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2 Executive summary

2.1 Background and Project Objectives

The project originated in response to a request to ACIAR from the Pakistan Agricultural Coalition (PAC) with Pakistan government support. The project objectives were to: (a) investigate existing marketing systems, identify sources of inefficiency and weaknesses, and (b) design and disseminate concrete, practical policy reform recommendations for improving market efficiency, farm incomes, consumer welfare and gender equity.

2.2 Main research findings

From the start of the research process, the team engaged closely and worked interactively with policy makers, senior government officials and industry stakeholders to understand in depth the existing system, problems, and constraints on policy makers. We adopted a 'mixed methods' approach, combining quantitative and qualitative methods of data collection and analysis, and produced a comprehensive body of analytical research on (a) marketing systems and channels from farm gate to final markets, and (b) market performance, and prospects (including export prospects to China following CPEC).

2.2.1 Market demand for all three crops we studied - mango, tomato, and chilli – is expected to increase over time. In the case of tomatoes, the current and medium term goal is to meet domestic demand as Pakistan is forced to rely on imports to maintain a socially acceptable consumer price. Mango and chilli also have good export potential.

2.2.2 But to meet market needs, it is necessary to shift from the current 'low quality-high-cost' equilibrium, reduce wastage, improve storage and processing. Exporting also requires higher quality, credible certification, and better marketing. *The central policy challenge is to provide the conditions for integrating rural producers into modern value chains, while ensuring that vulnerable small farmers will share the benefits from industry modernization.*

2.2.3 The current marketing system is inefficient. It needs comprehensive reforms involving a combination of legislative/regulatory changes **and** complementary institutional reforms and supportive policies.

The central bottleneck to value chain modernization that can be addressed by policy reforms is the concentration of market power in the hands of licensed Commission Agents (Arhtis). While they provide a range of essential marketing services, their control of market access allows them to exercise market power and hinder entry of new firms.

2.2.4 Our main policy recommendation is: *Implement legislative reforms to remove barriers to entry of new firms and weaken the monopoly power of Arhtis so that new dynamic firms can enter horticultural industries, modernize them through technological and institutional innovations, and integrate small producers into modern value chains.*

2.2.5 These legislative reforms must be followed by government policies, investments and initiatives, including establishing appropriate private-public partnerships, to complement the legislative reforms to assist and foster improved production, distribution and marketing, including exports.

2.3 Achievements and Impact

In line with the above research findings, the project team formulated, refined and disseminated a set of concrete, practical, realistic proposals for market reforms and interventions, that recognised the financial, administrative, political, and socio-cultural constraints facing Pakistan's policy makers.

Our findings and proposals were disseminated through draft reports and papers, and many formal, and even more informal, presentations, meetings and discussions, building on the strong relationships of trust and policy credibility established with key stakeholders in industry and government (at both province and national level). As a result, even before

the formal end of the project, the project achieved major policy impacts, with promise of much more:

1. **Our main recommendation was *accepted and implemented through major legislative changes in Punjab, and incorporated into the national export development strategy***.
2. The recognition of the value of ACIAR policy research at the highest level of government generated requests and created opportunities for ongoing policy contributions, enhancing prospects for greater impact from future policy projects.
3. Lessons drawn from the Chinese experiences were incorporated into the rural transformation strategy in Pakistan's 12th Five Year Plan (1918-2023).
4. Project recommendations have started to influence new government initiatives, such as the Punjab government's 'Model Farm Project" led by Kashif Jamshed, a member of the project Advisory Committee, and private sector initiatives such as those undertaken by PAC and PMEX.

2.4 What needs to be done

2.4.1 Revision, refinement, and editing of the project outputs (at present mostly in draft form) into (a) research papers, reports and briefs that are publishable or otherwise ready for public circulation and, (b) preparation of a monograph based on the research findings

2.4.2 Continuation for another 18 months to two years of dissemination and advocacy roles, building on links and relationships built up with key stakeholders with more policy briefs, presentations, and meetings to achieve full potential for policy impact

3 Background

This project was developed following a request from Pakistan Agricultural Coalition (PAC) – a non-profit organization established by 20 of Pakistan's leading business groups - led by Mr Arif Nadeem, former Secretary of Agriculture in the Punjab Province of Pakistan, and supported by the Pakistan government.

