Another major area to which the Department needs to pay considerable attention is to align and synergize the on-going projects with the new policy thrust and within this broader context create mutual cohesiveness and complementarily among the projects to achieve enhanced impact. Clearly, some projects currently implemented by the department (whose initiation predated the formulation of the agriculture policy) may not be in sync with the new policy while some facets of the policy might ignore or negate the good work that the projects have achieved thus far.

Additionally, the government needs to redefine, rectify and clearly delineate some of its priorities manifested through adequate budgetary allocations in the wake of new agriculture policy such as supporting subsistence farmers versus promoting corporate farming; price support system versus competitive farming sector; traditional cropping system versus crop diversification to high value crops; transforming subsistence agriculture to profitable commercial venture, climate resilient versus climate insensitive agriculture, etc.

Then agriculture is a risky enterprise with inherent price and volume risks. The policy goal might not necessarily be to maximize the growth of production in any sub-sector/commodity; rather it should be to create the necessary and sufficient conditions which in turn can enhance the capacity of the agricultural sector/farmers to adjust to a more competitive environment. The production processes and input delivery systems also need to exhibit flexibility and be allowed to adapt to fluctuations in the domestic/foreign market conditions (output and input) and technologies. In due course, given the right policy environment, the fluctuations and variations can be addressed through adjustments in cropping patterns and farm structure as opposed to sticking to a few selected crops. This adjustment capacity requires sound management information systems, flexible rural factor markets (including labor, land, water, and finance inputs) as well as a competitive agribusiness sector, adequate infrastructure, technology development, and most importantly, an increased human capital (education and training). The policy while encompassing the above, must lead to efficient agricultural growth, higher-value products and higher total factor productivity for profitable agriculture.

It may also be mentioned that through the current interventions of the department, some work on crop diversification and alteration of existing redundant cropping patterns has been initiated.

1. Methodology

1.1. Approach

A bottom-up, inclusive and analytical approach has been followed with a primary focus on major stakeholders' perspectives (including those of farmers-small, medium and large, agribusinesses and relevant government and non-

government organizations) to reflect upon the performance, achievements and outcomes of the agriculture department.

The analysis also draws on the technical, operational and financial capacities of the department to ensure that the holistic approach in assessing the performance of the department, benefits from the departmental perspective on the current state of agriculture in the province. Several position papers, commissioned by the department during the preparatory phase of the new policy on themes like climate change, institutional reforms, food and nutrition security, income enhancement and poverty alleviation, horticulture etc., were also fully made use of by the BIPP research team.

The following parameters constituted the kernel of the analytical approach:

- **Relevance:** This part of the evaluation approach addresses whether the interventions, specifically the projects undertaken were relevant to the agenda and annual objectives of the department has also served the intended beneficiaries.
- **Effectiveness:** Are the objectives of the interventions being achieved? How big is the effectiveness of the project compared to the objectives planned?
- **Efficiency:** Are the objectives being achieved economically and cost effectively by the development intervention? How big is the efficiency or utilization ratio of the resources used?
- **Impact:** Does the development intervention contributes to reaching higher level development objectives and/or created a visible transformative impact on the lives and livelihood of the targeted beneficiaries?
- **Sustainability:** Are the positive effects or impacts sustainable? How has been the sustainability or permanence of the intervention and its effects on the intended beneficiaries?

1.2. Process

The over-arching methodology comprised the following key tasks and activities:

i. *Conceptual Design:* this entails development of a performance appraisal framework to ascertain what tasks, activities and projects undertaken by the department are to be appraised and what dimensions need to be explored.
ii. *Matching:* of the departments objectives, work plans and mandate for the year with the achieved outcomes and possible impacts at the expiration of the project duration: This entails ensuring if all project documents, deliverables, tasks and activities that were originally part of the terms were actually delivered.
iii. *Gap Analysis:* The gap analysis exercise identifies the gaps between the departments' planned objectives and the outcomes achieved especially at the project and unit level within the department.

iv. *Capacity Constraints and Bottleneck Identification:* enlistment of constraints and bottlenecks that impacted the results achieved.
v. *Inception Report:* outlines the field implementation plan and sampling design for each of the three primary data collection methods detailed below.
vi. *Primary data Collection and field visits* and decentralized/local level discussions
vii. *Focus Group Discussions and Key Informant Interviews:* The idea is to benefit from the farmers and other stakeholders perspective including experts.
viii. *Secondary Review:* best practice programs and desk review of available research and data.
ix. *Evaluation Report:* consolidation of primary and secondary review into a final evaluation report.

1.3. Hierarchical Validation Methodology (HVM)

As per the hierarchical validation methodology, the findings and observations of FGDs and KIIs were cross-validated by presenting these to each other.

Focus Group Discussions:

FGDs were conducted through an innovative scenario-based methodology whereby the participants were presented a range of scenarios on salient segments of agriculture sector to achieve profitability and competitiveness. The structure of the focus group discussion was as follows:

- The FGDs were approximately 90 to 120 minutes in length.
- Around 10 to 15 members were present.
- Moderator was someone who all the participants can trust.
- Brainstorming exercises were key in eliciting the desired responses.

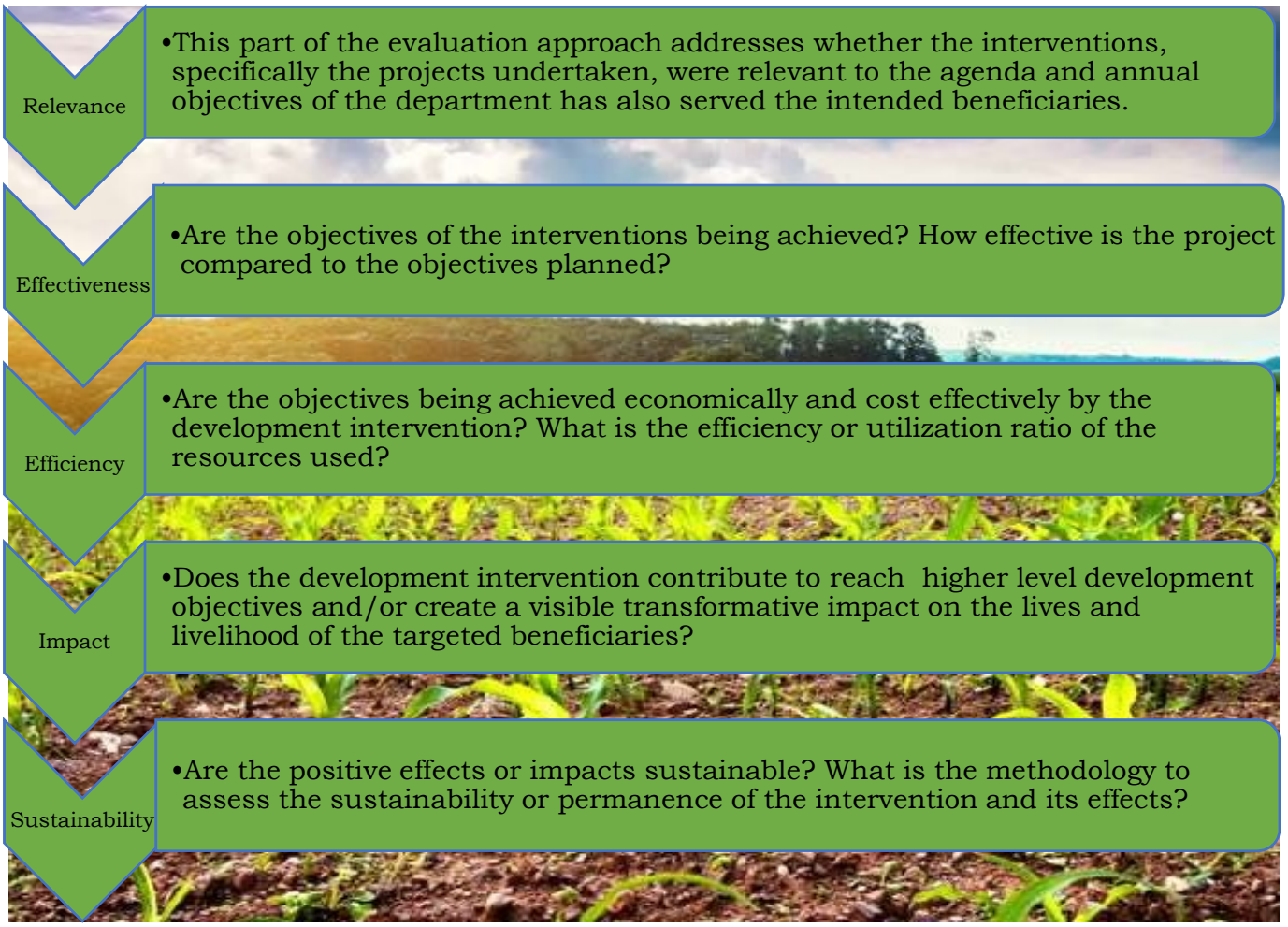
Key Informant Interviews:

The sample for KIIs was selected with a view to ensure inclusivity from a gender, income, expertise, representation and geographic perspective. The structure of the KIIs was as follows:

- 20 to 25 individuals were selected for one-to-one interviews
- A detailed probative questionnaire was designed to extract maximum information from the respondents.
- Generation of recommendations from the participants that helped fulfill the gaps that were left in the implementation.

The methodology to conduct the performance appraisal adopted by the BIPP research team, as earlier stated, ensured compliance with the following set of five criterion presented in Figure 4.

FIGURE 4: CRITERION FOR PERFORMANCE APPRAISAL



1.4. Constraints

An effort has been made to carry out a comprehensive assessment and appraisal of the performance of the Department over the past 1-1.5 years as stipulated in the ToRs. However, the process of conducting the exercise was constrained by the following inherent limitations:

The exercise was essentially focused on desk review with only three field visits, two FDGs and some KIIs. The sample was small and, as such, had its own limitations to reveal credible empirical evidence for evaluating Department's performance

The Agriculture Policy which prescribes the overall framework for government intervention in the sector, we were informed, has not been formally adopted as yet. Earlier draft provided to BIPP was replaced by a revised draft. A set of position and policy briefs was also provided. However, in the absence of the approved policy document, it was a bit presumptuous to determine the internal consistency and relevance of the policy papers/briefs as also the robustness of

the policy framework especially in the wake of enormity of the challenges which the sector faces.

Be that as it may, while the vision and strategic thrust seems to have been reasonably clearly articulated, there seems to be a disconnect between the HQ formation and operational outfits of the department. This institutional weakness led to a considerable variance of understanding as well as of the views and perceptions of the field offices as to the major thrust of department's new initiatives.

BIPP team designed a Questionnaire for the Deputy Commissioners to independently seek a feedback on the performance of the agriculture department, its projects and relevance of its activities. This Questionnaire was distributed through the Agriculture Department with a follow-up request to elicit response with the intervention of local deputy director agriculture. The idea was to reach out to the wider stakeholders and benefit from their perspective and views on agriculture sector. There was, however, no feedback- not from a single office- which not only speaks of the low priority being attached to agriculture at the decentralized level but also is indicative of lack of functional rapport of the department with other departments at the operational level.

Though initially, there was excellent rapport and support by ADU in the conduct of appraisal exercise, this support considerably diminished after the submission of the zero draft as is evident from lack of substantive response despite repeated reminders. The comments on zero were too generic. In view of the inordinate delay, the Report therefore, had to be finalized without the benefit of iteration and specific comments from the department.

Chapter 2: Primary Data Collection

2.1. Key Informant Interviews

A set of questionnaires was developed to elicit methodical feedback from the selected key informants with adequate flexibility to allow for unstructured but candid and forthright response. The issues reported by key informants in the field were catalogued and categorized based on their affiliation with a larger issue category to gauge the frequency and intensity with which a certain issue is reported. For instance, 'agriculture competitiveness' is bracketed within productivity-related issues while 'weak communication' is categorized as an administrative issue.

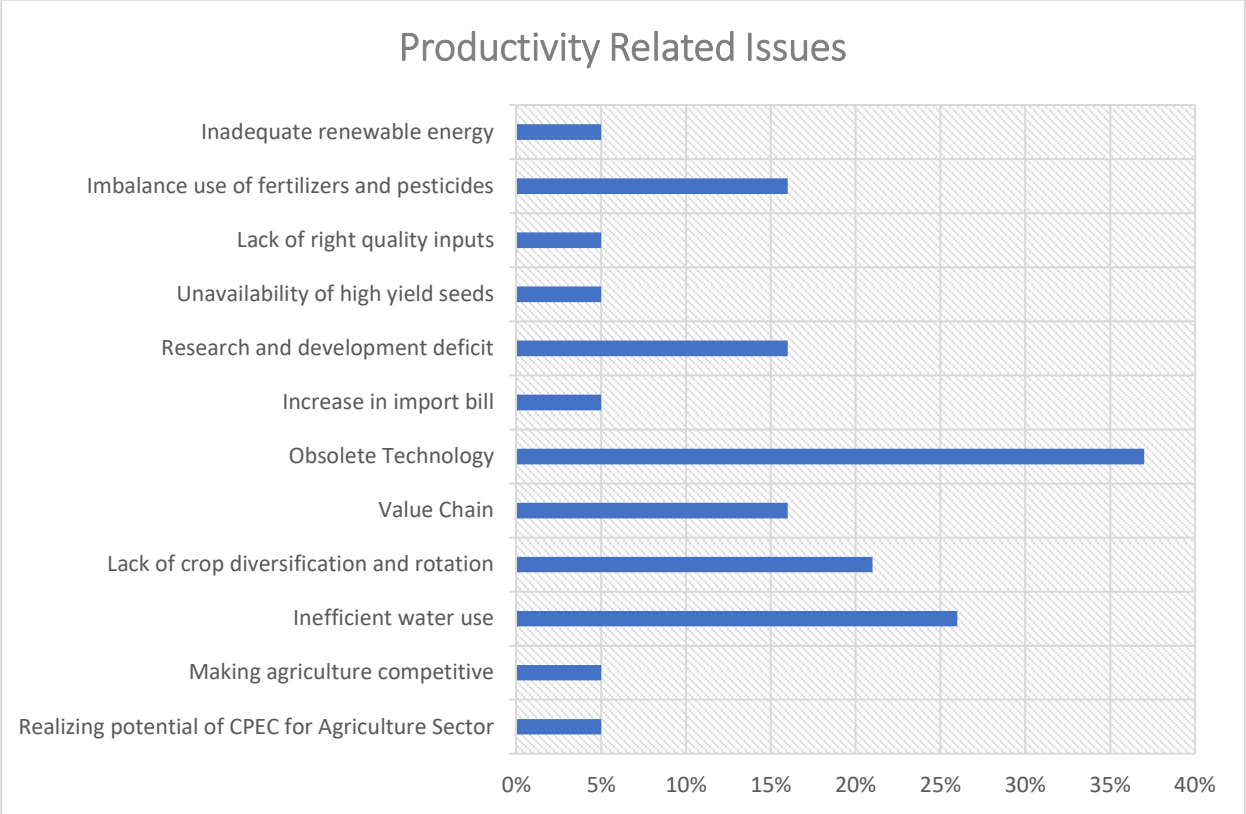
The Tables below present data on the number of informants who have reported a certain issue as a major constraint in the agriculture sector. To gauge the intensity, the proportions of informants that have reported a certain issue were calculated as a percentage of total informants interviewed. A similar exercise was conducted for the responses collected through the focus group discussions.

TABLE 1: PRODUCTIVITY-RELATED ISSUES

Issues	Frequency (No. of Key Informants Reporting the Issue)	Intensity (Proportion of Informants Reporting the Issue as % of Total)
Realizing potential of CPEC for Agriculture Sector	1	5%
Making agriculture competitive	1	5%
Inefficient water use	5	26%
Lack of crop diversification and rotation	4	21%
Value Chain	3	16%
Obsolete Technology	7	37%
Increase in import bill	1	5%
Research and development deficit	3	16%
Unavailability of high yield seeds	1	5%
Lack of right quality inputs	1	5%
Imbalance use of fertilizers and pesticides	3	16%
Inadequate renewable energy	1	5%

Obsoleteness of technology was the most frequently reported issue that reflects poorly on productivity too. It was reported that the costs of mechanization (both capital and revenue) have risen to a point where the average farmer is unable to replace the outdated and obsolete machinery.

FIGURE 5: PRODUCTIVITY RELATED ISSUES



Efficiency of water use in agriculture, as some of the later parts of this report document, is an issue that not only endangers the sustainability of the agriculture sector but also is a key concern for domestic consumption. Demand-side management of water through water saving and conservation measures was discussed during the FGD. However, effective management and use of water did not seem to be an area of concern amongst farmers especially in the Barani north. Water did come up as an issue in Bhakkar since it is primarily rain-fed.

Another important issue was the lack of crop rotation and diversification. Due to lack of incentives for research and development and the reported gaps in extension services, the farmers seemed reluctant and in certain cases short of resources to graduate out of traditional crops, resorted to limited varieties of seed and reluctant to diversify and rotate their crops.

The field visits also revealed limited awareness of the farmers regarding the issues like renewable sources of energy or CPEC and their potential for the agriculture sector.

TABLE 2: ADMINISTRATIVE ISSUES

Issues	Frequency (No. of Key Informants Reporting the Issue)	Intensity (Proportion of Informants Reporting the Issue as % of Total)
Weak Communication	2	10%
Need for cultural change	1	5%
Inefficient market system	2	10%
Training and skill development	7	37%
Adverse role of intermediaries	3	16%
Lack of commitment between government and private sector	1	5%
Misallocation and wastage of resources	1	5%
Rigid bureaucratic system	1	5%
Inefficient dairy operation	1	5%
Transparency and lack of governance	1	5%
Lack of oversight and reporting mechanisms	1	5%
Illegal import of dry milk	1	5%

Training and skills development and skill at 37% emerged as an issue of the highest intensity followed by the inefficiency of the intermediaries involved in providing the agricultural services. Clearly, the adverse role of the *Aarthi* who is by far the most influential intermediary in the agriculture sector came up conspicuously. Other administrative issue of the rigidity of the bureaucratic system was also raised which seems to have been tackled ever since a more active coordination by ADU.

TABLE 3: POLICY ISSUES

Issues	Frequency (No. of Key Informants Reporting the Issue)	Intensity (Proportion of Informants Reporting the Issue as % of Total)
Policy and institutional fragmentation	7	37%
Climate change	4	21%
Inefficient water use	5	26%
Lack of crop diversification and rotation	4	21%
Value Chain	3	16%
Inefficient market system	2	10%
Research and development deficit	3	16%
Illegal import of dry milk	1	5%
Absence of enforcement of law	1	5%
Lack of gender inclusion	1	5%
De-capping of milk	1	5%

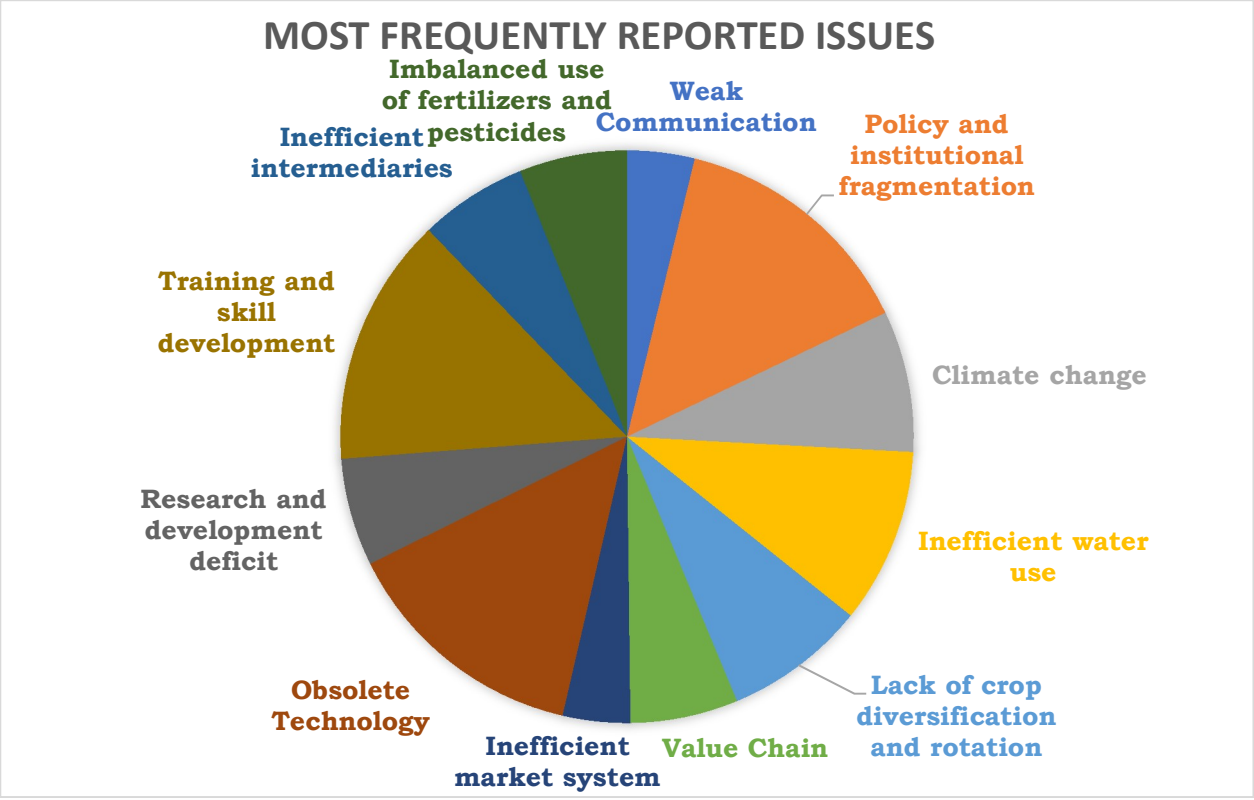
Most informants reported the fragmentation in the policy and institutional space as a key issue. Policy coherence and strengthening of institutions and their intra and inter-institutional coordination was also forcefully put across.

The Table below presents a consolidation of the most frequently reported KII issues as derived from the four issue categories above. The frequency threshold used to select the most frequently reported issues is 'greater than 10%'.

TABLE 4: MOST FREQUENTLY REPORTED ISSUES (THRESHOLD > 10%)

Issues	Frequency (No. of Key Informants Reporting the Issue)	Intensity (Proportion of Informants Reporting the Issue as % of Total)
Weak Communication	2	10%
Policy and institutional fragmentation	7	37%
Climate change	4	21%
Inefficient water use	5	26%
Lack of crop diversification and rotation	4	21%
Value Chain	3	16%
Inefficient market system	2	10%
Obsolete Technology	7	37%
Research and development deficit	3	16%
Training and skill development	7	37%
Inefficient intermediaries	3	16%
Imbalanced use of fertilizers and pesticides	3	16%

FIGURE 6: MOST FREQUENTLY REPORTED ISSUES



2.2. Focus Group Discussions

The Tables below present the reportage of FGD issues divided into identical categories used for KII reporting above. Two focus group discussions (one comprising farmers and the other, extension and agriculture officers) were conducted each in the districts of Chakwal and Bhakkar respectively to document both Southern and Barani perspectives

TABLE 5: EXTENSION AND AGRICULTURE OFFICERS

Extension and Agriculture Officers		
Issues	**Chakwal**	**Bhakkar**
Productivity Issues	• Vulnerability of Technology	• Obsolete and lack of agro-ecological specific technology and practices
Administrative Issues	• Workers have little knowledge of projects • Unsatisfactory incentive and service structure (Lack of motivation)	• Diluted impact of subsidies due to administrative issues
Policy Issues	• Exclusive and non-participatory policies • Inapplicable policy (not considering land and topographic statistics)	• Incentivizing farmers irrespective of their mode of irrigation

Productivity issues mentioned by the farmers of both districts are very similar despite the difference in the regional dynamics of Barani and South Punjab. The vast differences in climatic and soil conditions of the two areas should entail different farming and agriculture techniques and methods which implies that their productivity, costs and incomes would be different too. However, as the focus group discussion results report, majority issues reported by farmers and extensions workers in the two regions were similar in some cases.

TABLE 6: FGD ISSUES

Farmers		
Issues	**Chakwal**	**Bhakkar**
Productivity Issues	• Non-availability of machineries • Scare water resources (need for small dams and ponds to collect water in Barani areas) • Low quality of seeds	• Water shortages • Low quality of seeds • Non-availability of machineries
Administrative Issues	• Lack of awareness of projects and services of the department • Missing linkages with the surrounding villages	
Policy Issues	• Government policies inclined towards farmers with land holding of 5 or more acres (ignoring small farmers) • Incompetent Potohar Agriculture Policies	• Unbalanced supply and demand of crops • Pricing Issues • Slow and time taking projects

The experience from the field; two FGDs and several KIIs bore fairly consistent results. The BIPP research team followed the hierarchical validation methodology to identify common issue that one individual or group of respondents identified but was seen later to be consistently and uniformly present in discussions with other groups. Some reflections during the field visits were also made on projects, others pertained to policy issues and while this report makes an analysis of both separately, the field responses in themselves provide a clearer and accurate description of the felt needs and priorities which the department should focus on in the future. Some of these issues, however, are already being taken care of: for instance, the extension issues are being addressed through extension 2.0 while issues pertaining to the lack or obsolete machinery are expected to be tackled through HMSCs project.

Some policy issues that were reported in the field need immediate attention. For instance:

(a) The new configuration of a "small farmer" makes farmers who are actually poor and small almost invisible from the priority agenda of the department. This should be reconsidered by the department to make sure that incentives and support systems meant for the poor farmer and associated processes are transparent and reach the farmer who is actually poor. This would obviate the possibility of asymmetric distribution of government support through, inter alia, adoption of a more realistic definition of "small farmer" and more direct and targeted means of distribution;

(b) The trust of the farmers also needs to be reinstated somehow through more overt and direct means of engagement by the extension services. It seems that the centralized structure of the Department and the adoption and diffusion of SMART technologies and monitoring techniques portrays the extension and field workers as being less benevolent and helpful and creates a trust deficit with the farmers.

(c) Farmers in the field also seemed to be greatly interested in training programs but were opposed to those provided infrequently, often too time consuming, ineffective and ensuring little direct physical access. They also complained that the training programs were designed more towards the technical farming and usage of technology than toward entrepreneurship and innovation. The emphasis should be on involving professional entrepreneurs, incubation centers and trainers that can provide farmers the mindset and means to innovate for increasing farm productivity and profitability.

(d) On the government side, extensions workers seemed to lament the inappropriateness of the service structure that they deemed to be less rewarding than it should ideally be and provided them hardly any incentive to perform.

Chapter 3: Project Analysis

It is important to underscore the following points as a prelude to the project analysis exercise:

- Several of the constraints that impede the optimization of agricultural growth and progress fall outside the core functional mandate of the Agriculture Department e.g., the construction and M&R of farm to market or feeder roads is under the Communication and Works Department (C&W). Similarly, issues pertaining to impacts of climate change, livestock and dairy production and those related to water quality and availability, even though inextricably linked with the agriculture sector, are outside its domain and are managed by other departments. More specifically, successful implementation of SMART and PIPIP projects to a great extent depends upon on the ground performance of Livestock and Dairy Development Department and the Irrigation Department.
- The main discussion regarding the relevance, applicability, effectiveness, efficiency and sustainability of the major projects of the Department currently under implementation took place during the focus group discussions in Chakwal and Bhakkar. The FGDs, inter alia, aimed at ascertaining the extent to which there was satisfaction regarding the projects on the ground and how the field research could reveal priority areas for corrective action or improvement.
- Some reflections on the projects were also received during the interviews with key informants where senior members of the government, academia and private sector were asked about their satisfaction with the interventions of the projects run by Agriculture Department independently and those with the support of World Bank.
- Lessons were also drawn from the international best practices and success stories of the programs and projects similar to the ones being analyzed.

Against this backdrop, the following section embodies the analysis of the major agriculture projects referred by the Department for assessment.

3.1. Establishment of Hi-Tech Mechanization Service Centers (HMSCs)

The project, inter alia, envisages reduction of the human and draught animal's drudgery, enhancement of the cropping intensity, precision and timeliness of agricultural operations and reduction in the losses at different stages of crop production. It had the following foremost objectives:

- Food security management in holistic manner.
- Emphasis on innovative technologies to bring vertical crop productivity.

- Increase in farmer's income through increased crop productivity, better support price and diversified agriculture practices.
- Development and adoption of new technologies for enhancing crop productivity.
- Improvement in the living standards of farmers and poverty reduction.

The project has a 4.5 year implementation timeframe from 2017 to 2021 but it does not seem to have fully entered into the implementation phase as yet. At the time of writing this report, work on service centers planned for the 17 districts during the first phase (2017-18) is still pending.

As for the project design, a detailed implementation and cost sharing plan seems to provide adequate information as to the financing of the service centers in each of the 36 districts, the kind of mechanization services and project management. The idea of 50:50 cost sharing between the government and service provider seems to be a rational financial choice in terms of ensuring inclusivity and raising adequate private sector financing.

The review of the literature on farm mechanization and the success stories on the use of modern technology and farm mechanization also validate the overall conceptual design of the project.

However, lack of relevant and need-specific mechanization was a key issue distinctly reported by key informants and focus group participants during BIPP's field research. The tractor technology, it was also averred, is outdated with huge maintenance and replacement costs beyond the affordability of the small farmers.

In our view, mechanization project especially that which provides a low cost mechanization alternative to the farmers, is a fairly useful and relevant intervention in the context of Punjab where research and development and innovation through the use of technology remains low. The major question however, is the provision of cost-effective, need-based, multi-purpose, farmers-segment centered and relevant machinery and tools which are not rendered obsolete given the rapid pace of technological development. Otherwise, low relevance and high costs would mean low efficiency and therefore would incentivize low applicability and reluctance to adoption of the technology.

Likewise, technical and operational skills have to be imparted continuously to ensure that these do not become redundant too quickly. This may require regular financial investments to sustain the training component of the project.

The following points also need particular attention:

- Inclusivity in terms of ensuring the participation of the small farmers some of whom may not have the required investment to mechanize their farms, needs to be ensured;
- While mechanization is absolutely essential to achieve productivity and profitability gains, the requirements for machinery differ according to the scale and size of the farm. The machinery mix and component should

therefore cater for the requirements of the small scale, medium and large scale farmers.

- The need for specific kind and type of tools and machinery required by most of the small farmers for various stages of agriculture e.g, from pre-production, production to post production was very strongly articulated during the KIIs and field visit. A list of machinery proposed for the purpose is attached annex 1.
- Proper training for "operating" the machinery instead of "driving" it should be arranged. Most of the farmers were generally oblivious of the full import and functionality of the implements and machinery and as such fail to realize maximum benefits of mechanization.
- On the supply side, the department will have to ensure that the service centers are financially sustainable and the cost sharing formula works out in the long-term to continue to provide farmers the services once the centers are completely functional. The closure of the centers due to financial issues can be extremely disruptive for the sector.

3.2. Strengthening Marketing for Agriculture and Rural Transformation (SMART)

The objectives of the project are to increase the productivity of crop and livestock farmers, improve their climate resilience, and foster agribusiness development in Punjab. The project has a 5-year implementation timeframe from 2018-19 to 2022-23. The implementation arrangements envisage substantial contributions and commitments by various departments including Agriculture, Livestock and Dairy Development, Food, Irrigation Finance, P&D, and Industries, Commerce & Investment. Each department need to have a dedicated program delivery unit or a focal person to support the interventions of the project.

The conceptual design of SMART project envisions a new experience for Pakistan; it is a P for R project where the department can only claim the project finance after accomplishing specific tasks and outcomes that align with one of the 12 high level DLIs. This is not only important from a financing perspective but also from an administrative and technical standpoint as this implies major focus on the broad policy, institutional and systemic areas. The World Bank would not provide technical support in carrying out the detailed activities nor per se push for meeting certain targets in any stipulated timeframe. Instead, the Department itself must work hard and monitor timely achievement of the broader targets to be able to claim and access the funding. According to the World Bank, the department has acquitted itself very well so far with this unique P for R modality.

In our view, the SMART project is extremely relevant to remove inherent distortions in harnessing the full and competitive potential of agriculture sector. The issues dealt with by SMART project like phasing out input subsidies, achieving higher productivity, growth in farmers' income and use of

ICT-interventions and technology have indeed come up high on the agricultural agenda and discussions.

It may be reiterated that phasing out the agriculture subsidies that are counter-productive and a burden on the economy as a whole have long been on the donors' agenda and in particular of the World Bank in Pakistan. During a meeting with a high-level World Bank delegation in Lahore, the BIPP research team learnt that the SMART implementation team is highly satisfied with the results produced by SMART project and believes that the project could be instrumental in phasing out subsidies especially through empowerment and training of the farmer that could make him financially and technically self-reliant.

As for the ICT component, according to literature on the sub-Saharan Africa, ICT use in agriculture and rural development is a powerful instrument for improving agricultural and rural development. The impediments to adoption and diffusion of ICT like lack of awareness, low literacy, infrastructure deficiencies (e.g. lack of electricity to charge electronic gadget, language and cultural barriers in lCT usage, the low e-inclusivity and the need to cater for the special needs of some users) need to be effectively addressed and suitably integrated into the implementation plan for sustainability. These issues were indeed articulated during focus groups discussions with extension workers who believed that lack of training to use the SMART tools and the absence of technology and innovation milieu, is a great impediment to adoption of new technological innovations.

The following points also deserve government's attention:

- The high costs of the project imply difficulties on the sustainability front. The project description does offer some reflections on how sustainability shall be ensured but it still remains a difficult propositions in the event, World Bank exits in which case the Government of Punjab may find it hard to sustain the financial commitments for project implementation.
- The technical and operational sustainability of the project will only be ensured if existing transparency and system strong checks and balances that the department of agriculture has maintained until now, continues.
- The operational sustainability of smart also depends upon the interest and efforts of other contributing departments some of which do not seem to have shown the interest and progress that the DA has shown. Clearly better integration and coordination within the government would be vital for sustainability and also remain a key challenge.

3.3. Empowerment of Kissan through Financial and Digital Inclusion

The project seeks to achieve the following objectives:

- Facilitate the small farmers for buying timely inputs at affordable Price.
- Provide markup free loans.
- Empower farmer with latest production technologies and information.
- Provide smart phones with preloaded mobile apps to the farmers.

- Empower farmers both digitally & financially.

The project has a 3 years implementation timeframe from 2017-18 to 2020-21 and project is being implemented with the help of selected banks/MFBs to empower the farmers with both technology and financial support.

During the field visit to Bhakkar, the BIPP research team discovered that access to Kissan voucher was highly politicized. The vouchers are reportedly neither distributed with fairness and equality nor under the supervision of a neutral government or non-government functionary despite in the presence of a formal distribution strategy. Even though farmers think that agri credit could be extremely useful in providing them with some financial relief in the face of adversities like the exploitative clutches of the *Aarthi* and ever-increasing rate of interest charged by local money-lenders, their access to the voucher was limited by factors impacted by politics and local power hierarchies.

A review of the world practices and literature was also carried out by BIPP research team to see the extent to which the project conforms to the success stories in financial and digital inclusion. A relevant research study by S.S Acharya on the effectiveness of financial and digital inclusion of the farmer through rural credit, RFIs and Kissan Cards (yet to be launched) bears testimony to the fact that given the South Asian agriculture context (poverty status and agri characteristics like for instance agro-ecological conditions, etc. being very similar in the Indian and Pakistani Punjab), financial support to the farmer is a much needed and necessary government intervention. Acharya makes the following key observations to substantiate his claims.

- Kissan Credit Cards and the financial inclusion initiative have really been instrumental in the impressive rise in agricultural credit and not credit subsidies and the sharp rise in the share of short-term credit in the proportion of input costs points towards diversion of subsidized credit for non-agricultural purposes.
- The unmet demand for rural credit is considerable. Local moneylenders continue to provide credit to the rural families, as the reach of institutional agencies to weaker sections has remained poor. Meeting the credit needs of 25 million nonfarm informal sector enterprises continues to be a challenge to the rural financial institutions (RFIs).
- The rate of interest charged by RFIs from farmers is considerably higher than that charged by financial institutions from urban consumers. This is beyond the means of owners of small or marginal farms, which are nonviable or viable at the margin, and the self-employed in the informal sector. Despite an understanding reached between the Indian Banks Association and the government in the presence of the Reserve Bank of India (RBI) that crop loans will carry single-digit interest, banks were reportedly charging 12% to 14% interest.

Malawi's experience with voucher schemes and coupons, subsidies and rural credit provides contradictory evidence especially on input subsidies by arguing that input subsidies are not a quick fix for dealing with high food and fertilizer

prices. They must target and promote smallholders' incremental access to and productive use of inputs, build sustainable demand and private sector supply, and be integrated with other policies for increasing agricultural productivity, rural development and management of incremental production to provide rural people with reliable improvements in food access and real incomes.

Dorward et.al (2008)[2] believe that the voucher or coupon system can be an effective way of rationing and targeting subsidy access to maximize incremental production and economic and social gains, with opportunities for innovative public/private partnerships to develop input supply and demand systems. Still, there are many practical and political hindrances which dampen the effect of program design and implementation to increase efficiency, control costs and limit patronage and fraud.

It is heartening to note that the Agriculture Department, in the new agriculture agenda, intends to ensure integration of subsidies' elimination in the relevant broader policy prescriptions aimed at enhancing agriculture productivity and profitability.

The following points are also highlighted for government's consideration:

- The relevance of the project in regard to digital inclusion seems needs to be improved based on the modern interventions in the agriculture sector around the world but also when compared with other projects of DA in Punjab. SMART especially seeks to make farmers self-reliant in the use of ICT and technology to increase productivity, incomes and farming education o that they become less dependent on the extensions advice as also the technical and financial subsidies provided by the government.
- The impact of the project, in terms of the current farmer reliance on subsidies could have been much greater if higher efficiency could have been achieved on the operational side which currently is strongly affected by the inequitable and asymmetric access to the vouchers.
- If similar operational hazards find a place in the distribution of Kissan cards, their desired impact may also not be achieved. It is important that distributions be done through a transparent manner by involvement of a third party distributions firm who shall be able to devise mechanisms for equitable distribution of cards.
- Institution of a robust monitoring and accountability system is a must to depoliticize the vouchers scheme and ensure fair and equitable distribution.
- In order to ensure financial inclusion as also the use of credit only and only for agricultural purposes, it is imperative to integrate local service providers and encourage private (financial institutions)-public sector partnership in credit/ vouchers distribution.

[2]Dorward et. Al, (2008). Towards 'smart' subsidies in agriculture? Lessons from recent experience in Malawi. Natural Resource Perspectives. Overseas Development Institute.

- The voucher scheme must be integrated with consultancy and advisory services of the extension outfit of the department to guide and train the recipient farmers on the optimal use of inputs and the cropping cycle and pattern.

3.4. Extension Service 2.O – Farmer Facilitation through Modernized Extension

The project aims to assist the farmers by modernizing the extension services in two specific areas:

- soil testing to provide an accurate assessment of the soil fertility status, which can be used to make fertilizer recommendation; and
- Development of soil database by using ICT tools such as GIS to make the information public with more certainty and reliability.

The project has a 5 year implementation timeframe from 2015 to 2020.

During the KII with the World Bank team, it was emphasized that Punjab needs to learn from the international best practices in extension, especially from the developed countries of Europe which have made significant progress in agriculture. The conceptual design of the project or the ways and methods through which the department expects to roll it out were seen to be reasonably appropriate. But the concern was regarding the relevance of doing so in the modern day when government provided extension services, that are often seen as making the farmer technically reliant on the extension workers and therefore less enterprising and innovative, are considered perpetually deficient in outreach, capacity and expertise.

The World Bank team also averred that the extension support services by the Government were tantamount to providing technical subsidies that need to be phased out in the long-term since they tend to cause market failures by increasing the costs of the government to levels that are unsustainable. Farmers should be financially independent and viable to afford private consultants that provide extension support as is the case in the more developed countries of the world.

The literature review (a paper by Prokopy et.al) on the role of extension workers, closely relevant to the extension support services in Punjab provides interesting lessons which could be factored in by DA in the interventions being made under extension 2.0. These are:

- Extension budgets are diminishing, and extension personnel are stretched thin with numerous, diverse stakeholders and decreasing budgets.
- Farmers are more likely to go to private retailers and consultants for information than extension.

- Extension needs to continue to foster its relationship with private information providers because working through them will be the best way to ultimately reach farmers with climate change information.
- Extension educators must be better informed and trained; university specialists and researchers can play a critical role in this training process.

In addition, we wish to make the following specific points:

- The project is overwhelmingly geared to the extension services based on soil science from soil sampling to analysis to recommendations on fertilizer application based on missing/insufficient nutrients on specific plots of land. These are important factors but water availability, pest treatment, temperature variations and climate change impact, crop cycle management, agriculture good practices for commercializing agriculture are critically needed to help transform agriculture and increase productivity and profitability. Basically, it is a project to strengthen soils aspect, which is of great importance in its own right, but it is not at all modernization of extension services.
- The project should have provided for synergies and linkages with the activities of other departments materially relevant to agriculture e.g., water management activities of Irrigation Department, Environment Department for better land, water resource management etc.
- The inclusion of certain ICT tools like web portal, GIS and soil database in a soil-focused project do not make any traditional extension service modern. If the government considers this project to modernize extension service, it is difficult to technically justify in view of the persistent weaknesses in the overall extension system.
- The project design is weak not only because it has too broad objectives hence unrealistically ambitious, but also because of its underlying assumptions. For example, one main assumption is that all farmers, have at least minimum literacy and computer knowledge to benefit from a web portal, which is questionable. There is another assumption that various fertilizers are readily available in villages on time, in sufficient quantity and at reasonable cost. At times, factors like local politics, artificial shortages etc. become serious hurdles in fertilizer availability.
- The project period is five years, and most of the time seemingly is to be spent on collection and analysis of a large number of soil samples. It is not clear when the entry point for extension is.
- Knowledge of and extension advice on soils and fertilizers is but only one of the needs of farmers. The office of the DG Extension in Punjab already seem to have something similar to a web portal containing useful information for farmers, covering several technical areas.
- Also, the determination of nutrient status has to be agro-ecological zone specific to recommend fertilizers and nutrient type and dosage.