3.1 Rationale for the project

Pakistan's horticulture industry, one of the largest in the world, has huge growth potential in domestic markets, where population and income growth provide the basis for large increases in demand, and in export markets, where it has only a tiny market share. The situation with exports at the time of project formulation was summarized as follows:

Pakistan's horticulture sector suffers both from low farm productivity and from high wastage and post-harvest losses that constrain profitability. Inefficient marketing channels with up to six or seven middlemen between producers and end-users, low investment in modern processing and storage facilities and infrastructure, and poor integration with modern value chains result in 30 to 40% of perishable product spoiling before reaching consumers.

Currently, almost all of Pakistan's horticultural output is consumed domestically. Exports are a tiny fraction of production and have been quite stagnant. Poor quality and inability to meet export market standards constrain market access (e.g. chilli exports from Pakistan are banned by the European Union (EU) due to unacceptable levels of aflatoxin) and, even when exported, they fetch much lower prices compared with exports from competitor countries - often Pakistani products fetch prices 50% or more below competitor country produce. Exports represent only 4% of production, around one per cent of Pakistan's total exports, and 0.3% of global horticultural exports (Khalid, 2015; World Bank, 2015).

China-Pakistan Economic Corridor (CPEC) was expected to strengthen this export market potential by providing preferential access to the world's fastest growing horticulture market. Horticulture provides employment and incomes to a large number of small farmers and agricultural workers, including women, and is critically important in the diet and nutrition of the population. Hence it features prominently in the government's development strategy.

Policy makers and stakeholders have long recognized that a number of factors, such as inadequate credit and input markets serving farmers, poor infrastructure (storage and processing facilities, roads and transport systems), and low levels of education, impede the performance of not only the horticulture sector but also the wider agricultural and livestock sectors.

There was a general consensus among industry and government analysts that weak and poorly functioning marketing systems were also a major factor hindering modernisation and development of the industries. But no in-depth studies were available that probed the structure of the markets and marketing chains to identify specific reform options to improve their functioning.

This motivated the request for a policy project to investigate sources of market system weaknesses, and policy and institutional reforms to remedy the socioeconomic situation.

These considerations called for a research project to:

(a) Explore the existing marketing systems, identify sources of inefficiency and weaknesses, and
(b) Design and disseminate a set of concrete, practical and evidence-based recommendations for marketing policy reforms to facilitate better functioning horticultural markets and improve producers' and consumers' welfare.

The expectation on the part of the Pakistani stakeholders who requested the project was that the researchers would produce policy reform proposals that would be evidence based and practical, and draw on Australian and global experiences, with attention to the important social objectives of alleviating poverty and improving the position of females in Pakistan.

3.2 Preparation of the project and establishing the research team

Dr Ejaz Qureshi, ACIAR Program Manager at the time, brought together a group of researchers from Australia, Pakistan and China to develop a project proposal. The proposal was born out of two independent concept notes from Scott Davenport and Thilak Mallawaarachchi (University of Queensland).

In developing this proposal, Ejaz Qureshi and Scott Davenport travelled to Pakistan and, with on-ground assistance from ACIAR Country Manager for Pakistan, Dr Munawar Kazmi, met with government, academics and industry stakeholders to refine project objectives and identify key research questions. The Phase I proposal was then submitted with Davenport as Project Leader and NSW trade and Investment as the Commissioned Organisation. Following the Phase 1 assessment, a project development workshop was held in Islamabad on 12-13 March 2015, attended by proposed collaborators in Pakistan and China to consider the project in detail and identify priorities, project teams and responsibilities.