- Capacity building/training, a very important aspect in using extension agents for any specific project, is not well pronounced if not totally ignored.

The Department should also benefit from the USAID policy brief on Extension and Adaptive Research of July 2017 which embodies some good recommendations on facilitating the role of the private sector in the provision of agricultural services, capacity strengthening of the extension services (shift to crop-specific extension, better inter-agency linkages, training and development of extension staff etc).

3.5. Punjab Irrigated Agriculture Productivity Improvement Project (PIPIP)

The salient objective of the project is to improve water productivity i.e., producing more crops per drop. More specifically, the project seeks to achieve the following:

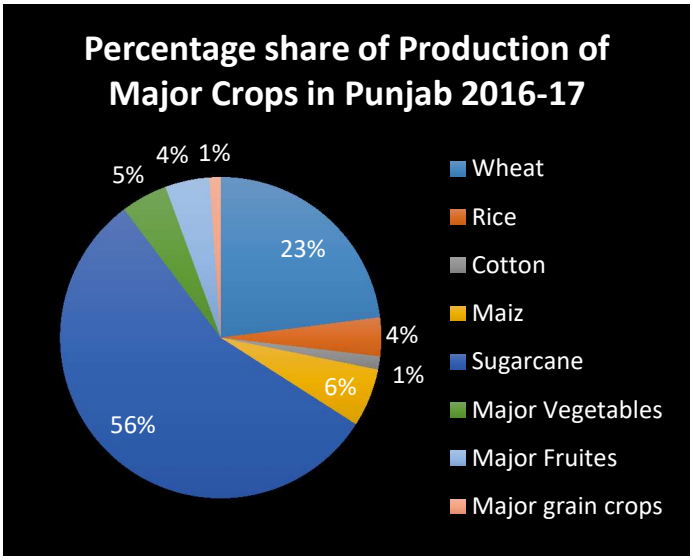
- improve productivity of irrigation water by efficient conveyance and its effective farm level use by adopting conservation agriculture practices;
- produce more profitable crops through installation of HEISs;
- strengthen private sector services delivery capacity and sustainability for supporting irrigated agriculture; and,
- Build capacity of stakeholders for better management of irrigation water and attaining higher crop yield with less production cost.

The project has a 9-year implementation time frame from 2012-13 to 2020-21. Water is pivotal to sustain agriculture growth and productivity. More than 80 percent of Pakistan's cropped area is irrigated and about 90 percent of the agriculture output comes from the irrigated lands which speak of the high relevance and impact that the project has the potential to create, if implemented with the diligence and commitment it requires. The latter part of the report, however, provides a comprehensive analysis of HEIS and PIPIP, water usage as an input cost to the farming process and the agriculture sector and how its wastage impacts the efficiency of the sector and the sustainability of not only agriculture but also household consumption and industrial sectors.

Chapter 4: Policy Review and Analysis

4.1 Situation Analysis -- Direction of Agriculture Growth (Major Crops)

FIGURE 7: PERCENTAGE SHARE OF PRODUCTION



For the last few decades, the agriculture sector has been facing a spectrum of dilemmas due, inter alia, to high prices of agriculture commodities and climate change. When the agriculture sector ultimately crashed to -.5 % growth in FY 2015-16, the Government of Punjab embarked on some drastic remedial steps to resuscitate the sector. As a result, the sector witnessed a record-breaking increase in growth from negative to 3.5 % in the overall agriculture sector while 4.2 % in major crops against the target of 2.5 % in just one year. During FY 2016-17, 22.2 million tons of wheat was harvested, the highest ever in the history of Punjab (and Pakistan) since 1947.

Overall, staple crops including wheat, sugarcane, rice, cotton and maize account for 25.6 % of value addition in agriculture and 5.4 % of GDP. Other crops contribute 11.6 % value addition to agriculture.

Given the diversity of the agriculture sector, the major thrust of the Department now is to balance staple food crops, higher value horticultural crops, and other commercially beneficial and export-oriented products. An enterprising farming community, commodity exports through the China Pakistan Economic Corridor (CPEC) and rural transformation through use of Information and Communications Technology (ICT) in farming will help to implement farmer-centric and precision agriculture. The Agriculture Department is also determined to harness the benefits of Public Private Partnerships (PPPs) that can be instrumental to achieve long-term sustainability and bring a wider range of benefits for the farmers especially the small holders.

The Agriculture Department is committed to transforming the agriculture sector into a progressive and modern sector that can not only address food security challenges but also compete in the domestic and international markets. In order to realize this commitment, the government has introduced numerous institutional and market reforms: the government seeks to make

technology and credit more accessible for the larger agricultural populace. The immediate relief program through Kissan Package, the Punjab Government executed a comprehensive set of subsidies for the agriculture sector (a targeted subsidy on Potash Fertilizer through branchless banking without involving any intermediate channels). The main challenge, however, is to ensure that subsidies are targeted, efficient and effective.

To uplift the economic conditions of farmers and provide finance to access agricultural inputs etc., the Government launched interest free loans scheme involving various banks and micro financial institutions. 125,000 farmers out of whom 93 % are new to banking have already benefited. This is eloquent testimony of financial inclusion as one of the notable achievements.

The regulatory role of the public sector is being strengthened and necessary reforms introduced to ensure effective participation of the private sector in service and input-output delivery systems. Cross-cutting themes across all wings, directorates, research bodies of Agriculture Department including advocacy, capacity building, climate change interventions, gender disparities etc., have been pervasively espoused and pursued.

The World Bank is also supporting the Department with a $300 million project to modernize agriculture in the province. The SMART Punjab P for R will help the government promote transformational change in the crop and livestock subsectors by focusing on activities contributing to three Results Areas: (1) increased on-farm productivity and value of agriculture and livestock; (2) increased value addition and competitiveness of agriculture and livestock; and (3) enhanced resilience of smallholder farmers to climate change and natural disasters. Each Results Area involves a specific combination of policy reforms, institutional strengthening, and public investments.

4.1.1. Punjab's Dominant Share

Agriculture is central to economic growth in Punjab as its contribution to national agricultural economy is overwhelming. It grows 85% of the national maize, 77% of wheat, 66% of sugarcane, 65% of cotton, 51% of rice, 78% of grain crops (Bajra, Barley, Castor seed, Gram, Groundnut, Jowar, Linseed, Mash, Masoor, Moong, Rapeseed and Mustard, and Sesame), 65 % of major fruits (Apple, Apricot, Banana, Citrus , Dates , Grapes , Guava, Mango, Peach, Pears, Plum and Pomegranate) and 65% major vegetables (Chilies, Garlic, Onion, Potato, and Tomato). Table 1 below provides a snapshot of production of major crops in Punjab in comparison to other provinces:

TABLE 7: PRODUCTION OF MAJOR CROPS IN 2016-17

Provincial Production of Major Crops in 2016-17 (Percentage Share)				
Crops	**Punjab**	**Sindh**	**Khyber Pakhtunkhwa**	**Balochistan**
Wheat	76.73	14.66	5.12	3.49
Rice	50.74	38.86	2.31	8.10
Cotton	65.39	33.71	0.01	0.89
Maize	85.38	0.06	14.51	0.06
Sugarcane	65.73	26.77	7.46	0.04
Major Vegetables	64.66	16.77	7.59	10.99
Major Fruits	64.70	13.19	4.77	17.34
Major Grain Crops	78.32	9.57	5.11	7.00

Source: AMIS
Vegetables includes: Chilies, Garlic, Onion, Potato, Tomato,
Fruits include: Apple, Apricot, Banana, Citrus, Dates , Grapes , Guava, Mango, Peach, Pears, Plum, Pomegranate,
Other grain crops includes: Bajra, Barley, Castor seed, Gram, Groundnut, Jowar, Linseed, Mash, Masoor, Moong, Rapeseed And Mustard , Sesame

The major crops rice, cotton, wheat, sugarcane and maize account for 23.8% of the value added in overall agriculture and 4.66% of GDP. The other crops account for 11.03% of the value added in overall agriculture and 2.15 % of GDP. During 2016-17 the growth in crops was 3.02 % against the negative growth of 4.97 % during the same period last year. The growth in sub sector of important crops, other crops and cotton ginning was 4.12 %, 0.21 % and 5.59 %, respectively against last year growths of -5.47 %, 0.59 % and -22.12 % respectively.

The performance of five major crops, wheat, cotton, rice, maize and sugarcane is given below.

Wheat

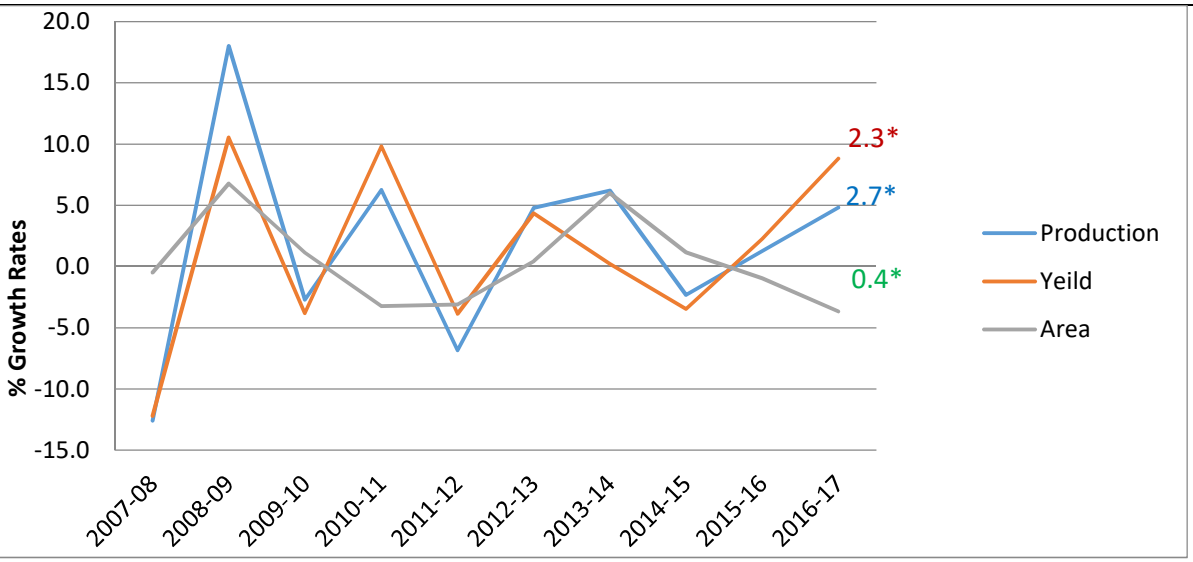
Wheat is one of the main agricultural crops in Pakistan. It contributed about 9.1 % of value added in agriculture and 1.7 % of the country's gross domestic product (GDP) in 2017-18. In 2014-15, wheat produced in Punjab contributed 1.62 % to the national GDP and 7.7 % to national value added[3].

During 2016-17, wheat crop of Punjab was cultivated on an area of 16,458 thousand acres showing a decrease of 3.7 % compared to 17,084 thousand acres during the corresponding period last year. Wheat production stood at 20,466 thousand tons during 2016-17 recorded an increase of 4.8 % over the

[3] Agricultural Sectoral Plan 2015

production of 19,527 thousand tons last year. It needs to be noted that increase in production is largely due to increase in yield, though area devoted to wheat only increased marginally. The statistics of last decade for wheat production, area and yield are shown in the figure 8.

FIGURE 8: GROWTH RATE OF WHEAT IN PUNJAB



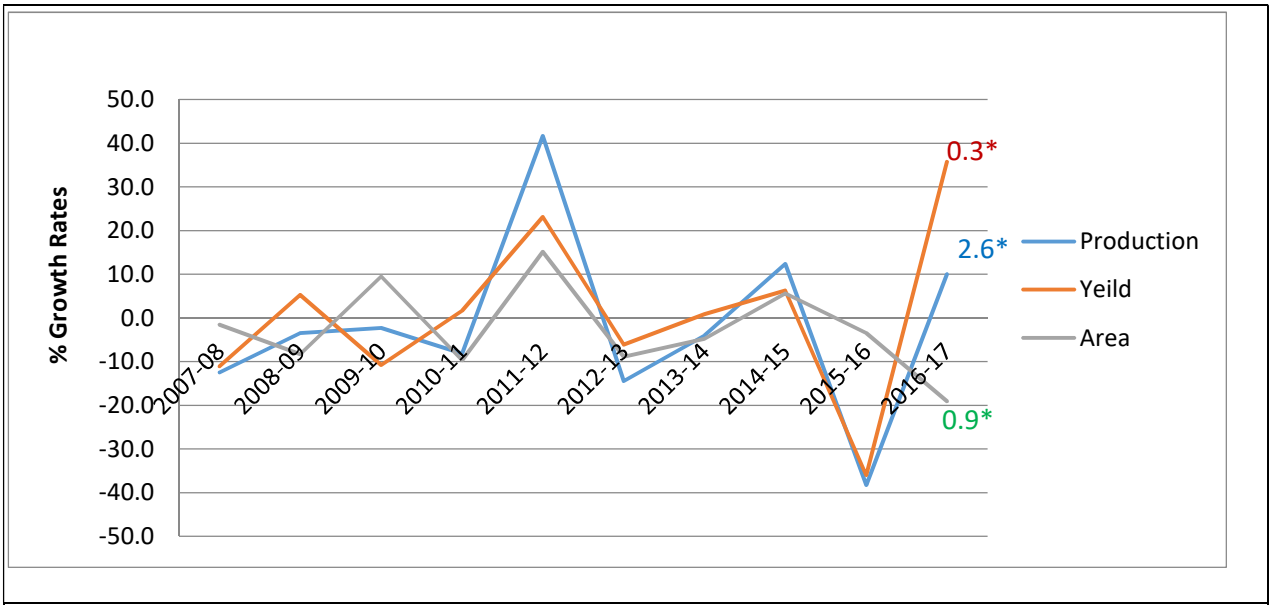
Source: AMIS
*Ten years Average Growth rate

The ten years average growth rate of Punjab in the last decade for wheat production, area and yield is 2.7 %, 2.3 % and 0.4% respectively. The Punjab's wheat production recorded a growth of 4.8 % in 2016-17 from negative growth of 12.6 % in 2007-08 while the area of wheat recorded a negative growth of 3.7 % in 2016-17 from negative growth of 0.1 % in 2007-08.

Cotton

Cotton is a highly important source of raw material for the textile industry and contributed 1.0 % share in GDP and 5.5 % in agriculture value addition during 2017-18 compared to 1.1 % contribution to national GDP and 5.18 % to national value added in 2016-2017. During the 2016-17, cotton crop of Punjab was cultivated on an area of 44856 thousand acres showing a decrease of 19.1 % compared to 5542 thousand acres during the corresponding period last year. Cotton production stood at 1187 thousand tons during 2016-17 and recorded an increase of 10 % over the production of 1079 thousand tons last year. The statistics of last decade for cotton production, area and yield are shown in the Figure 9.

FIGURE 9: GROWTH RATE OF COTTON IN PUNJAB



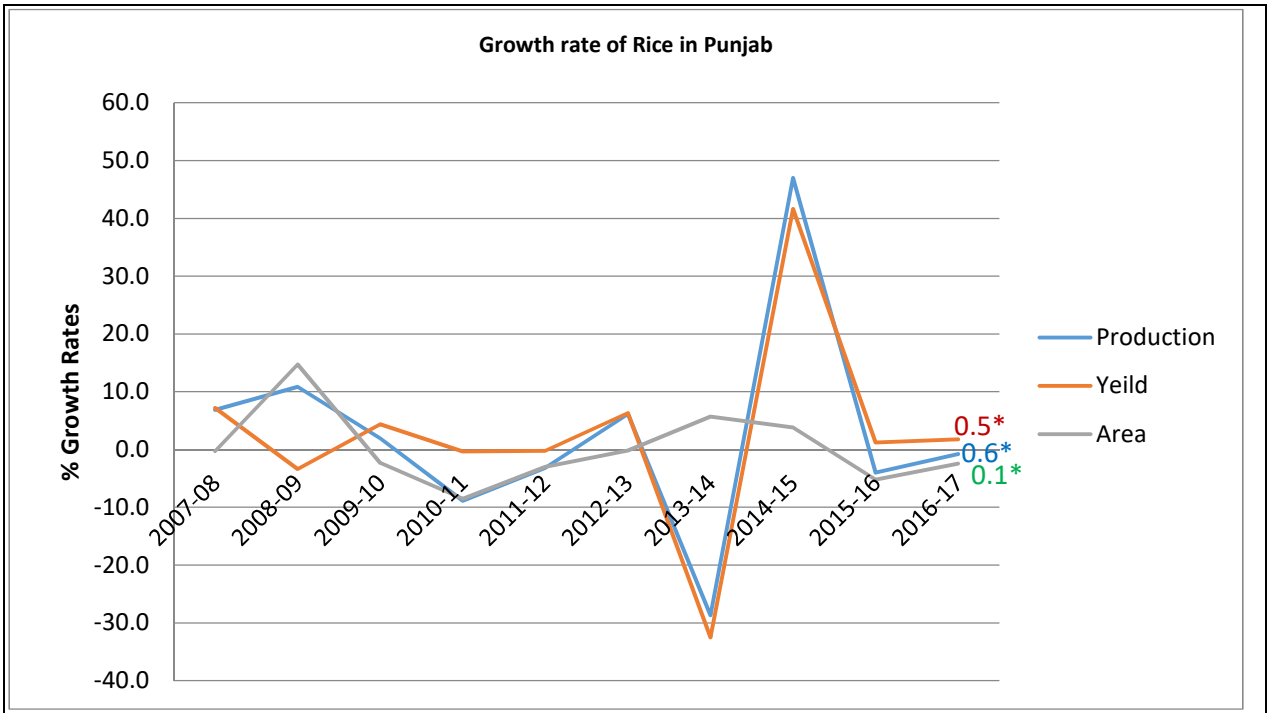
Source: AMIS
*Ten years Average Growth rate

The Punjab's ten years average growth rate of last decade for cotton production, area and yield is 2.6 %, 0.9 % and 0.3 respectively. The Punjab's cotton production recorded a growth of 10 % in 2016-17 from negative growth of 12.4 % in 2007-08 while the area of cotton recorded a negative growth of 19.1 % in 2016-17 from negative growth of 1.6 % in 2007-08.

Rice

Rice is an important food and cash crop, second staple food grain crop of Pakistan. It accounts for 3.1 % in the value added in agriculture and 0.6 % of GDP. The rice produced in Punjab contributed 0.36 % to national GDP and 1.66 % to national value added. During the 2016-17, rice crop of Punjab was cultivated on an area of 4291 thousand acres showing a decrease of 2.5 % compared to 4399 thousand acres during the corresponding period last year. Rice production stood at 3475 thousand tons during 2016-17 and recorded a decrease of 0.8 % over the production of 3502 thousand tons last year. The statistics of last decade for rice production, area and yield are shown in the Figure 10.

FIGURE 10: GROWTH RATE OF RICE IN PUNJAB



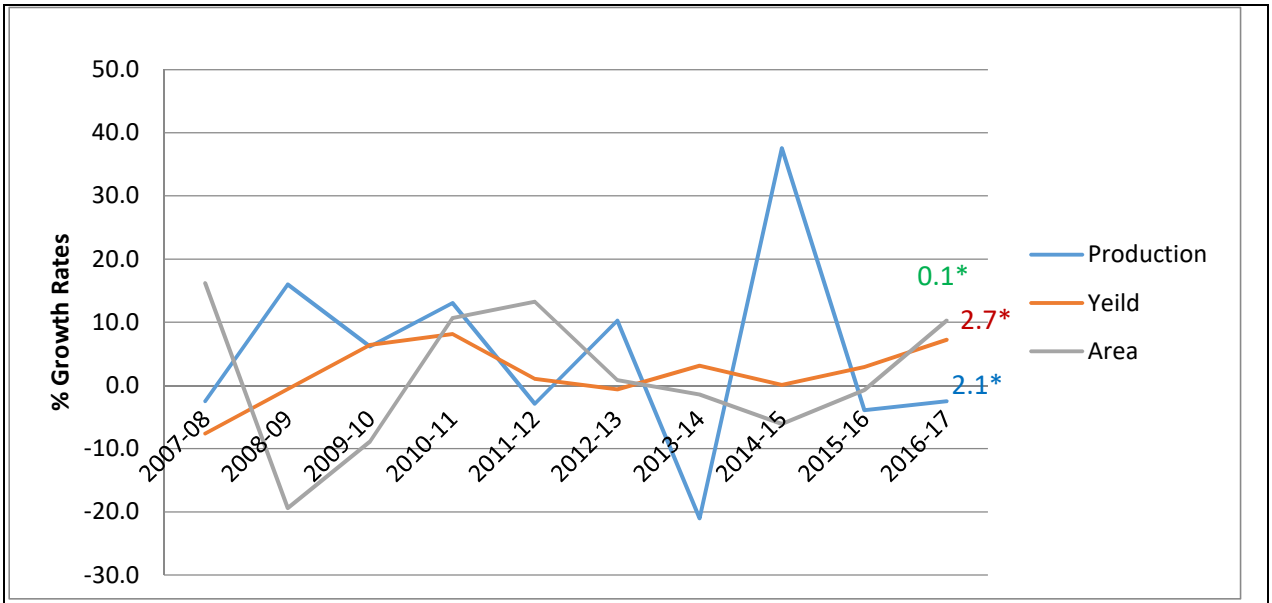
Source: AMIS;
*Ten years Average Growth rate

The Punjab's ten years average growth rate of last decade for rice production, area and yield is 0.6 %, 0.1 % and 0.5 respectively. The Punjab's rice production recorded a negative growth of 0.8 % in 2016-17 from positive growth of 6.8 % in 2007-08 while the area of rice recorded a negative growth of 2.5 % in 2016-17 from negative growth of 0.3 % in 2007-08.

Sugarcane

Sugarcane is high value cash crop and provides raw material to sugar and related industrial production. It accounts for 3.6 % in agriculture's value addition and 0.7 % in overall GDP. The sugarcane produced in Punjab contributed 0.44 % to national GDP and 1.95 % to national value added. During the 2016-17, sugarcane crop of Punjab was cultivated on an area of 1922 thousand acres showing an increase of 10.3% compared to 1743 thousand acres during the corresponding period the previous year. Sugarcane production stood at 49613 thousand tons during 2016-17 and recorded an increase of 18.2 % over the production of 41968 thousand tons the previous year. The statistics of last decade for sugarcane production, area and yield are shown in the following.

FIGURE 11: GROWTH RATE OF SUGARCANE IN PUNJAB



Source: AMIS
*Ten years Average Growth rate

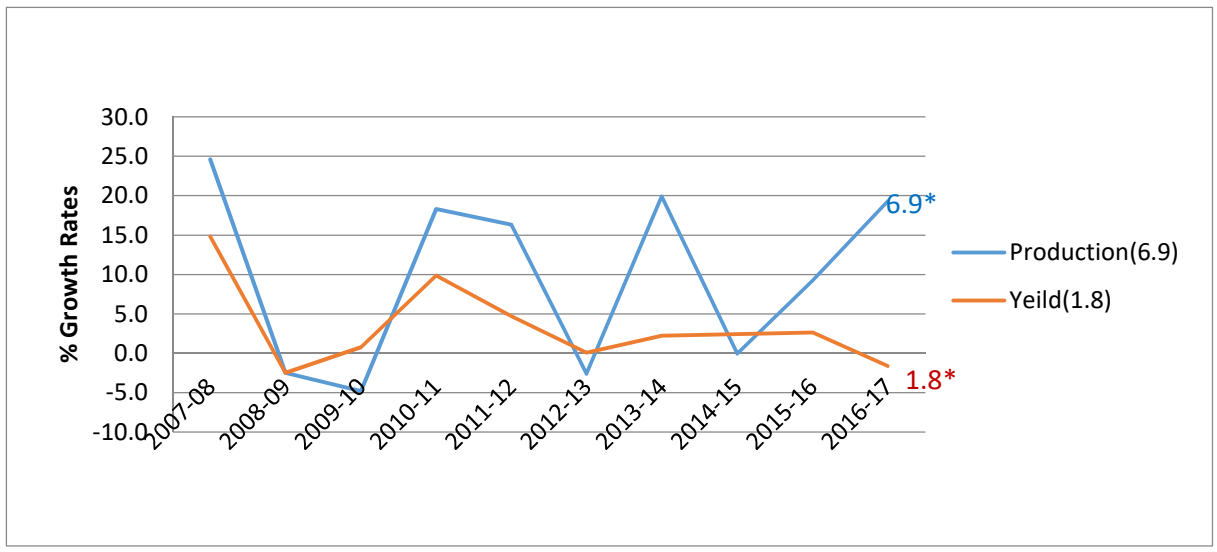
The Punjab's ten years average growth rate of last decade for sugarcane production, area and yield is 2.1 %, 0.1 % and 2.7 respectively. The Punjab's sugarcane production witnessed a significant growth of 18.2 % in 2016-17 from growth of 7.8 % in 2007-08 while the growth of area decreased from 16.2 % in 2007-08 to 10.3 % in 2016-17.

Maize

Maize is considered an enriched food grain. It contributes 2.4 % value added in agriculture and 0.5 % to GDP. The maize produced in Punjab contributed 0.44 % to national GDP and 1.95 % to national value added. During the 2016-17, maize production in Punjab stood at 5237 thousand tons during 2016-17 and recorded an increase of 19.3 % over the production of 4391thousand tons the previous year.

The statistics of last decade for maize production, area and yield are shown in the Figure 12.

FIGURE 12: GROWTH RATE OF MAIZE IN PUNJAB



Source: AMIS
*Ten years Average Growth rate

The Punjab's ten years average growth rate of last decade for maize production and yield is 6.9 % and 1.8 respectively. The growth rate maize production in Punjab decreased from 24.6 % in 2007-08 to 19.3 % in 2016-17.

4.1.2. Agricultural Exports

Punjab is the hub of agro-food exports of Pakistan. The export performance of the country, therefore, represents the performance of the province. It holds immense potential to benefit from the exports of agriculture and food products. There are four distinct advantages which are unique to the country/province: (i) agro-ecological and seasonality advantage which implies that the international demand for agriculture and food products could be adequately met by suitably orientating the production cycle to the peak demand and lean supply period in the export market; (ii) the largest contiguous irrigation system; (iii) proximity to the international markets in Europe, Middle East, Central Asia and China with both time and transportation cost competitiveness; and (v) relative cheap labor cost compared to the competitors especially from Australia and South America. In fact labor cost in India and China is also going up, that would lead to larger window for export to these huge markets. The new ecological zone developed in Punjab do provide an opportunity to establish or revisit Punjab comparative advantage in agriculture.

The new Punjab Agriculture Policy 2018, does not adequately spell out harnessing the potential for export led growth of agriculture though it very well recognizes the need to develop a competitive agriculture which is a prerequisite for increasing market share in domestic and export markets. Policy steps being suggested include -greater role of private sector in developing modern

agricultural system. The shift to more private sector agriculture also must be supported by significant improvements and supporting development in the agricultural value chain, including its agricultural marketing system. Further it emphasizes that overall, unproductive subsidies in agriculture should be phased out, the productive ones should be better targeted and the savings in resources from these should be diverted to higher value areas which can compete well in high end export markets. If these output market institutions work properly, the scope for a more diversified and higher valued agriculture can grow and so would be possibility of exports.

In addition, to get maximum benefits from CPEC, the Punjab/Pakistan government should assess and negotiate tariff and non-tariff measures and pursue business opportunities including branding and marketing with Chinese and Central Asian firms that ensure inclusive, unskilled, labor-intensive growth in Punjab's agriculture. The development of domestic commerce and a pro-Punjab investment policy will be essential to maximize gains from CPEC. This can best be managed by the proposed Agriculture Innovation Fund and associated programs, which are presented below. A joint China-Pakistan team acting as an Advisory and Mediation Council should evaluate linkages of CPEC to smaller, poorer and more remote sectors and regions of the Punjab to ensure that adequate benefits flow to them. Punjab should also take lead in developing global value chain (see box) to promote exports in light of growing Chinese imports.

Box 1: Need for Pakistan to be Part of China Global Value Chains – how Punjab can Benefit

The trade deal under second round of CPFTA should aggressively promote the idea to Pakistan be the part of Chinese global value chains. There are two possibilities, first Pakistan could be part of existing Chinese global value chains with greater intensity. The efforts are aggressively perused under current negotiations. The focus should be seeking concessions in areas where the strengths of the two countries complement each other thereby encouraging intra-industry trade.

Second, Pakistan to make a case with China to consider relocation of export oriented Chinese industries to Pakistan like low cost farm machinery, cotton value addition and food processing. The CPEC cells created at in Punjab level can undertake studies to bench mark the cost comparisons for commodities that are feasible from China perspective to relocate in Punjab/Pakistan. The selling point may be the low cost of Punjab labor that would provide Chinese companies an opportunity to expand their operation though our labor will have to develop the Chinese matching skills required for each industry to be set up in Pakistan. It is known that concessions are being requested in Chinese "Sunset" industrial sectors which would incentivize Chinese investors to relocate their production facilities in Pakistan.

Relocating of Chinese industries to Punjab will not only lead to much needed diversification but also to enhance efficiency of low-skilled labor-intensive industry as well as be instrumental in technology transfers, channelizing the economies of scale, and adding value to the production chains in sectors like agriculture, agro-industry and information technology. Above all a window to enhance Punjab exports.

To give overall perspective at national level the following Table manifests the export performance of agriculture sector in the recent years. It is sadly evident that during 2016-17, agro-food exports registered substantial decline by 7.7 percent. While this is indicative of one year's performance, the data is consistent with the observation of a structural issue faced by exports over a longer period as well.

The poor performance of exports in recent years are attributable to: weak external demand, lost textile share to new competitors in international markets, lack of value-addition, unfavorable terms of trade for exports, appreciation of real exchange rate and energy shortages.

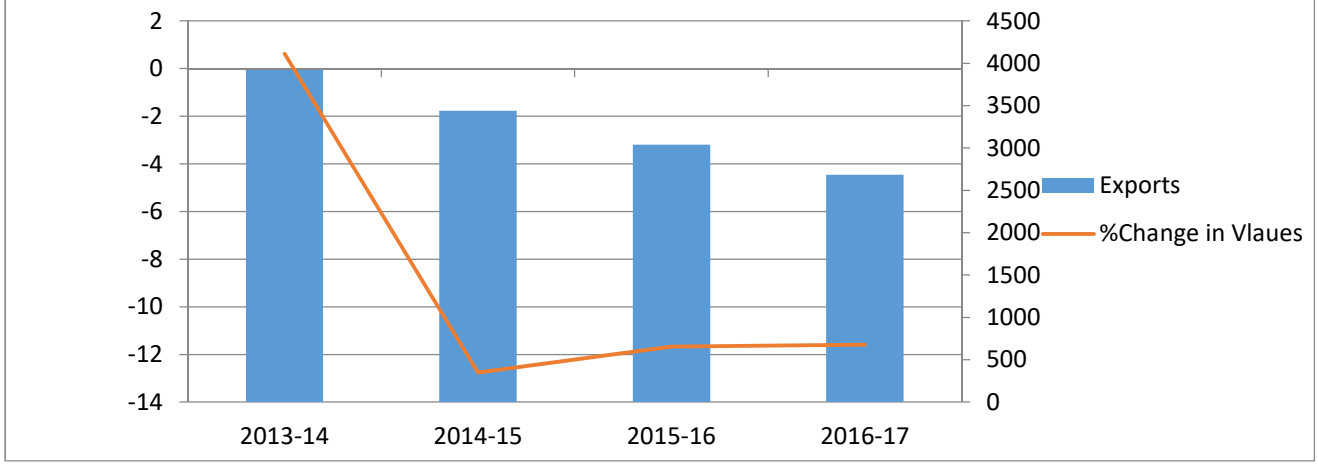
TABLE 8: RECENT EXPORT PROFILE -VALUE IN US$ THOUSAND

SUMMARY	JULY-JUNE		% CHANGE
	2016-17	2015-16	
Grand Total	**20,422,236**	**20,786,510**	**(1.75)**
Agro& Food	**3,386,984**	**3,667,856**	**(7.66)**
Textile Group	**12,172,990**	**12,142,035**	**0.25**
Metal & Minerals	**256,352**	**240,865**	**6.43**
Engineering Manufacturing Goods	**2,215,709**	**2,260,532**	**(1.98)**
Other Sectors	**2,390,201**	**2,475,222**	**(3.43)**
Source: Trade Development Authority of Pakistan			

4.1.3. FOOD GROUP EXPORTS OF PAKISTAN

As for the food group exports, it witnessed a decline of 11.58 % during 2016-17 as compared to 0.63 in year 2013-14. Within food group, rice exports declined by 14.9 % in 2016-17 from 16.40 % in 2013-14.There are many reasons for declining trend in Food Exports that include fall in the international commodity prices during that period (i.e., The Basmati rice declined by 7.5 percent in value and 3.9 percent in quantity during July-March FY2017 as compared to corresponding period last year suggesting a fall in the global basmati rice prices during the period. However, month on month basis in March its exports value increased by 8.0 percent despite sharp decline in quantity by 8.8 percent, showing a reverse trend in the prices of basmati rice.), lack of R & D, lack of exportable surplus, strong competition in international market. We need to promote innovation, R & D, and trade diversification. This would help domestic industries to improve its production base and integrate with international businesses.

FIGURE 13: FOOD GROUP EXPORTS OF PAKISTAN



Source: Pakistan Economic Survey 2016-17

4.1.4. Pakistan's Major Exports Competitiveness

The following Table shows the top ten exports of agriculture commodities of Pakistan of which a major share is that of Punjab. So in our view the following sector represents well the need to develop Punjab based exports.

TABLE 9: TOP TEN EXPORT OF AGRICULTURE COMMODITIES OF PAKISTAN

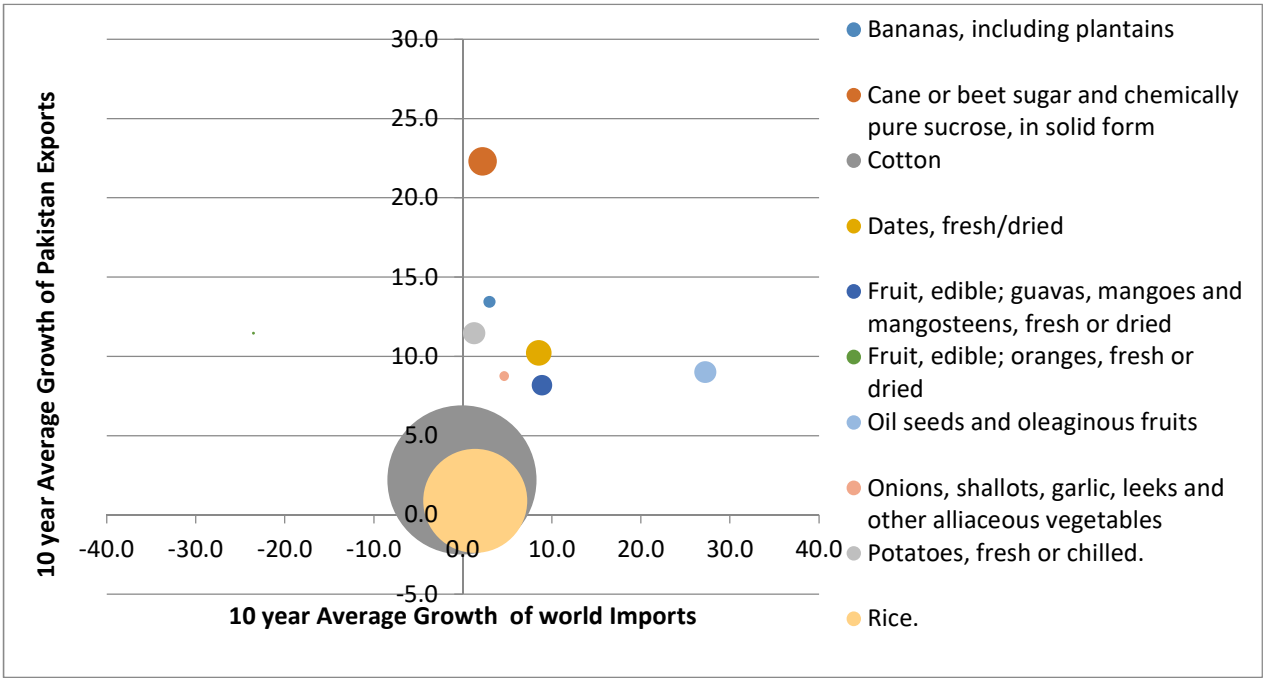
		Pakistan Competitiveness		
		World Imports	**Pakistan Exports**	**Exports of final year in US $**
		10-year Average Growth	**10-year Average Growth**	**2016**
1	Bananas, including plantains	3.0	13.4	22575138
2	Cane or beet sugar and chemically pure sucrose, in solid form	2.2	22.3	126783637
3	Cotton	-0.1	2.2	3497373555
4	Dates, fresh/dried	8.5	10.2	102596397
5	Fruit, edible; guavas, mangoes and mango stems, fresh or dried	8.9	8.2	65834992
6	Fruit, edible;	-23.5	11.5	1320441

	oranges, fresh or dried*			
7	Oil seeds and oleaginous fruits	27.2	9.0	75107953
8	Onions, shallots, garlic, leeks and other alliaceous vegetables	4.6	8.8	15203465
9	Potatoes, fresh or chilled.	1.3	11.5	78187426
10	Rice.	1.4	0.9	1703048708

Source: UN Comtrade
*The International sources do not recognise Kinnow. That's why we consider the Oranges.

On the import side, oilseeds and oleaginous fruits have shown the highest growth (27.2%) in the past ten years. On the exports, it is evident that all above mentioned crops have very high growth rates except for cotton and rice which is 2.2% and 0.9% respectively. The graph below shows the major exports competitiveness of Pakistan:

FIGURE 14: PAKISTAN'S MAJOR EXPORTS COMPETITIVENESS



Source: BIPP's Research Analysis

Figure 14 provides an insight into competitiveness of our top exports. Cotton tops the export list in value terms. Rice, the second most important commodity is also performing well. Other crops show small shares as compared to these two above mentioned crops.

4.1.5. Export Policy

Pakistan liberalized its trade policy considerably between 1996 and 2003 in terms of simplifying the tariff structure, eliminating most quantitative restrictions and lowering tariff rates while also abolishing many state trading monopolies for agricultural products. However, reforms got off track in 2006 when there was reversal of a number of more important liberalizing reforms in agriculture, notably related to wheat, sugar and fertilizer policies. Furthermore, in 2008, the government introduced several Regulatory Duties, in addition to the expansion of SROs–Statutory Regulatory Orders–which, since 2006, were used both to give exemptions to normal tariffs, in some cases, and to increase tariffs in others.

Table 10 shows the status of current policy with respect to agricultural items.

TABLE 10: EXPORTS POLICY FOR AGRICULTURE INPUTS AND OUTPUTS

Products	**Status**
Rice	Subject to the conditions and procedures specified by the Ministry of Commerce; obligatory pre-shipment quality inspection
Wheat	Freely allowed
Sugar	Organic Brown Sugar
Urea	Subject to the approval of ECC of the Cabinet on case to case basis.
DAP, NAP, and other Fertilizers	Except re-export of fertilizer by UNDP and other UN agencies.
Cotton	(i) Export contract registration with TDAP against security deposit of 1% of the contract value and presentation of the same before customs authorities with shipping documents along with cotton grading and classification certificate issued by the Pakistan Cotton Standards Institute. (ii) An irrevocable letter of credit shall be opened by the buyers within thirty-five days and the shipment of contracted quantity shall be completed within one hundred and eighty days of the registration of contract. In case letter of credit is not opened within the stipulated time or non-performance of the contract the security deposit shall be forfeited by the State Bank of Pakistan proportionate to the quantity not shipped. (iii) The export of cotton shall be allowed on the basis of types as well as grades. The exporters shall, however, mention the grade equivalence on the shipping documents if they opt to export the cotton on type basis and the requirement of classification and grading certificate in such cases, shall be dispensed with, if the ginned cotton is packed in export packing.

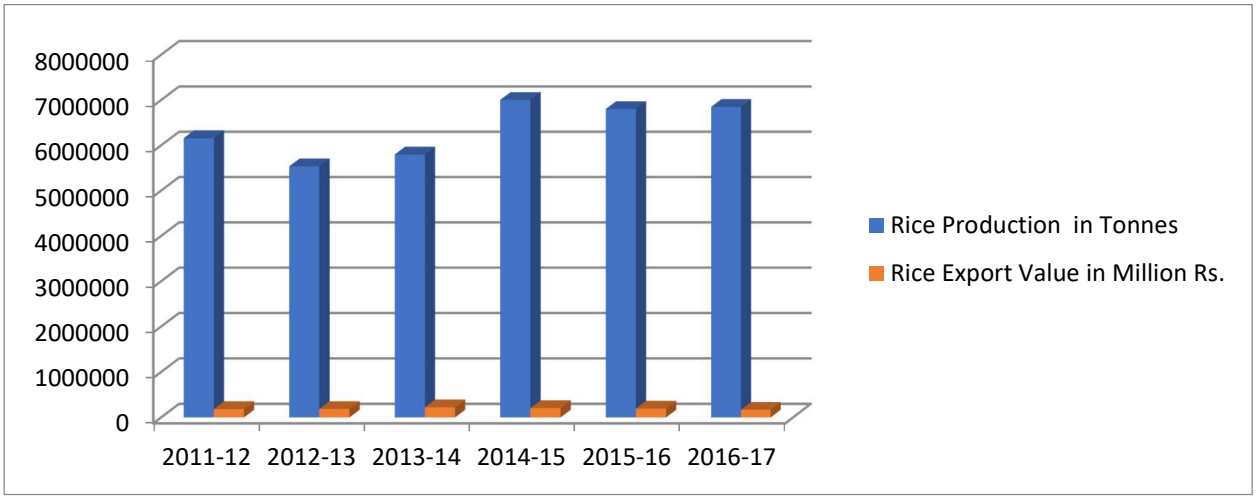
Source: Trade development Authority of Pakistan

4.1.6. Export Performance of Key Commodities

Rice

Figure 15 shows that rice production has generally declined in recent years and exports have fluctuated, in line with fluctuating global prices.

FIGURE 15: RICE PRODUCTION AND EXPORT



Some of the reasons for this include the following:

***Domestic versus international prices*:**

Analysis by Valdes (2013) of data from 2009-2011 shows fluctuations in both border and farm gate prices. The border price in US dollars was $1088/ton in 2008-09, $830 in 2009-10 and $828 in 2010-11. The per-kilo prices in rupees at the border and at the farm gate were Rs 85 and Rs 19 respectively in 2008-09, Rs 70 and Rs 24 in 2009-10, and Rs 70 and Rs28 in 2010-11. Note that in 2008-09, when world price were experiencing sharp increases the farm gate price was at its lowest of the three years. Translating the border price into a farm gate equivalent leads to a nominal rate of protection of –35 percent in 2008-09 and of –20 percent in 2009. The nominal rate of protection was positive 3 percent for 2010-11. This implies that rice production was effectively taxed in two out of the three years.

***Changing consumer preferences*:**

The rice market is changing as consumers are increasingly demanding different types of rice for ethnic and health reasons. Stores now have to carry a larger variety of rice types (such as parboiled rice, organic rice, and diabetic rice), brands and qualities, and the market in the richer developed countries is now very competitively shared. Pakistan has not managed to expand rice export varieties and is consequently suffering from rising competition in international market.

Competition

India has developed a basmati look-alike variety that is cutting into Pakistan's traditional basmati export market largely in Punjab. In fact, Pakistani farmers themselves are now moving over to the Indian variety because it grows faster, consumes less water and labor and thus allows them to grow three crops in a year. In part, this response also highlights the lack of dynamism in local research efforts, after some success more than three decades ago.

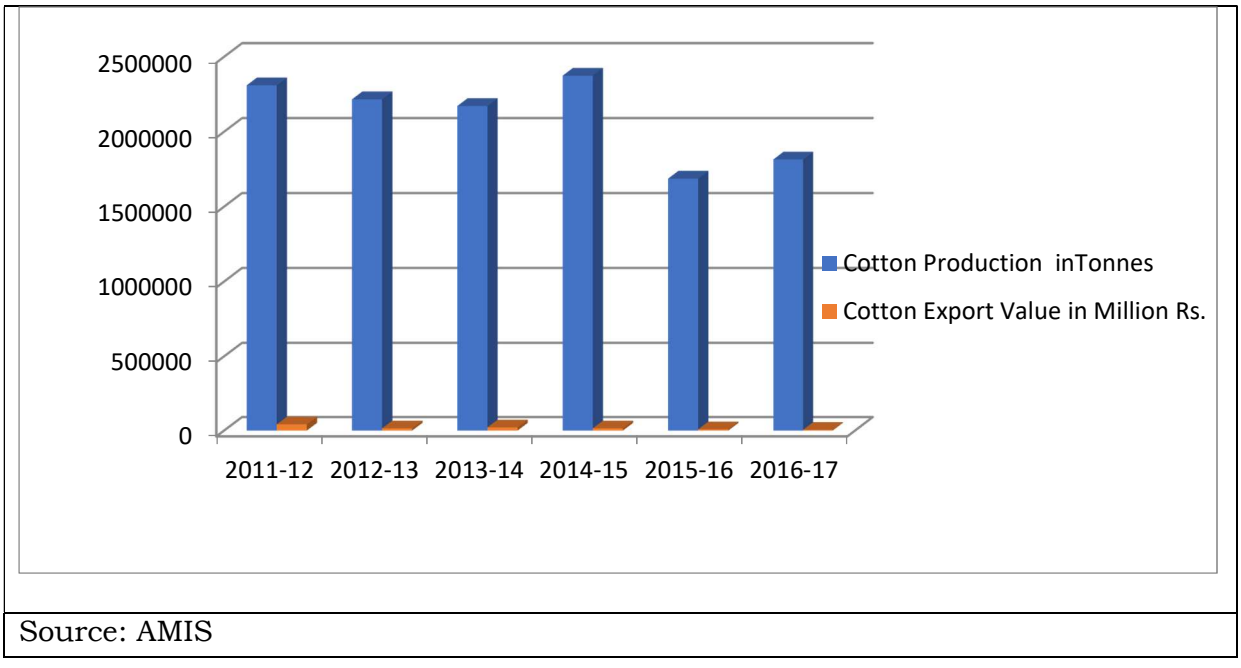
Maintenance of standards

Rice export markets are increasingly characterized by a focus on quality. Despite the existence of several government agencies in the rice sector, Pakistan lacks adequate mechanisms for ensuring that rice exports meet global quality standards. This affects the reputation and price of rice exports. Even where farmers or exporters are keen on meeting these standards, lack of government support constrains their effort.

Cotton

In recent years, the production and export of cotton from Pakistan has somewhat declined (see Figure 16) due mostly to a disease called the leaf curl virus other pest attacks and to the slow and unregulated adoption of a hardier seed variety called BT cotton.

FIGURE 16: COTTON PRODUCTION AND EXPORT



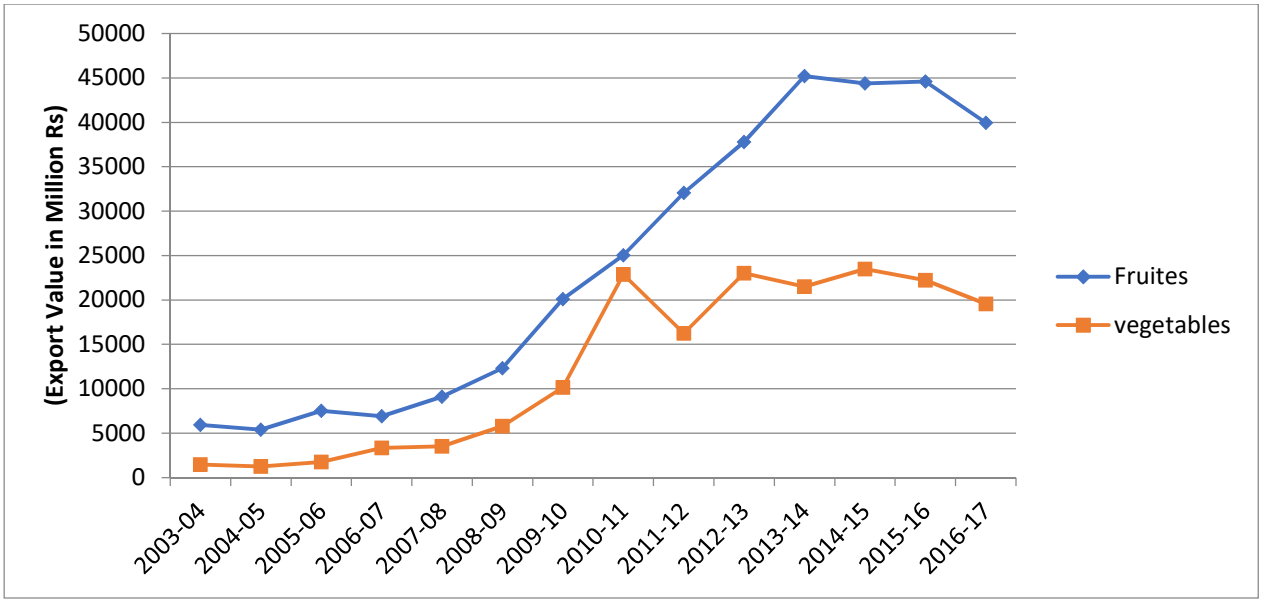
Source: AMIS

Horticulture

According to the growth strategy of Punjab, Pakistan's export for value-added horticulture products is USD 48 million, grown at 118% in the last 10 years, with an annual average growth of 13%.Fruits, vegetables and other horticulture products are processed to make value added products like pulps, purees, pastes, concentrates, juices, jams, jellies, preserved fruits and vegetables, etc. Such products have a large international market. Total export market of preparations of horticultural products is USD 58.3 billion that grew from USD 44.8 billion in 2007. This represents an overall growth of 31% and an average annual growth rate of 3.5%

The Government of Punjab considers horticulture a priority area for the future for two reasons: a) rising demand for fresh produce, both in domestic and international markets; and b) high returns and job opportunities compared to other competing crops.

FIGURE 17: EXPORTS OF FRUITS AND VEGETABLES



Source: AMIS

Fruit and vegetable exports largely coming from Punjab have generally been raising in recent years, though from a low base (see Figure 17). Vegetables from Pakistan, in particular, enjoy a favorable position in neighboring countries to the west and north. Nevertheless, the current level of exports is low. Pakistan exported about 0.561 million tons of fruits and vegetables during 2014-15 and earned foreign exchange of US$ 168.71 million.

Non Traditional Crops

Horticulture produce holds a huge market for exports not only for traditional horticulture products but also nontraditional like guava and loquat. Among vegetables, potatoes and onions are vastly grown in Punjab, hold a large global market because of competitive advantage due to superior variety, volume and price. Than medicinal plants as presented in table also hold promise for import substitutions. Turmeric present one example where the growth in production and export of turmeric has been reported significant, and international markets and domestic and international prices have shown high integration. India has captured 60 % of global market Pakistan has equally good potential to capture share in this growing market.

4.1.7. Common Issues for Agricultural Exports

Moving from Comparative to Competitive Advantage

Punjab should reduce reliance on comparative advantage and strive to create sustainable competitive advantage. The Province of Punjab is endowed with climatic conditions to produce commodities that carry huge comparative advantage. Cotton is a good example- we still produce around 13 million bales, India with similar production few years back now produces 32 million bales. Again we are living with our comparative advantage, but Bangladesh is doing better by relying on its competitive advantage and capturing larger market share for value addition ($ 15 billion export versus us $13 billion). Fruits and vegetable are other case in point where our comparative advantage has not been translated into competitive advantages and good market performance. Mango, as an examples, where we have lost global market share. The prerequisite to improve the competitiveness in the international markets is the quality. However, a lack of modern infrastructure for cold storage, grading, post-harvest treatment and transport facilitates, periodic gluts occurring on markets, and the lack of capacity to store fruit undermine the supply of quality products. The translation of this comparative advantage into competitive advantage requires large investment in market development. The legal framework that impeded private investment must be changed to enable the agricultural sector to fulfill its export and growth potential. A private-public partnership is needed to attract much needed investment in agro-industrial sector. The good news is that Punjab is moving in this direction, but need to put more focus on producing quality products which are growing in demand in global markets (see section on export and quality below).

Price competitiveness

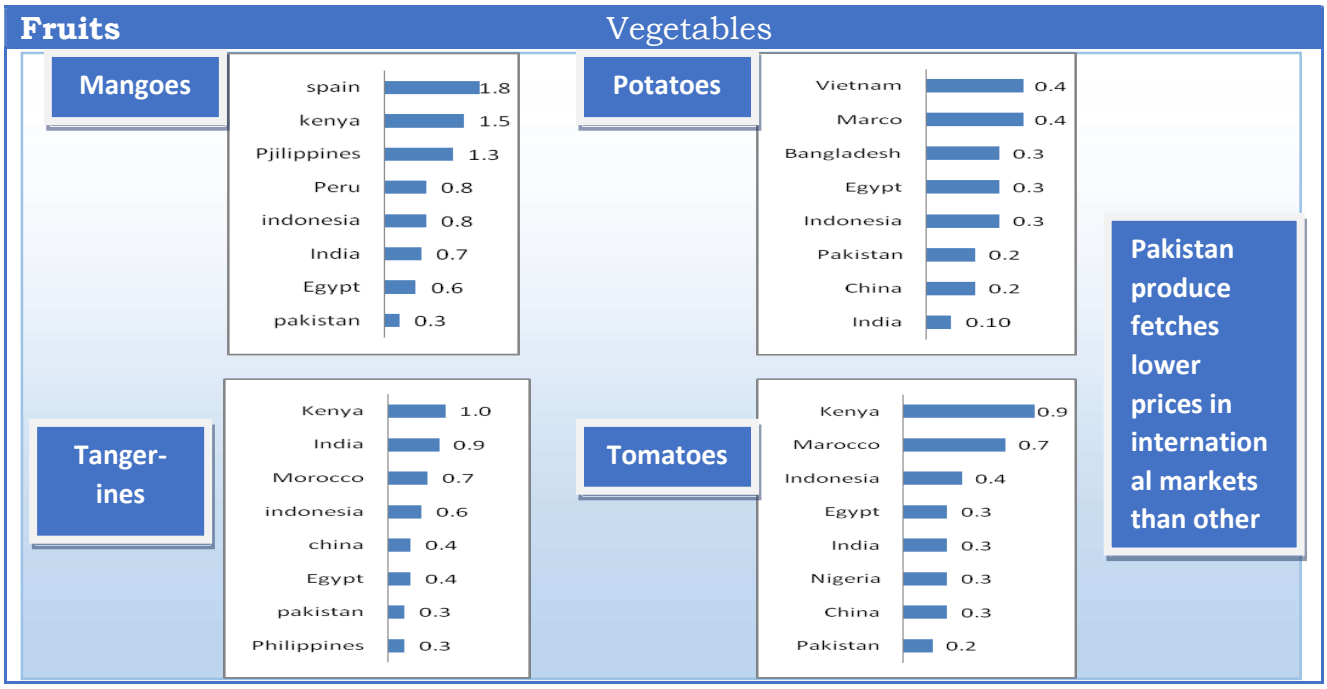
Domestic price policy sometimes makes it difficult to export a particular commodity. Taking the case of wheat, the current price support policy keeps domestic prices above international prices and prevents wheat exports without

a subsidy. The same is currently true of sugarcane. Thus, sugar from Brazil can capture the Iranian market, as Pakistani sugar is more expensive by 32 percent. Australian wheat seizes the Chinese market as Pakistani wheat costs twice as much. High-yield Indian basmati look-alikes grab 96pc of the Saudi market as low-yield Pakistani super basmati is uncompetitive *(Muhammad Ashraf, Agro-food products: access to export markets, Dawn, Business & Finance weekly, October 24th 2016).*

Low unit export values

Our exports have low unit value compared to our competitors. This is especially true for such horticulture crops as mangoes and tomatoes. (See Figure18)

FIGURE 18: EXPORT UNIT VALUE $/KG



Source: PHDEC, 2008

Exports do not meet quality standards

The product which reaches the final consumer or export markets is the result of poor production systems coupled with inadequate harvest and post-harvest handling, storage and transport systems. There is no credible system to monitor and control quality and assign quality grades. Restrictions on domestic and international trade will be simplified to ensure that only those required for essential reasons – such as health and bio-safety reasons - are maintained and Punjab also needs to adopt key international instruments such as a trade related intellectual property right (TRIPS), Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP). Lastly, stronger and better branding of its products is needed, especially high quality products such as Basmati rice

and mangoes, in both domestic and international markets. There is also a great potential to develop new products like fruit candies and herbal teas as cottage products for value added exports. Enhanced collaboration will be undertaken with leading traders and exporters to facilitate this process and to provide a legislative and regulatory cover for creation of branded agriculture products.

Market access

Many developed countries continue to protect their agricultural sectors through tariffs, quotas, standards and anti-dumping practices as well as high levels of domestic price supports. These measures not only restrict the access of competitive foreign producers to their markets, but also induce surplus production, which frequently precipitate global price depressions.

Pakistan avoids creating segmented domestic markets where provinces restrict trade among themselves and the country is isolated from the opportunities provided by international and regional markets. Punjab being a dominant producer, loses the most.

High input costs and low subsidies

In recent years, output prices of agricultural commodities have declined while input costs in Pakistan have continued to rise, making agriculture a money-losing enterprise.

Lack of R&D

Research and development has traditionally been a low priority. For instance, there is near absence of development of new high yielding varieties of cotton and rice. India has developed many basmati and basmati- look-alike (non-basmati) varieties during the last few years whereas Pakistan has failed to develop any basmati variety during the last 30 years.

Promoting Agricultural Exports

The Ministry of Commerce developed a Strategic Trade Policy Framework (STPF) to achieve annual exports of US$ 35 billion by 2015-18 based on transition from a “factor-driven“ economy to an “efficiency and innovation-driven” economy. The following elements, in particular, need mention: (a) competitiveness (quality infrastructure, labor productivity, access to utilities, and level of technological development); (b) compliance with standards (convergence of local & international standards, protection of intellectual property, and effective and efficient disputes resolution mechanism); (c) creating conducive policy environment (monetary policy, tariff & tax regime, and synergic industrial & investment policies); and (d) achieving market access (multilateral, regional, and bilateral).

In the short run, the STPF aims to reverse the decline in key exports. For agriculture, these include: (a) basmati rice, (b) horticulture, (c) and meat and meat products. The focus of markets export enhancement is on Iran, Afghanistan, China, and the European Union especially in the hope to benefit from GSP Plus status in the European Union.

In the medium run, the STPF aims to structurally transform the export sector through a three-pronged strategy — sustainability, growth and penetration. The products (e.g. textiles) and markets (e.g. US) where Pakistan is already strong, the 'sustainability' of existing shares and consistent 'growth' is to be ensured through enhanced competitiveness and removal of inefficiencies. Products (e.g. horticulture) and markets (e.g. China) where potential is under-exploited, a 'penetration' strategy, developed in consultation with the stakeholders, is required to realize the potential.

In the long-term, ,the strategy entails structural reforms of the entire export sector, including high tech and innovative products (e.g. engineering and pharmaceutical) in the product mix; value added exports substituting commodities; quality enhancement supplanting price race; value creation through designing and branding replacing private labeling and market diversification towards unexplored markets (e.g. South America and Africa).

4.1.8. Actions Required

The Growth Strategy of Punjab clearly stipulates the need to incentivize value addition in private sector SMEs, crop diversification, good agriculture practices, establishment of processing units in private sector for export of horticulture crops and improved market systems. These are very important building block for preparing an export led export strategy for Punjab. We recommend the following:

- ***Making agricultural products competitive:*** There is need to increase land, water and labor productivity, improve post-harvest handling, create cold chains and, more importantly, produce according to what the market demands in quantity and quality. This, in turn, requires a supportive policy environment featuring a proper incentive structure (right prices), competitive exchange rates (avoid appreciation and overvaluation) and supportive institutions for credit supply and marketing.

- ***Value added exports:*** Allowing market prices to set crop decisions will give farmers an incentive to move into higher value added crops rather than stay with those whose profitability depends on procurement price levels set by the government policy. This will introduce greater risk for farmers but also ensure a greater diversity of crops and long run sustainability of the sector. In particular, it will induce a shift towards more vegetable and fruit production and reduce the acreage devoted to rice and wheat.

- ***Compliance with standards:*** Food safety is the prime concern in most of high-end export markets such as Europe, USA, and Japan. Food products must comply with stringent sanitary and phytosanitary (SPS) requirements as also taste, quality and presentation. The consistency of fruits in terms of size, shape, weight, color and level of ripeness are important parameters for consumers in making their buying decisions. Pakistan has lost some markets (such as chilies from Sindh) because of the inability to comply with food safety

standards. Government needs to establish and enforce regulations relating to standards, the assigning of grades to products and investment in treatment facilities.

- ***Potential Markets***: We need to map countries/regions in terms of potential they offer as trading partners — which commodities they are importing with consistent growth, do we have a comparative advantage and the required competitiveness in commodities they want most? The trade or import profile of China and India is important; Pakistan needs to focus more on these two markets, especially China which would provide plethora of opportunities under CPEC for better market access and trade integration. At the same time to leverage exports to new expanding markets like Economic Corporation Organization (ECO) region and part of Africa, a bigger incentives package should be introduced.

- ***Policy Regime:*** We should shift to a policy regime that promotes exports rather than existing policy of import substitutions. The crops that are being promoted for exports are also the one that are affected the most by unfavorable incentive structure — high cost of inputs, lack of supporting infrastructure like electricity, gas, water, feeder roads and access to credit are few to name.

Incrementally, we should move out of agriculture based raw products as lead exports or products exported by small and medium enterprises that carry low values and volumes. On policy reforms, there is a need to incrementally devalue the currency; this will discourage import of cheap goods and at the same time provide a competitive price for our exports.

Against this backdrop, the need for a broad policy and strategy framework for exports is reiterated. While it is a fact that agriculture sector is a risky enterprise with inherent price and volume risks, the goal of such a policy option is not necessarily to maximize the growth of production in any particular sub-sector/commodity but to create the necessary and sufficient conditions for the agricultural sector/farmers to adjust to a more competitive environment. The production structure as well as the agro processing industry and inputs delivery system should be allowed to adjust rapidly to changes in domestic/foreign market conditions (output and input) and technologies, through changes in cropping patterns and farm structure. This adjustment capacity requires sound management information systems, flexible rural factor markets (labor, land, water, and finance) as well as a competitive agribusiness sector, adequate infrastructure, technology development, and most importantly, more human capital (education and training). Such a strategy would lead to faster agricultural growth, largely through adjustments in the output mix toward higher-value products, which should result in higher total factor productivity and develop agriculture sector more responsive what and where are opportunities for Punjab in export markets.

4.2. Institutional Reforms- Identifying Areas for Policy Formulation and Implementation

Under the 7th National Finance Commission Award, announced on 18th March 2010 and revised on 10th May 2010, following the 18th Constitutional Amendment, in June 2011, several responsibilities related to agriculture were devolved to the provinces. The provinces were made autonomous with regard to legislative, regulatory and policy making, development planning and budgets for agriculture sector and could chose to either follow existing Federal laws and regulations or promulgate new ones. Provinces have also been given authority to directly deal with donors like WB, ADB etc., for financing. A Council of Common Interests allows the provinces to discuss and coordinate various issues including adopting laws and regulation related to, for example, marketing and trade.

It may be recalled that the capacity at the Federal level to manage agriculture was already deficient. A culture of intuitive decision making or 'golden gut', donor-driven process or sub-optimal analysis of the major policy issues was widely pervasive. With the devolution of responsibility to the provincial governments, and given the complexity and enormity of challenges confronted by the agriculture sector, it is imperative that the provincial agriculture departments are endowed with the capacity, competence and skills mix to: (i) formulate rational and robust policies, strategies and legal, regulatory and programmatic frameworks; (ii) design priority areas for research; (iii) monitor and evaluate sector development; (iv) promote private sector growth; (v) provide technical support to extension services; and (vi) keep stakeholders informed of new developments concerning research, analysis and markets. It is only through well capacitated departments that a favorable and responsive policy, institutional and operational environment can be created for farmers' centered sustainable agricultural development.

Coming specific to the Agriculture Department Punjab, while the vision, intent and commitment of DA seem to have been articulated lucidly, the issues of capacity and expertise - structural, functional and technical - need to be addressed upfront to concretize the vision and intent into reality. There is evidently a mismatch between the strategic vision to introduce a paradigm shift and the institutional reality to steward and implement the paradigm shift. The BIPP team's field visits and interviews with the senior policy makers, experts, agri-business leaders and farmers during this appraisal assignment abundantly testified to the DA's institutional inadequacy and capacity deficit.

Further, the implementation of paradigm shift as envisioned by DA, a priori, entails effective and active engagement of the department beyond the core sectorial agriculture's technical and operational issues. DA needs to develop close nexus and linkage within the broader and multi-sectorial policy space. This involves, among others, macro-level as well as inter-sectorial integration on both upstream and downstream issues, for example, around climate change, trade, finance, private sector investment, business partnerships,

export promotion, pricing and inputs taxation, quality assurance and consumer safety standards, regulatory framework, etc. The structural and organizational lay out of the department and the systems and processes in vogue require substantial re-engineering and strengthening to be able to successfully respond to the needs of multiplicity of the stakeholders and the differential level of the beneficiary farmers as to their holding, income level, ability to access services etc. More specifically, there are four areas that need urgent action:

- Reforming the Agriculture Commission
- Capacity building for planning and policy formulation
- Improved coordination mechanisms within and among related Ministries
- Change management to ensure that every ounce of the intellectual capacity and every rupee of the resource allocation placed at DA disposal are utilized to the maximum.

4.2.1. Reforming the Agriculture Commission

The GoP has set up an Agricultural Commission with participation of farmers, senior government officials, prominent academics etc., to review the problems in the sector and suggest solutions. The Commission is supposed to bring together the experienced minds and experts to guide reforms in the agriculture sector through a mix of top policy makers, reputed civil servants, and eminent representative of the private sector. However, in our view, the existing membership lacks the right mix of expertise and experience to address complex and changing complexion of problems and prescribe integrated solutions based on credible information and research. Some of the evident shortcomings are:

- There is pervasive perception among the stakeholders that the policy making process at provincial level at present is led by a powerful Commission which is oblivious of and fails to benefit from empirical and credible research based support system. Given the scale of investment, a systematic analysis for important province like Punjab (with new ecological zone being put in place) for estimating incentive structure and efficiency of resource use is needed to make policy/investment decisions based on both economic and financial prices. For example, for a critical sector like agriculture and livestock, last in-depth policy work was done by World Bank in 1993 by Jim Longmire and Pascale Debord on" Agriculture Pricing and Comparative Advantage in Pakistan". The Commission has neither the vision nor the capacity to guide such important work.
- There is huge planning and policy work which has been supported by the donor funded value chain studies during last decade or so. It is hardly being used in a coordinated and concerted manner for actual implementation – clearly a weak link (ADB, WB, USAID, Australian and JICA to name few). The Commission and other relevant departments have not benefited from the reservoir of this huge knowledge base for policy formulation.

- Policy formulation traditionally has been more a response to crisis than based on strategic vision. Few policies that were formulated are hardly being implemented. Ad hoc policy shifts are common, favoring few interest groups at the expense of large beneficiaries. The Commission has significant number of large and influential farmers whose interests, it appears or is perceived, to constitute the prime basis for development initiatives. The policy environments did not support growing role of agribusiness and value addition, especially for small farmers.

It may here be mentioned that the newly formulated agriculture policy seems to be a much better, focused and forward looking document as compared to previous versions. However, some key areas are still not covered or addressed as much as they deserve due to their overwhelming importance. One is the issue of water pricing, as highlighted in BIPP policy paper. The adoption of modern technology will not take off unless we value the water. Second the document spells out very little as how to orient sector towards exports which is a dire need for setting right the economy not to speak of role of agricultural exports in making the sector competitive and profitable. The document should embody statement to give boost to agriculture exports especially moving from high volume, low value exports to low volume but high value exports. Intervention to improve quality of agriculture produce (SPS) is also missing in policy matrix at the end of document. The Commission should have the capacity to guide the Department to address the policy areas that need improvement.

4.2.2. The Capacity Building for Planning and Policy Formulation

It is vital to build the policy and planning capacity for DA so that investment is made with high returns in a conducive policy environment. This is very important given the new spirit and commitment in Punjab to develop a competitive and sustainable agriculture. The existing capacity of the Department to analyze, formulate and implement polices is limited to non-existing in certain areas. It is expected to formulating policies and regulations that create a favorable environment for agricultural development. It will also designate national priority areas for research, monitor and evaluate sector development, promote private sector growth, provide technical support to extension services at the operational level and keep stakeholders informed of new developments concerning research, analysis and markets. Furthermore, DA at this critical juncture needs to learn from national and global success stories and experiences and be innovative and forward looking. There is persistent feeling among the stakeholders that the policy making process is not consultative enough and that the proposed actions present the “wish lists” of the different sections of DA rather than a coherent set of actions based on valid research.

Moreover, one of the keys to higher productivity is better marketing and fair deal for farmers who is caught in vicious cycle of low appetite for risk, low investments leading to low productivity, low market orientation with low value addition- all this results in low income. The market reform process is slow. The

marketing transaction are still run by the spirits of outdated Agricultural Produce Markets Act (1939), which restricts wholesale transactions for agricultural commodities such as fruit and vegetables to be through regulated markets run exclusively by government-appointed registered commission agents. There is hardly a concept grade based pricing system in our wholesale markets, so important in modern marketing but totally neglected. The Punjab Agricultural Marketing Regulatory Authority Act 2018 promulgated recently seems a good initiative to provide for the systematic growth and transformation of marketing of agricultural produce and assist the development of agricultural commerce through multiple channels. It also envisages prescription of grading standards and good agricultural practices, besides establishing collection center, virtual market, service providers in aid of marketing of agriculture produce and promotion of alternative marketing channels and controlling unfair marketing practices. The full import and impact of PAMRA, if implemented faithfully, will accrue in due course. For the purpose DA needs to have the capacity to implement and prepare a well-targeted implementation framework.

Then policy formulation for research and extension continues to be inadequate though DA in conjunction with the World Bank did prepare a diagnostic report on Research and Extension. According to recent FAO report there is a heavy concentration of research scientists in and around Islamabad. Out of the total 1046 scientists of the Pakistan Agricultural Research Council (PARC), 608 (i.e. about 58 %) are based at the National Agricultural Research Centre (NARC). Most of the geographical area of their research work is in fact rain fed. It is also true that the mandate of the PARC is less research per se and far more policy guidance, coordination, collaboration, technical backstopping, research evaluation and impact assessment.

The DA should also take full cognizance of the fact that the sources of donor funding is drying up fast due, inter alia, to poor economic health of donor countries and their result oriented approach prompted by the so called “Donor Fatigue”. They emphasize on program design quality, stakeholder ownership and sustainability. DA is expected to respond to this challenge by increasing reliance on its own resources, which are considerably more than in the past but still limited. It will also need to improve its resource mobilization efforts with donors and financing agencies.

Additionally, improved coordination mechanisms within and among related Departments is absolutely needed to develop synergies, achieve efficiency gains and cost savings and create enhanced impact of the development interventions. This coordination dysfunction dilutes the efficacy of agriculture related activities. Few examples are: the water user association developed by Irrigation Department in the past should have a component on providing extension and marketing services to enhance income of participating farmers and better impact for the economy; livestock policies are promoted in isolation of agriculture department, when Punjab agriculture is largely crop/livestock integrated system; role of Environment Department to inform CSA is missing; on farm water investment policies have been lopsided, integrated approach was missing all along - first emphasis on land leveling, than on canal lining and

now on HEIS. If these programs were developed in coordination with other departments within DA and in coordination with Irrigation Department (groundwater development) the results could have been much rewarding. Then there is clear oversight to make an assessment on the benefits these programs in water saving – how much is real and how much is just paper saving?

Institutional strengthening and change also implies a reorientation of the functions of public institutions away from direct market interventions towards control and enforcement; e.g. the Food Department would move away from focusing on wheat procurement towards ensuring food safety. The Bank has committed to provide technical assistance to help implement the wheat marketing modernization program led by the Food Department.

In view of the foregoing, the major focus for policy and planning capacity strengthening should be on:

- formulation and development of innovative, consensual, inclusive and rational and sector wide agricultural policies and strategic priorities to re-orientate the sector as per the new vision including for increase in the productivity and profitability of agriculture; and resuscitate and re-define its critical role in the broader economic and sustainable development including integration with global production network and agricultural supply chains;
- policy formulation for research and extension and the ability to designate priority research areas;
- addressing in a holistic manner, in coordination and conjunction with all the major stakeholders, the impact of climate change on the agriculture sector and ability to pro-actively and strategically respond to current as well as emerging climate change challenges through design and implementation of adaptation as well as mitigation measures;
- engaging private sector (joint ventures, PPP) to lead investment and economic growth; promoting agribusiness within the context of global realities of trade liberalization; and strengthening DA oversight and regulatory frameworks;
- Implementation, operational and technical capacity for programs of innovative nature (Strengthening Markets for Agriculture and Rural Transformation Program with unique P for R element, e-voucher, insurance, climate change) besides monitoring, evaluating and assessing the impact of these initiatives.
- strategic program planning and innovative projects design for financing by international development agencies;
- institutional effectiveness to synergize intra and inter-sectorial coordination; and,
- Change management.

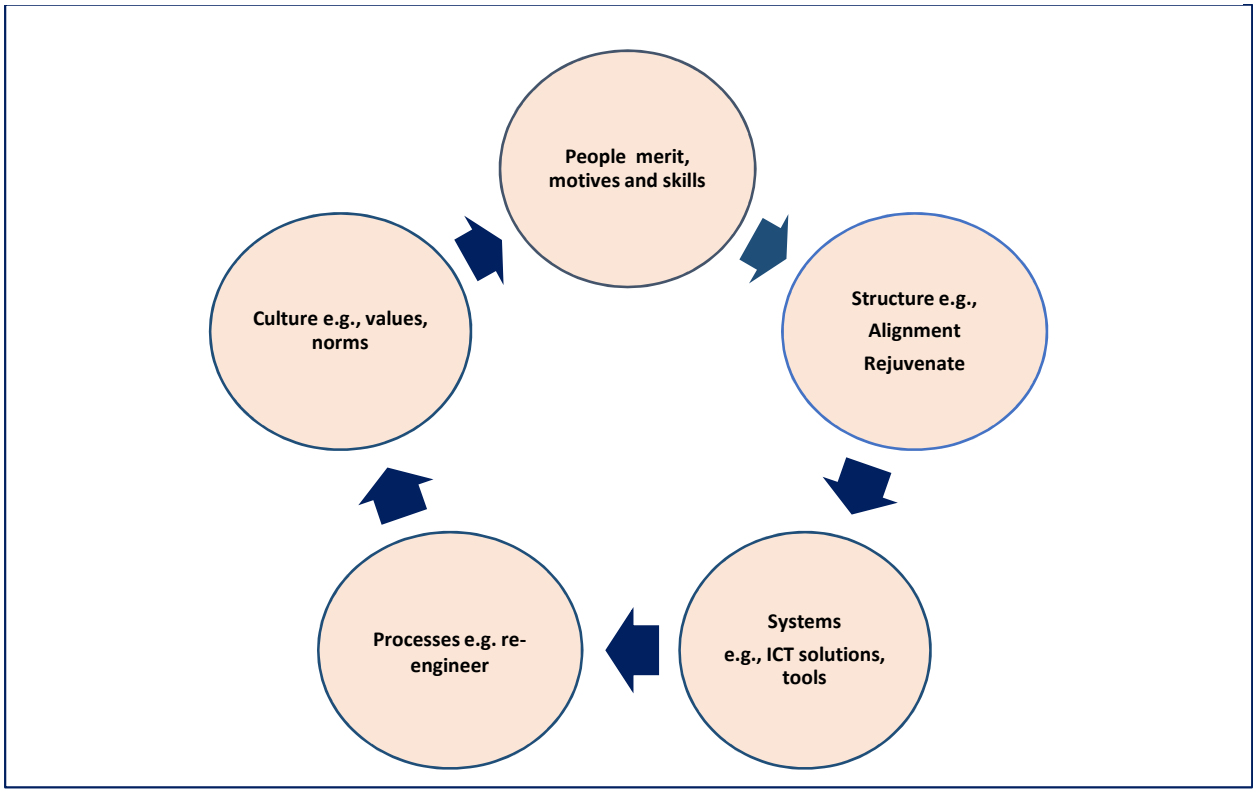
In due course, DA has to bring about a major cultural change in its functioning to emulate evidence/research-based service delivery, primacy of and responsiveness to the farmers and strong commitment to the departmental goals.

4.2.3. Change Management

In order to ensure smooth implementation of change and paradigm shift, senior managers have a responsibility to their staff to involve them in articulating a shared vision and make them aware of the need to maintain an adequate level of skills to retain a competitive edge in the job market. An adequate training budget and a culture of learning organization which encourages personnel development as a fundamental tenet are sine qua non for the purpose.

In the interview with the Secretary Agriculture, need for this change management was taken up. He was of the view that a staged approach - first targeting the senior managers; then involving the middle management cadre; and finally reaching out to the lower echelons will be more pragmatic and is accordingly being followed. However, the interview revealed that for last one year, even the senior managers have not been fully "converted" into owning the revised orientation and objectives of the agriculture department We are of the view that timely change management is the key for the successful implementation of the envisioned goals. For the purpose, we recommend a pent-angular composite approach to the change management as depicted in the Figure 19:

FIGURE 19: CHANGE MANAGEMENT: PENT- ANGULAR APPROACH



A brief description of each element is provided below:

People: This involves selection, deployment, development or retention of the employees on merit basis. Transparent performance appraisal based on specific targets in line with the organizational priorities, investment for continuous skills-competence development, accountability and accompanying reward and punishment mechanism are the kernel for having motivated and knowledgeable work force capable of championing and participating in the change process.

Structure: The effective and efficient achievement of the envisioned and re-defined objectives, a priori, entails adjustment in the organizational structure-both functional and divisional. The hierarchical arrangements, lines of authority, roles, powers and responsibilities, communication and information flow and coordination and intra organizational linkages must align with and contribute to the achievement of the organizational objectives. The change process may involve establishment of new units, abandonment of obsolete units, rejuvenating or merger of the existing units.

Systems: Installation of relevant system is sine qua non for implementing change, reducing costs, and improving organization wide productivity and efficiency gains. The integrated ICT solutions and management practices based on the organizational need and change paradigm could be cost effectively instituted to improve management process, operational procedures, and services delivery and making the organization a learning organization.

Process: The pursuit of operational excellence is key to the organizational change. This of necessity requires improvement or re-engineering of the current processes through process mapping and flows analysis. Quality and reliability of re-engineered processes could be ensured through constant monitoring and impact assessment. It is equally important to train the staff on the new processes.

Culture: One of the most challenges task for the leadership is changing the organizational culture in view of the well-entrenched and interlocked set of existing personnel attributes, attitudes, assumptions, traits, values and communication practices. Multiplicity of tools need to be deployed to ensure cultural transition e.g., from to "rule" to "serve", from status quo to championing change, from stagnation to activation etc. These tools broadly include inspirational leadership (shared visioning, strategic planning, role modeling), informational management (role definition, incentives, incentivizing, hiring, promotion, negotiation et.) and coercive (firing, punishment and disciplinary systems).

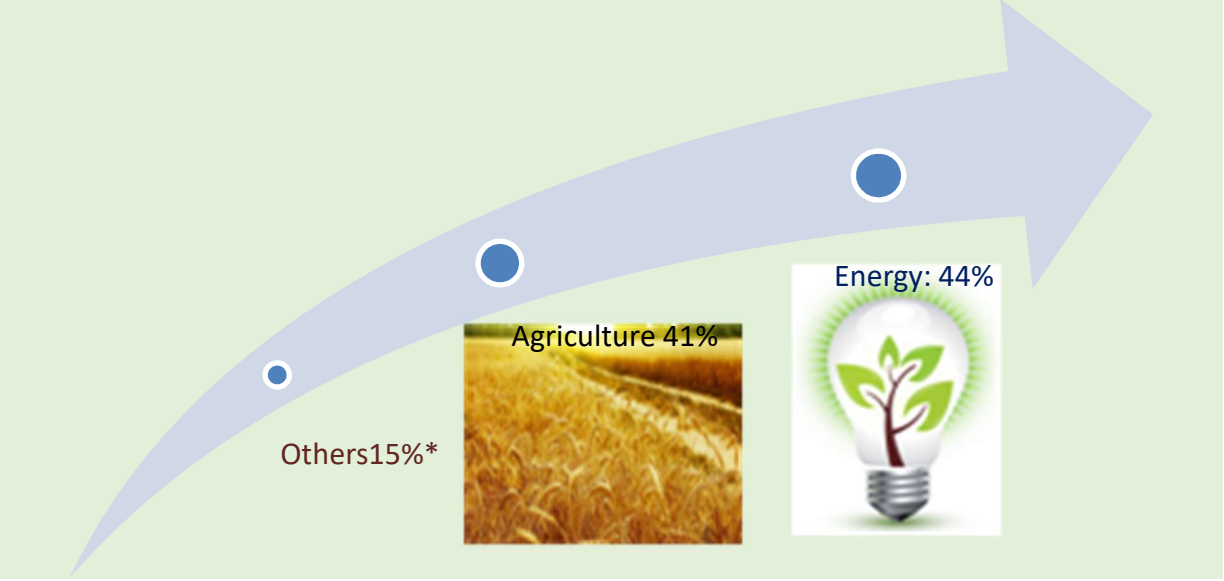
If DA agrees with this approach, further details will be provided. Suffice to say, that the above approach is derived from best international practices.

4.3. Climate Smart Agriculture

4.3.1. Agriculture, Greenhouse Gases Emission and Climate Change Challenges

Pakistan ranks low in the world (148) on the list of global emitters. The total GHG emissions of Pakistan in 2015 were 405 million tons of carbon dioxide equivalent which represented an increase of 87 % since 1987[4]. This represents only 0.8 % of global greenhouse gas (GHG) emissions. Agriculture, however, is one of the largest contributors representing approximately 41% of the emissions, mainly through livestock rearing (78%) and cropland (22%- crop residue 2%, rice 6% and synthetic fertilizers 14%). Energy contributes 44%; land use changes 8%; industrial processes 5% and waste management 2%.