Davenport, who had by then joined Monash University from NSW Government, developed the final proposal in July 2015 with Sisira Jayasuriya and Thilak Mallawaarachchi, drawing on their previous experiences in agricultural market reforms, including previous projects on Indian agricultural markets. This set down the basic analytical approach based on competition policy principles that had been effectively applied in NSW and elsewhere in Australia.

Following Davenport's departure from the team before the final proposal was submitted, Sisira Jayasuriya was chosen as Project Leader. A revised proposal, drafted by Sisira Jayasuriya, Thilak Mallawaarachchi and Hayat Khan in collaboration with Pakistani partners led by Dr Azeem Khan (National Agriculture Research Centre/Pakistan Agricultural Research Council)) and Chinese partners led by Prof Jikun Huang (Chinese Centre for Agriculture Policy), was formally approved by ACIAR for start on February 2016. But field research activities were not initiated until well into the middle of 2017 because agreement with with the Pakistan government agencies and arrangements for disbursement of funds to the lead Pakistani collaborating agency, PARC, could be finalized only in April 2017, close to the main harvesting period and the fasting season.

The project team comprised:

(a) Australian researchers with extensive experience in policy research, developing countries' agricultural issues and market studies, econometric commodity modelling, survey design and analysis, and Islamic credit;

(b) Pakistani partners, drawn from industry, government and academia with strong links to government and industry; and

(c) Chinese team from the Chinese Centre for Agriculture Policy - the leading agricultural policy research group in China.

The project faced several challenges during the course of project implementation. Research activities and time lines were affected by the departure at various points of key personnel such as, Imran Ali (Karachi School of Business and Leadership, who retired mid-way through from his institution and failed to meet deliver agreed on research output) and David Adelman (UQ) (who also left without making a contribution and was replaced by Shabbir Ahmed from 1 January 2017). On the other hand, the addition of Nauman Ejaz, Tariq Ali, Zarmeen Hassan, Shabbir Ahmed, and Waqas Farooq, much strengthened the team, and Jeffrey Lafrance, who had planned to contribute econometric advice, also agreed to took over as Project Leader in late 2018 when Sisira Jayasuriya decided to step down as PL.
.
Several project activities, particularly workshops with planned visits by foreign partners to Pakistan, were interrupted several times by security related issues. Security issues also limited and hindered field visits by foreign team members.

However, the project coped with these challenges successfully, and delivered on its main objectives, achieving significant policy impacts even before the formal end of the research project. ACIAR’s willingness to extend the formal dates of completion helped in this process.

4 Objectives

The project planned to address the following key questions in its research:

- What are the existing agricultural marketing arrangements and regulations that contribute to prevailing marketing chain inefficiencies and hinder investment and upgrading of production, processing and marketing technologies?
- What are the medium-term domestic and global market opportunities, with particular attention to the opportunities in the Chinese market?
- What feasible marketing reforms and complementary policies would enhance marketing performance?
- What will be the impact on various groups such as producers, consumers, women and the poor, and what measures can ensure that reforms enhance the welfare of affected groups, particularly women and the poor?

To address the above key questions, the project formulated the following four research objectives:

1) Investigate main features of existing marketing systems including role of policy, regulatory and institutional factors.
2) Assess domestic and global (including China) market potential.
3) Identify and assess extent of, and main factors contributing to, market inefficiency and low exports, and evaluate costs of inefficiency.
4) Identify reform options, analyse their efficiency and distributional impacts, and formulate and disseminate a set of concrete, practical recommendations for policy action.

The project selected three major horticultural crops, Mango (a crop that had been the subject of a significant body of previous ACIAR sponsored scientific and technical research), Tomato and Chilli, for study. The crop selection was based primarily on prioritization by the PARC, the lead collaborator in Pakistan; choice of Chilli was strongly influenced by the work being undertaken by the Pakistan Agricultural Coalition, which had initiated pilot schemes to test new trading systems.

The scope of the project was defined as a *policy project* addressing issues related to the *marketing system*. As stated in the project proposal, the *"primary focus of the study is on the marketing system, not all aspects of the horticulture industry. However, other aspects will be considered to the extent they are directly relevant to the study of the issues of the marketing system*'.

5 Methodology

5.1 How was the work done?

This was funded by ACIAR as an agricultural development policy project with the ultimate aim of generating policy recommendations that will improve horticultural markets in Pakistan, and hopefully, also have wider relevance for agricultural marketing reforms in other developing countries.

Therefore, we recognised from the outset that, to maximise the probability of adoption of recommendations by government and industry, they must not only be evidence based and derived through rigorous analysis, but must also be realistic, responsive to market realities and opportunities, politically and socio-culturally acceptable, and administratively feasible.

The research process was designed from the outset to be participatory, and conducted in close collaboration and interaction with the key stakeholders to ensure that the research was rooted in the ground realities, and the results, findings and policy recommendations would be practical, concrete and co-owned by the stakeholders and policy makers.

The setting up of a high level Project Advisory Committee to guide the research process was an important initiative to achieve the above objectives. The Advisory Committee included senior government officials and researchers at both national and provincial level (agriculture being a state responsibility under the Pakistan constitution) and industry representatives).

In addition, despite restrictions on mobility within the country due to security issues, the project team reached out and developed close contacts with a range of important and influential personnel in research, industry and government during the period of the project.

5.1.1 Scheduling of activities

The chronological order of planned activities and dates for delivery of outputs presented in the project proposal prioritised the focus on formulating and disseminating concrete policy recommendations among key stakeholders in Pakistan. It also placed major emphasis on developing a rich understanding of the regulatory frameworks, enforcement mechanisms, institutions, and the complexities and ground realities of the marketing systems, arrangements, networks and relationships that formed the living markets.

This meant that we planned to, and spent, a significant amount of time in the initial phase of research in conducting a detailed critical review of the literature including articles in local journals, unpublished theses, and various reports by agencies such as IFPRI, FAO, World Bank, and USAID that had been involved in agricultural development and policy. While variable in quality, and often technically and analytically weak, these articles and reports did contain much valuable information that helped us refine our investigations of the market structures, and in designing and implementing additional focused studies, often through key informant surveys, before coming out with reports and papers.

Our primary emphasis in the project was on formulating and disseminating policy recommendations that would achieve impact during the project implementation phase. Generating academic publications was an important goal, particularly for the academic members of the team, and it was understood and recognised by the team that research reports and analyses must be exposed to peer scrutiny and critical comments to ensure quality standards and analytical rigor. We planned to achieve that through presentations in seminars and conferences and circulation of draft reports among peers during the research process, leaving the preparation of academic publications and an academic monograph as the final outputs of the project. (See Project Proposal, the *last activity* in the set of *Activities and Outputs/Milestones*).

This approach, though explicitly presented in the project proposal in the order and timing of activities and outputs, presented problems and difficulties during the research review process – particularly during the MTR - because, as planned, there were not many 'tangible' research outputs or striking findings that could be highlighted and profiled scheduled for until the second half of the project. If the standard metric used by academic reviewers to assess research outputs and impact is applied in a mechanical way to assess if a project is proceeding well, then the appearance was that the project was not proceeding well at all: no 'journal publications' as evidence of successful research.

Though the approved project proposal had explicitly signalled how we expected to proceed, and though timelines on delivery of major outputs were met (despite delays and interruptions beyond the control of the research team), the team had to cope with criticisms that the project outputs were too little (see attached MTR review report and our response: *Attachment No* 1 (a) and 1 (b)). This pressure to provide quick results and journal style research papers was stressful.

But the project leaders maintained the strategy that had been agreed on at the outset, and did not give in to the pressure to produce quick results. We were confident that our strategy would generate important, policy relevant research in the end, and thereby achieve real policy impact rather than produce a set of long and sweeping recommendations with no chance of adoption and impact. We remained focused on our research programme to deliver on the central goal of policy reform recommendations.