FIGURE 20: CLIMATE CHANGE CHALLENGES

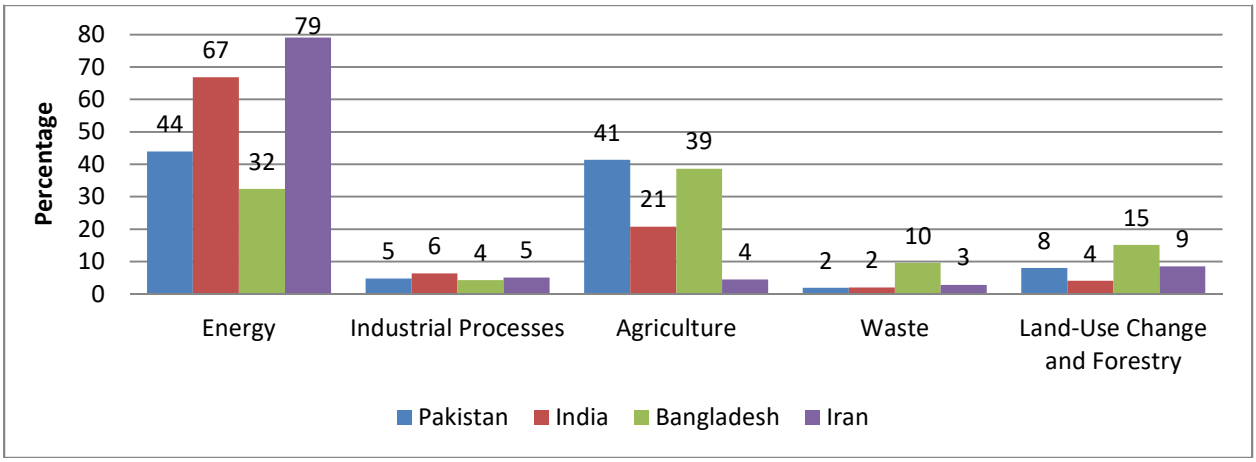


* Land use changes 8%, industrial processes 5%, waste management 2%

[4] USAID-IFPRI Draft Position Paper on Climate Change for Internal Review

Compared to the neighboring countries, the emissions of agriculture in Pakistan are much higher as is evident from the Figure 21 below:

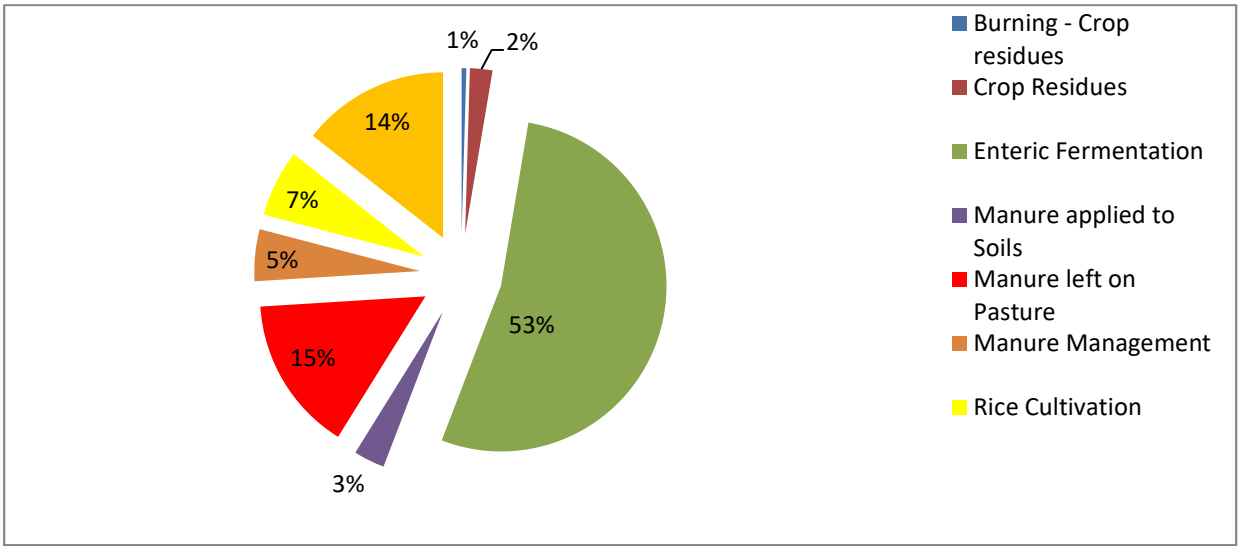
FIGURE 21: DISTRIBUTION OF GHG EMISSIONS IN 2013 BY SECTOR AND NEIGHBORING COUNTRIES



Source: World Resources Institute CAIT

FIGURE 22: SHARE OF GHG EMISSIONS IN PAKISTAN

Within the agriculture sector, the following Figure 22 depicts the share of GHG emissions in Pakistan:



Source: Food and Agriculture Organization of the United Nations 2014

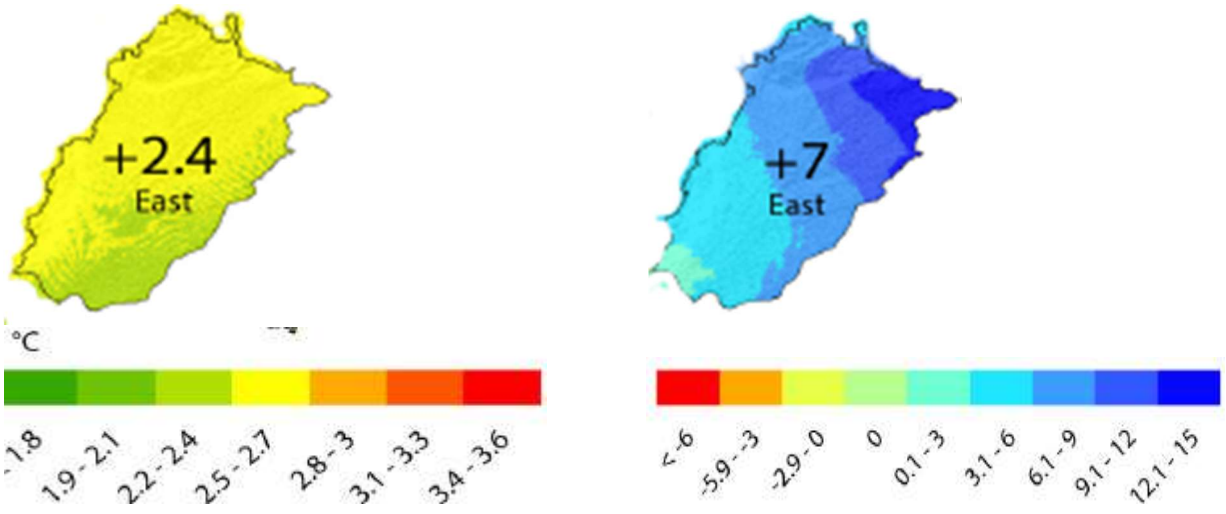
Enteric fermentation stemming from livestock constitutes a high 53%[5].

Pakistan has pledged to reduce 20 % of its emissions by 2030 under the Paris Climate Accord 2015. Punjab, being the agricultural hub and with a population of around 110 million (ranked 12th in the world), will have to contribute a major share in meeting this target though the Accord provides the flexibility not to compromise on agricultural productivity while achieving this target.

The sector in Punjab is extremely vulnerable to climate change in terms of water scarcity, higher run off, erratic rainfall, diversity of geographic conditions (aid, semi-arid), variable level of vulnerability, high temperatures and rates of evapo-transpiration etc.[6] The Figure 23 below show the changes in annual mean temperature as well as total precipitation in the province.

FIGURE 23: CHANGES IN ANNUAL MEAN TEMPERATURE AS WELL AS TOTAL PRECIPITATION

Changes in annual mean temperature (◦C) **Changes in total precipitation (%)**



Global warming induced change in the rain fall pattern and variations in temperatures could cause severe impact on the livelihood assets of millions of poor and marginalized people. It is estimated that with rise of temperature (+0.5°C - 2°C), agricultural productivity will decrease by around 8%-10% by 2040[7]. Changes in monsoons (increased water in summers and floods) and increased temperatures are also likely to affect the crop growth cycle and shorten the time between sowing and harvesting.

[5] USAID-IFPRI draft Position Paper on Climate Change

6 Ibid

7Dehlavi et al. 2015. Climate Change Adaptation in the Indus Eco-region: A Microeconomic Study of the Determinants, Impacts and Cost Effectiveness of Adaptation Strategies. Islamabad: World Wildlife Fund (WWF) Pakistan

4.3.2. The Climate Smart Agriculture- the Recipe

Reportedly, the Agriculture Department has embarked on formulating the Climate Change strategy. From the interviews with the Department officials, however, it appears that the major focus will be on adaptation with emphatically no plan to factor in mitigation measures on the "myopic plea" that Pakistan contributes only 0.8% to global GHG emissions and that the National Appropriate Mitigation Actions (NAMAs) are not mandatorily binding and instead voluntary in nature. In our view this is erroneous and represents a halfhearted, partial and sub-optimal effort to address a complex and serious problem. NAMA is an integral part of sustainable development as has been unequivocally recognized in the Bali Action Plan for which Pakistan was instrumental.

Pakistan, for the following reasons, should make a sovereign choice and incorporate without delay unilateral mitigation actions in CSA strategies to cope with the urgent and potentially irreversible threat of climate change:

- By 2020, the GHG emissions are expected to be doubled[8] given the economic potential of the country, its bourgeoning population and hype in the energy needs. It is extremely important not to lose sight of the long term, transformational and strategic perspective.
- A shift toward cleaner, renewable and energy efficient regime and low carbon emission economy is indispensable for the country to achieve sustainable development. Agriculture sector has to play a key role in this endeavor especially in instituting Monitoring, Reporting and Verifiable (MRV) standards and voluntary targets for GHGs.
- Climate change is higher-risk-high-impact challenge to agriculture of Punjab. The province is a cache and confluence of major river systems with a vast network of canals and distributaries. It has the most productive irrigated agricultural area with enormous potential for implementation of green (transportation) and renewable technology and energy efficiency.
- The changes in monsoons and increased temperatures are likely to bring considerable challenges to the agricultural sector and cropping system and yields being most vulnerable to floods and drought, rise in the temperatures and precipitation, increasing water scarcity etc.; and thus the need to propagate conservation and climate resistant agriculture geared to reducing emissions.
- At the same time, irresponsible agriculture could adversely induce climate change. The crop residue burning and environmentally unfriendly land preparation practices are regular features widely in vogue the curbing of which entails costly administrative and legal measures for enforcement. The total neglect of mitigation measures, besides denying the possibility of maximizing the mitigation-adaptation

[8] 3 Policy Brief November 2010, Lead and Ministry of Environment

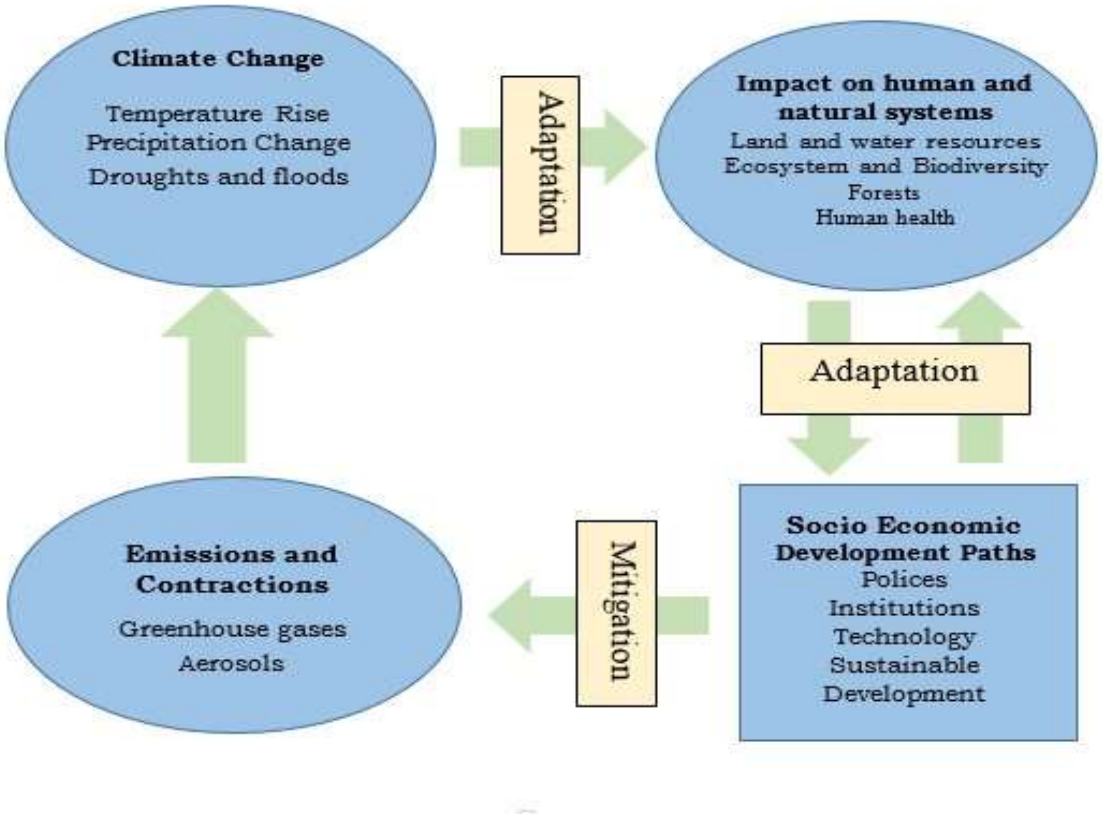
synergies for win-win-win situation will accentuate inter sector fragmentation and allocative efficiency of meager financial resources.
- The $100 billion annual financing pledged needs to be accessed by Pakistan to move towards greener source of energy, capacity building and adapt to the effects of climate change.

The Department as such needs to go beyond adaptation indeed to ensure that climate change in all its sectorial manifestation is mainstreamed into the planning, programming and budgetary processes and that effective mechanisms and frameworks are operationalized to monitor and account for the efficiency and cost-effectiveness of climate related interventions.

4.3.3. The Proposed Indicative Climate Smart Agriculture (CSA) Strategic Framework

Agriculture contributes a significant share of the greenhouse gas (GHG) emissions that are causing climate change – 17% directly through agricultural activities and an additional 7-14% through changes in land use. It is therefore both part of the problem – and potentially an important part of the solution. (OECD Report, 2016). The main objective of CSA is to enhance the ability of the agriculture sector at all levels and at all stages of the agriculture cycle (pre-production, production and post-production) to: better and effectively respond to the climate change challenges i.e., recurrent droughts, floods, and increase in temperature; augment the resilience and reduce the vulnerability of the farmers; reduce GHG emissions; and achieve profitability and competitiveness for sustainable agricultural growth and development. The adaptation and mitigation constitute the essentials of CSA with range of tested and proven technological interventions, innovation and practices. However, the effectiveness of adaptation and mitigation measures, a priori, entail: (a) systemic understanding of the impact on human and natural resource endowment and (b) the intertwined relationship of the dynamics of different socio-economic development paths and policy choices within the ambit of an integrated climate change framework as depicted by Figure 24 below.

FIGURE 24: INTEGRATED CLIMATE CHANGE FRAMEWORK



As is evident from the above, the change in climate has a direct bearing on the natural resources and eco-systems and on the human health which in turn entail adoption of a package of policy, institutional and technological solutions to enable the sector adapt to the changing climate and at the same time mitigate and reduce GHG emissions. There is thus a huge potential to harness the adaptation-mitigation nexus in pursuing CSA[9].

Adaptation and mitigation are not mutually exclusive. There are complementarities and synergies e.g., the GHG emissions can be mitigated by adoption of agricultural technologies and management practices that can help farmers adapt to climate change. Agricultural diversification, conservation agriculture, integrated nutrient and soil management, use of high quality seeds and planting material of adapted varieties, IPM, integrated weed management and high efficiency irrigation system- examples of Adaptation can be beneficially coupled with Mitigation measures like soil compaction

[9] Mitigation measures are those actions and anthropogenic interventions that are taken to permanently eliminate, reduce and curb greenhouse gas emissions and to enhance the sinks of greenhouse gases.
Adaptation measures are based on reducing vulnerability to the effects of climate change and refer to the ability of a system to adjust to climate change; moderate the potential damage; and take advantage of opportunities to cope with the consequences.

management, agro-forestry and tree planting, sustainable forest management, proper livestock management (especially housing), proper water management in rice and sugarcane fields, use of green technologies and renewable energy. The challenge, however, is how to reduce the trade-offs while maximizing the synergies.

In view of the foregoing, it is absolutely imperative to design a strategic framework which ensures integration of CSA into agriculture and its mainstreaming into planning and budgeting and Medium-Term Budgetary Framework. The specific elements of CSA framework are:

(a) Vision:

To effectively respond to the climate change challenges to the sustainable agricultural development for meeting the food and fiber needs of the present as well as future generations; augment farmers' resilience and responsiveness to climate change; reduce agriculture related emissions; and ensure sustained contribution of the agriculture sector to economic and human development.

(b) Strategic Pillars:

The following 7 strategic pillars should constitute the CSA kernel and be viewed as an integral part to deal with the climate change related intra-generational and inter-generational development challenges. These pillars, a priori, envisage (wherever possible) harnessing the synergy between adaptation and mitigation to ensure sustainable and profitable agriculture:

1. Crop management
2. Livestock Management
3. Soil and water management
4. Agro-forestry
5. Integrated sustainable food and energy System
6. Agriculture Infrastructure
7. Access to Climate information/Improve climate knowledge

(c) Priority areas of intervention under each Pillar both related to adaptation and mitigation; and,

(d) The four Common Thematic Threads to be an integral part of the specific areas of intervention which are: agro-ecological zones responsive interventions; enabling policy, legal and regulatory environment; institutional and structural framework including research and development system; and gender sensitive planning and programming given the pre-dominant role of women in agriculture and livestock economy.

Figure 25 below depicts the seven strategic pillars, the indicative priority action areas under each of these to implement climate smart agriculture and the four common threads which run all across these pillars and the action areas.

FIGURE 25: SEVEN STRATEGIC PILLARS

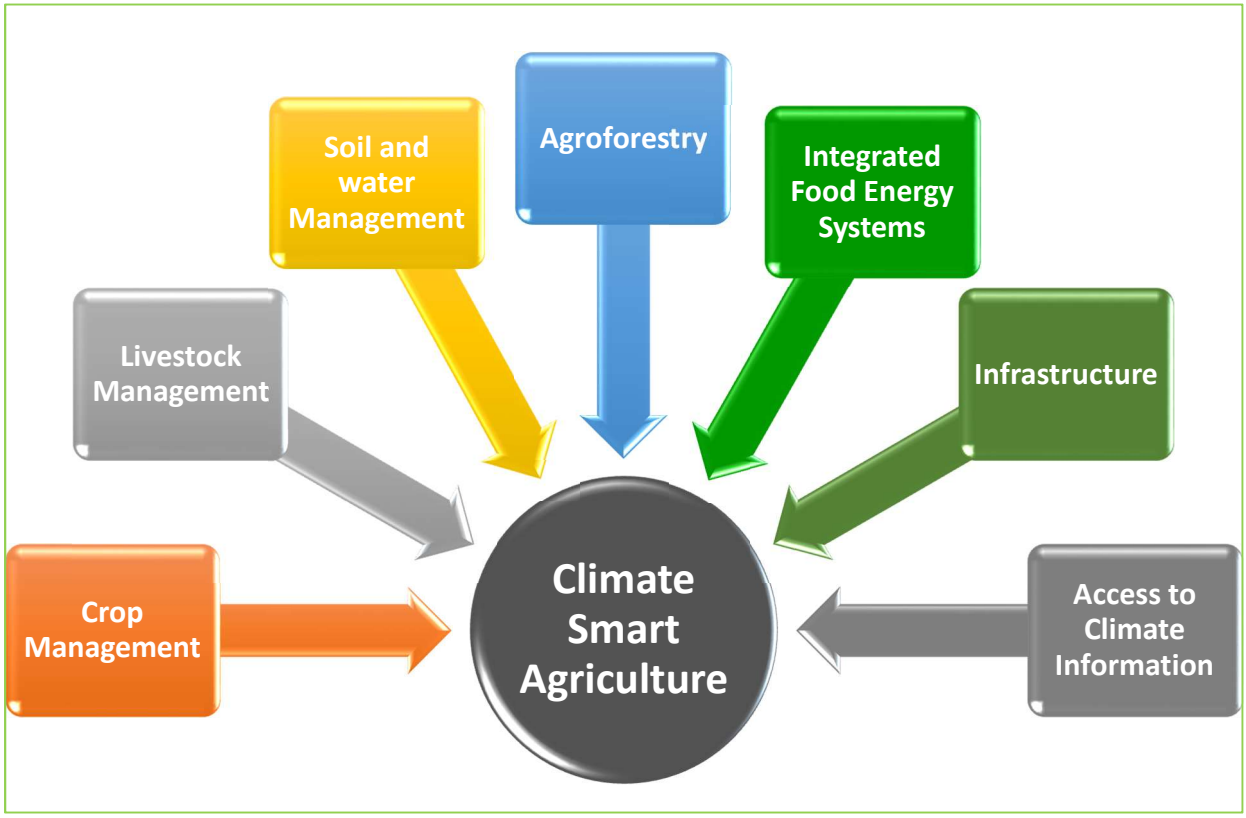


FIGURE 26: PRIORITY AREAS OF INTERVENTIONS

Following is the brief description of the seven pillars:

1. Crop Management: Crop management involves the prudent and timely use, sequencing and synergy of agricultural practices and techniques to achieve yield and productivity gains and overall growth and the development of agricultural crops. The farm level interventions essentially take care of the small and medium farmers to maximize income and profitability and increase returns to the factors of production. These practices are generally determined

by the biological characteristics (Rabi, Kharif or all weather crops), the sowing methods (row, planting), the harvesting mode (grain, green feed, plucking) and the general agro-ecological conditions (soil, climate, precipitation etc.). There are general crop management practices (irrigation, mechanical, pest and disease management- biological or chemical control- fertilization) which could be refined to come up with crop management practices specific to individual crops**.** These could be: inter-cropping with legumes; crop rotations; new climate sensitive varieties; improved storage and processing; crop diversity; improved seeds and input use; IPM etc.

2. Livestock Management: This refers to the entire gamut of livestock related activities (species based- beef cattle, dairy cattle, sheep, goats, poultry) including animal nutrition, health and disease, manure treatment, breeding, grazing, lactation, housing and waste management both for dairy and meat production. The livestock management takes into account the seasonality factors, market fluctuations, productivity and profitability of livestock rearing of an enterprise: improved feed to reduce GHG; rotational grazing; fodder crops; grassland restoration and carbon sinks (natural or manmade reservoirs and systems that suck and store CO^2 from the atmosphere of which the main are plants, soils and oceans). Integrated carbon sequestration[10] program for long-term storage of carbon dioxide or other forms of carbon to either mitigate or defer global warming and avoid dangerous climate change through better utilization of arid and semi-arid areas and rangelands have the potential to store up huge quantities of organic carbon to reduce atmospheric carbon stock by removing carbon from the atmosphere and storing it in soil or biomass; rehabilitate degraded rangelands; re-vegetate the degraded areas; and to improve socio economic conditions of the animal herders.

3. Soil and Water Management: Fresh water, clean air, healthy soil and a thriving ecosystem are germane to sustainable agriculture development. This involves achieving high efficiency of soil and water performance based on basic soil physical and biological properties, soil erosion, crop residue management, site characterization, site specific management, land application of waste water management, irrigation and drainage and water quality. It also includes basic soil and water interactions, salinity and sodicity issues, water transport, storage (dams, ridges; HEIS) and water use efficiency, conservation agriculture laser leveling, contour planting; terracing; alternate wet/dry paddy cultivation, Sugarcane;); rehabilitation and landscapes; building famers' capacity to use and adopt sustainable soil management practices

4. Agro-forestry: Agro-forestry involves deliberate and planned integration of trees and plantations into crops and livestock farming with a view to achieving

[10] the process by which carbon sinks remove CO^2 from the atmosphere is known as carbon sequestration

economic and environmental benefits. It is intensive land management system that optimizes the benefits from biological interaction between trees and shrubs and crops and/or livestock and leads to more productive and sustainable use of natural resources. It is productive use of land, animals and trees to maximize the production and develop a more dynamic, ecologically sustainable and natural resource management system. Its adoption leads to the accrual of major gains to improve the environment, income and lives of people. Agro-forestry has proven to be viable option especially in those areas and ecological systems where the need for restoration and revitalization of degraded landscape is associated with the need for increased food, industrial raw material and fuel production.

5. Integrated Food Energy System: The IFES ensures reduction of inputs of fossil fuels, fossil based fertilizers and water by reusing material land energy on the farm. It also helps alleviate energy poverty (use of biomass) and sustain decent and sustainable living standards especially for the poor small farmers e.g., lighting, heating, cooking as well as education, modern health treatment and productive activities. IFES aims at simultaneously producing food and energy as a possible way to achieve the energy component of sustainable crop intensification through the ecosystem approach e.g., (a) combining production of food and biomass for energy generation on the same land though multiple cropping system or systems mixing annual and perennial crop species (agro-forestry system). Either system can be combined with livestock and/or fish production; (b) maximize synergies between food crops, livestock, fish production and sources of renewable energy (adoption of agro-industrial technology e.g., gasification or anaerobic digestion) that allows maximum utilization of by products and encourages recycling and economic utilization of residues. China and Vietnam already have success stories of biogas schemes: long tradition of integrated agriculture (crop-livestock-biogas), available technology, enabling environment, laws and regulations, industrial standards for bio-gas plants, extension services and training (startup investment cost however an issue). In China, around 25% of the rural population is served by household biogas schemes.

6. Climate Smart Agriculture Infrastructure: Agriculture infrastructure[11] is critical both to future agricultural growth, and to curb the emissions and

[11] for precision farming, livestock sheds, smart greenhouse; hardware (automation & control systems, drones, GPS/GIS/Remote sensing, driverless tractors, mobile devices); Wireless modules; milking robots; Software (Web-based, Cloud-based); Services (System integration & consulting, Maintenance & support, Farm operation services); Supply chain management services; Application Tools (Field mapping, Crop scouting; Irrigation and Inventory management); Livestock monitoring application (breeding and feeding management); Smart greenhouse application (water & fertilizer management; yield monitoring): climate proof infrastructure for storage; retrofit rural infrastructure to cope with climate risks (flooding or water shortages; rain water harvesting and conveyance infrastructure

climate change impact. This entails that public- and private-sector actors make infrastructure investment choices on climate sensitive basis. Else, there will be significant economic risks, including the potential for stranded assets, lock-in to fossil fuels with volatile prices, and exposure to future climate change impacts that may damage or disable infrastructure. Two key principles in this regards are very important: (a) all infrastructure policies, plans and projects should build in resilience to the risks of climate changes projected during their lifetimes; and (b) all these policies, plans and projects should be consistent with the overall national climate targets and long-term objectives and able to be justified in the context of the international long-term goal of holding average global warming to under 2°C.

7. Access to Climate Information: Since the climate is changing, farmers need appropriate information to be able to cope with and facilitate decision-making based on a variable and changing climate. They need to be trained on the basic concepts of weather and climate information like seasonal forecasts, planting dates, length of the season, dry spells, timescales for prediction, and climate risks, among others. They need to know how climate-related risks affect agriculture and through which mechanisms these can be mitigated; how to access and use climate information and interventions and effectively benefit from them to achieve livelihood outcomes in specific socio-economic contexts; what are the best methodologies for mitigating and adapting to the impact of climate. The design, production, processing and implementation and dissemination of climate information require existence of institutional expertise and climate information services to reach out to the farmers.

The description of the four inextricable and common threads is as follows:

(a) Agro-ecological Zones:

AEZs generally represent broad homogeneity of agro-climate, soils-terrain characteristics and locale specific agricultural capacity and serve as a tool to:

- make rational policy choices, land use planning including location of agro-industry and targeted development interventions;
- introduce climate sensitive cropping systems;
- identify best suited crops for each zone;
- Ensures provision of zone specific advisory and extension services (on cropping systems inputs, agro-technology, farmers training etc.);
- Guide and orientate zone specific research for prescribing climate sensitive varieties and management practices.

(b) Policy, legal and regulatory frameworks:

These include:

- establishment of consolidated policy and legal frameworks including laws and guidelines in consultation with all relevant departments and stakeholders through a concerted action to be able to, inter alia, create effective and enabling environment for climate smart agriculture[12];
- promulgation of Climate Change Policy which fully reflects the synergies and complementarities between climate change adaptation and mitigation;
- provincial water policy and groundwater act to address the overexploitation of water resources; introduce rational water pricing and improve sustainability and efficiency of irrigation for more equitable access to water and better assessment and collection of water rates to meet inter alia M&R costs;
- rationalization of subsidy policies to unlock funds for capital-intensive high efficient technologies (a specific DLI has already been provided for in the SMART project);
- agricultural insurance system to help farmers stabilize incomes and sustain resilience;
- Incentive package for encouraging private investment in CSA for propagation of new technologies and approaches and reduce potential losses related to climate change.
- Policy framework for conservation and improved management of fragile ecosystems to reducing GHG emissions, maintains ecosystem services and helps communities adapt to climate change.
- land use and related policies and plans including title, fragmentation, consolidation and farm size, agro-ecological zone based cropping systems in Punjab; and
- Livestock policy to reduce GHG emissions while increasing productivity.

(c) Institutional Framework

This would entail:

- Development of analytical capacity coupled with the strong institutional arrangements to effectively address climate change in agriculture.
- Capacity building of the agricultural department in development project selection, design, appraisal and implementation and also of decision makers on issues of climate change, climate sensitive budgeting and planning, with a particular focus on the agricultural sector.

[12] for example policy streams and legal and regulatory frameworks for CSA including: Agriculture, Climate Change, Environment, Livestock and Forestry and those relating to industry, disaster management and provincial development strategy.

- Vulnerability mapping for planning and implementation and robust data, information and knowledge base imperative for the identification, formulation and implementation of feasible and effective climate change mitigation and adaptation measures in the agriculture and land use sectors.
- development of a regular monitoring and assessment system of land resources to track changes in land quality over time as well identify potential productive areas through soil degradation;
- Enabling institutional environment through incentive based emission control mechanisms (carbon taxes, carbon credits etc.)
- easy and timely access to climate information for the farmers to make deliberate production and investment decisions; and regular dissemination of information among farmers on land availability, productivity potential, capacity, sustainability, land use changes and farming systems.
- establishment of competent and responsive extension and advisory services to focus on farmers' training and capacity development to prepare them flexibly respond and adjust to the climate change impact including better livestock manure and nutrient management, use of manure as biogas etc. [13]
- Access of farmers to the decision-making forums and space for a more rational policy and programmatic interventions which effectively cater for the farmers' needs.
- platform to be headed by Environmental Department for effective coordination on climate change related issues with both government agencies and public and private sector institutions;
- Establishment of a formal institutional forum or mechanism led by Agriculture Department to harmonize and synergize cross sectorial interventions in support of CSA.
- Revamping and orientating climate sensitive research and development with major role of UoF, Barani Agriculture Research Institute and crop specific research entities and that of UVAS .

(d) Gender sensitivity especially to

- ensure gender sensitivity to the upstream policy, planning and programming and downstream project and operational processes of CSA;
- provide gender sensitive extension services and training on climate change technologies, packages and practices including balanced and proper use and application of fertilizers, pesticides and herbicides;
- implement advocacy, educational and awareness programs regarding the dangers of pollution from improper use and application of agro-chemicals; the key barriers to make them a stronger economic player; access to financial resources; ownership of land; capacity to benefit from mobile applications; and women friendly agricultural standard practices

[13] USAID IFPRI draft Position Paper on climate change

4.3.4. A Practical Model- Paradoxical

During the course of appraisal exercise especially relating to CSA, BIPP team of experts and researchers besides desk review and study of the subject, looked into the possibility of identifying if climate smart agriculture was being successfully implemented by the farmers through individual initiatives given the enormity of the impending challenge. Through series of interviews with the experts and progressive farmers, the team managed to identify a group of farmers lead by Mr. Asif Sharif which was successfully pursuing what the group calls is "Paradoxical agriculture" a combination of conservation agriculture and intensified system of cropping with all the major ingredients of CSA. Box 2 attempts to capture the major features of Paradoxical agriculture.

Box 2 Paradoxical Agriculture

In one of the field visits (village Dabur Bhattian, Sukheki), pursuant to the meeting with one of the Key Informants, BIPP team witnessed the practical demonstration of adoption of paradoxical agriculture crop management practices and technology to realize the twin objectives of crop/agriculture profitability and competitiveness. An integral part of the package was the capacity building, training and skills development of the farmers.

Paradoxical Agriculture integrates both the principles and theory of conservation agriculture under practices of system of crop intensification on the one hand and the practical and economic consideration of the field on the other while aiming to move ultimately to organic farming. The diverse technologies deployed are based on a set of agronomic and biological fundamental for application to any crop production system and process. It involves:

- use of seeds and plants that are not genetically modified;
- abstinence from the use of synthetic fertilizers, hormones or inorganic nutrients; the use of bio-fertilizers;
- no or very little use of pesticides, herbicides or weedicides; espousal of IPM and holistic view of pest management to reduce environment and human impacts of pesticides and natural pest control methods, bio-pesticides and weed control practices;
- focus on optimal use of inputs to improve conversion rations;
- conservation of agriculture with minimum use of tillage, minimum soil disturbance, no periodic deep tillage, proper soil cover, and crop rotation;
- system of crop intensification i.e., timely planting/transplanting, lowest trauma to plant during various operations, optimally wide spacing between plants, weeding and active soil aeration, water management to meet but not exceed plant and soil needs, compost application to enhance structure and function of the soil systems;
- Water use efficiency.

The farmer, Mr. Sultan Bhatti, had cultivated 10 acres of wheat crop using the paradoxical agriculture technology under direct advice, guidance and training from Mr. Asif Sharif, the proponent of PA. The following Table shows the comparative analysis of the costs of production under the PA system and conventional agriculture and the huge differential between the two palpably demonstrating the competitiveness and profitability of the wheat crop. The positive policy implications are: (a) withdrawal of the subsidy; (b) withdrawal of the support price; (c) incentivize exports; and (d) the area retrieved from wheat because of vertical productivity to be used for high value crops.

Table 11 below shows the comparison between different constituents of yield per acre between Paradoxical Agriculture and Conventional Agriculture

TABLE 11: PARADOXICAL AGRICULTURE VS CONVENTIONAL

		PA	Conventional
Description	**Rate**	**Actual**	**Averages**
seed rate used-kg		4	40
cost of seed	2700	270	2700
cultivation -seedbed preparation			3000
Fertilizer -DAP/Total Conventional	2800	1000	10,210
Water - per hour tube well	150	600	3500
cost per acre		8191	24910
Yield/Kgs per acre		67.66	45

It is strongly recommended that Paradoxical agricultural practices be adopted as integral part of the CSA strategic framework

4.4. CPEC: Potential for Transforming Agriculture in the Least-developed Districts of Punjab and Alleviating Poverty

There are four important factors enshrined in the CPEC framework to provide impetus to competitive agriculture: firstly, the focus on agricultural development and poverty alleviation; secondly, provision of special economic zones and food-agriculture processing and agro-industry therein; thirdly, the network of feeder and connecting roads and fourthly, access to domestic and international markets to support international trade flows and induce a considerable shift in the intra-country trade.

4.4.1. The Proposed Development Model for Poverty Alleviation[14]

The development model comprises three salient components: (a) a staged development approach (b) four pronged interventions and (c) additional sub zones or clusters in the selected districts based on their endowment and agricultural production systems.

a) Staged Approach

Given the resistance to change, relative neglect of some of these districts and the primitive and subsistence practices in vogue, the local specificities should be fully factored in designing development interventions. This will entail the following stages:

[14] based on BIPP's 9th Annual Report: The State of the Economy: CPEC"

- In the first instance, efforts should aim at improving the overall productivity based on the existing production system to make agriculture profitable.
- The second stage should focus on diversification of the sector to promote high value crops, based on the potential comparative and competitive advantages.
- Third stage, benefiting from the experience of the first two, should aim at increasing the overall factor productivity to transform the sub-sectors/commodities/agriculture into fully competitive, commercial and agro-industrial ventures with robust forward linkages to domestic and international markets.

b) Four-Pronged Intervention

A composite set of four pronged interventions is proposed to fully realize potential benefits from the agro-commercial activities:

(i) Software — Policy Recommendations

The two position papers prepared by DA with the assistance of USAID i.e., "Rural Poverty and Agriculture" (Oct 2017; and "Strategies for Formulation of Agriculture Policy" (Dec 2017) embody some useful recommendation for increased income and poverty alleviation of rural poor and farmers. The former advocates focus on mid-sized farmers for farm level productivity interventions (extension and advisory services, ICT tools) minor-crops oriented (R&D, price and procurement interventions) and livestock related measures in the first instance.

The latter avers for small commercial farmers: better access to credit and inputs, applied research on fertilizer use, optimal cropping systems based on water availability, and competent and better trained extension and advisory services. In our view, however, the subsistence farmer should be brought in the loop for sustainable poverty alleviation.

The policy choice should not necessarily be to maximize the production, but to create necessary and sufficient conditions for the farmers to become more competitive for profitable agriculture. The production structure as well as the agro processing industry and input delivery system should be incentivized to respond effectively to the changes in domestic and external markets and technologies. In order to achieve faster agricultural growth and commercialization, the policy must, inter alia, provide for: (i) enabling environment for farmers to facilitate their responsiveness to the market demands (ii) incentive structure to make farm sector profitable and competitive (iii) enhancement and strengthening of commodity chain through product transformation and value-creation, product enhancement (cleaning, grading, packaging), cost effective and time saving transportation and logistics support (quality control, cold chain procedures etc) (iv) integration climate change and sustainability (v) facilitation of flexible rural factor markets (labor, land, water, and finance) and (vii) promotion of the role of private sector, service centers, NGOs and farmer associations.

(ii) Hardware — Physical Infrastructure

This includes provision of the agricultural infrastructure including input based infrastructure (seed, fertilizer, pesticides, farm equipment and machinery etc.), resource based infrastructure (water/irrigation, farm power, energy) and physical infrastructure (transport, storage, processing etc.). This will also ensure farmers' access to institutional finance and markets; stimulate spread of proven yield enhancing technologies; lower input costs; promote agricultural growth; and thus concretize modern, commercial and flexible farming systems.

(iii) Orgware — Institutional strengthening and Capacity Building

The institutional infrastructure (agricultural research, extension, advisory services, financial and credit institutions etc.) is sine qua non to transforming traditional agriculture to commercial and profitable activity. Capacity development of the farmers and agricultural institutions must be geared to technology generation and transfer, farmer training, technical advice, adoption of modern service delivery methods including dissemination of international best practices. Provision of easy credit facilities is essential for farmers' investment in production.

(iv) Techno-ware

The pre-production through to post production cycles add value to the product and significantly augment the profitability and competitiveness of agriculture. The information and intelligence on input and output markets, price fluctuation, weather and demand and supply structure can be accessed through integrated ICT solutions to help small farmers make right production and procurement choices. These solutions could be deployed on the smart phones, internet and other digital tools which are already being pervasively used even in the remote rural areas.

c) The New Economic Sub-Zones and Clusters

The staged approach and four pronged interventions, as described above, are integral to establishing economic sub-zones and cluster to full fruition. These sub-zones/clusters should be modeled around the specific crops, as given in the Annex-3 which over the years have registered increase in yield and production and seem to have sustained the natural comparative advantage.

4.5. Ceiling on Milk Prices

Price capping in dairy (milk) by the unfair market practices is a serious constraint for the production to take off. The price capping, including the informal means to do so, prevents the milk producer to recover the cost of production. The major interests and groups in the private sector manipulate the policy process to resort to dry milk and whey powder imports. There is an urgent need to identify and map all such informal price capping induced by the unfair market practices of the private sector and embark on policy reforms on price de-capping. The associated benefits of such policy reforms in the sector include:

- Producers to attain adequate price of their produce leading to rural prosperity and poverty alleviation
- Growth in milk production to catalyze job creation in rural areas. Enhanced growth will meet domestic demand; attract investments in farming/ production; and will help in tapping export market to generate foreign exchange.
- Supply chain to be strengthened so as to minimize adulteration and curb black market economy;
- Consumers to attain healthy food items of premium quality while making them cheap in long term;

It may, however, be emphasized that de-capping alone would not bring the needed change in developing a competitive dairy sector. Two complimentary policy actions are needed (1) improving price transmission from consumers to producers and (2) enhancing milk productivity.

Furthermore, importation of cheap powdered milk not only suppresses the local prices but distorts competition in favor of the formal processors. It has to be either totally banned or strict import quotas with high tariff rates have to be set in case the importation is unavoidable to meet domestic demands. This may be necessary until the Pakistani industry is able to meet the ever-increasing volume demand of consumers. The viability of imported powdered milk and its impact on the industry and local milk prices do, however, require further research.

4.5.1.Improving price transmission from consumers to producers

The identification of current price setting mechanisms is an important policy requiring attention. The current mechanism does not transmit the right market signals from final market to the producer.

Farm gate prices are influenced and controlled by the formal processors who hold more buying power because of their oligopoly on the market structure. Enforcement of antitrust laws can address these malpractices. At the farm gate level, the research revealed that formal sector players, who primarily buy from the informal chains, have the main say in price fixing in the absence of any formal mechanism set by the government. The current price mechanism is linked to the structure of the dairy industry.

A large number of smallholder farmers and *dhodhis*, that supply or trade in small volumes, cannot influence price or sale volume of larger enterprises and, therefore, are susceptible to price manipulation. The formal processors, however, handle a large enough proportion of output to affect price or sale volume of other firms and that leads to price-output interdependence. These commercial industry leaders exercise considerable influence to forge collusion and control milk price setting at the farm gate (Bain, 1968). Rogers and Sexton (1994) highlighted the need to consider the monopsony /oligopoly issues in the policy development debate, particularly in the agricultural markets, to promote competition. The aim of regulatory policy should be to improve market performance by encouraging a competitive environment free of collusive or predatory activity (Bain, 1968).

In the price determining mechanism at the retail end, there are a small number of emerging informal chains that are vertically integrated and represent the characteristics of monopolistic competition. The retailers, who are large contractors as well as supplying formal processors, negotiate milk prices with the city government during the annual price reviews for fresh, unpackaged milk. This retail price fixation was also noticed by the Pakistani government price regulatory body (Competition Commission of Pakistan, 2012).

4.5.2. Productivity enhancement is a key to economic profile of milk production

Given the importance of dairying in the irrigated region, a cluster of competitive production base (Porter, 2000) with a focus on increasing productivity of farms best utilizing the local factors of production (Porter, 2008) is the way forward. Our analysis also highlights the fact that farmers with higher milk productivity are moving towards profitable milk enterprise.

Low milk productivity is one key factor for lower income. Simple actions like providing enough and better-quality feed, water and space to the animals would contribute a great deal in enhancing milk yield. The sector needs to move up the productivity curve where real tradeoff begins.

4.5.3. Need for Comprehensive Study on Trade and Price Policy

There is a serious need to review the cost of milk production and wave-off the unnecessary burden being put on the dairy farmers in terms of duties and taxes on the raw material, feed items, consumables and equipment for the livestock and dairy farming.