Based on our own past experience, and drawing on the literature on guides to best practice for policy research, both Pakistani researchers and foreign partners invested significant time and effort to build up contacts and relationships with senior officials, influential stakeholders, and where possible, policy makers. We communicated and interacted through both formal and informal channels, and in offices and outside. This helped to build trust and confidence, and proved invaluable when the opportunities came for communicating policy messages. This, too, was time intensive, but it was time well spent.

The end result, we believe, has vindicated our phasing of activities and the strategic approach.

5.1.2 Methodological and analytical approaches

The research approach and methodology combined both qualitative and quantitative market research methods. We adopted a cross-disciplinary perspective, involving methods and techniques from economics, advanced econometric analysis where essential and appropriate, insights and feedback from business and private sector actors, and drew on sociology, gender studies, and other social sciences.

We integrated material and data drawn from a wide variety of sources: literature reviews, structured surveys, and key informant surveys and interviews of producers, traders, processors and exporters, market structure case studies, qualitative and conceptual models, and econometric modelling and analysis, and impact evaluations.

The research program in Pakistan was implemented in three overlapping stages, with feedback loops.

Well grounded policy analysis and choice of analytical models can be conducted only on the basis of an indepth understanding of the institutional, social and regulatory contexts, the main structural features of the markets, and the nature and quality of available data, including their statistical properties reflecting the underlying data generating processes.

a. The first set of research activities - at the very beginning of the project – involved implementing ***qualitative studies of the markets*** to provide the essential pre-requisite knowledge and data for subsequent modeling and analysis, drawing on

literature surveys, key informant interviews of market players, and an intensive search of data sources and a stock take of available data.

This provided us with a good picture of the marketing regulatory systems and constraints on farmers and small traders at the top of the marketing chain. It also shed light on possible reasons for the presence of localized market power that could hinder competitive forces in local markets.

Ahsan Rana's initial review of literature and analytical study on market structures and regulatory systems pointed to regulatory barriers that constrained new players from entering legally sanctioned agricultural produce markets where farm produce is bought and sold. That pointed to the need to follow up with studies to gain more understanding of specific marketing channels.

b. Concurrently with this, we initiated the planning of intensive and focused data collection and structured sample surveys of producers/farmers and the marketing of produce at the farm gate level. These surveys were undertaken during the main crop season in 2017, but some studies were also conducted the following year to address weaknesses and deficiencies in the first set of surveys.

c. It became clear as research progressed and survey results were analysed, that the differences in marketing systems for the three crops were very substantial, and the priority marketing policy issues were different.

Using available research and studies, including a very large number of studies that were technically and analytically weak but quite rich in useful information, we concluded early on that while mangoes and chilli had substantial export potential (though actual exports were small), if some quality and processing issues could be addressed. This was not the case with tomatoes, where Pakistan is a net importer – at least in the near to medium term.

Pakistani *mangoes* have been recognized as of high quality, with potential appeal to a large foreign market as demonstrated by several previous studies. The market for mangoes, a sub-market of the global market for tropical fruits, is differentiated by country of origin, and the negative premium for Pakistani mangoes in global markets required investigation because its intrinsic quality would suggest, if not a positive premium, at least no price discount. There is also very little processing (other than preparation of some mango chutney) in Pakistan; this contrasts with neighboring India that exports large volumes of processed mango pulp.

The global market for *chilli* is also large but differentiated by variety, rather than country of origin, and the low levels of Pakistan exports were well known and recognized to be related to poor handling and quality assurance.

Initial plans to undertake econometric studies of market potential in export markets were dropped because export volumes were tiny, the products were differentiated by several attributes, reliable time series price data were unavailable, and above all, it was clear that the fundamental constraints to exports were related to failure to meet quality and Sanitary and Phytosanitary (SPS) standards. In other words, exports were not constrained by lack of demand in global markets.