While few policy/economic oriented studies (some of which reported above) do bring out very useful insight into key areas of action, the work needs to be extended to estimate comparative advantage and competitiveness of livestock and diary production in Pakistan.

Finally, most of livestock studies do not take into account traded component in cost of producing a liter of milk, whose prices are determined in international markets. The economic cost of imported skimmed milk, feed and meals that either carries tax or subsidy whether directly or indirectly is absolutely unknown. A detailed analysis calculating parity prices for milk, feeds and livestock meals are missing component of policy analysis. It is proposed to use Policy Analysis Matrix to estimate milk production using both financial and economic prices and estimate comparative advantage of producing milk in terms of export markets (DRC analysis).

4.6. Sugarcane Deregulation

Like wheat the sugarcane industry is also in a huge mess. This year all stakeholders are reporting financial losses. The underlying reason is a policy failure

stemming out of heavily protected industry. There is urgent need to deregulate the industry and rid it of the highly distorted price and trade regime.

The sugarcane price is currently fixed as a minimum on the basis of average recovery without consideration of mill or farmer's efficiencies. No quality payment has been introduced to match with the developed cane growing countries of the world. Table below shows historical prices:

TABLE 12: SUGARCANE INDICATIVE PRICES BY PROVINCE (RS. PER 40 KG)

Year	Punjab	Sindh
2003-04	40	41
2004-05	40	43
2005-06	45	58
2006-07	60	67
2007-08	60	67
2008-09	80	81
2009-10	100	100
2010-11	125	127
2011-12	150	152
2012-13	170	172
2013-14	170	172
2014-15	180	182
2015-16	180	182
2016-17	180	182
2017-18	180	182

Source: 2006-2018 Agriculture Marketing Information Service (AMIS), Directorate of Agriculture (Economics & Marketing) Punjab, Lahore.

Price fixing provides strong signals to grow sugarcane instead of other possible options, as it raises its profitability (see analysis in section below) which may and may not happen. Ministry of National Food Security and Research (MNFS&R) sends its recommendations for support price of sugarcane in October each year following the request of provinces. However, the provinces take their time in announcing the prices. The international price of sugarcane is not taken into account leading to high cost either to producers or consumers and now also to government.

Sugar in Pakistan's domestic market continues to be priced well above the international market. Current Lahore wholesale prices are $550 per metric ton, an estimated 15% higher than the international market. Last year, the wholesale price was at $435 per metric ton, an estimated 28% higher than the international market pegged at $341/metric ton. The sugar market is insulated from imports by a tariff of 40%. While mills enjoy high price in the domestic market, millers are still squeezed between high provincial and federal minimum cane prices and their returns from selling sugar in the domestic market along with the costs of carrying stocks of unsold sugar. Still, production continues to expand as mills offer

predictable prices for cane and, in recent years, export subsidies have facilitated exports.

At present, in Pakistan sugarcane is the only crop that gets paid by weight and not by quality. The loss is generally borne by the mills. A significant improvement in the supply of quality cane is expected as soon as a payment mechanism is determined which takes into account cane quality, in particular, sugar content. Efforts are now underway led by the Pakistan Sugar Mills Association to persuade the Government to consider adopting the cane payment system used in Australia or other parts of the world, which is based on cane quality and is fair to both growers and millers.

The existing policy also leads to a reduction in the sugar yield and increase in its cost. In addition, the cane price is on average recovery of each mill without any minimum base. Thus, if a cane price of Rs.40 per kg is fixed for average recovery of 8.5%, the mills getting 7.5% recovery shall pay Rs. 35.29 for 40 kg and the mills getting 9.5% recovery shall pay Rs. 44.71. This means that Rs.0.47 shall be adjustable for increase or decrease of 0.1% in recovery from standard recovery fixed as 8.5%.

4.6.1.The Policy Impact

Around eight to 10 sugar mills in Punjab faced bankruptcy by the end of the crushing season 2014-15 owing to financial crunch after sugar prices crashed in the province. The amount of over Rs. 60 billion payable to sugar growers remained stuck as a result.

Every year at the start of the crushing season, millers deliberately delay crushing for one reason or other. These tactics often force growers to sell their crop for less than the fixed price. For last two years, the situation has been worsened. A number of sugar mills did not start their operations during the ongoing crushing season anticipating huge loss due to carried-over stock and good sugarcane crop, depressed international market and other factors.

On the other hand, farmers have one of the worst years making income out of sugarcane. As against the fixed price of Rs. 180 per 40 kg, the farmers are forced to sell at a price as low as Rs. 120. Under present situation there is no economic rationale to bring the produce to the market. Ministry of National Food Security and Research (MoNFS&R) has estimated that sugarcane growers in Sindh, Punjab and KP are expected to suffer a financial loss of up to Rs. 133 billion due to less payment by mill owners (Sugarcane growers likely to suffer Rs. 133 billion loss, Mushtaq Ghumman,Mar 22nd, 2018, Islamabad, Business Recorders).

Minister for National Food Security and Research, reported that except one or two sugar mills of southern Punjab, no sugar mill is paying the minimum support price fixed by the provincial governments to the farmers; instead purchasing sugarcane

from farmers at the low rate of Rs. 120 to 130/40 kg and getting invoices from the farmers of Rs. 180/40 kg.

If crushing is delayed, growers would have no other option but to sell the standing cane crop to exploitative middlemen who carries his business in the outskirts of cane mills for much less than the fixed price. This gives middle man an opportunity to exploit the farmers all along the season as price is so low that farmers are tempted to sell. The farmer is in a hurry to get his cane out. The farmer does not have holding power, as he needs the cash. Mills on their part take time to open the factory and also take time to pay because they exhaust their working capital. The Arthi has the holding power, since he can wait 2-3 months for the money, and he sells it to the mills for Rs. 180. So, neither the farmer nor the mills benefit.

It is equally important to note that the delay in crushing and subsequent delay in farmers' ability to sell affect the sowing of wheat, whose productivity is affected with late sowing.

The major challenge of the Sugar Industry is to offload the surplus stock, and to pay the growers dues of more than Rs. 225 billion.

4.6.2.Key Messages and Needed Actions

Restructuring of the sugar industry: Pakistan, over the years, has become exporter of sugar from importer again and, with the present subsidy and incentive structure, this trend is likely to continue for quite some time to the great detriment of the sugar industry. The restructuring of the industry and setting the pricing and subsidy distortions right are absolutely essential prevent the constant decline in the industry and to put it back on the right track of competitiveness, growth and profitability. The industry has been prompted to enter into an era of export orientation vainly trying to export its surplus stocks accumulating for last three years. The important policy question is: does it make economic sense to produce excess supply of sugar which fails to compete in the international export market on the one hand and, on the other, incentivize production of a high-cost-high-water consumption crop to the detriment of competing crops which have both better comparative and competitive advantages.

Sugarcane Pricing: A fair pricing mechanism is necessary to protect the growers and encourage higher yields, tackle the problem of potential shortfall in the cane crop and rationalize the high cost of inputs. This will simultaneously entail safeguarding the interest of consumers through institutional and regulatory and enforcement mechanisms for price stabilization and obviating possibility of artificial increases.

Given the high volatility of wheat and sugar prices in the world markets and the political sensitivity of these import-competing crops, a price band policy with price floors and ceilings might be an attractive option to evaluate. There is an ongoing debate in many countries over what might governments do to deal with the recent increase in volatility of commodity prices, especially of food prices.

Wheat and sugar are two possible candidates for this type of intervention to reduce price volatility. A price band policy, restricted to these two products, could be based on moving averages of border prices, and would have to be unrelated to domestic prices. Otherwise, such a policy would fit the category of a variable levy, an instrument forbidden under the Uruguay Round of GATT/WTO.

Comparative and competitive advantage of sugarcane crop: There is hardly any credible study that estimates the comparative advantage of growing sugarcane, when the country is in the midst of: a serious water crisis; the productivity of sugarcane crop is one of the lowest; the recovery rate requires substantial improvement; and the benefits of cogeneration not being fully realized. The newly identified Agro -Ecological Zones (AEZs) provide good bases for GoP to undertake a comprehensive and long overdue study to estimate comparative and competitive advantage of the crop and sugar industry. Even the Judiciary has taken cognizance of the distortions to, inter alia, endow some rational semblance to the location and operation of the industry.

*Sugarcane Trade Issues***:** It is indeed instructive to benefit from some of the suggestions made by Valdes (2013) as summarized below:

- Governments could accumulate stocks during low-world-price periods and sell stocks during high-world price periods in order to reduce domestic price increases. But such an approach has proven to be costly and usually unsustainable.
- A more promising policy option that does not require government control of stocks is to use a type of variable tariff based on moving averages of world prices. When world prices rise in short term, the tariffs would fall, cushioning the negative impacts on domestic buyers. When world prices fall, the tariffs would increase, to ward off the negative impacts on domestic producers. This option should however be exercised on exceptional basis and administered with a credible commitment through pre-established and transparent regulatory framework.
- The tariff schedule should be reformed to reduce dispersion and to remove the implicit tax on agriculture. The current tariff and duty system is not transparent, but complex, hard to understand and interpret.
- Pakistan should move towards a uniform and low tariff, with the tariff as the only border measure, no exceptions and no other taxes. A uniform tariff would not preclude sales taxes, as long as they are uniformly applied to imports and domestic production. Uniform tariffs, as the normal rule guiding trade policy, would not preclude the prudent and occasional use of transparent contingency measures, such as safeguards, anti-dumping and countervailing duties, which are all WTO legal. At the provincial level as well, taxes should not discriminate between domestic and foreign supplies.

Sugarcane zoning: A review of both old and present zoning systems is needed to promote equity and justice. Zoning obliged farmers to sell their produce to the mills of their areas. It had been a cause for much heart burning among the growers and resulted in: (a) denial of adequate return to the growers; (b) non-payment of dues

for long periods; (c) unrest among the growers; and (d) de-incentivizing the farmers for increasing production and improving quality.

Before concluding, the need to study the comparative and competitive advantage of growing sugarcane in Punjab may be reiterated. Based on available data, primary as well as secondary and making use of trade data bases, a good bench marking with selected key indicators would help in formulating right export strategy for sugarcane in Pakistan.

4.7. Establishment of Grain Warehouses

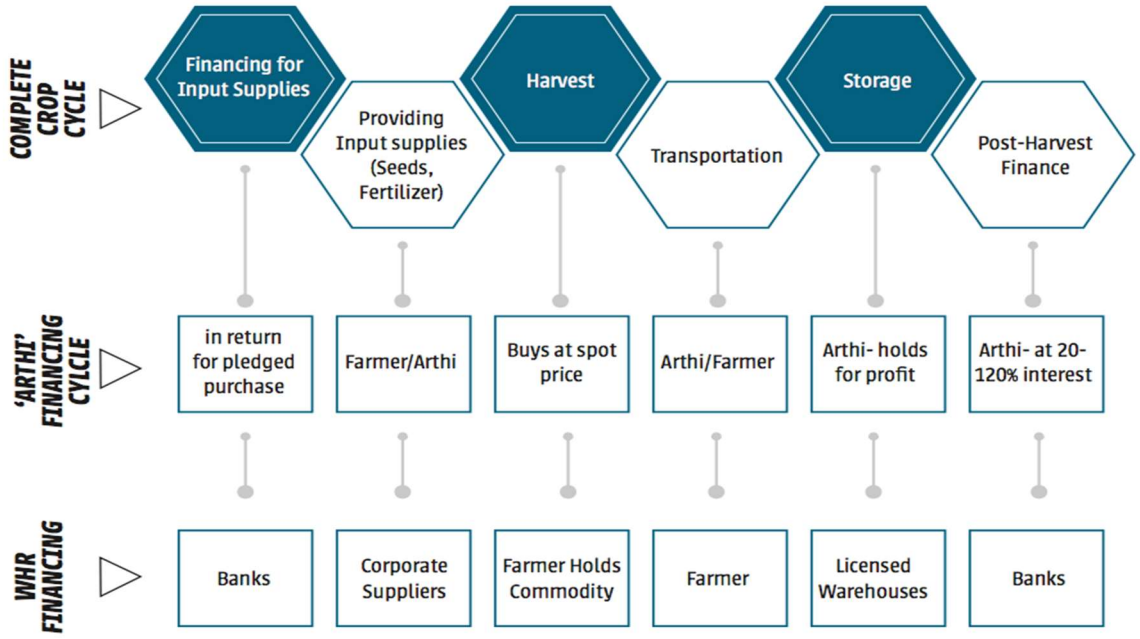
4.7.1. The Warehouse Receipt Initiative

The Warehouse Receipt (WHR) financing allows the use of crops instead of land as loan security and provides post-harvest working capital to the farmer. Figure 27 provides a comparison between the traditional model and WHR in terms of input supply, transportation of commodity and post-harvest financing. For banks, WHR financing is advantageous as it allows "lenders to immediately sell off a very liquid asset.[15] The collateral is mostly in the form of wheat, cotton, rice, maize and other grains. When the commodities are stored, the licensed warehouse issues a receipt providing evidence of physical storage of commodities, as well as the grade (quality of goods), quantity and value of the commodities, which then becomes the basis for the financing.[2]

[15] State Bank of Pakistan. Framework for Warehouse Receipt Financing System in Pakistan, P14. 2014. http://sbp.org.pk/acd/Guidelines/2014/Draft-Frmwork-Warehouse-Receipt-Financing.pdf

[2] Ibid

FIGURE 27: COMPARISON OF TRADITIONAL (AARTHI) WITH WHR MODEL



Creating private-public partnerships that support building warehouses, with treatment facilities in selected districts on a pilot basis, for grain crops such as rice or wheat and potato depending on the crop cycle, is a viable option. A feasible private-public modality needs to be explored as an appropriate way forward. The government would, initially, help in infrastructure development through land and subsidized credit. A private or community owned storage facility can be linked to a bank which can pledge stocks and advance loans to the farmers treating them as collateral. These storages can solve three major problems: (a) taking famers out of the middleman's clutches by providing viable credit options; (b) increase in farmers' income and profits; and (c) ensure price stability in the market. The added advantage is that long supply chain would be reduced along with a cost reduction that can be passed on to the consumers who also bear the high cost of purchasing these basic commodities.

4.7.2.Electronic Warehouse Receipt Financing – Another Perspective

The key reasons for constrained agri-lending include: use of farmers' land as collateral, lack of standardization of agricultural commodities, and the absence of an eco-system of professionally-managed modern agri-warehousing that can be trusted by banks. Land is a difficult form of collateral for farmers as well as banks. From a farmer's point of view, one acre of canal-fed land in Punjab is worth Rs. 2.5 million but the typical loan available from banks against this land is in the range of Rs.25,000 per acre. From the bank's perspective, agricultural land is extremely difficult to liquidate in case of default. Therefore, farmers are mostly stuck with informal lenders who typically charge mark-up of 35 % per annum (at times as high as 50 to 60%) and fill the wide gap between agri-credit demand and supply.

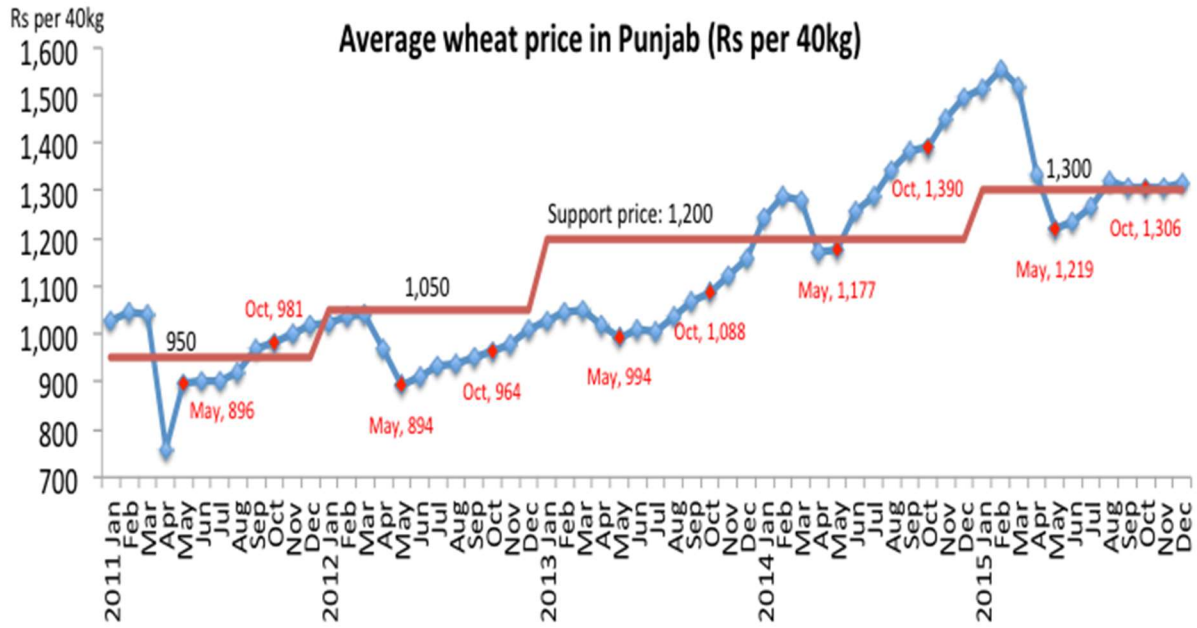
Small farmers are the worst hit members of this value chain. This necessitates development of new pilot models involving a different form of collateral, standardization and collateral assurance.

4.7.3.Benefits and Concerns

Based on the presentation made by PAC on "Pakistan Agricultural Coalition Transforming Pakistan's agriculture" in Turkey (2017), following are the potential benefits of the program;

- Farmers avoid making a 'distress sale' (Figure 28) at time of harvest to attain money for sowing next crop. The monthly prices tracked since 2011, clearly show that the prices are depressed during post-harvest glut. Farmer can get 5% higher price if he avoids distress sale in May.

FIGURE 28: WHEAT DISTRESS PERIODS



- Saving due to marketing through a shorter value chain as farmer is paid 8.5% less when selling wheat at the mandi due to reduction in transport and marketing cost at mandi.

- Finally, farmer pays over 13% more to middlemen because he has insufficient cash to sow the next crop, thus reflecting over-charging amount by the middle man. These savings are greater than what bank charges for 5 months.

Figure 29 below shows the benefits that accrue to the farmers by adopting PAC approach.

FIGURE 29: FARMERS BENEFITS ADOPTING PAC APPROACH

Farmer profitability with agri-collateral manager

Assumptions

Wheat yield	30	maunds per acre	[40kg per maund]
Deductions at mandi	5.0%	of sale price	
Agri-collateral manager charge	0.25	Rs per kg per month	
Loan as % of commodity value	70%		
Mark-up	10.0%	per annum	
Transport to and from warehouse	30	per maund	

Current practice (for 1 acre)	May-15
Wheat prices (Rs. per maund)	1,150
Sale of wheat	
Value of wheat	34,500
Deductions at mandi	1,725
Net payment to farmer	**32,775**

Proposed practice (for 1 acre)	Oct-15
Actual appreciation May-Oct 2015	
13%	1,300
Sale of wheat after 5 months of storage	
Value of wheat	39,000
Mark-up (5 months)	1,006
Agri-collateral Manager charge (incl trading)	1,500
Net payment to farmer	**36,494**
Gain to farmer compared to current practice	11%

There are, however, few concerns that include:

- Previous attempts have not succeeded mainly because formal allocation of relevant roles and responsibilities had not been worked out among banks, warehouse operators, borrowers, etc.
- The program's potential to be scaled up requires in-depth study. Most previous attempts have been implemented at best at pilot stage. The basic question about this pilot is its robustness to guarantee success, or what is fundamentally different in this pilot that will make it work.
- Further the program is loaded with subsidy; none of previous interventions was successful, when subsidy is taken off. The economic feasibility has to be established.
- There is also a very limited awareness of WHR financing among the value chain actors, primarily confined to stakeholders who have been directly involved in the development of the scheme for Pakistan through SBP's roundtable seminars and workshops.

4.7.4. Key Actions Proposed

Key areas that need further development for the implementation of a successful and effective system of WHR financing are:

- establishment of CMCs for licensing and quality control of warehouses;
- establishment of a warehouse and storage network for agricultural produce;
- creation of a database on storage facilities;
- development of a commodity exchange market; and
- Raising awareness of farmers.

Given the agro-ecological and cropping diversity of Punjab, it is possible for the formation of more than one CMC.

(a) Short-Term

Establishment of Collateral Management Companies

Following the implementation of the SRO 302 (I)/2017, Collateral Management Companies (Establishment & Operations) Regulations by the SECP in May 2017, the formation of a CMC has been made possible. A functioning CMC is essential if the WHR financing model in Pakistan is to progress beyond the pilot stage and achieve critical mass required for sustainability.

Establishing a Warehousing and Storage Network

A strategic plan for implementing public-private partnerships to expand and upgrade the warehousing industry is required. This will enable the formation of a strong network of storage facilities licensed by a CMC. The storage facilities developed by the agriculture department Punjab may also be incorporated into the system, being upgraded and maintained by private warehouse operators.

Filling Information Gaps

A comprehensive analysis of the price trend of major agricultural commodities over the last five years reveals that WHR financing could be a viable source of credit for wheat, rice, cotton and maize farmers in Pakistan. These commodities are storable and their post-harvest price trends over the last four to five years justify delayed marketing. It is worth noting that the majority of farmers in Pakistan have small landholdings – over 72 % hold less than 8 acres of land. Once the system is strongly established, small farmers will also be able to benefit from WHR financing

Any plan for the development of WHR financing in Pakistan needs a strong database of storage facilities in the country, with detailed information regarding capacity, type, and distance from nearby farms, catchment areas and important crops growing in the vicinity. A scoping survey should be immediately carried out covering both government and privately owned storage facilities.

A strong price intelligence mechanism also needs to be put in place. Currently, the only such service is being provided by the Pakistan Bureau of Statistics through the Agricultural Market Index Statistics (AMIS). An online digital platform with real time update on regional, provincial and international commodity prices, linked

through the commodity exchange to all participants involved in WHR financing will enable efficient and effective operation of the system.

(b) Medium Term

Legislative Cover for Warehousing and Storage Network

Once the CMCs are fully operational, secondary legislation covering the WHR financing processes in detail should be implemented and enforced by a government agency such as the Ministry of Finance or Law in collaboration with the SECP and SBP, who have already done considerable work on the subject. The secondary legislation should address the warehousing requirements, commodity parameters, financing terms and conditions, as well as insurance and quality requirements for WHR financing.

Developing a Commodity Exchange Market

The development of a formal commodity exchange market is essential. Ideally, it should be able to capture 50-70% of the volumes currently being traded in the informal sector. PMEX has developed a commodity exchange mechanism which can be adapted to the requirements of WHR financing with some refinement and expansion.

Awareness Raising Of Farmers

A widespread advocacy and capacity building campaign for farmers across the country is required for raising awareness about the advantages of WHR financing and how to use the system. Farmers' needs have to be carefully studied in order to tailor WHR financing products for their advantage, which can break the arthi's monopoly on smallholders across the country. Initially, NGO-assisted farmer's cooperatives can be a good model for raising financial literacy and technical capacities of small and medium farmers.

(c) Long-Term Sectorial Reforms

The establishment of commodity exchanges in recent past has provided a new platform for price discovery and price risk management for the farming community. The challenge is to widen farmers' participation in the exchanges and ensure that the exchanges provide a platform for genuine price discovery and hedging opportunities for the farming community. Future markets, by themselves cannot improve supply efficiency and boost agriculture credit and financing of the agricultural sector unless concomitant reforms take place along the entire value chain. The next generation of reforms should facilitate emergence of pan Punjab-Pakistan electronic trading platforms (Spot Exchanges) for an integrated market.

An electronic spot exchange will ensure greater transparency in price determination as electronic screen terminals across the province will display the prices and quantities of various commodities traded. Transparency of transaction

would help governments in addressing evasion of mandi taxes. Electronic exchanges will promote quality standardization which would ensure greater access to finance from banks and other financial institutions (FIs) to the farmer. Transaction costs are lower under the electronic auction system as compared to the current mandi system by about 10 percent.

WHR financing is ultimately dependent on a robust and competitive agriculture sector. Reforms in the agriculture sector, aimed at increasing profitability, competitiveness and efficiency, are required as a matter of urgency in a systemic manner involving all government institutions, private sector, farmers etc. Agriculture in Pakistan lags way behind the international market in terms of scale of production, input costs and per acre yields of important commodities. Currently wheat production is being subsidized by the government, which is severely undermining the export capability of one of the major crops in the country. Innovations are required to stall soil degradation that is affecting crop yields and increasing input costs for agriculture, pushing the whole sector into an unsustainable cycle. WHR financing can only succeed if the commodities involved are competitive in international markets.

4.8. Incentive Driven Policies for selected crops in New Ecological Zones of Punjab – Case of Cotton and Sugarcane

The focus of this section is to analyze the ongoing work in developing AEZs for which some preliminary data is available, and at the same time to bring international experience to enrich the existing work being done on policy and economic side of developing economic ecological zones. Sugarcane and cotton crops are discussed as major case.

4.8.1. Economic-Ecological Zoning

Crop Suitability Maps and Economic Analysis

Crop suitability maps are developed based on the agro climatic factors such as Max. Temp and Min. Temp, Soil EC and Texture, Rainfall, Surface Water, Groundwater etc. Based on these indicators, an attempt is made to spell out agro-climatic zones and crop suitability maps based on crop norms as also the decision criteria for practical suitability of growing crops driven by economic returns on investment. The analysis of cost of production and returns of enterprises shows the weak and strong points for farming community and associated farm enterprises and helps in deciding which crops to grow in a particular agro-ecological setting. In order to draw economic analysis, district wise data on crop yields, farm gate prices of produce and cost of production is needed. As the AEZ study included currently cultivated and future crops in crop suitability mapping, it was not possible to include all crops for economic feasibility because of missing data and due to non-cultivation of some crops in some districts.

Moreover, the cost of production is officially (by Crop Reporting Service) calculated on province-wide basis and thus the cost data is currently not available at district

level. This leaves only the possibility of using crop yield and market prices information i.e., revenue and provincial cost data to calculate gross margins for its use for AEZs. The analyses can be helpful in the formulation of effective price policy; agro-economic zoning; and appropriate mix of extension and advisory services.

It may here be underscored that the following data issues, if resolved, can help in developing refined information regarding agro-ecological zones.

- District or Tehsil wise data for cost of production is not available from any department.
- There is a limited coverage of crops/vegetables in collecting economic data.
- Intra-district variation (agro-ecological) is not considered in collecting information.
- Farm size wise data is not collected to cater for size specific issues.
- Variation in technology (tunnel farming etc.) is not considered while collecting information.

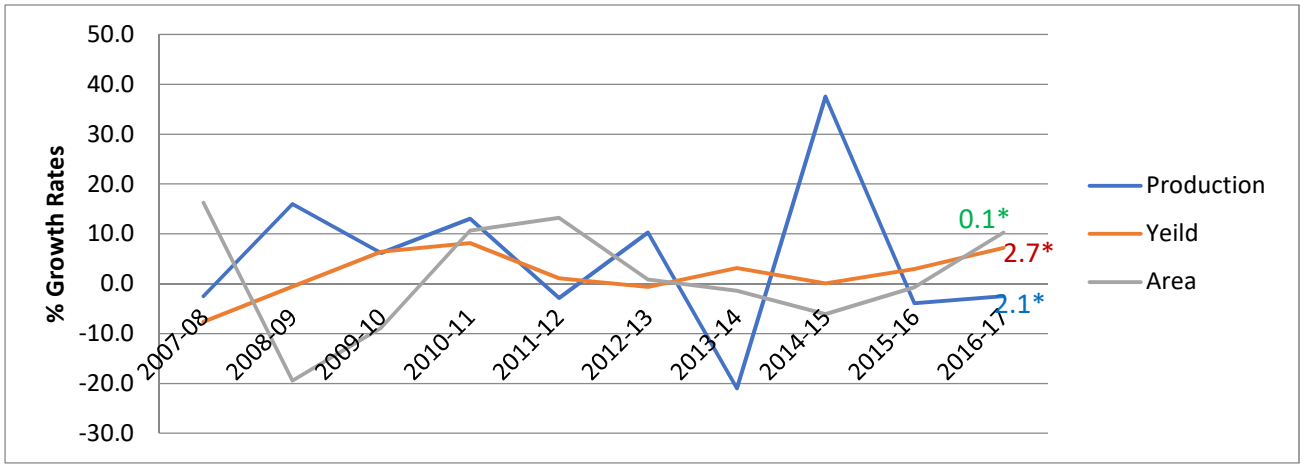
As mentioned above, the assessment mechanism is not based on exact data that reflects the farm budget analysis of crop for newly identified AEZs. There is a need to undertake a comprehensive data collection effort on cost of production and analysis at the District or Tehsil levels that can help in identifying agro-economic potential of each zone. The experience and expertise of FAO can enrich the ongoing analytical work which seeks to estimate comparative advantage of growing a crop or crops during season for given districts/regions using Policy Analysis Matrix. It is also suggested to undertake a more comprehensive economic analysis that goes beyond estimating gross and net margins. These policy indicators (GN and NM) are good to estimate competitiveness of growing a crop under exiting incentive structure facing a crop or farm. At present, the incentive structure is quite distorted giving policy and technical support to only a few commodities while ignoring others that might hold larger economic benefits to the economy. What is needed is to estimate comparative advantage of given crop grown in district or region which is calculated after removing both policy and market distortions. The next section attempts to illustrate this point taking the case of cotton and sugarcane grown in south and considering the new AEZs. The analysis will show that Sugarcane does not have comparative advantage in the South Punjab. The work is based on a sound study completed by Imran Sharif in 2009 on cotton and sugarcane grown in Multan Region.

4.8.2. Sugarcane and Cotton under new Zones – A case study for planning future analytical work

During 2016-17, sugarcane crop of Punjab was cultivated on an area of 1922 thousand acres showing an increase of 10.3% compared to 1743 thousand acres during the corresponding period the previous year. On the other hand, during 2016-17, cotton crop of Punjab was cultivated on an area of 44856 thousand acres showing a decrease of 19.1% compared to 5542 thousand acres during the

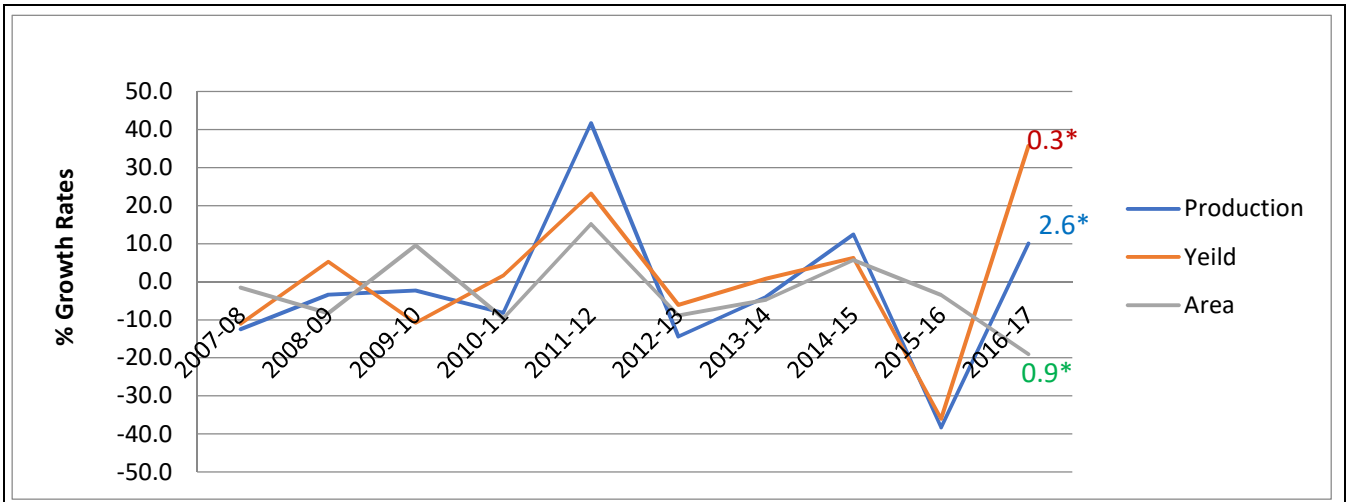
corresponding previous year period. There is a wide spread apprehension that sugarcane may encroach cotton areas because of, inter alia, lower productivity and quality of cotton and consequent low returns. The cotton belt, i.e. the South Punjab area is also very conducive to sugarcane production. Furthermore, the better draining soils are also less prone to Redrot disease, which is a major sugarcane disease in Pakistan. Figures 30 and 31 below show the growth rate of production of sugarcane and cotton in Punjab respectively:

FIGURE 30: GROWTH RATE OF COTTON IN PUNJAB



Source: AMIS
*Ten years Average Growth rate

FIGURE 31: GROWTH RATE OF SUGARCANE IN PUNJAB



Source: AMIS
*Ten years Average Growth rate

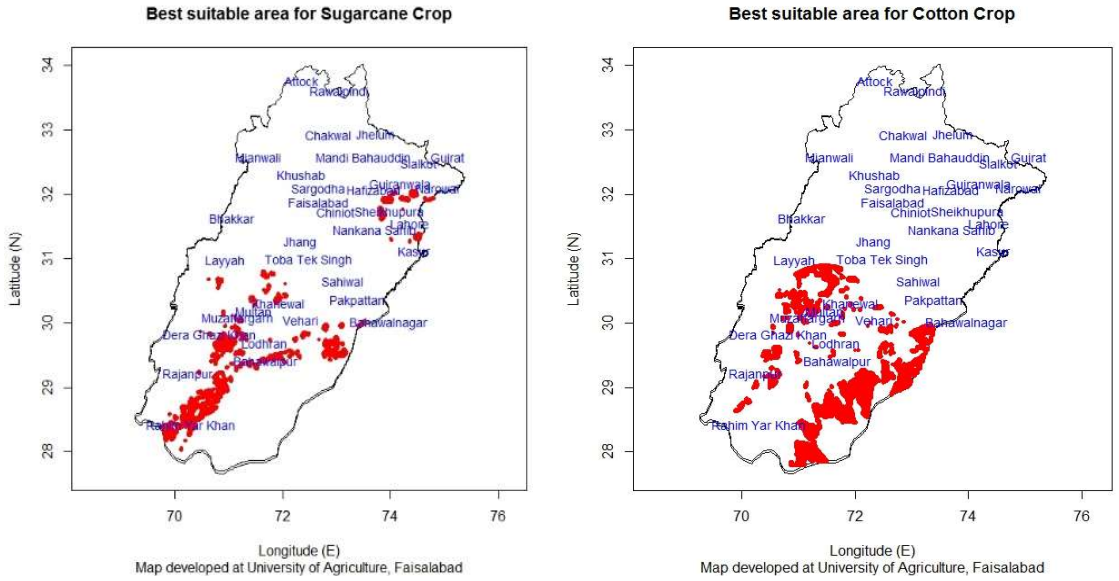
The trends also indicate an increase in area under sugarcane which is happening at the cost of wheat and cotton. Further, there is a tendency for relocating some

sugar mills towards the south where the productivity is higher. Factory areas no longer exist as mills can procure their raw material from neighboring mill areas by paying more thus creating an element of competition between the millers. Transporting cane over very long distance increases the overall cost of production. And, the sugar mills located in south are providing better support (financial assistance and other facilities /Incentives) to farmers to attract and retain them for sugarcane crop.

A clear policy on defining the areas or locations under sugarcane vis a vis the other crops need to be articulated and the impact of relocation of sugar mills on overall sugar production in the province needs to be underpinned.

The Figure 32 shows the agro-ecological map produced by UoF indicating the best suitable area for sugarcane and cotton crops.

FIGURE 32: AGRO-ECOLOGICAL MAP PRODUCED BY UOF



It has been witnessed that most of the farmers are shifting towards the sugarcane crop as it is more profitable but this is mainly at the cost of the wheat and cotton crops, as land used for sugarcane cultivation cannot be reverted back to rice or cotton.

Based on data extracted from UoF draft report, a profitability profile of traditional and high value crops reveals that high profitability of traditional crops is largely from south districts. When it comes to traditional crops, sugarcane followed by wheat carry highest profitability- these are the two crops that have been supported through direct and indirect subsidies. This also confirms the sugarcane expansion at the cost of cotton, which is showing extreme low profitability. A rough study, however, showed that the farmers and the national economy suffered substantial losses running into billions of rupees by this shift from cotton to sugarcane.

In our view, the sugarcane profitability is based on financial or private profitability that might bring information on competitiveness of a commodity but it does not prove conclusively if sugarcane has a comparative advantage. Thus there is a need to further assess this policy indicator in prescribing crops in new ecological zones.

The next section shows how misleading is gross or net margins based on financial prices in promoting a crop in a region that can entail huge financial losses to the society or economy at large. For this reason, we are proposing an extended model for estimating agriculture potential in new ecological zones.

TABLE 13: RELATIVE PROFITABILITY COTTON VERSUS SUGARCANE IN SOUTH PUNJAB

Crop	Profitability Per Acre	Leading District
Wheat	38344	Lodran
Rice	12519	Bahawalpur
Cotton	13487	Rajanpur
Moong	16298	Layyah
Maize	31623	Pakpattan
Sugarcane	46669	Rajanpur
Canola	56156	TT Singh
Cucumber	281121	Bahawalnagar
Garlic	1537907	Bahawalpur
Tomato	4432261	Mainawali,

Source: Agro-Ecological Zones in Punjab, Department of Agriculture. 2018

4.8.3.The Proposed Model for Future Economic Analysis for AEZs

The Existing Model

The cost of production per hectare for each crop in a district is figured out by multiplying the per kg cost (calculated at province level by the CRS) by the district specific yield while the revenue is generated by taking the yield product and its respective product price. The product prices are obtained from the Agricultural Marketing Information Services (AMIS) website.

Net revenue (NR) is arrived at by subtracting total cost (TC) from total revenue (TR). Hence,

$NR = TR - TC \quad (1)$

Gross margins were calculated as;

$GM = TR - TVC \quad (2)$

Where, $TR = P * Q; TC = TVC + TFC$ and $TVC = \Sigma(P_{xi} * Q_{xi})$

TVC = Total Variable Cost

TFC = Total Fixed Cost

P = Price of Crop

Q = Quantity of Crop

P_{xi}= Input price

Q_{xi} = Quantity of Input

Net income
NI = (TR-TC) + Value of By Product
We can say that Gross Margins are without land rent and Net Income include land rent with value of By Products
TR = Total Revenue gain from crop
TC = Total Cost

We, however, propose to use extended model to be integrated in ongoing useful work. It will bring credible policy indicators to support crops in new ecological zones based on comparative advantage of growing a commodity. A spreadsheet model on Policy Analysis Matrix (PAM) is simple, yet powerful and easy to communicate with policy makers. The tool would address issues related to incentive structure and efficiency of resources used by a commodity grown AEZs.

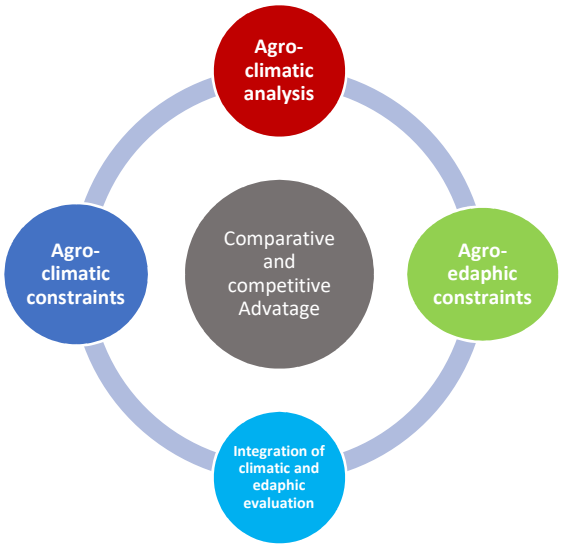
Relative efficiency in production of crops would depend on three factors: (i) technology (which determines production possibilities and influences rates of product transformation), (ii) resource endowments (which affect the value of domestic resources, such as land, labor, water and capital), and (iii) international prices (which directly determine the value of tradable inputs and outputs and indirectly influence the value of domestic resources). The study would evaluate the impact of changes in these parameters on incentive structure and efficiency of resource use in production of commodities in each districts of Punjab. The model is also very powerful to outline the policy options to rationalize water use in crop production, a vital factor under the present water crisis.

The Extended Model

(a) Measure of Economic Incentive

- Comparing output domestic price with international price to establish Nominal Protection Rate (sugar cane output is taxed or subsidized);
- Comparing domestic output and traded input prices of sugarcane with international price to establish Effective Protection Rate (EPC), that would tell us the real picture of tax or subsidy

FIGURE 33: A CASE OF SUGARCANE AND COTTON TO ILLUSTRATE THE EXTENDED MODEL



(b) Measure of Comparative Advantage

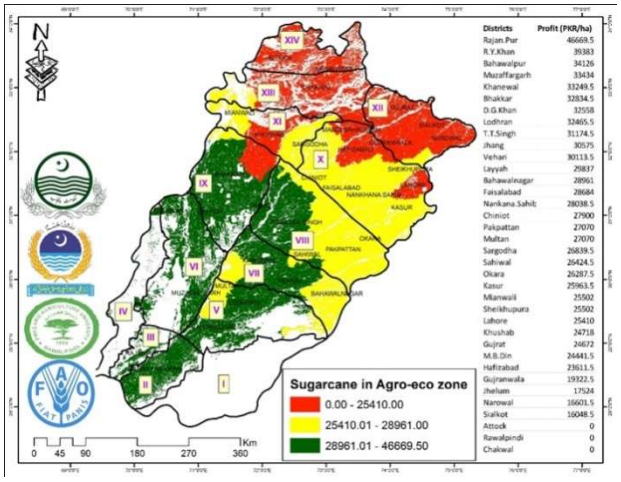
- Net Private Profitability would determine the competitive advantage
- Net Social Profitability would determine the comparative advantage

- Export and Import parity prices would be calculated to establish the comparative advantage of producing for domestic markets or exports
- Sensitivity analysis by changing some key parameters and assumption to assess the degree of impact
- Based on the above results, consultant would open policy debate with stakeholders

The practical applicability of this model is demonstrated by selected sugarcane and cotton. The sugarcane is supported by huge direct and indirect subsidy while cotton a crop is relatively not supported but has been the main source of exports that is on decline in terms of both acreage and production. During late 50's and 60's there was a rapid expansion of cotton cultivation, spreading progressively from Central Punjab to Southern Punjab (Afzal, 1970). The trend is turning around and now sugarcane is being cultivated in areas which were only considered for cotton.

The Table 14 and Figure 34 show the private profitability of growing sugarcane and cotton largely in south. Clearly sugarcane is a winner with profitability three times higher than that cotton, though the cotton is grown for shorter duration. It is also interesting to find that Rajanpur, Rahim Yar Khan and Bahawalpur are the leading districts for obtaining highest profitability both for sugarcane and cotton.

FIGURE 34: PROFITABILITY OF GROWING SUGARCANEAND COTTON LARGELY IN SOUTH



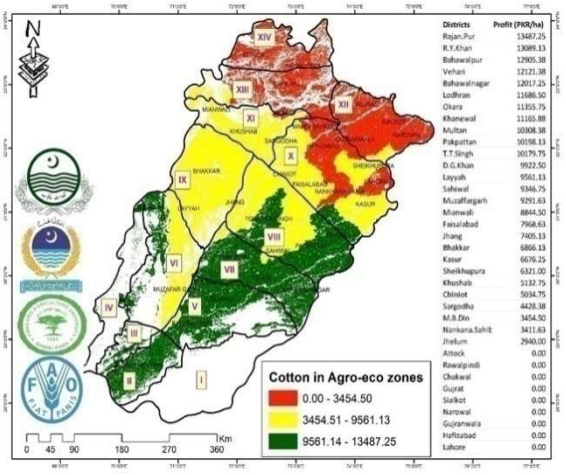


TABLE 14: LEAD DISTRICTS IN SUGARCANE AND COTTON PROFITABILITY

Districts	Sugarcane Rs per acre	Districts	Cotton Rs per acre
Rajanpur	46669.5	Rajanpur	13487.25
R Y khan	39383	R Y khan	13089.13
Bahawalpur	34126	Bahawalpur	12905.38
Muzaffargarh	33434	Vehari	12121.38
Khanewal	33249	Bahawalnagar	12017.25

Source: Agro-Ecological Zones in Punjab, Department of Agriculture. 2018

The analytical work, using Policy Analysis Matrix in Multan and Bahawalpur regions[16], provides an interesting set of policy insight on the comparative advantage of growing these two competing crops in the south. The PAM model uses both financial and economic prices and envisages:

- Net Private Profitability would determine the competitive advantage
- Net Social Profitability would determine the comparative advantage
- Export and Import parity prices would be calculated to establish the comparative advantage of producing for domestic markets or exports.

The results are summarized below:

TABLE 15: KEY POLICY INDICATORS SUGARCANE VERSUS COTTON

	Sugarcane	Cotton	Comments
Nominal Protection Coefficient	.88	.89	Farmer are being Taxed
Effective Protection Coefficient	.77	.83	Farmers taxed even when input costs being considered
Domestic Resource Cost	1.14	.57	Cotton has comparative advantage but SC not
Value Added per acre	10222	19709	Cotton adds almost twice value added
Water Productivity (inch of water)	724	1383	Cotton water productivity is much higher

Source: Imran Sharif Chaudhry, Muhammad Bashir Khan, Muhammad Hanif, Associate Professor, Economic Analysis of Competing Crops with Special Reference to Cotton Production in Pakistan: The Case of Multan and Bahawalpur Regions, Pakistan Journal of Social Sciences (PJSS) Vol. 29, No. 1 (June 2009)

Based on above analysis, sugarcane does not have comparative advantage in the south. According to above analysis, it costs Rs.114 by investing in domestic resources such as land, water, and labor to add Rs.100 to the economy, clearly a losing proposition. On the other hand, for cotton by investing Rs.57 we get a return of Rs.100, lot more value per acres than sugarcane. The water productivity is the key policy indicator, showing that water productivity of sugarcane is almost half as compared to cotton. This type of analysis on larger scale is needed to bring greater value to this ongoing FAO supported work.

The policy conclusion in the context of developing new ecological zones are:

[16]Imran Sharif Chaudhry, Muhammad Bashir Khan, Muhammad Hanif, Associate Professor, Economic Analysis of Competing Crops with Special Reference to Cotton Production in Pakistan: The Case of Multan and Bahawalpur Regions , Pakistan Journal of Social Sciences (PJSS) Vol. 29, No. 1 (June 2009), pp. 51-63

1. Promoting sugarcane in the south where cotton carries huge comparative advantage would be very costly in terms of value addition but also in wasting scarce resources like water.
2. A series of graphs indicate best suitable areas for selected crops in each district. In our view the analysis could be improved by attaching different levels of production (in area and yield terms) to different districts.
3. We propose to use extended model to be integrated in ongoing useful work. It will bring credible policy indicators to support crops in new ecological zones based on comparative advantage of growing a commodity. A simple yet very powerful and easy to communicate with policy makers, we propose to develop and use a spreadsheet model on Policy Analysis Matrix (PAM).
4. The scope of studies to be carried out to estimate technical, economic and environmental potential of each new AEZ should incorporate the extended model briefly presented above for the future work.
5. Punjab can benefit from large set of policy work done by FAO in Iran, Egypt, Syria, Yemen and other countries to estimate comparative and competitive advantage of each agro-ecological zones.

4.9. Water Pricing and High Efficiency Irrigation Systems (HEIS)

4.9.1.High Efficiency Irrigation Systems (HEIS)

The High Efficiency Irrigation System (HEIS) program is a new initiative by the Government of Punjab that reportedly increases the efficiency of water use from 40% to 95%. Although HEIS technologies have been developed and successfully adopted in various countries around the world, uptake of this program has been slow. The high installation cost is a constraint to the adoption of these technologies. The parent project promotes HEIS as a key intervention for enhancing agricultural productivity and for generating employment opportunities in installing and maintaining the systems. Private sector participation is being promoted through the manufacturing and supply of materials. A significant impact of the HEIS technologies is the increased participation of women farmers as irrigation has become a daytime-only activity and is much easier to manage because of a simple tap mechanism. In addition, the employment of women has increased in the HEIS farms; in particular, at least 50 women are employed on an average 10-acre vegetable farm.

The HEIS technologies have also been developed and successfully adopted inter alia, in Israel, USA, China, Australia, and India etc. The major constraint in the adoption of these technologies is their high installation costs. The issue has, however, been resolved through research and development of low cost-efficient irrigation technologies, particularly in China, where cost effective systems have been developed for orchards and all field crops/vegetables. The experiences of other countries and recent studies suggest that introduction of HEIS is highly effective in conserving water resources. Israel is the leader in developing the technology and has supported China, India and Egypt to enhance water productivity both in physical and value terms.

4.9.2. The Progress on HEIS evaluated

According to Punjab Irrigated-Agriculture Productivity Improvement Project (Revised) the installation of drip and sprinkler irrigation systems have so far been completed on about 20,500 acres (8,300 ha) against a total target of 120,000 acres as envisaged under the original PIPIP. It also provides reasons for such a low performance - It is mentionable that installation of HEIS is a reformatory initiative in irrigated agriculture of the country, which have been envisaged to bring a paradigm shift in crop production, as modernization has taken place in every agricultural operation all over the World and Pakistan can remain no exception. The farmers are using traditional irrigation practices for last many years due to lack of knowledge and non-availability of necessary services for requisite modern irrigation technologies. Indeed during the PIPIP planning phase it was anticipated that pace of HEIS adoption would initially remain slow in the Punjab mainly owing to following challenges:

- HEIS is a new technology in Pakistan
- Involves complete paradigm shift to move from inexact to exact agricultural practices
- High initial cost of HEIS equipment
- Inadequate (negligible) capacity of supply & service companies (SSCs) in terms of manpower and inventory to cater even whatever demand is available
- Lack of technical know-how amongst all stakeholders
- Availability of highly subsidized canal water
- Site specific issues/ requirements of HEIS

According WB evolution report (web research), the overall rating of progress towards achieving project development goals are *highly satisfactory;* the overall implementation progress is *satisfactory;* the project implementation is on the right track; and the project has generated significant development impact, such as promoting new irrigation technologies, fostering an activity market for Laser Land Leveling, optimizing crop structure towards high value crops (vegetables and fruits), mobilizing private sector investment, and significantly increasing women's employment etc. Thus, the Implementation Progress (IP) rating remains as satisfactory and all targets for Laser Land Leveling (LLL) Units are achieved. Given that an active private market has already established through the project assistance, there will be no additional investment in LLL from the additional financing. The government will exit this area and let the market play its role. In addition, to date 9,578 watercourses have been completed with work in progress on another 837.

There are however serious *concerns* on progress for installation of HEIS. To date, HEIS is installed on 40,170 acres and works are in progress on another 10,584 acres (discrepancy-see above). Several companies in Pakistan are providing HEIS solution to farmers. Dadex, Ali Akbar Group, Jaffar Brothers, and Haji Sons are few prominent names. The private sector is fully geared to manufacture (most of parts)

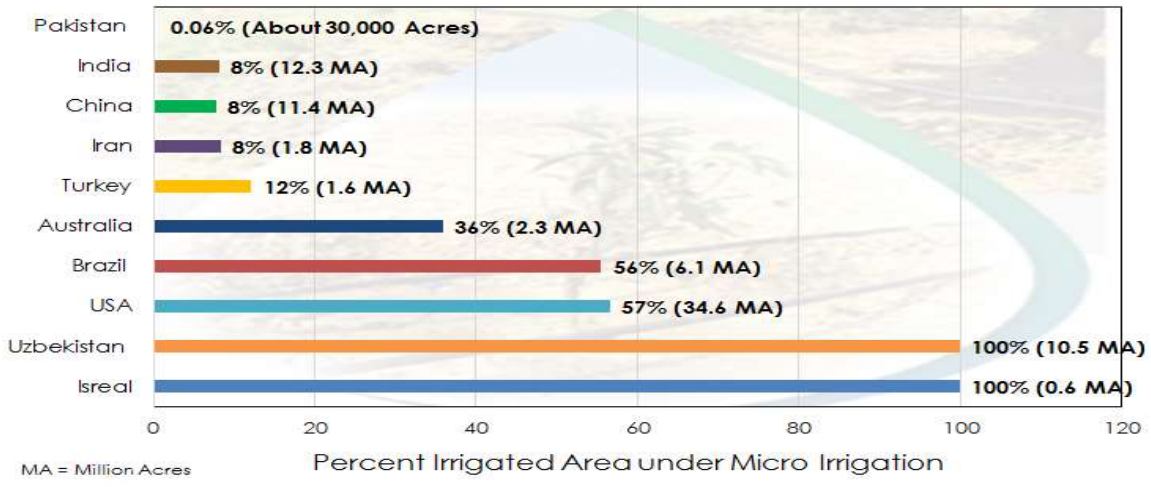
of HEIS solutions and installing them, even on turnkey basis. Specifically, Government of Punjab is making efforts to develop the Pothwar region with the provision of subsidized HEIS and small irrigation schemes, comprising water lifting arrangement along with lined/piped water courses[17]. However, the rate of installation is still slow and in order to meet targets on time, the project implementation team needs to take steps to expedite the timely implementation of HEIS project.

4.9.3. BIPP's Perspective

In our view, there are number of policy gaps that have been over-looked in planning and implementation of PIPIP I that need to be addressed for improved implementation of PIPIP II. The perspective is based on extensive experience of BIPP team in working in the field analyzing crops value chain for traditional and high value crops in Punjab and also based on extensive experience of policy work on estimating comparative and competitive advantage in water scarce conditions in most of the water scarce regions of the world—Palestine, Jordan, Egypt, Yemen and Iran. Besides, this perspective was further enriched during the course of focused group discussions (FDGs), meetings with progressive farmers and department's functionaries and Key Informant Interviews (KIIs). The specific critique is:

- Pakistan started supporting a program on micro irrigation very recently, only in last five years, whereas most water scarce countries started adopting HEIS at least 40 years ago. The cumulative capacity and experiential deficit led to both design and operational deficiencies in introducing HEIS and hence the low rate of adoption. The Figure 35 pretty much explains that we have been lagging by a distance.

FIGURE 35: PERCENTAGE IRRIGATED AREA UNDERMICRO IRRIGATION



[17] Policy brief on Director General Agriculture (Water Management) , July 2017, Technical Assistance for Formulation of Agriculture Policy in Punjab Subcontract Number: PEEP-ID-003

- Pakistan and Punjab invested very little on "on farm water management" (demand management) as opposed to large investments of supply enhancement and creating a large number of water related institution heavily loaded with manpower. Even on the supply enhancements side our record is not appreciable. We under-invested in water management at the farm levels where the benefits or returns on the investment are largely realized or are expected.
- Our on-farm water investment policies have been lopsided; integrated approach was missing all along - first emphasis on land leveling, then on canal lining and now on HEIS. The impact assessment of these programs always revealed paradoxically huge water saving, enhancement of yield and income. The results at macro levels are, however, not supporting the claims. The fact is that agriculture in Punjab is becoming more and more unsustainable due to skewed water pricing, declining income and rising costs not to mention the depleting groundwater resources.
- Are we adopting top down policy in promoting HEIS? It is well documented that investment in HEIS are site specific; one cannot generalize that sprinkler or drip irrigation is the panacea for improved water management. Sprinkler irrigation was basically designed to meet the challenges of irregular rainfall; if drought condition prevails the technology was expected to bridge the water demand for that period. The issue is: Was proper vetting being done for assessing suitability of technology for specific land and crops? The answer seems to be in the negative.
- In some areas of Punjab, HEIS is the only viable option due to low availability of surface and subsurface water. Examples include Potohar and Thal regions. In these areas, cultivation of major crops using conventional irrigation practices is not feasible due to acute water shortage. Hence, the Department must promote HEIS and cultivation of crops that require less water.
- The canal irrigation, an option easily available in the irrigated areas at much cheaper costs, defies the promotion of HEIS in the absence of rational and competitive water pricing.
- The pockets and individual episodes of success should not be generalized across the board to validate the feasibility of the project. Most of it is still in pilot stages, heavily driven by subsidy and technology taking off at scale has not yet happened. The small farmers which form a good 70 % are by and large left out of this development paradigm.

Was agriculture policy in past conducive to adopting HEIS?

- Within agriculture policies or water policies formulated, rationalize water use in agriculture was never addressed by improving allocative efficiency of water use. In fact agriculture uses bulk of water (95%), wastes most of it and pays the least.

- We continue to pump subsidy in promoting this technology. The returns could be much better if we have invested the same amount in training farmers how to use and maintain the technology. The adoption of tube well technology in Punjab provides an ideal case to review and adopt.
- If we take out the subsidy segment, the average farmer carries an opinion that the initial cost of investment is beyond his means and he is not trained to maintain the equipment.
- Even large farmers those who took loan/subsidy find it difficult to recover the investment as indicated above and also find it difficult to get trained staff to keep it up and running
- Then according to DA policy review, the thrust of promoting HEIS should shift from a small set of techniques (e.g. tunnel farming), and a few crops (e.g. orchards) to a diverse range of techniques and major crops. HEIS's use in tunnel farming[18] has now become an established practice.
- Therefore, it is possible for public support to move on and focus limited public financial resources elsewhere. Major agronomic crops, which use the highest share of water resources, are a good candidate like orchards, wheat and sugarcane. However, existing HEIS technologies may need to be modified according to local conditions to become socially acceptable and economically viable for farmers of major crops.

There is a need to rationalize subsidy policy for HEIS. The policy direction could be supported subject to two years of proven successful operations of HEIS, to avoid any resale or discontinuation of use of subsidized solutions.

Has the link between value of water (pricing) and adoption of HEIS been accounted for?

The important point is why technology adoption of HEIS has been low as indicated above. Farmers may well be aware of technological options, but do not invest in it unless pushed by:

- *cost incentives (rising water prices)*
- *pulled by profitable market opportunities*

4.9.4. The Cost or Price Factor

In Punjab and as a matter of fact all over Pakistan, water pricing carries political and social dimensions that generally prohibits its proper valuation. Farmers in Pakistan pay very minimal amount for the water, and over time its value has decreased. The water charges in Asia are generally low but in Pakistan they are even lower. Hussain (2007) provides a good overview of Irrigation Service Charges (ISC) in the region that varies from US$7.5 /ha to US$59.5/ha, In Pakistani

[18]Due to increased area of tunnel farming, farmers are not getting high prices for their off-season vegetables – in many cases they get even less than the cost incurred. Reportedly, many farmers have de-installed the tunnels.

systems, ISC level varies from US$4.6/ha to US$10.6/ha with an average of$7.4/ha. Under the flat rate system in Punjab, initiated in 2003-04, the water charges per acre were fixed at Rs.85 for Knarif season (sugarcane, rice, cotton and maize) and at Rs.50 for Rabi season (Wheat, oilseed, vegetables). But if we incorporate the recent data, since 2003-04 Pakistani Rupee has lost considerable value against dollar and now ranges $0.34 to $0.74 which is almost free. These values are quite low compared to what user is paying for tube well water or for domestic use.

Water pricing is instituted for two reasons, first to raise enough revenues to maintain and develop irrigation infrastructure, this is called the financial prices. Then equally important is to improve allocative efficiency of water use which is estimated by marginal cost pricing. This would require a mechanism in place to provide water on demand or measuring water as being used. In Pakistan marginal cost pricing does not exist nor is feasible under existing irrigation distribution infrastructure. The emphasis has been and continues to be on raising revenues to meet financial needs to run and maintain the system.

Irrigation has delivered notable agricultural productivity gains to Punjab in the past, but the irrigation sector suffers from major financial deficits. Water charges (*abiana*) fail to reflect actual water use or cover the maintenance and repair (M&R) costs. *Abiana* rates typically represent less than 0.2% of crop budgets. The flat water rate per acre implemented in 2003/04 gives farmers little reason to conserve water and use it more efficiently. At best, current M&R spending (about US$ 65 million per year) is one-third of the minimum amount required.

The *Abiana* recovery-to-assessment ratio improved from 60% to 86% during 2000-2010. However, this improvement is mainly due to 26% decrease in assessment amount (denominator) while recovery (numerator) improved just by 6% and that too in the last year (2009-10). The *Abiana* recovery to assessment ratio of the Lower Chenab Canal (East) AWB, which was initially 76% in 2003-04, continued a downward trend until reached to 59% in 2007-08. This ratio further declined to 23% in 2009-10 after public administrator took over management on expiry of AWB contract period in 2007-08. This shows that financial performance under farmers' management started well but deteriorated with time possibly due to lack of continued support from government.

Irrigation system in Punjab is financially unsustainable as it recovers only 20% of the O&M costs, putting the burden of Rs.686 million each year on provincial government to provide subsidy for keeping the system in operation. Furthermore, a large share of the expenditure goes to operational head such as salaries, vehicles and offices, leaving only 33% for irrigation infrastructure maintenance.

Abiana revenues would, however, gradually increase from Rs. 0.5 billion in FY16 to Rs. 1.8 billion by FY22 as a result of improvements in assessment and collection, for a total increase in Abiana revenues of approximately Rs.5.1 billion (US$50 million) over the five-year period of the program which would be allocated to

improve M&R[19]. Improved M&R and greater incentive to use water efficiently would enhance efficiency of delivery and on-farm utilization.

Water Scarcity and pricing: The first half of the analysis was confined to the financial aspects of water charges. With water scarcity growing and pressing need to rationalize water use in agriculture, the existing water pricing that entails large subsidies is the main the reason for rigid cropping pattern. Although flat rate system reduces administrative costs, its biggest flaw is that *Abiana* rate does not reflect water consumption by crops, i.e. sugarcane and maize have been charged equally, despite the fact that water requirement of sugarcane is twice that of maize in Punjab. In our view, the adoption of modern technology (HEIS) can take off much faster and would be need based if water price is valued at its opportunity cost.

There are hardly any studies that provide insight into crop profitability of rice, sugarcane and other crops based on economic prices of water or its true value. Farm budgets based on economic prices provide a good start for policy makers but can provide further insights if the Policy Analysis Matrix is prepared. The section below shows that farmer's ability to pay for high water charges is much higher than often argued.

Ratio of Water Charges to Gross and Net Cash Income

The ratio of water charges to gross and net cash income can be used to assess the farmer's ability to pay for irrigation water. Estimates of gross income per acre can be obtained by using the average yield for the year 1999-2000 and the government floor prices for the same year. The ratio of the current abiana to these values varies from 0.57 % to 1.22 % for various crops. With increase in water rates by two folds, farmers would have to pay from 1.74 to 3.66% depending on the crop of their gross income for canal water (Table 16).

TABLE 16: ABIANA AS PERCENTAGE OF GROSS INCOME BY CROP, 1999-2000

Item	Wheat	Rice	Cotton	Sugarcane
Gross income (Rs./Acre)	7560.75	7259.21	16050.94	16247.52
Current Abiana Punjab (Rs./acre)	59.80	88.52	93.01	177.16
Abiana as % of gross income	0.79	1.22	0.57	1.09
Current Abiana				
Increased by 10%	0.87	1.34	0.64	1.20
Increased by 50%	1.18	1.83	0.87	1.64
Increased by 100%	1.58	2.44	1.16	2.18
Increased by 200%	2.37	3.66	1.74	3.27

Based on the yield and procurement prices in 1999-2000.

[19]Calculated as follows: current *Abiana* collection is about PKR0.5 billion per year. Improvements in *Abiana* assessment (basically doubling the area assessed) combined with a gradual increase in the *Abiana* collection rate from 50% to 90% would result in *Abiana* revenues of PKR1 billion in 2018, 1.5 billion in 2019, 1.6 billion in 2020, 1.7 billion in 2021 and 1.8 billion in 2022. Compared to a baseline of PKR0.5 billion per year this would amount to additional *Abiana* revenues of PKR5.1 billion, or an average of about PKR1 billion per year.

A reasonable charge for irrigation water as a percentage of gross income is 6% for Asian countries (John Mellor Associates, Inc. and Asianics Agro – Development International (Pvt.) Ltd., 1994, p.126). Thus, even a two-fold increase in Abiana would not raise the water charges in relation to gross income above levels common in other Asian countries. From the above results one can conclude that even though water rates are increased by large percentage over the current Abiana, the resulting charges would be well below the average ability of farmers to pay. Further raising water charges can be expected to have little or no effect on water use. Similarly farmers will be willing to pay substantially higher water charges for reliable good quality water.

Cost of water and HEIS

Cost/value of water and adoption of modern technology is a real issue in Punjab. In the absence of data, lessons from other countries in the region will be a good guide. The adoption rate of a system depends largely on the rate of return on each technology. The financial returns of new water technology are a function of amount of water saved and cost of water to the farmers. In Yemen, the high investment cost of $ 3,100 per ha to $ 4,000 per ha is difficult to recover with low value of saved water. The low value of water is reflected in the form of a high subsidy in diesel. Further in most areas water and not the land is the binding constraint. Any water saving due to adopting efficient technology would encourage farmers to bring additional land under cultivation.[20] In case of Iran according to IWMI, the price of water is $ 0.004 per cubic meters, one of lowest in the world.

The cost of saving water through adoption of modern technology is estimated at $0.11 per cubic meter. This means as long as the cost to recover value of water is not enhanced to $0.11 per cubic meters, farmers do not have any incentive to adopt modern technology. In case of Punjab, where farmers have access to canal water, they do not have incentive to adopt modern irrigation technology, though they might have incentive to generate extra water as less water is available in canal system. This means that instituting a cost recovery regime (volumetric or other modified) would, in the absence of increase in water charges, not have any effect on water saving or intra-sectorial allocation of water going to high value crops.

In many countries, low price of water does not provide the necessary incentive to invest in high cost technology. An incentive policy based on rationale water pricing, developing indigenous technology and providing subsidy to environmental friendly technology is needed to derive potential benefits from vast but poorly managed water resources.

4.10. Wheat Deregulation

World Bank, under the umbrella of their SMART project, is proposing an alternative which envisages to replace the existing public wheat procurement-stocking-

[20]Ward, Christopher, 1995, Yemen: Water Strategy, Agriculture and Irrigation Policy for Water Conservation, Discussion Paper 4.1, UNDP, Netherlands.

distribution system with one that combines (a) a targeted income transfer program, (b) reduction in procurement and stock limit to a level required for emergency reserve, (c) a lead role of the private sector in the wheat market, (d) a liberalized trade regime, and (e) an incentive program for farmers to diversify, financed from the freed-up fiscal resources from subsidies. This alternative would lower prices of wheat and wheat flour, incentivize farmers to diversify to higher-value commodities which would result in higher incomes, and make net consumers and producers better off.

4.10.1. The Proposed Package of Reforms

(a) Broader Reform measures

Based on the above analysis, the following reform measures are proposed:

- Change from bag to bulk handling and storage system;
- Abolish the zero-loss policy and pay farmers only for good quality wheat;
- Deregulate the sector with more private sector involvement and align the wheat support price with international trade levels;
- Target subsidies to small (poor) wheat producers to compensate for lower wheat support price;
- Introduce a margin between PFD procurement and release price to cover (part of) PFD's incidental charges;
- Improve inspection methods and install grain cleaning systems at wheat intake.

(b) Wheat handling and storage strategy

For the change from bag to bulk handling and storage, we assume that government intervention in wheat procurement will gradually decrease to a level of 2 million MT/year and that the carry forward stocks will not comprise more than 1 million MT. This will result in a 3 million MT bulk storage capacity, which will be sufficient to cover the PFD requirements. This 3 million MT of storage capacity should consist of:

- 1 million MT of large scale "strategic storage facilities" with the following features: Units with capacity of between 50,000 and 100,000 MT each at approximately 10 to 15 different sites in the surplus areas; For each silo between 5 to 10 wheat collection and transfer centers in order to limit the transportation distance for the smaller farmers to 10 km; these silos should replace the current PFD go-downs; Public funding for these.
- 2 million MT of "near-farm bulk storage facilities" with the following features: Units with capacity of 10,000 to 20,000 MT each at 100 to 200 different sites in the wheat surplus areas; these silos should replace the current open storage facilities (ganjis); Private investment funding based on a Public-Private Partnership (PPP) model.

- All above storage facilities to be equipped with a rapid sampling and laboratory analyses equipment;
- Install cleaning systems at the intake of all above storage facilities.

4.10.2. The World Bank Supported Reforms

The GoP would withdraw from the wheat market and leave the trade to the private sector which has both the required capacity and expertise. This withdrawal would be accompanied by the following measures:

i. Compensation to farmers who would be negatively impacted by the likely drop in market prices in the form of a direct income transfer based on the difference between the prevailing market price at harvest and the procurement price previously announced by the Government.
ii. The cash transfer would be capped by limiting the compensation to a certain quantity of wheat per farmer (e.g. three tons) and for a fixed time period (e.g. three years to enable farmers to diversify out of wheat if they wish to do so).
iii. Eligibility for the income transfer could range from only those who had sold to the Food Department in the last three years (1.3 million farmers) to all farmers growing wheat below a certain farm size, irrespective of whether or not they actually ever sold wheat to the government.
iv. Creation of a strategic wheat reserve of 1 million tons as estimated by the Punjab Food Department to meet the needs during emergencies and disasters. This strategic reserve could eventually be held by the private sector on behalf of the government, but in the short term the Government would need to build good quality silo storage.
v. Disposal of the existing wheat stock to the domestic market to avoid further losses - either through open auction setting the floor price or cascading price.
vi. Disposal of existing wheat storage facilities owned by PFD. The Food Department currently has 2.2 million of covered warehouse storage of which 0.9 million is leased from the private sector. Following the move to silo-based, and eventually private sector-managed near-farm storage of 1 million tons, the existing warehouses would no longer be needed and would be sold off or leased out.
vii. Deregulation of private sector wheat imports to allow traders to import wheat in times of domestic shortages. The Government would not intervene in the domestic wheat market unless prices rise above the current level of Rs.1300 per 40kg – at that time the Trading Corporation of Pakistan (TCP) would import and release subsidized wheat on the domestic market. The current regulatory duty on wheat imports (60% since September 2016) would gradually be phased out over a three-year period which would coincide with the proposed compensation time to farmers.

The reforms to deregulate wheat market are long overdue, costly and crowd out badly needed funds to improve the competitiveness of agriculture sector. The policy reform is also key to promote diversification of Punjab agriculture towards high value crops, leading to growth in exports.

Besides the fiscal advantages, the reform would result in significant social benefits through a lower market price for wheat which, based on the current import parity price, is expected to stabilize around Rs.950/40kg.[21] This would have a major positive impact on urban consumers, as well as on the rural poor (a large majority of whom are net wheat buyers).

Another major benefit to the province would be increased crop diversification away from wheat towards higher-value crops, particularly horticulture crops which generate revenues per unit area and labor that exceed those for wheat by a factor 5-6. Yet more benefits would be generated by the permanent reduction in the staff costs of the Food Department, even though some short-term costs would have to be incurred on staff retraining and/or severance packages for redundant staff.

[21] The World Bank Commodity Markets Report (October 2016) expects that international wheat prices will remain stable in the near future. The projected price for 2017 is US$179/MT and US$188/MT for 2018. WB projection indicates only a slight increase in international prices in the next 10 years, forecasting a wheat price of US$216/MT in 2025.

Chapter 5: Conclusions and Recommendations

The agriculture sector in Punjab is vitally significant and holds enormous potential to boost and sustain the provincial economy and indeed the national economy as is abundantly evident from its contribution to provincial and national GDP, income generation and employment especially the women. The sector, however, assiduously failed to engage the priority attention of the successive governments to the extent that the year 2015-16 witnessed for the first time in the history of Pakistan a negative growth. The government of Punjab rightly took immediate cognizance of this decadent situation and decided to adopt drastic measures to resuscitate the sector both in terms of setting right the upstream policy frameworks and embarking on major programmatic interventions.

Against this backdrop, the overall performance of the Agriculture Department, Punjab, over the last one and a half year, has been quite impressive especially in developing and articulating the upstream frameworks. The Department has already spelled out a vision and mission statement with clearly defined goals to make agriculture profitable and competitive, pursue ICT led farmer centric service delivery and incentivize private sector led growth. Recently, a robust and responsive Agriculture Policy has also been promulgated with a conscious effort to integrate the upstream policy and regulatory frameworks with the Punjab Growth strategy, the Vision 2025 and national commitment to SDGs implementation as development goals. This has been preceded by major development and programmatic initiatives and development portfolio in conjunction with the donors and through larger ADP allocations by the Department.

The Department also seems to have reasonably adequately spelled out the way forward to deal with major challenges by focusing on, inter alia, crop diversification to horticulture, developing value chain, investing in R&D, strengthening market, pursuing climate smart agriculture, rational water management and utilization, harnessing CPEC potential to integrate with GPNs and Value Chains and increasing farmer income and profitability.

There are, however, some specific areas of deficit (policy, institutional, operational) which continue to afflict the sector and given the enormity of the legacy challenges require unflinching commitment at all levels from HQ down to the lowest echelons to fetch agriculture sector the role it deserve as engine of growth for national economy, poverty alleviation and regional disparity reduction. The recommendations that follow attempt to identify in specific terms those areas and prescribe solutions for government consideration.

5.1. Harmonization and Integration of New Agriculture Policy

It is vitally important for the Department to ensure that the new agriculture policy fully harmonizes with, both vertically and horizontally, and complements the Federal policy regimes (e.g., imports and exports, price setting, standardization, national research and inter provincial issues- rehabilitation) as well as provincial policy and upstream frameworks to avoid possible policy fragmentation and

concomitant dysfunctions (divergence, conflict, duplicity, wastage, diluted impact etc.)

The Department needs to align and synergize the on-going projects with the new policy thrust and within this broader context, create mutual cohesiveness and complementarity among the projects to achieve enhanced impact.

DA should practically demonstrate its commitment to the new Agriculture Policy by (a) redefining and clearly delineating its priorities; and (b) making adequate budgetary allocations and in the process making correct choices for example between supporting subsistence farmers versus promoting corporate farming; price support system versus competitive farming sector; traditional cropping system with focus on four major crops versus crop diversification to high value crops; flexible o rigid rural factor market; transforming subsistence agriculture to profitable commercial venture; climate resilient versus climate insensitive agriculture, etc.

The sub-policy options should not necessarily be to maximize the growth of production in any particular sub-sector/commodity but to create the necessary and sufficient conditions for the agricultural sector/farmers to adjust to a more competitive environment.

5.2. Farmer-centered Agriculture

The Department should reconsider a more realistic definition of "small farmer" to make sure that incentives and support systems meant for the poor farmer reach the farmer who is actually poor, to obviate the possibility of asymmetric distribution of government support and ensure direct and targeted distribution.

The trust of the farmers also needs to be reinstated somehow through more overt and direct means of engagement by the extension services. It seems that the adoption and diffusion of SMART technologies and monitoring techniques portrays the extension and field workers as being less benevolent and helpful.

Training programs, which are provided infrequently, often too time consuming, ineffective and ensuring little direct physical access should be avoided and instead geared towards entrepreneurship and innovation. The emphasis should be on involving professional entrepreneurs, incubation centers and trainers that can provide farmers the mindset and means to innovate for increasing farm productivity and profitability.

5.3. Projects related recommendations

(a) Establishment of Hi-Tech Mechanization Service Centers (HMSCs)

The Project needs to pay heed to inclusivity dimension in terms of ensuring participation of the small farmers some of whom may not have the required investment to mechanize their farms.

Relevant and need and farmers-segment based mechanization- which does not become obsolete in a short period of time, especially affordable by the small farmers both capital and maintenance costs, serves multi-purposes and various stages of agriculture (from pre-production to post-production)- will incentivize high applicability and adoption. An indicative list of machinery proposed for the purpose is attached at Table 18.

Technical and operational skills in the training programs should be imparted continuously to ensure that the skills do not become redundant too quickly. Regular financial allocation to sustain the training component of the project is sine qua non for the purpose.

The Department should ensure that the service centers are financially sustainable and the cost sharing formula works out in the long-term to continue to provide farmers the services once the centers are completely functional.

(b) Strengthening Marketing for Agriculture and Rural Transformation (SMART)

A comprehensive ICT training program to use the SMART tools and full gamut of its functionalities should be provided to the extension staff to ensure effective and efficient implementation of the related project activities.

The high costs of the project imply difficulties on the sustainability front in case World Bank opts to exit. The Government of Punjab should be prepared to sustain the financial commitments for project implementation.

The technical and operational sustainability of the project will only be ensured if existing transparency and system strong checks and balances that the department of agriculture has maintained until now, continues.

For operational sustainability of SMART project, DA should play a proactive role both at the HQ (ADU) and field levels (Deputy Director Agriculture) to ensure better integration and coordination with other contributing departments some of which do not seem to have shown the desired level of interest and progress.

(c) Empowerment of Kissan through Financial and Digital Inclusion

The relevance of the project in regard to digital inclusion needs to be improved based on the modern interventions in the agriculture sector around the world but also through better synergy with other projects of DA in Punjab e.g., SMART which seeks to make farmers self-reliant in the use of ICT and technology to increase productivity, incomes and farming education.

The impact of the project could be enhanced through equitable and symmetric access of the farmers to the vouchers and distribution of Kissan cards in a transparent manner by a third party.

Institution of a robust monitoring and accountability system is a must to depoliticize the vouchers scheme and ensure fair and equitable distribution.

In order to ensure financial inclusion as also the use of credit only and only for agricultural purposes, it is imperative to integrate local service providers and encourage private (financial institutions)-public sector partnership in credit/ vouchers distribution.

The voucher scheme must be integrated with consultancy and advisory services of the extension outfit of the department to guide and train the recipient farmers on the optimal use of inputs and the cropping cycle and pattern.

(d) Extension Service 2.O – Farmer Facilitation through Modernized Extension

The project design is weak and does not ensure modernization of extension services. The inclusion of certain ICT tools like web portal, GIS and soil database in an overwhelmingly soil-focused project do not make any traditional extension service modern. As such the project needs to incorporate other important factors like water availability, pest treatment, temperature variations and climate change impact, crop cycle management, agriculture good practices for commercializing agriculture to help transform agriculture and increase productivity and profitability.

The project should provide for synergies and linkages with the activities of other departments materially relevant to agriculture e.g., water management activities of Irrigation Department, Environment Department for better land, water resource management etc.

The determination of nutrient status should be agro-ecological zone specific to recommend fertilizers and nutrient type and dosage.

Capacity building/training, a very important aspect in using extension agents for any specific project, should be included in the project.

(e) Punjab Irrigated Agriculture Productivity Improvement Project (PIPIP)

Pakistan and Punjab should make reasonably adequate investment on “on farm water management” (demand management) in complement with large investments of supply enhancement and dams. The investment in water management at the farm levels leads to substantial benefits and returns. Improved M&R and greater incentive to use water efficiently would enhance efficiency of delivery and on-farm utilization.

On-farm water investment policies should pursue an integrated approach combining land leveling, canal lining, HEIS. This should be inextricably linked to rational water pricing and sustainable utilization of groundwater resources.

The investment in HEIS should be site specific; one cannot generalize that sprinkler or drip irrigation is the panacea for improved water management. Sprinkler irrigation was basically designed to meet the challenges of irregular rainfall; if drought condition prevails the technology was expected to bridge the water demand for that period. This requires that proper vetting be undertaken to assess the suitability of technology for specific land and crops.

In some areas of Punjab, HEIS is the only viable option due to low availability of surface and subsurface water. Examples include Potohar and Thal regions. In these areas, cultivation of major crops using conventional irrigation practices is not feasible due to acute water shortage. Hence, the Department must promote HEIS and cultivation of crops that require less water.

The canal irrigation, an option easily available in the irrigated areas at much cheaper costs, defies the promotion of HEIS in the absence of rational and competitive water pricing.

The pockets and individual episodes of success should not be generalized across the board to validate the feasibility of the project. Most of it is still in pilot stages, heavily driven by subsidy and technology taking off at scale has not yet happened. The small farmers which form a good 70 % are by and large left out of this development paradigm. A feasibility for its promotion to the small farmer based on land and crop specific consideration is recommended.

Within agriculture and water policies, it is important to rationalize water use in agriculture and improve allocative efficiency of water use and curb wastage.

The HEIS returns could be improved by investment in training farmers how to use and maintain the technology. The adoption of tube well technology in Punjab provides an ideal case to review and adopt.

The HEIS should focus on a small set of techniques (e.g. tunnel farming), and a few crops (e.g. orchards). The existing HEIS technologies may need to be modified according to local conditions to become socially acceptable and economically viable for farmers of major crops.

There is a need to rationalize subsidy policy for HEIS. The policy direction could be supported subject to two years of proven successful operations of HEIS, to avoid any resale or discontinuation of use of subsidized solutions.

An incentive policy based on rationale water pricing, developing indigenous technology and providing subsidy to environmental friendly technology is needed to derive potential benefits from vast but poorly managed water resources.

5.4. Agricultural exports

(a) Making agricultural products competitive:

There is need to increase land, water and labor productivity, improve post-harvest handling, create cold chains and, more importantly, produce according to what the market demands in quantity and quality. This, in turn, requires a supportive policy environment featuring a proper incentive structure (right prices), competitive exchange rates (avoid appreciation and overvaluation) and supportive institutions for credit supply and marketing.

(b) Value added and non-traditional crops exports:

Allowing market prices to set crop decisions will give farmers an incentive to move into higher value added crops rather than stay with those whose profitability depends on procurement price levels set by the government policy. This will introduce greater risk for farmers but also ensure a greater diversity of crops and long run sustainability of the sector. In particular, it will induce a shift towards more vegetable and fruit production and reduce the acreage devoted to rice and wheat.

Horticulture produce holds a huge market for exports not only for traditional horticulture products but also non-traditional like guava and loquat, medicinal plants, turmeric etc., which have high potential to capture share growing global market.

(c) Compliance with standards:

Food products must comply with stringent sanitary and phytosanitary (SPS) requirements as also taste, quality and presentation. . The consistency of fruits in terms of size, shape, weight, color and level of ripeness are important parameters for consumers in making their buying decisions. Government needs to establish and enforce regulations relating to standards, the assigning of grades to products and investment in treatment facilities.

(d) Potential Markets:

Pakistan needs to diversify from traditional markets of EU, USA etc., and focus more on other markets like ECO, Africa, India and especially China which would provide opportunities under CPEC for better market access and trade integration. To leverage exports, a bigger incentives package should be introduced.

(e) Policy Regime:

The policy regime should be shifted to promote exports rather than existing policy of import substitutions with favorable incentive structure — low cost of inputs, supporting infrastructure like electricity, gas, water, feeder roads and access to credit a few to name. Incrementally, we should move out of agriculture based raw products as lead exports or products exported by small and medium enterprises that carry low values and volumes.

On policy reforms, there is a need to incrementally devalue the currency; this will discourage import of cheap goods and at the same time provide a competitive price for our exports.

The Ministry of Commerce has already developed a Strategic Trade Policy Framework (STPF) to achieve annual exports of US$ 35 billion by 2015-18 based on transition from a “factor-driven“ economy to an “efficiency-driven“ and “innovation-driven” economy. For agriculture, increase in export of following commodities is envisaged; (a) basmati rice, (b) horticulture, (c) and meat and meat

products. The focus of markets export enhancement is on (a) Iran, (b) Afghanistan, (c) China, and (d) the European Union especially in the hope to benefit from GSP Plus status in the European Union. Punjab should fully benefit from this framework by integrating production of these commodities and their value addition (branding, labeling, packaging, designing etc.) on a sustainable and competitive basis to realize the full export potential.

(f) Flexible and responsive production system:

The production structure as well as the agro processing industry and inputs delivery system should be allowed to adjust rapidly to changes in foreign market conditions (output and input) and technologies, through changes in cropping patterns and farm structure. This adjustment capacity requires sound management information systems, flexible rural factor markets (labor, land, water, and finance) as well as a competitive agribusiness sector, adequate infrastructure, technology development, and most importantly, more human capital (education and training). Such a strategy would lead to faster agricultural growth, largely through adjustments in the output mix toward higher-value products, which should result in higher total factor productivity and develop agriculture sector more responsive what and where are opportunity for Punjab in export markets.