In the case of *tomatoes*, a politically sensitive food crop, in which *Pakistan is a net importer*, domestic demand has been increasing substantially, while domestic prices have been quite volatile. From our review of the literature, our discussions with industry and government agricultural trade policy officials, and analysis of the international trading data it was clear that the urgent and pressing challenge for Pakistan – both immediately and in the foreseeable future – is how to meet rapidly rising domestic demand. The inability to meet domestic demand, despite significant supply increases, has resulted in persistent pressures to import. According to the most recent Global Tomato Industry Report 2020, "…*Pakistan emerged as the fastest growing importer in the world, with a CAGR of +27.5% from 2007-2018",* despite the fact that Pakistan has stringent import controls, and has tried to reduce imports by

banning imports from India in recent years. But it has been forced to switch to imports from other countries, such as Iran, to bring down domestic prices and placate consumers.

The policy issue of relevance and interest in the Pakistan tomato industry is how to enhance domestic supplies and, to the extent possible, efficiently store produce in the peak season to meet low season demand. Marketing reforms that can facilitate entry of modern supply chains and investments in storage and processing can contribute to meeting this real policy challenge. High domestic prices of tomatoes are a trigger for consumer protests (Pakistani news media has reports on protests about 'skyrocketing' tomato prices even in 2019 and in 2020). Meeting domestic market demand is, and will remain, the major challenge, at least in the medium term. Therefore we decided not to devote time and efforts to analyzing export market potential – an issue of no immediate policy relevance - and to focus instead on domestic marketing issues.

These factors motivated the design and implementation of follow up studies, including key informant surveys of markets at the consumer end of the marketing chain. In the case of mangoes and chilli, understanding the links between the marketing system and low quality was important not only for reducing wastage and quality deterioration in domestic markets, but also for exploiting the potential for exports. In the case of tomatoes, we focused on understanding how the incentive structures generated by the marketing system may be hindering necessary investments in quality preservation and reduced wastage.

Budget and, particularly, time constraints precluded large scale follow up studies with statistically valid sampling sizes and procedures. But team members gained important insights into the marketing systems, including the many personal relationships and the complex web of networks that underpin the functioning of markets at each node as they gained more experience with the conduct of key informant interviews. Information gathered from those interviews, combined with information from other sources, enabled us to conduct valuable studies of urban markets, and to study constraints to expanding exports of chilli and mango.

Team members realized that respondents – particularly key market intermediaries – were unwilling to provide reliable and accurate price and cost information they considered confidential, and sometimes may even give misleading information. In studies where we seek to obtain good data on marketing margins and trading strategies, key informant surveys were far more likely to provide more reliable information, though such data do not lend themselves to standard statistical/econometric analyses and quantification of welfare impacts of existing market distortions.

This taught important lessons for many of us. As economists trained to routinely use statistically valid sample sizes and sample selection procedures, it was a learning experience that information from well-planned and thought-out key informant surveys may be superior in some circumstances. As traders were reluctant to divulge sensitive market-related information it was important to gain their trust and confidence before interviews. Team members contacted them through people they trusted and got the right 'introductions', before interviews. The interviews were naturally time intensive.

These key informant interview-based studies, some of them still ongoing despite the end of formal project activities, helped us to build up a rich picture of the way that horticultural markets in Pakistan work in practice, and also giving us a better understanding of the factors that make them resistant to changes and reforms. This enabled us to avoid simplistic assumptions about market structures in our analyses, and formulate policy recommendations that were realistic, relevant and concrete.

d. We formulated conceptual models and undertook econometric modeling of some aspects of market performance drawing on results and insights from the survey based information.

As our fundamental motivation and focus of this research project was on the efficiency of the marketing system, we could not (and did not) make the conventional, but quite unrealistic, assumption that the marketing system is a well-functioning, perfectly competitive system. Making that assumption would have been tantamount to assuming away the central problem of market inefficiency, the focus of our research (see Sexton, 2013, for a general review). The methodological approach and models followed the modern approach to analysis of food supply/value chains in treating the system not as a simple single stage production-distribution system but as a multi-stage system with one or more intermediary stages between producers and consumers. This general approach drew in particular on the methodological and analytical literature on competition policy, including the comprehensive OECD report (2014) on *Competition Issues in the Food Chain Industry*, and also on the broad conceptualisation of issues as set out in the seminal Australian report, The *National Competition Policy: Report by the Independent Committee of Inquiry* ('Hilmer Report').