(g) Investment in R&D and innovation:

Research and development should be given high priority especially for development of new high yielding varieties of cotton and rice. Private sector should be incentivized and encouraged to adopt innovative, entrepreneurial and technology driven agriculture enterprise.

5.5. Institutional Reforms- Identifying Areas for Policy Formulation and Implementation

(a) Reforming the Agriculture Commission:

The existing membership should be augmented/replaced to provide for right mix of top knowledgeable policy makers, reputed civil servants, and eminent representative of the private sector, large, medium and small farmers to (a) guide reforms in the agriculture sector; move away from interest based agriculture policy and planning; address complex and changing complexion of problems (climate change, technological advancement, integration with GPNs and GSCs etc.,); and prescribe integrated solutions based on credible information and research.

(b) Planning and Policy Formulation Capacity of the Department:

The major focus for policy and planning capacity strengthening should be on:

- formulation and development of innovative, consensual, inclusive and rational and sector wide agricultural policies and strategic priorities to re-orientate the sector as per the new vision including for increase in the productivity and profitability of agriculture; and resuscitate and re-define its critical role in the broader economic and sustainable development including integration with global production network and agricultural supply chains;
- policy formulation for research and extension and the ability to designate priority research areas;
- addressing in a holistic manner, in coordination and conjunction with all the major stakeholders, the impact of climate change on the agriculture sector and ability to pro-actively and strategically respond to current as well as emerging climate change challenges through design and implementation of adaptation as well as mitigation measures;
- engaging private sector (joint ventures, PPP) to lead investment and economic growth; promoting agribusiness within the context of global realities of trade liberalization; and strengthening DA oversight and regulatory frameworks;
- Implementation, operational and technical capacity for programs of innovative nature (Strengthening Markets for Agriculture and Rural Transformation Program with unique P for R element, e-voucher, insurance, climate change) besides monitoring, evaluating and assessing the impact of these initiatives.
- strategic program planning and innovative projects design for financing by international development agencies;
- institutional effectiveness to synergize intra and inter-sectorial coordination; and,
- Change management based on a pent-angular approach involving HR, structural adjustment, systems, processes and above all cultural orientation.

These capacity deficits of DA should be addressed as a matter of urgency at and across all levels of the Department, the newly established Agriculture Commission, and Agriculture Delivery Unit etc.

Additionally, improved coordination mechanisms within and among related Departments is absolutely needed to develop synergies, achieve efficiency gains and cost savings and create enhanced impact of the development interventions.

Institutional strengthening and change also implies a reorientation of the functions of public institutions away from direct market interventions towards control and enforcement; e.g. the Food Department would move away from focusing on wheat procurement towards ensuring food safety. The Bank has committed to provide technical assistance to help implement the wheat marketing modernization program led by the Food Department.

5.6. Climate Smart Agriculture

The adaptation and mitigation constitute the essentials of CSA with range of tested and proven technological interventions, innovation and practices. The Department needs to go beyond the existing exclusive focus on adaptation and ensure that mitigation measures are appropriately integrated (at all stages of agriculture pre-production, production, post-production) in the overall policy and programmatic framework to effectively respond to climate change impact on agriculture. Indeed climate change in all its sectorial manifestation has to be mainstreamed into the planning, programming and budgetary processes and effective mechanisms and frameworks fully operationalized to monitor and account for the efficiency and cost-effectiveness of climate related interventions.

For adaptation and mitigation measures to be effective, an integrated climate change framework needs to be developed based on: (a) systemic understanding of the impact on human and natural resource endowment and (b) the intertwined relationship of the dynamics of different socio-economic development paths-various policy choices, responsive institutions, different types of technological interventions etc.

An integrated framework is accordingly proposed comprising (i) a clearly articulated CSA vision (what is intended to be achieved); (ii) the strategic pillars based on the synergy between adaptation and mitigation to ensure sustainable and profitable agriculture (Crop management, Livestock management, Soil and water management, Agro-forestry, Integrated sustainable food and energy system, Agriculture infrastructure and Access to climate information/improvement of climate knowledge); (iii) clearly defined priority areas of intervention under each Pillar both related to adaptation and mitigation; and (iv) the four Common Thematic Threads to be an integral part of the specific areas of intervention: agro-ecological zones responsive interventions; enabling policy, legal and regulatory environment; institutional and structural framework and system; and gender sensitive planning and programming.

Paradoxical agriculture which combines conservation agriculture and intensified system of cropping and as is being successfully pursued by a group of farmers (more than one thousand) in Punjab should be adopted as an integral part of the CSA strategic framework.

5.7. CPEC: Potential for Transforming Agriculture in the Least-developed Districts of Punjab and Alleviating Poverty

There are four important factors enshrined in the CPEC framework to provide impetus to competitive agriculture: firstly, the focus on agricultural development and poverty alleviation; secondly, provision of special economic zones and food-agriculture processing and agro-industry therein; thirdly, the network of feeder and connecting roads and fourthly, access to domestic and international markets to

support international trade flows and induce a considerable shift in the intra-country trade.

A development model comprises three salient components: (a) a staged development approach (b) four pronged interventions-policy, institutional, physical infrastructure, and technological; and (c) additional sub zones or clusters in the selected districts based on their endowment and agricultural production systems is recommended for implementation.

5.8. Ceiling on Milk Prices

A regulatory policy is required to improve price transmission from consumers to producers. The aim of this policy should be to improve market performance by encouraging a competitive environment free of collusive or predatory activity.

Productivity enhancement is a key to economic profile of milk production. Given the importance of dairying in the irrigated region, a cluster of competitive production base with a focus on increasing productivity of farms best utilizing the local factors of production seems to be the way forward. Simple actions like providing enough and better-quality feed, water and space to the animals would contribute a great deal in enhancing milk yield. The sector needs to move up the productivity curve where real trade off begins.

There is a need for comprehensive study on trade and price policy. While few policy/economic oriented studies do bring out very useful insight into key areas of action, the work needs to be extended to estimate comparative advantage and competitiveness of livestock and diary production in Punjab. It is proposed to use Policy Analysis Matrix to estimate milk production using both financial and economic prices and estimate comparative advantage of producing milk in terms of export markets (DRC analysis).

5.9. Sugarcane Deregulation

(a) Off load surplus stock:

The government should regulate the Sugar Industry to off load the surplus stock, and to pay the growers dues of more than Rs. 225 billion.

(b) Restructuring of the sugar industry:

The restructuring of the industry and setting the pricing and subsidy distortions right are absolutely essential prevent the constant decline in the industry and to put it back on the right track of competitiveness, growth and profitability. Export of surplus stocks accumulated over last three years which is not competitive in the international market should be discontinued to discourage production of a high-

cost-high-water consumption crop to the detriment of competing crops which have both better comparative and competitive advantages.

(c) Sugarcane Pricing:

A fair pricing mechanism is necessary to protect the growers and encourage higher yields, tackle the problem of potential shortfall in the cane crop and rationalize the high cost of inputs. Given the high volatility of sugar price in the world markets and the political sensitivity of the crop, a price band policy with price floors and ceilings might be an attractive option to evaluate.

(d) Comparative and competitive advantage of sugarcane crop:

The newly identified Agro -Ecological Zones (AEZs) provide good bases for GoP to undertake a comprehensive and long overdue study to estimate comparative and competitive advantage of the crop and sugar industry.

(e) Sugarcane Trade Issues:

It is indeed instructive to benefit from the following suggestions:

- A plausible policy option could be to use a type of variable tariff based on moving averages of world prices. When world prices rise in short term, the tariffs would fall, cushioning the negative impacts on domestic buyers. When world prices fall, the tariffs would increase, to ward off the negative impacts on domestic producers. This option should however be exercised on exceptional basis and administered with a credible commitment through pre-established and transparent regulatory framework.
- The tariff schedule should be reformed to reduce dispersion and to remove the implicit tax on agriculture. The current tariff and duty system is not transparent, but complex, hard to understand and interpret.
- Pakistan should move towards a uniform and low tariff, with the tariff as the only border measure, no exceptions and no other taxes. This would not preclude sales taxes, as long as they are uniformly applied to imports and domestic production as also the prudent and occasional use of transparent contingency measures, such as safeguards, anti-dumping and countervailing duties, which are all WTO legal.

(f) Sugarcane zoning:

A review of both old and present zoning systems is needed to promote equity and justice and ensure adequate return to the growers; timely payment of dues; and incentivize the farmers for increasing production and improving quality.

5.10. Establishment of Grain Warehouses

Creating private-public partnerships that support building warehouses, with treatment facilities in selected districts on a pilot basis, for grain crops such as rice

or wheat and potato depending on the crop cycle, properly linked to a bank (which can pledge stocks and advance loans to the farmers treating them as collateral) should be pursued as a viable option.

Electronic Warehouse Receipt Financing is another solution to help farmer avoid "distress sale" and raise money for the next crop and save them from the excessive charges levied by the middleman. While the previous program did not yield the intended results due, inter alia, to the non-delineation of roles and responsibilities between WH operators, banks borrowers etc., excessive subsidies and limited awareness of WHR financing, an in-depth study is required to attend to these issues and come up with a robust model to guarantee success and make it work.

Further key areas that need development for implementation of a successful and effective system of WHR financing are:

- establishment of CMCs for licensing and quality control of warehouses;
- establishment of a warehouse and storage network for agricultural produce;
- creation of a database on storage facilities;
- development of a commodity exchange market; and
- Raising awareness of farmers.

Given the agro-ecological and cropping diversity of Punjab, it is possible for the formation of more than one CMC.

A compact of short term, medium term and long term measures as detailed in the main body of report are required around these key areas for a robust WHR financing system.

5.11. Incentive Driven Policies for selected crops in New Ecological Zones of Punjab – Case of Cotton and Sugarcane

The following data issues should be resolved in developing refined information regarding agro-ecological zones.

- availability of District or Tehsil wise data for cost of production;
- adequate coverage of crops/vegetables in collecting economic data;
- intra-district variation (agro-ecological) in data collection;
- Farm size wise data to cater for size specific issues.
- Variation in technology (tunnel farming etc.) while collecting information.

The sugarcane profitability is based on financial or private profitability that might bring information on competitiveness of a commodity but it does not prove conclusively if sugarcane has a comparative advantage. Thus there is a need to further assess this policy indicator in prescribing crops in new ecological zones.

The policy conclusion in the context of developing new ecological zones are:

- Promoting sugarcane in the south where cotton carries huge comparative advantage would be very costly in terms of value addition but also in wasting scarce resources like water.
- The analysis could be improved by attaching different levels of production (in area and yield terms) to different districts to identify suitable areas for selected crops.
- We propose to use extended model to be integrated in ongoing useful work. It will bring credible policy indicators to support crops in new ecological zones based on comparative advantage of growing a commodity. A simple yet very powerful and easy to communicate with policy makers, we propose to develop and use a spreadsheet model on Policy Analysis Matrix (PAM).
- The scope of studies to be carried out to estimate technical, economic and environmental potential of each new AEZ should incorporate the extended model as described in the main body of the report.
- Punjab can benefit from large set of policy work done by FAO in Iran, Egypt, Syria, Yemen and other countries to estimate comparative and competitive advantage of each agro-ecological zones.
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5.12. Wheat Deregulation

(a) Broader Reform measures

The following reform measures are proposed:

- Change from bag to bulk handling and storage system;
- Abolish the zero-loss policy and pay farmers only for good quality wheat;
- Deregulate the sector with more private sector involvement and align the wheat support price with international trade levels;
- Target subsidies to small (poor) wheat producers to compensate for lower wheat support price;
- Introduce a margin between PFD procurement and release price to cover (part of) PFD's incidental charges;
- Improve inspection methods and install grain cleaning systems at wheat intake.

(b) Wheat handling and storage strategy

For the change from bag to bulk handling and storage, the government's intervention in wheat procurement need to gradually decrease to a level of 2 million MT/year and that the carry forward stocks should not comprise more than 1 million MT. This will result in a 3 million MT bulk storage capacity, which will be sufficient to cover the PFD requirements. The storage facilities should be equipped with a rapid sampling and laboratory analyses equipment and a cleaning systems at the intake of the storage facilities.

(c) Further Reforms to Deregulate

The WB prescribed reforms should be implemented in full. GoP should withdraw from the wheat market and leave the trade to the private sector which has both the required capacity and expertise.

The reforms to deregulate wheat market will improve the competitiveness of agriculture sector; and promote diversification of Punjab agriculture towards high value crops, leading to growth in exports; result in significant social benefits through a lower market price for wheat with major positive impact on urban consumers, as well as on the rural poor (a large majority of whom are net wheat buyers).

BIPP also wishes to place on record the excellent cooperation and support provided by the Agriculture Delivery Unit especially Ms. Sana Khalid and Mr. Talal Khan and other functionaries of the Department in conducting this exercise though there were a few unintended hiccups towards the end.

Annex.1

KII Questionnaire

Q.1. What five major deficits and problems (including policy, institutional) can you identify pertaining to the agriculture sector in Punjab?

Q.2. How do you see the past two years performance of agriculture in Punjab both in terms of achieving productivity gains (making agriculture profitable and competitive) and attracting investment and how do you compare it with the overall performance prior to 2015?

Q.3. Can you mention a few projects that the agriculture department is currently doing that you area ware of and give your opinion especially with regards to the design quality, deliverables and the likely impact on the small farmers?

Q.4. Do you think the current Agriculture policy formulated by the department (a) is responsive to, the needs of the farmers (b) integrates well with the development priorities of the province (growth strategy) and Pakistan (vision 2025) and (c) is climate sensitive given that Pakistan is one of the top 10 worst affected countries vulnerable to the severity and rapidity of climate change and afflicted with the major problem of increasing "water scarcity"? Any specific adjustments or shifts, you wish to recommend.

Q.5. In your opinion, do the current allocation of resources and investment in the agriculture sector represent "value for money" in terms of harnessing the full potential of agriculture in Punjab and that these resources are turned in to tangible results both in terms of spurring the economic growth and improving the overall wellbeing of the farmers' especially small ones? Will you suggest some specific adjustments in the existing resource allocation and investment thrust of the government to maximize sustainable agriculture potential?

Q.6. How do you compare the agriculture performance of Pakistan's Punjab with that of India's and of some of other countries with identical Agri-ecology? Are there any best practices and/or lessons learned of which Punjab could benefit?

Q.7. How do you see the potential of technological interventions including mechanization and ICT integrated solutions to transform the subsistence agriculture to commercial agriculture as also giving further boost to profitability and competitiveness for the medium to large farms? Please give a few specific examples indicating the priority areas of interventions for the purpose?

Q.8 What is your overall take on the institutional capacity and performance of the agriculture department to bring about a paradigm shift and transformation of agriculture into a competitive and profitable sector in the wake of major

opportunities and challenges e.g., rural poverty, urbanization, climate change, technological advancement, CPEC etc?

Q.9. Can you suggest some measures to?

- boost agricultural exports;
- reduce trade deficit; and
- improve agriculture's terms of trade to move agriculture up the policy and resource allocation agenda

Key Informant Interviews

1. Mr. Asif Sharif (Agriculture Expert)

In one of the field visits (village, Dabur, Bhattian, Sukheki), pursuant to the meeting with one of the Key Informants, BIPP team witnessed the demonstration of adoption of paradoxical agriculture crop management that had resulted in the attainment of twin objectives of crop/agriculture profitability and competitiveness. An integral part of the package was the capacity building, training and skills development of the farmers.

Paradoxical Agriculture integrates both the principles and theory of conservation agriculture under practices of system of crop intensification on the one hand and the practical and economic consideration of the field on the other while aiming to move ultimately to organic farming. The diverse technologies deployed are based on a set of agronomic and biological fundamental for application to any crop production system and process. It involves:

- Use of seeds and plants that are not genetically modified;
- Abstinence from the use of synthetic fertilizers, hormones or inorganic nutrients;
- No use of pesticides, herbicides or weedicides;
- Focus on optimal use of inputs to improve conversion rations;
- Conservation of agriculture with minimum use of tillage, minimum soil disturbance, no periodic deep tillage, proper soil cover, and crop rotation;
- System of crop intensification i.e., timely planting/transplanting, lowest trauma to plant during various operations, optimally wide spacing between plants ,weeding and active soil aeration, water management to meet but not exceed plant and soil needs ,compost application to enhance structure and function of the soil systems;
- Integration and application of latest researched production management

TABLE 17: PARADOXICAL VS CONVENTIONAL

		PA	Conventional
Description	**Rate**	**Actual**	**Averages**
Seed rate used-kg		4	40
Cost of seed	2700	270	2700
Cultivation -seedbed preparation			3000
Fertilizer -DAP/Total Conventional	2800	1000	10,210
Water - per hour tube well	150	600	3500
Cost per acre		8191	24910
Yield/Kgs per acre		67.66	45

The farmer, Mr. Sultan Bhatti, had cultivated 10 acres of wheat crop using the paradoxical agriculture technology under direct advice, guidance and training from Mr. Asif Sharif, the proponent of PA. The following Table shows the comparative analysis of the costs of production under the PA system and conventional agriculture and the huge differential between the two palpably demonstrating the competitiveness and profitability of the wheat crop. The positive policy implications are: (a) withdrawal of the subsidy; (b) withdrawal of the support price; (c) incentivize exports; and (d) the area retrieved from wheat because of vertical productivity to be used for high value crops.

Issue catalogue

- Obsolete, traditional, subsistence input technology resulting in low productivity and yield
- Excessive use of fertilizers and pesticides
- Unavailability of right mix of agricultural tools, implements and machinery
- Lack of skilled labor and training opportunities
- Inefficient crop management practices including lack of crop rotation, cultivation and harvesting techniques
- absence of extension and advisory services
- The exploitative role of the middleman

2. Capt. Muhammad Mahmood – Secretary Agriculture

This KII meeting took place in the Old Secretariat office, Lahore. Representatives from BIPP met Agriculture Secretary regarding the progress of Agriculture department in the past two years. He outlined the constraints faced by the department that he inherited at the time of his induction which included:

- Dearth of financial and technical resources to launch the programs and policies necessary to provide the agriculture sector the special treatment that it deserves.
- Trust deficit between farmers and the department.
- High cost of production due to production, pre- and post-production in efficiencies
- Lack of capacity development both at the individual and institutional levels
- Lack of good leaders and managers which has led the department to provide training and education scholarships that can create future leaders and managers

The Secretary during the interview also highlighted the following points:

- When he joined, agriculture sector's performance was dismally poor as it had experienced, for the first time in the history of Pakistan, a negative growth. There was a conscious realization at the politico-professional level to revitalize the sector for which "Kissan Package "was, inter alia, introduced. He took this challenge as an opportunity, in the wake of strong political will at the highest level, to bring about a paradigm shift in the agriculture sector through a three-pronged focus: enhancing profitability; farmer centered ICT based service delivery; and incentivizing the role of private sector to lead agricultural growth;
- He agreed with the observation that there was a gap and disconnect

between the HQ and the operational outfits in the pursuit of the transformation process in the sector which he was trying to fix while conscious of historical status quo legacy and resilience to change. It took him quite a bit of time even to convince his team at the HQ that the transformation was successfully workable.

- In addition to the constraints already covered in the main document, he identified the need to bring about a cultural change in the managers and staff of agriculture department right down to the lowest echelons so that they own and commit themselves towards implementing the well thought out paradigm shift; make use of the ICT and smart agriculture tools for management and service delivery; and carry out their role in terms of providing good quality services to the farmers to win back their trust and confidence.
- He has embarked upon an incremental approach to bring about this cultural change: the top tier is already on board; he is working at present with the middle level management; and hopefully within a year, this much need change will reach the lowest tiers. Monitoring and accountability, incentivized pay structure; training and workshops were some of the tools being used in this regard.
- He was conscious of the political economy of decision making and the possibility of rotation of leadership which could thwart the gains already made or derail the transformation process in the sector characterized by, in addition to the three areas of focus, transition from subsistence to commercial farming; major crop focus to HYC and horticulture; diversification and value addition; and market driven and results based agricultural performance. In order to ensure sustainability, he has personally ensured that WB assisted SMART project, embodies specific covenants, DLIs, P4R instrument and clearly articulated results chain to keep the paradigm shift on tack in terms of (a) emphasis on-farm productivity and value of crops and livestock; (b) value addition and competitiveness of crops and livestock; and (c) climate change sensitive agriculture to enhance resilience of smallholder farmers.
- On specific questions as to the CSA, CPEC and HYCs, he responded as follows:
    a. CSA extremely important and reflected in WB SMART project but so far comprehensive strategic thrust lacking on which CC adviser was working; capacity deficit; lack of reliable data were the major deficits
    b. CPEC potential was being realized and for the purpose HYC (olives etc.) in the potohar region and suitable interventions (dates etc.) in the southern Punjab through which CPEC route passes were being promoted. This was work in progress;

c. While he conceded lack of major resource shift from the major crops to horticulture, he underscored the commitment of the government to promote and incentivize the HYCs and horticulture;

Issue catalogue

- The need to mobilize the staff at all levels to espouse and concretize the transformative vision and paradigm shift of the agriculture sector into reality
- Lack of commitment and sensitization at lower tiers and the need to develop a communication strategy
- Cultural change in the functional milieu of the department to make it farmer centric and regain farmers 'trust
- Adoption of agriculture sector wide approach (which goes much beyond the core domain of agriculture department) to ensure sustainability and enhanced impact in the realization of departmental goals
- Policy and institutional fragmentation vis-à-vis the allied departments (irrigation, livestock, forestry, environment)
- Implementation of Climate Smart Agriculture given the rapidity and severity of climate change
- Harnessing full potential of CPEC for agriculture sector
- Making agriculture competitive and profitable in the global context and issues of subsidies
- Water use efficiency including water pricing

3. Babar Malik - Chief Technical Advisor, Agriculture Delivery Unit

- The importance of value chain and what has been achieved in the past couple of years was discussed in detail.
- He stated that value addition has immense importance as it can overcome the money deficits of the agriculture sector.
- He also highlighted the issues of the agriculture sector that can purely beat tribute to the least importance that is given to value chains.
- He also talked about the balance of payments impact that a large import bill creates which needs to be minimized.
- He under scored the need to integrate C in the policy, institutional and programmatic interventions of the department.
- He talked about the role of mechanization, diversification from major to HYCs and agriculture product market reforms as also impact of inefficient resource allocation including regressive subsidies regime which impacted competitiveness and profitability of agriculture.
- In a draft paper he shared with BIPP team, he highlighted lack of effective linkage of research and extension and lack of priority to streamline and improve the research system

- He dwelt in detail on the potential of olive production and development of potohar as olive valley including the need to incentivize agro-industry, institutionalize training and improve extension and advisory services

Issue catalogue

- Lack of crop diversification to HYCs and potential for olive
- Need for value chain development and addition
- Inefficient market system and segmentation causing financial deficit in agriculture sector
- Outdate mechanization practices
- Drastic increase in import bill (import bill of edible oil)
- Climate change and its impact on agriculture
- Water inefficiencies
- R&D deficit- resource, capacity and institutional
- Lack of processing, packaging technology
- Farmers' training and skills development
- Value chain financing
- Traceability to build consumer confidence

4. Saqib Shahzad – International Food Policy Research Institute (IFPRI)

The International Food Policy Research Institute Pakistan is an important player in the agriculture sector, specifically research and extension, globally but more importantly in Punjab where the provincial agriculture policy formulation is in full swing and IFPRI, alongside other government and non-government stakeholders is part of the formulation process. So, thy interview of Mr. Saqib Shahzad who's working on the policy side at IFPRI Pakistan was instrumental in bringing to light the supply-side perspectives pertaining to the agriculture policy. Clearly, where did the policy formulators draw their primary inspiration from and what objects are they trying to achieve through the policy were key supply-side questions that needed to be addressed.

Saqib Shahzad opted to speak more about the agriculture policy as that discussion fell more under the umbrella of work that he and his institution had conducted and felt that he might not be able to talk about the institutional and structural changes that have taken place within the agriculture department. He did answer in the affirmative to a question regarding the general performance of the department by responding that the pace at which certain transformations like those under the smart agriculture project have taken is satisfactory however, the problems regarding pricing, water availability and the role of intermediaries.

However, he thought that the newly formed agriculture policy addresses

everything from price distortions to agriculture financing to farmer incomes and inclusion of agriculture in the CPEC plans. He also believed that not only the policy is complete but it also includes the political economic and governance aspects which are key towards the successful implementation of the policy. He mentioned projects like extension 2.0 and smart agriculture as success stories even though there are areas and pockets where processes could be improved.

One important aspect that dominated the discussion was the renaming of the small farmer category to small commercial farmer and the expansion of the category to include farmers that own and possess land up to 75 acres. This was defended by Mr. Saqib Shahzad as a category which was not only inclusive but also logical since farmers having a holding larger than 75 were deemed to be too large and those lesser than 3acres were small. He believed that famers slightly less than 75 acres, it was learned empirically, faced the same problems that a farmer with a holding of say, 5 acres does.

Issue catalogue

- Lack of water availability due to inefficient coordination with irrigation department
- Inefficient role of intermediaries leading to market failure
- Unavailability of high yield seeds leads to high cost of production

5. Mr. Mansoor Ali – Asian Development Bank

The five major constraints and opportunities identified by the informant included:

- Disconnect between Government Extension and Private Sector
- Disconnect between Research Institutes and commercial needs of sector
- Primary focus still on production without linkage to value-chain
- Non-functioning marketing system. No strategy to reform Agri markets
- No strategy of focusing on relevant crops in terms of climate change and water crisis
- Marked improvement in internal debate on way forward and dissection of shortcomings.
- Realization that private sector investment best way forward for sector
- Financing subsidy under Kissan package is a good move but suffered from poor execution in the first year primarily due to bureaucratic procedures.
- Some ongoing efforts on using IT for communication and information outreach. Still early to comment on success
- New seed development at Research Institutes is ongoing but lack of infrastructure as well as incentive does not result in commercial adoption of new technologies

Policy:

The policy does cover all the main topics and is an important prerequisite for future development. However, as always, the disconnect between policy goals and individual strategies and projects is where the country has suffered. There is still no mechanism to ensure strict adherence and following of policy doctrines.

Resource Efficiency:

While resources may be ample, their misallocation as well as wastage is the prime reason for slow development. In fact, most of agri growth can be attributed to private sector initiatives. The usual bureaucratic structure is a major hurdle for reform. Redesigning of incentives and goals of key research, extension and marketing staff is necessary if their productivity is to be aligned to the needs of small farmers.

Pakistan has shown robustness in the sense that lower subsidies compared to India gives strength to manage changing situations. Indian agri growth has a large component of helping hand from subsidies. However, the infrastructure of Indian agri research and the conduit of its output to farmers is far superior. Numerous examples are there to show the efficiency of introduction of new varieties and technologies to farmers.

ICT Involvement:

ICT is an integral part of all future development but currently its role is only being talked about in terms of information and data collection and dissemination. Reform of markets by using ICT has to be the main goal if farmers are to get fair and transparent market prices. Linkage with national commodity exchange as well as establishment of local commodity exchanges requires radical adoption of ICT as well as policy and regulatory changes.

Performance of the Department:

Agriculture department's capacity is the same as rest of government departments, whether federal or provincial. There are pockets of brilliance but the overall poor reward and incentive mechanism cannot be expected to bring about radical transformation of the sector. A gradual move to improve selected area scan bring about change over years. Lack of leadership continuity with its effect on policy hiatus is the feature of public sector in the country. In this environment, only piecemeal improvements may be possible which is still better than none at all.

- boost agricultural exports;
- reduce trade deficit; and
- improve agriculture's terms of trade to move agriculture up the policy and resource allocation agenda

- Reduction in the long-value chain cost is important for export growth. Near-farm processing and linking farmers to export market demand can rapidly produce a culture of farming-for-export-markets. Providing farmers the right protocols on inputs and practices can result in good quality, targeted produce that is demanded internationally.
- More investment in local modification and manufacture of machinery as well as development of seed companies able to fulfill complete national demand can immediately reduce trade deficit. Linked with export promotion discussed above, the net deficit can be reduced. In addition, reliance on local production of large import items like oilseeds can reduce deficit from edible oil import.
- Greater visible linkage of agriculture to exports needs to be shown and marketed to policymakers. Policymakers need to be convinced that agriculture provides the quickest export growth potential. This becomes even more attractive when complemented by data showing that R&D needs of agri sector is less than manufacturing in order to provide same level of export growth.

Issue catalogue

- Lack of commitment between government and private sector
- Non-functioning marketing system
- Inadequacy of crop rotation
- Premature ICT intervention and lack of training both extension staff and farmers on the new gadgets
- Lack of infrastructure and incentive cause a slack at research institutional level
- No mechanism to ensure adherence and following of policy
- Disconnect policy, strategy and projects
- Misallocation and wastage of resources

6. Mr. Yawar Ali – Nestle Pakistan

- Current Agri policy is very good as per farmer needs (b) Do not have much knowledge on it (c) Agri department is doing good efforts for high efficiency irrigation systems, lining of water courses, provision of LASER levelers etc. But these are not sufficient to cater the climate change, there is need for raising huge campaigns to save every drop of water. Farmer does not seem to be prone to the current water crises and how to mitigate it.

  Building flood water reservoirs and rain harvesting are the areas which should be part of agriculture policies.
- Resource allocation seems good, looking at farm sizes, passing on benefit

to small farmers requires more efforts. Further investment for water reservoirs will have better returns for province.

- India competes better in costs and quality of agri commodities, however recent increase in export of rice from Pakistan is very good sign where Indian rice is struggling in international market due to pesticide issues.
- ICT is dire need to transform agriculture market. Recent efforts by Agriculture department on drone technology have allowed experts to work on new horizons. ICT should also be preferred for improving farmer's access to credit, inputs and expertise. Ultrasonic tools for water measurement at canals and water channels should be installed to monitor water distribution.
- Recent efforts by Agriculture department are much better than the past, there is overall improvement in performance of agriculture department teams. Continuing current efforts with deeper reach to small farmers can have significant improvement.
- Agriculture department has mobilized fodder research institute and Punjab Seed Corporation to provide better quality fodder seed. Around 65-70% cost of production of dairy goes to feed & fodders, so joint efforts by both departments can bring better improvement.
- Water pricing is good idea, success stories already exist in the world. It can bring good improvement in water management, the money earned can be invested back on farmers in improving their efficiency.

- Inefficient dairy farming operation resulting in high cost of production
- High losses of agri. commodities due to poor post-harvest handling
- Limited access of technology to farmers
- Agriculture financing through informal sector (like Arthi) at very high cost
- Lack of availability of right quality inputs

7. Malik Muhammad Akram, Director General On-Farm Water Management

After the introduction, the team asked the DG about limitations of PIPIP and the achievements and impact of HEIS. He went over the aims and objectives of the project and highlighted the impacts and gaps of PIPIP. He also said that the agriculture sector relies on the single largest contiguous irrigation system in the world and Pakistan is managing much lower crop yields per unit of water which is frightening because most of the water resources in Pakistan are consumed by the agriculture sector. To address such issues, serious efforts are needed to enhance water productivity due to which Punjab Irrigated agriculture productivity improvement project was started in 2013-14. The cost of the project is $250 million and is funded by the World Bank and also through farmer contributions. So, the 173 million funding comes from; (1) The World Bank, and (2) by the farmer/beneficiaries.

The DG said that the basic objective of the project is to enhance water and crop productivity through construction of watercourses. He claimed that they have renovated 5500 watercourses and installed 2000 irrigation schemes – irrigation scheme here includes watercourses of the Barani areas. The major component of the scheme was to install HEIS in1 lac 20 thousand acres, which are Sprinkler and Drip irrigation systems. This has been achieved in the allotted time.

The DG emphasized upon the limitations of the project by comparing India, Iran and Israel with Pakistan and said that in these countries, the Governments are providing 95 per cent subsidy on HEIS to increase productivity. However, it's difficult for the Pakistani farmer to abandon the traditional methods and to adopt new HEIS because the share of the farmer/beneficiaries is as low as 40% due to which the farmers are reluctant to invest money from their pockets.

Issue catalogue

- Lack of coordination with irrigation department
- Obsolete technology
- Lack of technology inclusion in farming practices
- Less water and crop productivity

8. Asad Zahoor – USAID PEEP

- The interaction of USAID with the department has been at many levels; firstly, we created a policy and strategy unit with the department around 2–2.5 years ago. We were working on PSU through consultants on a regular basis but the relationship has cemented since the joining of the current secretary. Then we also proposed the olive development group which was endorsed by the secretary who wanted it to proceed at a quicker pace. Then we collaborated on multiple policy issues so the partnership basically increased in frequency and depth.
- USAID PEEP's mandate is policy, legal and regulatory reforms. Our objective is also to spur investment in Agriculture.
- The current secretary's approach on service delivery, etc. coincides with the approach used by the donors and development organizations.
- USAID isn't currently funding the government on anything however we continue to support the olive project.
- I'm aware of two projects that the department is doing; both related to olives. One issue with the government is that its projects are usually focused on the supply-side but the current secretary is cognizant of the governance issues that compromise the quality of government projects and therefore has tried to keep the wasteful usage of resources greatly

under check.

- The resources of the department have increased especially after the creation of the ADU which has added greatly to the coordination of the department – this is manifested through the fact the all projects presented by the department in the ADP were approved by P&D. The two olive projects were lumped intone.
- DLIs within the smart agriculture project are key to sustainability and market reforms
- New people have been inducted in the department but that did not result in mistrust between the existing staff and new people hired through the ADU, etc.
- The agriculture policy should have fed in to the public-sector resource mobilization, should be directly aligned with the reforms and be linked with the productivity and growth.

Issue catalogue

- Transparency and lack of governance within the government is a large deficit
- Lack of oversight and reporting mechanisms

9. D.G. Agriculture Field Punjab (HMSCs)

Dr. Qurban Sandhu was asked about the limitations, achievements and impact of HMSCs. He briefly explained the components of the project and said that farm mechanization level is quite low as compared to the developed countries primarily because of the inadequacy of land cultivation in our region. The main constraints in increasing agricultural productivity are non- availability of farm machinery to the farmer at the right time and at affordable prices. Agriculture mechanization in Pakistan is limited to tractorization with cultivators only and due to the lack of technology usage in agriculture sector; we face the problem of crop yields gap. Production in the agriculture sector is far below the level of those countries that use the technology in their agriculture sector. DG also compared the per hectare use of horsepower with other counties by saying that: Pakistan's per hectare use of horse power is 1 or less than 1, India's 2.50 while that of China is greater than 3. He also added that the manufacturing of local farm machinery lacks standardization and quality. The quality of locally produced farm machines is generally poor because of the traditional layout of workshops and lack of engineering and technical expertise.

Issue catalogue

- Low farm mechanization due to inadequacy of land cultivation
- Non-availability of farm machinery to the farmers at right time and affordable prices
- Lack of technology in agriculture sector

10. Mr. Shahrukh – Economist Agriculture Commission

To address these concerns, the Government of Punjab took the initiative of building 72 Hi-Tech Mechanization service centers (HMSCs) in all districts of Punjab with support of the private sector on a 50:50 cost sharing basis. In the first phase of 2017-18, the project will cover 18 districts of Punjab which will be completed by June2018.

This was a brief meeting, Shahrukh started with the introduction of the agriculture commission: it wasformedin2016,main object is to have an inclusive approach so the department doesn't work in isolation, consists of 37 members from different government departments, academia, private stakeholders, farmers etc and has five sub-committees:

- Agriculture Marketing System
- Cost of Production
- Decamping of Meat and Milk Prices
- Formulation of Agriculture Policy
- Levy of Agriculture Income Tax

The chairman of the commission is the Chief Minister Punjab while the vice chairman is the Minister of Agriculture. The purpose of the subcommittees is to make sure individual attention is paid to the five issues in agriculture, the subcommittee provides its finding to the commission.

- The commission only provides recommendations to the ADU, it does not take decisions for them. All decisions are taken and executed by ADU.
- When asked about the PIPIP project, he did not have a lot of information on it, we raised the point of farmer owning land less than 5 acre being excluded from the project, to which he replied that the project kept economies of scale in mind when deciding the size of the farm to see the impact of new technology, i.e: drip irrigation.
- When asked about the involvement of the environment department while making the new agro-ecological zones, his response was that a member from the environment department has always been present in meetings (NOTE: In the meeting with DG Environment and team, there was no mention of their members being a part of these meetings)

- Major achievement of the commission was to initiate the formation of the agriculture policy of Punjab which was on-existent.
- It will take at least five to eight years to see the impact of the agriculture commission on the performance of the agriculture department.
- Members of subcommittee and the TOR's are available on the website along with the minutes of the meetings.

Issue catalogue

- Disconnection between department

11. Mr. Arif Nadeem – Agriculture Expert

The following points were made by the informant:

- Contradictions in the policy and project documents provided by the Agriculture department
- What should be the agriculture policy in the 21st century?
- Project intervention: why has agriculture department not been able to incorporate water which is a key factor in agriculture? HIES has also not been a thumping success.
- Mechanizing farms: if the design is good, the implementation is expected to be good (UN)

On the policy side, he said that:

- Strategic crops (maize, rice, wheat, cotton) is at thrust but they want to diversify to horticulture crops. But no intervention strategy is stated in the document.
- Wheat and fertilizer subsidy is bringing the national economy down, sugarcane is encroaching.

Issue catalogue

- Need for value chain management in agriculture department
- Plugging the value leakages at the production process and marketing stages
- Expended role of private sector
- A compact input technology package to commercialize agriculture
- Advanced processing capabilities
- Investment in the infrastructure for forward linkages both domestic and export market
- Identification of market segments for exports and information and intelligence system

12. Mr. Kalim Qamar – Agriculture Expert

Mr. Kalim Qamar commenting on one of the projects currently implemented by the department made the following comments:

- The title of the document is a misnomer as over 95% of the contents cover soil science from soil sampling to analysis to recommendations on fertilizer application based on missing/insufficient nutrients on specific plots of land. Basically, it is a project to strengthen soils aspect, which is of great importance, but it is not at all modernization of extension services. The inclusion of certain ICT tools like web portal, GIS and soil database in a soil-focused project do not make any traditional extension service modern. If the provincial government considers this document as an extension reform document then it is technically ill-advised. I am familiar with persistent weaknesses in Pakistan's extension system. Devolution has its own problems as I noticed in a number of developing countries. The reform of extension in any country requires a proper detailed assessment and analytical study, which this particular document is not.
- The project design is weak not only because it has too broad objectives hence unrealistically ambitious, but also its underlying assumptions. For example, one main assumption is that all farmers, have at least minimum literacy and computer knowledge to benefit from a web portal, which is questionable. There is another assumption that various fertilizers are readily available in villages on time, in sufficient quantity and at reasonable cost. We know it is not true as if nothing else local politics becomes a serious hurdle in the availability of fertilizers as I once discovered in the office of the Director General of Extension in Lahore.
- The project period is five years, and most of the time seemingly is to be spent on collection and analysis of a large number of soil samples. It is not clear when the entry point for extension is. Budget and work plans are also missing.
- Knowledge of and extension advice on soils and fertilizers is but only one of the needs of farmers. I won't be surprised if the DG Extension in Punjab already has something similar to a web portal containing useful information for farmers, covering several technical areas. This project proposal reminded me of the very successful FAO food security project in Sargodha. We had done exactly the same thing on soils (and many other aspects), taking soil samples from selected farmer's plots, analyzing them to determine nutrient status and then recommending what fertilizers to apply.
- Capacity building/training, a very important aspect in using

extension agents for any specific project, is not well pronounced if not totally ignored.

- Assuming that this project focuses on Punjab, my technical opinion is that it will not advance or improve extension services in any significant way let alone reform the extension system

Issue catalogue

- Modernization of ICT tools for extension purposes
- Weak project designs due to broad objectives and unrealistic ambitions
- Lack of primary research of agriculture department
- Lack of capacity building and training for extension agents

13. Prof Dr. Talat Naseer Pasha, Vice Chancellor, University of Veterinary and Animal Sciences, Lahore (UVAS)

He stated that livestock was the largest stakeholder in the agriculture sector and accounts for 58.3% agricultural GDP. Over 7.5 million families, mostly landless and smallholders were dependent upon livestock as their major livelihood asset. Milk, by far, constituted the most important product of livestock which alone exceeded the combined values of all major crops.

Pakistan claims to be the third largest milk producer in the world with over 50 billion liters of milk annually. However, livestock arming is not treated as agricultural farming and thus denied the incentives including subsidies, reduced electricity tariff, income tax exemption, relief in import duties, etc.

Apart from that, one major challenge facing the livestock industry is the price capping of milk imposed by government in Pakistan as against the actual cost of production. This foments illicit practices including massive adulteration, black marketing and use of unhygienic synthetic recipe products made from vegetable fats etc. The UHT dairy liquid and UHT whitener seems to have grown enormously to the detriment of the fresh milk.

Dr. Talat Naseer recommended: (a) enhancing import duty to 100% to reduce the import of dry milk; (b) incentivizing small scale farmers; (c), delivery of quality extension services and advice to the livestock producers; (d) consumers awareness about the possible deleterious impact of re- constituted milk; and (e) initiation of school milk and egg program to combat the stunted growth in the young population.

Issue catalogue

- Excessive and illegal import of dry milk
- Department failed to raise awareness among consumers about quality of dairy products
- De-capping of milk has still not been done despite of market failure
- Need to rationalize and enhance Import duty on dry milk
- Extension and advisory services' improvement for the livestock farmers
- Nutrition and food requirements of the schoolchildren

14. Muhammad Saad, Department for International Development, DFID

The policy and program officer from DFID referred brought an interesting perspective to the KII discussions that both agriculture and water are neither on the agenda for DFID nor the reared any plans to initiate programs that center around the agriculture sector. He however dwelled upon the fact that the importance of agriculture sector cannot be denied and since DFID has a large portfolio focusing upon poverty eradication in South Punjab and in that regard, has built string synergies with the planning and development department of the government of Punjab and the in terms of aligning their efforts with the sustainable development goals. He said that this work is being done simultaneously with our work on issues pertaining to political economy and governance in Punjab which is primarily done through programs like the Sub-National Governance Programed (SNG).

He agreed with the fact that agriculture is an important tool to foster economic growth and can play a vital role in the poverty era dictation campaign currently run by DFID, however none of their direct tools to foster the desired economic growth currently focuses upon agriculture.

15. Humera Qasim – Climate Change Advisor, Agriculture Delivery Unit

In an interview held at BIPP, Ms. Humera Qasim made the following observations:

- The department only has a few projects that have climate change
- There is no capacity for way forward
- There is no action, communication and gender plan
- Formation of agro-ecological zones was an initiative of the secretary
- The smog project is one of the most important project by the agri dept: using GIS to figure out if smog is caused by burning stubble or traffic (this study is currently in process)
- GCF: Indus basin project. The PC-1 is underway, $54.7 million project, joint project of Punjab and Sindh
- Climate action plan is underway (Climate Smart Agriculture)

She also identified a few gaps and made recommendations to remove those gaps:

- Dissemination of communication with other departments
- Lack of capacity
- Will NOT work on mitigation, focus only adaptation because we are not an emitting country [0.7%]
- Lack of technology and funds
- Action plan is awaiting two docs: Punjab Climate Change Profile and Agro- ecological zones
- Adaptation measures: none since the study has not been done yet
- Livestock is not integrated in this
- lack of internal commitment and awareness

Issue catalogue

- Need to work on mitigation and the synergy between mitigation and adaptation need to go together with research and productivity that is the sustainable
- Irrigation dept. needs to be taken onboard
- The department is working in isolation, needs to coordinate with forestry, livestock, environment, irrigation
- Heat resistant crops need to be researched on
- Nothing about MO's?
- There needs to be a structural integration between depts.

16. Dr. Ghazanfar – Additional Secretary Planning, Agriculture Department

Dr. Ghazanfar mentioned the following achievements in performance and service delivery:

- Installation of biometric attendance mechanism
- Monitoring and Installation systems
- Involvement of DCOs in the agriculture sector
- Tabs given to field officers, tracking through GPS, reduces corruption and TA/DA cost
- Duties of DG's have been clearly defined in JD to make sure they meet their goals
- Performance contract is signed with all DG's and directors – quarterly review done
- ADU formed: competitive market salaries, people best in their fields hired for technical, ICT, M&E, strategy & policy advisors
- Commission performance is good, is involved from all stakeholders, looks over policy matters, however it needs a legislative cover (Act) waiting for approval from government.
- There is lack of robustness and inter departmental coordination, it is only present in foreign funded projects
- Sec 144 ban on agriculture waste burning to reduce smog!

- PIPIP only involves farmers above 5 acres holding because very small farmer cannot afford the drip technology
- Punjab farm mapping is under process
- Smartphones are provided to farmers with 9applications
- One-day training is done to train them on how to use the smartphone
- Registration of farming families (5.2 million families, 30 million farmers)

Issue catalogue

- Training centers are not optimally functioning
- Lack communication of farmer about new technology
- ICT/technology assimilation by farmer
- Absence of enforcement of law (sugar mills in cotton area)

17. Mr. Saif Anjum – Secretary Environment Protection Department

The informant made the following

observations:

- Climate change is an equal but differentiated responsibility
- We lack technology
- Imbalanced use of fertilizer and pesticide
- Renewable energy is needed
- Multiple devices are being used by EPD to reduce pollution: hand-held for factories and industry, ambient monitors for cities
- Environmental inventories:
- Industry brick kilns
- Biomass
- Domestic cooking
- Transportation
- Rail transport
- Air transport

There is impact on health, eco-system and

agriculture Cross-sectorial integration:

- There is lack of integration, it is only possible when there are working platforms available which sadly don't exist
- There is currently only one platform: GMO's
- In this project all departments were involved including academia
- Emergency provision has been taken in winters when there is low visibility and smog, 50 departments are involved
- Climate change policy has a chapter on agriculture – still awaiting to be

approved by the govt.
- Poor and landless are living in fragile ecosystems

Recommendations:

- Create adaptability and resilience, agriculture system should be able to absorb climate change shocks
- Agro ecological zones are not of use due to unpredictability
- A cohesive strategy needs to be made for departmental exchange
- Mitigation is essential with adaptation
- Irrigation, agriculture and livestock dept. needs to work together
- EPD should be the focal point for all climate change related work in departments

Issue catalogue

- Need to develop a platform for inter departmental coordination for environment and climate change issues
- Lack of technology
- Imbalanced use of fertilizer and pesticide
- Inadequate renewable energy
- Poor and landless are living in fragile ecosystems

18. Mr. Shaukat Ali – Secretary Food Department

The services provided by the Food departments include:

- Anti-Adulteration
- Food Security
- Market Stabilization
- Protection of Growers 'Rights

Have taken the initiative to set-up silos at different points in Punjab:

- Silos at Faisalabad: It is a complex of 15 silos each having 3300 metric ton
- Steel Silos at Islamabad: It is a complex of 6 silos having 5000-ton capacity
- Silos at Multan: A complex of 10 silos having 38000 metric ton capacity and it is being rehabilitated nowadays

Wheat procurement is the biggest challenge that the department is currently facing. The following issues regarding wheat need to be considered:

- The wheat stock is being damaged due to inadequate warehousing facilities and weight of wheat
- Our wheat is not globally competitive therefore we can't export
- If we don't take active initiative we're going to lose crop and cause losses to the economy
- We should change our cropping pattern according to global competitiveness, especially with CPEC.

Issue catalogue

- Inadequate warehousing facilities of wheat
- Wheat is not globally competitive

19. Mr. Nasim Sadiq – Secretary Livestock and Dairy Development Department

He stated that Pakistan has 300 billion dry milk imports despite being the 5th largest country in terms of livestock. 17 billion worth of animal hide and 3 billion wool imported. He also said that farmers with small holding should forget agriculture because it's too expensive for them and not profitable.

Wheat:

There is 4 years' worth stock of wheat yet we keep cultivating more wheat which is a menace to the economy.

Wheat procurement in the past:

- 60% is by private owners and mills
- 40% by food department, PASCO is currently providing a subsidy of Rs. 1200- 1300 Current wheat procurement:

- Private players have been wiped out
- Afghanis are gone
- Temperatures have increased leading to early harvesting!
- Farmers expenses have increased

No farmer wants to keep their harvested crop at home, it is as good as a dead body for them.

Milk: Don't compare our milk with India or Europe, they worship their animals and keep them in a very well-maintained way. Lal Bahadur Shastri formulated the livestock policy in India in 1953.

- Humped animal has deposits of fat and better milk quality which is demanded all over the world, Pakistan has this animal breed
- Other countries especially India slaughter sold animal, we slaughter our young healthy animal which is not advised.

Women account for 95% of the labour force, but there is lack of importance in

social fabric, women are clearly underestimated, we have been training men who are good for nothing since it's the woman who handles the cattle.

- We need to train our women, ever since women training programs have been initiated, animal mortality rate has fallen to 0.3%now.
- Rural economy has been ruined due to politicians and rural-urban migration.
- De-capping is critical in the livestock sector.

Three key people who can make this happen are:

- Nestle
- Agriculture department
- Livestock department

Tannery industry slaughters under-sized animal which leads to wastage of carcass and skin De-capping is not currently the number one priority of the livestock sector, there are lack of subsidies and cost of production of milk is high, in order to save cost bad fodder is being used, COP of 1 liter of milk is Rs. 100+ whereas price of milk is less, there is clearly stress-selling. Successful models need to be adopted from Iran and Turkey.

Recommendations:

- Rural economy needs to be improved
- Livestock sector should not be confused with agriculture
- Farmer needs to be relieved of stress
- We're taking money out of the rural economy, we need to stop doing that
- Water is essential or milk production
- The Government also needs to be cognizant of the population explosion occurring unnoticeably in the province

Issue catalogue

- Lack of gender inclusion and women empowerment
- De-capping of milk price is critical
- Illegal trade of animal across the border
- Wastage of carcass and skin
- Lack of subsides in livestock sector
- Cost of production is high

20. Mr. Sher Ayub Khan – CEOSMEDA

This KII meeting took place in the head office of SMEDA, Lahore. Around 8 employees of SMEDA participated in the meeting moderated by the BIPP staff

on the Agriculture Sector and the role of small-medium industry especially in terms of its ability to add value to the agriculture produce. The KII meeting with the involvement of senior level officers of SMEDA adopted the structure and shape of a focus group discussion.

The participants from SMEDA and BIPP exchanged many questions and answers regarding the agriculture sector, value chain sand role of SMEDA. The following key observations are emerged:

- The session started with the brief introduction of SMEDA, its mandate and mission. The outreach of SMEDA in the SME dense areas was also brought under discussion.
- A detailed discussion revolved around the operational strategy of SMEDA that includes Building a Conducive Environment, Developing Sectors and Clusters and Provision and Facilitation of Services.
- They explored the agriculture production data of Pakistan comprising vegetables, fruits and major crops and their exports.
- They also discussed about the Fruits and Vegetable value added sector chain and Small & Medium Enterprises.
- The following constraints faced by growers, exporters and infrastructure research and development are highlighted in the meeting
- Lack of quality assured Farm Inputs - Viral Free Planting Materials, Pesticides etc., Low yield, Seasonal Farm Contracting – Price insecurity, non-compliance with Intl. Standards (EUROGAP, SPS, etc.), Lack of product innovation / varieties, Poor Farm Management
- Lack of Skilled Workforce, Lack of business acumen, weak linkages with processors & exporters - disproportionate power of middleman, Lack of storage and transportation facilities, Lack of crop insurance products
- Highly skewed production – seasonality & perish ability, Incapability of Exporters to deal with quality sensitive buyers, Weak Compliance to Int. Std.& Certification, Lack of quality processing and packing, Poor image of Pakistan as a supplier of Quality Fruits, Lack of Product diversification, Market diversification - limited access to high end markets
- Lack of technical expertise & infrastructure, Lack of cold storages, ripening chambers, packing houses and transportation facilities etc, Limited and expensive refrigerated transport facilities, limited air cargo space, ineffective and outdated research setup, lack of value added processing facilities

Issue catalogue

- Lack of adequate support to agriculture SMEs - finance, training, technology, markets
- quality assured Farm Inputs for agriculture commercialization
- Low yield unsuitable for processing
- Seasonal Farm Contracting
- Lack of product innovation /varieties
- Poor Farm Management as hindrance to agri-business
- Lack of Skilled Workforce
- Weak linkages with processors &exporters
- Lack of storage and transportation facilities
- Lack of crop insurance products

21. Director General, Environment Protection Agency

The DG gave an introduction of the department and the nature of his role. He talked about lack of interdepartmental coordination, lack of inclusion of Climate Change in programs/projects and a lack of policy making.

The EPA was given a project to do the policy review on use of pesticides. Talking about physical intervention, environment is not considered as a critical factor, PND has recently asked mining companies and power plants to get environment approval and NOC from EPA, but this has not been done with all of the sectors in Punjab.

As far as policy is concerned, IWEIA intervention should be integrated. NOC from all sectors should be required, not just sand mining, coal mining and industry dept.

Naseem ur Rehman: Pakistan environment policy should have coordination with the agriculture department as agriculture sector is a major contributor to the economy and is most affected by climate change. Water depletion is a major environmental concern, the department EPA recommends drip irrigation in place of flood irrigation. (Perhaps they are not aware of the HEIS project of the Agri dept.).

The following points were also made:

- Agri department did not consult with environment department when forming new agro- ecological zones.
- Punjab draft of environment policy and smog policy is still awaiting approval
- Capacity building of EPA Punjab is critical and desperately needed
- A lab is required to have sufficient evidence
- Not aware of the HEIS project of the Agridept.
- Job of the DG EPA is 95% enforcement and compliance

- Environmental governess and environmental justice, secretary agriculture is part of the committee (still no interdepartmental coordination)

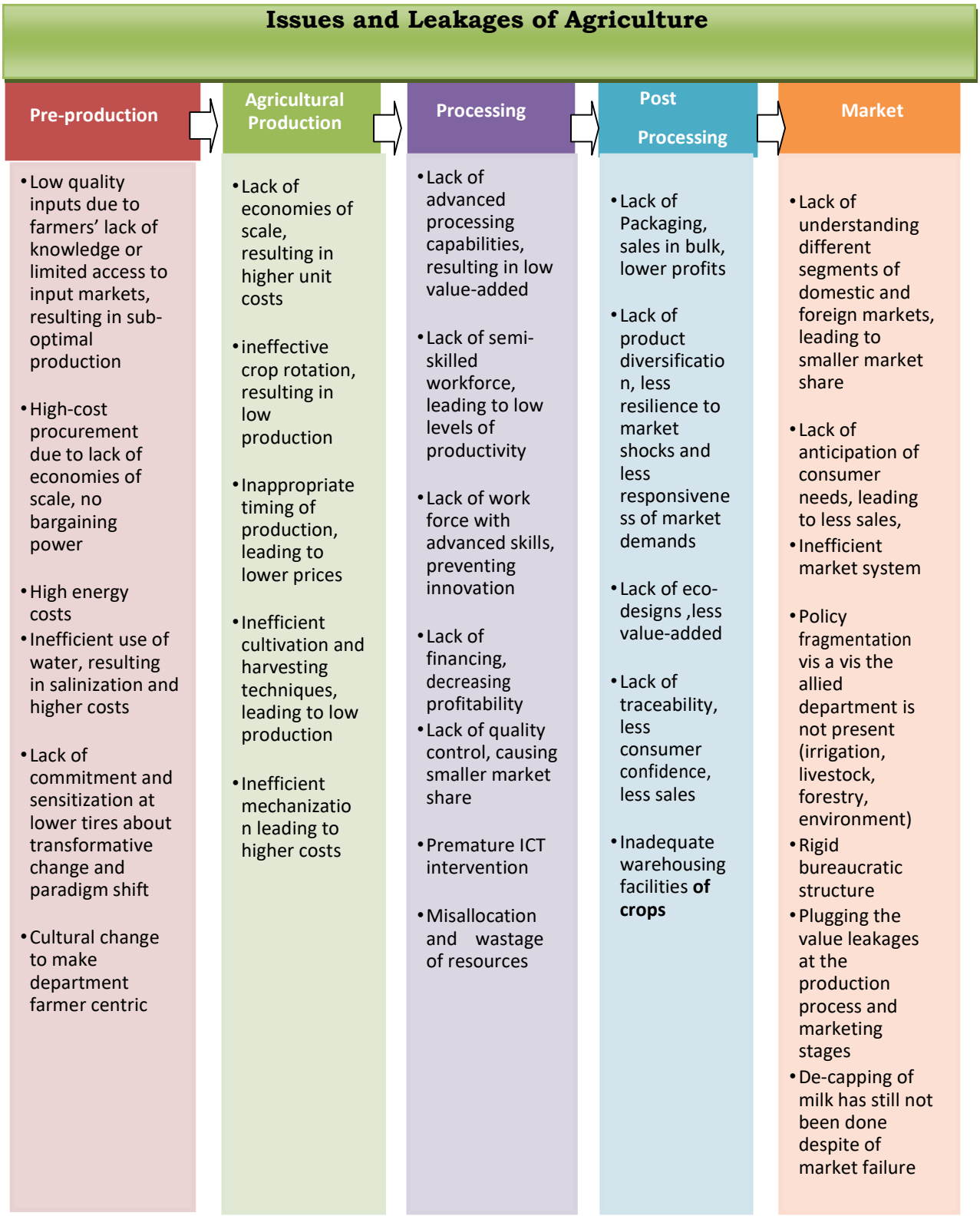
Adopted indigenous technology to reduce Bhatta emissions up to 70% and convert smoke to dust which in turn is raw material for paint manufacturing. Bhatta owners earn up to Rs.2 lakhs from the dust.

GM (Genetically modified) crops are not good for the future generations, also causes cross contamination in adjacent fields which is irreversible. GM crops have been tested and they have not resulted in a reduction in pesticide and fertilizer use.

Issue catalogue

- Lack of interdepartmental coordination
- Water depletion
- Absence of equipped labs
- Lack of inclusion of climate change in program/projects and policymaking
- Capacity building is critical
- Use of GM (Genetically modified) has not resulted in reduction in use of fertilizers and pesticides

FIGURE 36: ISSUE AND LEAKAGES OF AGRICULTURE



WHITE PAPER TO SHOW-CASE AGRICULTURE

BACKGROUND

For the last few decades, the Agriculture Sector has been facing major problems due to high prices of agriculture commodities and climate change. The farmers' cost of production was relatively much higher in the global context. When the agriculture sector ultimately crashed to -5 percent growth in FY 2015-16, the Government of Punjab began taking alarming steps towards agriculture. Consequent immense struggle and efforts were rewarded in the form of a record-breaking increase in growth from negative to 3.5 percent in the agriculture sector and 4.2 percent growth in major crops against the target of 2.5 percent in just one year. During FY 2016-17, 22.2 million tons of wheat was grown, becoming the highest yield in the history of Punjab (and Pakistan) since 1947.

Overall, the staple crops including wheat, sugarcane, rice, cotton and maize account for 25.6 percent of value addition in agriculture and 5.4 percent to GDP. Other crops contribute 11.6 percent value addition to agriculture. Given the diversity of the Agriculture Sector, the aim is to balance staple food crops, higher value horticultural crops, and other commercially beneficial and export-oriented produce. An enterprising farming community, commodity exports through the China Pakistan Economic Corridor (CPEC) and rural transformation through use of Information and Communications Technology (ICT) in farming will help to implement farmer-centric and precision agriculture. The Agriculture Department is determined to cash the benefits of Public Private Partnerships (PPPs) that can be instrumental in helping programs to achieve long-term sustainability and bring a wider range of benefits for the target audience. The vision of the Agriculture Department, Government of the Punjab is then, to transform the agriculture sector into a progressive and modern sector that can not only address food security challenges but also compete in the domestic and international markets through specific goals mainly, enhanced profitability, ICT led farmer-centric service delivery and private sector led growth.

In order to achieve these objectives, the government has introduced numerous institutional and market reforms: the government seeks to make technology and credit more accessible for the larger agricultural populace through its innovative Kissan Package program. Under this program, the Punjab Government executed a comprehensive set of **subsidy packages** for the agriculture sector. A targeted subsidy is being provided directly to farmers on Potash Fertilizer through branchless banking without involving any intermediate channels. The main target towards sustainability now requires ensuring that subsidies are: ***targeted, efficient and effective***. To

strengthen economic conditions of farmers and provide finance to access agricultural input products, Government of the Punjab launched a scheme of interest free loans from various banks and micro financial institutions. Interest-free loans have reached 125,000 farmers out of which 93 percent are new to banking - thus, financial inclusion being yet another great achievement. The regulatory role of the public sector is being strengthened and necessary reforms introduced to ensure effective participation of the private sector in service and input-output delivery systems. This Government vows to promote agriculture sector and aims to achieve 5 percent growth rate in the year 2017-18. Cross-cutting themes across all wings/directorates/research bodies will include advocacy, capacity building, climate change interventions and minimizing gender disparities.

SCOPE OF WORK

The crux of this assignment is to conduct a performance appraisal of the Agriculture sector, particularly the crop sector (including livestock) over the years capturing an in-depth insight on the *Policies; Institutional Strengthening; and the Processes* that were followed. The Paper will assess the outcomes/results from a holistic approach and identify the macroeconomic impact that these policies have been able to achieve. More specifically, the purpose is to project the past 1-1.5 years of work and progress achieved by the Agriculture Department - (critically evaluate what worked, what went wrong/identify areas which require improvement, how the process could have been improved, what additional component could have improved the process?). The **target audience** of the White Paper includes: political and donor platforms with the **main purpose** being to encourage more lucrative investments, which achieve high results ultimately attracting donor investment. All the policies; projections; projections and so on will be assessed through an economic lens, weighing their cost/profitability analysis.

The second aspect of the White Paper will be to highlight pipeline projects and targets that are envisioned for the near future. While reviewing their larger objectives and targets set to be achieved, they need to be critically assessed to check whether their direction is in sync with the larger macro-perspective of the agriculture sector - (are the new projects inclusive? what has been neglected? what recommendations can be derived?). The Agriculture Department has succeeded in bringing investment through flagship projects that tap on need-oriented vision. In this light, the following projects should be included in the key areas of focus when critically assessing the steps forward (are they going in the right direction or not?):

- **World Bank through the project titled, Strengthening Marketing for Agriculture and Rural Transformation (SMART) Program-for-Results (P for R)**.
  (PKR 350 billion (USD 300 million) from the World Bank for a P for R operation, which disburses technical assistance against agreed-upon results indicators verified through a credible verification mechanism focusing on measurable actions, outputs and outcomes through more sustained collaboration over a number of years. Key Result Areas in SMART P for R include: increased productivity of crop and livestock smallholder farmers including women; increased value added private investments in farm and non-farm SMEs; and improved resilience to climate change and natural disasters)
- **Empowerment of Kissan through Financial and Digital Inclusion**
  (Flagship project of Agriculture Department - approved in August 2016 for 5 years by the CM with an allocation of PKR 17 billion for payment of mark-up on PKR 100 billion Interest Free E-Credit to small farmers through smart phones in the annual budget of FY 2016-17)
- **Establishment of Hi-Tech Mechanization Service Centers (HMSCs)**
  (Approved at a total cost of PKR 3830.205 million envisaging establishing 72 Hi-Tech Centers in Punjab with collaboration of private sector)
- **Extension Service 2.O – Farmer Facilitation through Modernized Extension**
  (5-year (2015-20) project worth PKR 4104.739 million will reach out to around 5.2 million farmers equipping them with state-of-the-art support and knowledge and providing them with quality and timely inputs to increase crop productivity, expand area under cultivation and optimize the crop mix to ensure maximum returns to farmers)
- The Agriculture Department has a long history of implementing Water Management activities through partnerships and engagement with international donors. Currently, **Punjab Irrigated Agriculture Productivity Improvement Project (PIPIP)** is under implementation with assistance of USD 380 million from the World Bank.
- It is also hoped that partnership between Pakistan and China on **CPEC** will act as a Game Changer for the economy of Pakistan. The "One Belt-One Road" vision of Chinese leadership fits in well with the overriding objectives of the Punjab Government: enhanced productivity; farmer-centric service delivery; and private-sector led growth.

More specifically, the White Paper must identify which direction agriculture growth has been going in terms of:

- Exports
- Trade deficit (reduced recently due to food export)
- Imports
- Crop productivity
- Inputs
- Different policies generated and implemented
- Also, *shift in* existing policies (right decision, wrong decision, if right but how could it have been better steered?)

Different projects/plans and investments approved (right direction or not?) *and* Moving forward, critically assess the justification behind the difficult policy decisions taken:

- Financial support in the shape of SMART Agriculture
- Water pricing change - towards High Efficiency Irrigation Systems (HIES)
- Ceiling on Milk Prices
- Deregulation of wheat; and sugarcane
- New climate change strategy - to be merged in to the mandate of single-handed focus on water management for next 5 years
- Subsidy regimes to be linked with newly placed ecological zones (cotton, sugarcane)
- Establishment of grain warehouses

METHODOLOGY

1. **Approach**

An inclusive and analytical approach will be followed with a primary focus on major stakeholders perspectives (including those of farmers-small, medium and large, agribusinesses and relevant government and non-government organizations) to reflect upon the performance, achievements and outcomes of the agriculture department alongside its allied and associated projects and interventions. The overall approach to conducting the expected performance appraisal will ensure the following:

- **Relevance:** This part of the evaluation approach addresses whether the interventions, specifically the projects undertaken were relevant to the agenda and annual objectives of the department and also served the intended beneficiaries.

- **Effectiveness:** Are the objectives of the interventions being achieved? How big is the effectiveness of the project compared to the objectives planned?
- **Efficiency:** Are the objectives being achieved economically and cost effectively by the development intervention? How big is the efficiency or utilization ratio of the resources used?
- **Impact:** Does the development intervention contribute to reaching higher level development objectives and/or created a visible transformative impact on the lives and livelihood of the targeted beneficiaries?
- **Sustainability:** Are the positive effects or impacts sustainable? How is the sustainability or permanence of the intervention and its effects to be assessed?

Data gathering will be conducted with the purpose of finding answers to the above mentioned crux of the assignment. There will be a sincere effort to **report true findings and provide honest reviews** on their implications. Maximum stakeholder involvement will ensure that the compilation of the White Paper is an inclusive effort, reflecting the ground realities; and the views of all those directly, but also indirectly involved.

With regards to *the way forward*, the policy review needs to ascertain if and how the farmers will actually reach the ecological zones and whether or not availing subsidies with conditionality's (linking them to the zones) is feasible for them. However, the review primarily needs to adopt a larger-scale assessment / a birds-eye view to connect the dots in terms of overall macroeconomic impact and the required linkages through maximum utilization of inter-department and inter-provincial synergies.

2. Process

The over-arching methodology to conduct the performance appraisal should comprise of the following key tasks, activities and methods:

- *Conceptual Design:* this entails development of a performance appraisal framework to ascertain what tasks, activities and projects undertaken by the department are to be appraised and what dimensions need to be explored.
- *Matching* of the departments objectives, work plans and mandate for the year with the achieved outcomes and impacts at the expiration of the project duration: This entails ensuring if all project documents, deliverables, tasks and activities that were originally part of the terms were actually delivered.

- *Gap Analysis:* The gap analysis exercise identifies the gaps between the departments' mandate and the outcomes achieved especially at the project and unit level within the department.
- *Capacity Constraints and Bottleneck Identification:* enlistment of constraints and bottlenecks that impacted the results achieved.
- Inception Report: outlines the field implementation plan and sampling design for each of the primary data collection methods detailed below.
- Primary data Collection and field visits and decentralized/local level discussions
- Focus Group Discussions and Key Informant Interviews
- Secondary/Literature Review: best practice programs and desk review of available research and data.
- Evaluation Report: consolidation of primary and secondary review into a final evaluation report.

Secondary Research

Literature review: The analysis obtained from the desk review will account for approximately 70 percent of the Paper, given its macro-perspective purpose. This will be a two-way exchange, with the Agriculture Department equally benefitting from the large volumes of research work conducted by the Client in the areas of agriculture, water management and CPEC. Similarly, the Agriculture Department will share all relevant published and unpublished documentation covering past achievements and future forecasting including the Annual Agriculture Performance Report FY 2016-17, Agriculture Growth Strategy Paper, Feasibility Reports on HVA products and processes, etc.

Primary Research

- Raw / unpublished survey data collected by the Agriculture Department (e.g. AMIS): will be shared on request.

- Field work will contain the following 2 components:

1. Key Informant Interviews (KIIs): The structure of the KIIs is proposed as follows:

- 15 to 20 individuals need to be selected for one-to-one interviews
- A detailed probative questionnaire would be designed to extract maximum information from the respondents.
- Generation of recommendations from the participants that helps fulfil the gaps that were left in the implementation.

KIIs at the broader stakeholder level - One-on-one detailed reviews of policies with:

- Key stakeholders directly involved in the policy-making process (*Secretaries, Department Heads, Parliamentarians, donors - concerned with Agriculture, Livestock, Poultry, CPEC, etc.*);
- Regulatory authorities that can explain the policy framing in the light of new Agriculture Laws/Acts and the implications they hold in the near future;
- Stakeholders who can provide critical oversight on the implementation (*academia, activists, industrialists*); and

KIIs at the grass root level:

- Those directly benefiting / affected by the policy actions (*Factory owners, equipment suppliers, vendors/retailers, farmers*) - A few activities will also be designed to probe detailed answers such as placards, showcase of photographs and videos from the project implementation for feedback and examples.

2. Focus Group Discussions (FGDs):

The grass root/micro-perspective field work will reflect approximately 30 percent of the final analysis. This is primarily because the farmers, at this point will not be able to adequately estimate the actual impact of new policies. Nevertheless, the FGDs will be held primarily with farmers in the field to gather knowledge on their access to information on new policy actions; how far they are grasping the new knowledge content; their ability to respond/adapt to the new policy (smartphone mobile apps, availing interest-free loans, cashing vouchers, storing/managing surplus crops, etc); their know-how regarding who to approach in the field/market to avail the new products and also communicate their grievances.

Ayub Agriculture Research Institute/Research Wing can help identify a number of regions/districts where existing work on High Value Added (HVA) agriculture is taking place for productive farmer interviews that will achieve maximum inclusion and authentic data collection. The Pothwar region, which is the center of the CPEC route can be a starting point. Again, not much information can be gathered at this point of time with the small duration of the pipeline projects making it difficult to gage the exact implications and benefits.

The FGDs would be conducted through an innovative scenario-based methodology whereby the participants would be presented a range of scenarios on salient segments of agriculture sector to achieve profitability and competitiveness. Keeping in line the larger objectives of the Paper, the structure of the FGDs is proposed as follows:

- Each FGD will be approximately 90 minutes in length
- No more than 8 to 10 members should be present in each session
- Moderator will be someone who all the participants can trust

Roundtable consultation session:

This can be held on completion of the Inception Report to invite maximum sets of stakeholders (up to 50) on a single platform and give them a chance to make the White Paper's analysis entirely inclusive and promising with a more holistic and macro-perspective. Participation of senior stakeholders would include: Secretaries of Livestock & Agriculture Departments; and Agriculture Commission; Members Planning Commission and Punjab Economic Research Institute (PERI), etc.

TIMELINES:

Approval of /agreement on ToRs	End January, 2018
Review of all secondary documentation	Mid February, 2018
Data collection of impact analysis at the field level in addition to senior stakeholder views	End February, 2018
Inception Report based on preliminary findings	
Feedback session - Roundtable consultation session on draft Paper	Mid March, 2018
Final deliverable: White Paper on Agri Sector - Moving Forward	End March, 2018

BUDGETING:

PKR 2.15 million (inclusive of corporate tax; exclusive of PRA tax).

TABLE 18: PARADOXICAL AGRICULTURE - PQNK MACHINERY

Equipment	No	Est. Price	Est. Cost
Land development			
Bulk Soil Shifter-front closing Scraper	1	500,000	500,000
Laser leveller	1	650,000	650,000
Sub-Soiler	1	80,000	80,000
Chisel Plow	1	80,000	80,000
Ditcher For water courses	1	120,000	120,000
Sub –Total :			**1,430,000**
Seed bed preparation			
Tractor large 85 to 110HP for heavy duty work	1	2,500,000	2,500,000
Tractor small 22 to 50 Hp row crop wheels	2	800,000	1,600,000
Disc harrow	1	100,000	100,000
Bed Shaper	1	100,000	100,000
Sub Total :			**4,300,000**
Crop Production			
Seeder for small seeds	1	260,000	260,000
Seeder for Big seeds –penumatic	1	260,000	260,000
Transplanter - vegetables	1	220,000	220,000
Water bowser to supply water to transplanter	1	350,000	350,000
Weeder/aerater	1	170,000	170,000
No-till potato Planter	1	260,000	260,000
ROLLER Crimper & stubble slicer for No-till	1	160,000	160,000
Sub – total:			**1,680,000**
Irrigation and fertigation			
Fertigation Drums	8	2,000	16,000
Syphon tubes	120	1,500	180,000
Sub –Total:			**196,000**
Harvesting			
Potato digger for bed planted crop	1	260,000	260,000
Sub –Total:			**260,000**
Miscellaneous Implements			
Boom spray 45	1	130,000	130,000
Tractor trailers for supplies –self unloading	2	350,000	700,000
Rotavator reverse Cycle	1	120,000	120,000
Sub Total:			**950,000**
Total			**9,076,000**

Annex. 2

Focus Group Discussions

1. Assistant Directors (Extension) and Agriculture Officers, Chakwal

This FGD took place in the office of the Deputy Director Extension, District Chakwal. Around 10 extension workers and officers from the agriculture department participated in the discussion which was moderated by a staff member from BIPP.

The participants were exposed to a set of structured questions revolving around the challenges they face in administering the extension and research tasks assigned to them by the department, how often they interact with the officials from the secretary's office in Lahore, what changes have they experienced in their routine work and how the department has functioned in the last year or so. The extension workers were also asked if they are satisfied with the overall performance of the department. The following emerged as the key responses:

- The participants expressed general satisfaction with the structural and process changes that the department has made in the last year or so.
- A detailed discussion revolved around the agriculture and growth policies of the department and it was unanimously stated that the policies are developed without involving any input from the districts and hence aren't inclusive and participatory.
- It was also stated by the participants that the policies no matter how inapplicable they are to the local context are ultimately imposed on the districts to implement. The same they believed is the case with the current agriculture policy which might not consider the land and topographic characteristics that are specific to the Barani region.

- The workers not only described the huge ICT-led transformation that had taken place but also gave demonstrations on how the entire inter-connected ICT-based network that connects the famers, extension workers and the department works.
- They also discussed how technology is developing but also prone to errors that interrupt the system. However, it was agreed that if regular streams of investment flow into the smart agriculture project, the technological advancements made under it can be sustained.
- The workers had little knowledge of the projects that are currently being run by the government. The only project that was known to them was the smart agriculture project run by the World Bank and that too because of its tangible interventions.
- The department with support of research institutes like BARI conducts regular capacity building and training workshops which has enabled extension workers to respond to the queries of the farmers.
- The extension workers expressed dismay over the incentive and service structure provided to them. Promotions above Grade-17th expressed was almost impossible which reflects poorly on their motivation and performance.

2. Farmers, Chakwal

The main agenda was to know about the farmer's perspectives and views pertaining to the projects, policies and other interventions of the department.

Following were the key responses by the farmers:

- In the Barani region mostly there are Small Farmer's (2, 3 acres and holding) and government policy only benefits those who have 5 or more than 5acre.
- They also discussed about non-availability of Machineries likes Laser land levelers.
- Farmers were not aware of all projects, only two projects were implemented their PIPIP and Kissan empowerment package.
- Farmers stated that government should construct Small dams

in potohar area, there are some small dams but those dams are not fully utilized due to inadequate development of their area.

- Small storage ponds are also less in number as you know Barani area agriculture in entirely based on rainfall, so to collect rainwater it is essential to have some storage capacity like mini Dams, Water storage ponds, small dams.
- There should be small units for field assistant between every three villages so farmers can contact them easily and get response impulsively.
- Government should revise the Potohar Agriculture policies; because in this region farmers have small and, holding and government only facilitate those who have more than 5acres.
- The farmers were disappointed because of the seeds quality they are getting from the private source and government they mention that government should break the monopoly of big stakeholder in seed industry.

3. Assistant Directors (Extension) and Agriculture Officers, Bhakkar

Around 15-20 participants comprising the deputy director extension, Bhakkar, assistant directors, agriculture officers and field assistants attended the focus group discussion that was targeted towards understanding the

This discussion followed a similar one held in the district of Chakwal. The main purpose in holding one discussion in Chakwal and then one in Bhakkar was clearly to obtain perspectives from the both the Barani (North) and South Punjab but the purpose was also to see how the problems and

The interesting fact that emerged from an hour-long discussion with the extension workers was that in terms of the issues that the farmers report, nothing was noticeably dissimilar to what was reported in Chakwal in fact some of the major concerns that had emerged in

Chakwal were posited to the focus group discussion participants in Bhakkar to cross-validate (as per the hierarchical

validation methodology proposed) to see if those concerns are uniformly present across the province and it tuned out that the some of the problems that the extension workers faced especially in terms of adoption of the smart agriculture tools and in terms of lack of technological advancements and agri-mechanization were uniformly present and consistent across the province.

However, this caveat of similarity between agriculture issues of north and south Punjab holds with the following exceptions:

- The land and topography in South Punjab was different which meant that farmers whose lands were rained were much poorer and therefore the agriculture department had to incentivize them in a way different to the farmers whose lands were fed by a nearby water canal system. That makes the agriculture support, research and extension system in Bhakkar complicated.
- The land holdings are much smaller than the rest of Punjab which impacts yields, productivity and farmer incomes.
- Administrative issues have also compromised the impact the agriculture subsidies could have created in terms of providing financial relief to the farmers.

4. Farmers, Bhakkar

The main agenda was to know about the farmer's perspectives and views pertaining to the projects, policies and other interventions of the department.

Following were the key responses of the farmers:

- Government should set a limit on very crop and facilitate farmers with the raw material and should balance demand and supply of cop.
- Pricing issue, farmers stated that they are not getting the price as per their hard work they are coercion to sell their crops to "Arrtee"
- Farmers stated that the main issue we are facing is water shortage.
- The farmers were disappointed because of these seeds quality they are getting from the private source and government they mention that government should break the monopoly of big

stakeholder in seed industry.

- The loan/ financial aid process under the Kissan Package is very slow and time taking and farmer cannot afford that.
- Farmer stated that the PIPIP sharing percentage 60 40, 40% share of farmers should be lower by20%.
- Mechanization service centers are not there and farmer by their own support they are managing to bring machines from the landlords on high rent per hour.

Annex. 3

The staged approach and four pronged interventions, as described above, are integral to establishing economic sub-zones and cluster to full fruition. These sub-zones/clusters should be modeled around the specific crops, already identified in the preceding, which over the years have registered increase in yield and production and seem to have sustained the natural comparative advantage. Accordingly, the following small economic sub-zones and clusters (up to 30 acres) may be established to stimulate the economies of the selected districts. Initially, economy of scales may impede the development of commodity clusters and specific agro-industry type, but with right kind of incentivized policy and institutional framework and advisory and support services, these will mature into self-sustaining functional zones complementary to the CPEC major zones and hubs.

<table>
<tr><td colspan="2">Chakwal Sub-Economic Zone and Cluster
Area: 30 Acres</td></tr>
<tr><td>Type of Industry
Agro Processing Industry
- Wheat threshing, Flour Mills
- Rapeseeds, Vegetables Packaging

Clustering of producers processors, traders and support services for training and marketing</td><td>Software: Agri-business policy with specific incentives, SME policy, feasibility and investment studies
Orgware: Functional and efficient SMEDA advisory services, access to financial services and credit, extension services with focus on farmers' training for wheat and vegetables cultivation
Technoware: Efficient crop management practices improved input technology for wheat,

IPM, ICT for MIIS
Industrial zone: Bhalwal Industrial Estate, Pind Dadan Khan Special Economic Zone</td></tr>
<tr><td colspan="2">Connectivity M2 (Balkassar exit)</td></tr>
</table>

Attock Sub-Economic Zone and Cluster **Area: 30 Acres**	
Type of Industry Agro Processing Industry - Wheat threshing, Jowar threshing -Flour Mills Clustering of producers processors, traders and support services for training and marketing	**Software:** Agri-business policy with specific incentives, SME policy, feasibility and investment studies **Orgware:** Functional and efficient SMEDA advisory services, access to financial services and credit, extension services with focus on farmers' training for wheat and vegetables cultivation **Technoware:** Efficient crop management practices improved input technology for wheat, IPM, ICT for MIIS **Industrial zone**: Industrial zone: Rawalpindi Industrial Estate
Connectivity National Highway N-51	

Mianwali Sub-Economic Zone and Cluster **Area: 25 Acres**	
Type of Industry Agro Processing Industry - Wheat threshing, Flour Mills - Rapeseeds, Vegetables Packaging Clustering of producers processors, traders and support services for training and marketing	**Software:** Agri-business policy with specific incentives, SME policy, feasibility and investment studies **Orgware:** Functional and efficient SMEDA advisory services, access to financial services and credit, extension services with focus on farmers' training for wheat and vegetables cultivation **Technoware:** Efficient crop management practices improved input technology for wheat, IPM, ICT for MIIS **Industrial zone:** Bhalwal Industrial Estate
Connectivity M2 (Salem exit)	

Bhakkar Sub-Economic Zone and Cluster **Area: 25 Acres**	
Type of Industry Agro Processing Industry - - Bajra - Kharif fodder threshing Clustering of producers processors, traders and support services for training and marketing	**Software:** Agri-business policy with specific incentives, SME policy, feasibility and investment studies **Orgware:** Functional and efficient SMEDA advisory services, access to financial services and credit, extension services with focus on farmers' training for wheat and vegetables cultivation **Technoware:** Efficient crop management practices improved input technology for wheat, IPM, ICT for MIIS **Industrial zone**: Jhang Industrial Estate
Connectivity M2 (Balkassar exit)	

Muzaffargarh Sub-Economic Zone and Cluster **Area: 20 Acres**	
Type of Industry Agro Processing Industry - Jowar threshing -Moong threshing and processing Clustering of producers processors, traders and support services for training and marketing	**Software:** Agri-business policy with specific incentives, SME policy, feasibility and investment studies **Orgware:** Functional and efficient SMEDA advisory services, access to financial services and credit, extension services with focus on farmers' training for wheat and vegetables cultivation **Technoware:** Efficient crop management practices improved input technology for wheat, IPM, ICT for MIIS **Industrial zone:** Multan Industrial Estate
Connectivity M-4 and National Highway N-70	

Layyah Sub-Economic Zone and Cluster **Area: 20 Acres**	
Type of Industry Agro Processing Industry - Rice threshing, processing and packaging -Sesame processing Clustering of producers processors, traders and support services for training and marketing	**Software:** Agri-business policy with specific incentives, SME policy, feasibility and investment studies **Orgware:** Functional and efficient SMEDA advisory services, access to financial services and credit, extension services with focus on farmers' training for wheat and vegetables cultivation **Technoware:** Efficient crop management practices improved input technology for wheat, IPM, ICT for MIIS **Industrial zone:** Multan Industrial Estate, Dera Ghazi Khan Industrial Estate.
Connectivity M-2 and M-3	

Rajanpur Sub-Economic Zone and Cluster **Area: 25 Acres**	
Type of Industry Agro Processing Industry -Moong threshing and processing-Sesame processing - Rapeseeds, Onions, Vegetables Packaging Clustering of producers processors, traders and support services for training and marketing	**Software:** Agri-business policy with specific incentives, SME policy, feasibility and investment **Orgware: Orgware:** Functional and efficient SMEDA advisory services, access to financial services and credit, extension services with focus on farmers' training for wheat and vegetables cultivation Hardware and Infrastructure: Model wheat farm, training facility, market connectivity **Technoware:** Efficient crop management practices improved input technology for IPM, ICT for MIIS **Industrial zone:** Industrial zone: Rahim Yar Khan Industrial Estate
Connectivity: National Highway N-5	