We conceptualized the marketing system, in its simplest form, as being formed of, at least, three stages: the farm-level production, the marketing intermediaries, and the retailing stage. The value added produced by the marketing chain is distributed among all the players in the marketing chain. In the presence of market power at any stage of the chain, some agents might extract monopoly or monopsonistic rents at the expense of producers or consumers. In other words, marketing margins charged by the intermediaries would be higher than warranted by economic costs of the services provided. This has important implications not only for price transmission through the marketing system, but also for conventional economic welfare analysis, including analysis of the impact of tariff and other 'border price' changes.

We recognised that *the standard approach to quantifying welfare gains for consumers and producers breaks down in the presence of market intermediaries with market power*. *It is theoretically invalid and empirically misleading in the context of agricultural markets that have market intermediaries and are not perfectly competitive, as in Pakistan (and indeed in most countries).* Typically, when market intermediaries are able to exercise market power, price transmission is inefficient. changes in tariffs or other exogenous impulses are not fully passed through and changes in consumer surplus will be lower than that measured by conventional analysis.

Economic theory clearly and unambiguously shows that, unless there is very detailed information on the extent and nature of intermediate market structure and the market power of traders, it is not possible to model and quantify the extent of price transmission, and hence of changes in welfare, associated with any exogenous impulses or policy changes (see, for example, Bettendorf and Verboven, 2000; McCorriston, 2002; McCorriston, and Sheldon, 1996; Nakamura and Zerom, 2010; Nevo, 2001; OECD, 2014; Sexton, 2013; Sheldon and Sperling, 2003). As the required information was impossible to obtain at the level of detail and reliability required, we did not attempt to provide accurate quantitative estimates of welfare changes associated with policy changes. Instead, we focused on understanding analytically and demonstrating the nature and extent of market power exercised by market intermediaries, and making the case for significant efficiency improvements from policy reforms.

We undertook two econometric modeling exercises and analyses, using secondary sources of information, particularly market prices to investigate (1) spatial market integration to assess the extent to which internal trading links move goods across markets in different locations in response to arbitrage opportunities arising from supply or demand shocks, and (2) responsiveness of household consumer demand for selected horticultural commodities to income and price changes, also using large scale surveys of household expenditure patterns, to assess future demand trajectories.

In the market integration analysis, we developed and used a novel approach to analyse spatial market integration (drawing on the literature on analysis of financial

market contagion as an alternative to the standard time-series analysis requiring long time series data) that also permits assessment of market-specific differences in price response to shocks. This was important because key informant interviews had suggested that market structures in different locations may differ in substantive ways. This methodological innovation not only helped us in our analysis in this project, but, hopefully, will contribute to market integration studies more generally.

e. When planning the project, we expected that the design and formulation of specific policy recommendations for market reforms would take place towards the end of the project. But mid-way through the project, in 2018, the opportunity arose to contribute to agricultural market reforms in Punjab, and then we also got an unexpected opportunity in 2019 to also contribute to the development of the national export development strategy.

f. The Australian project team leaders visited Pakistan three times after the midterm review in September 2018 to interact with key stakeholders. They undertook field visits and interacted with the market players at different nodes of the market, which was very helpful in terms of understanding the problems in their concreteness and specificity and design practical policy recommendations. This also gave us the opportunity to share our insights and proposals with key stakeholders who are leading change in the country.

g. These visits and interactions were part of a wider process of interaction from the very beginning of the project. We grasped every opportunity to engage with policy makers, and present and discuss ideas, preliminary findings and, as research proceeded, evidence-based policy recommendations. This process of engagement with policy makers and senior officials and stakeholders helped us to gain a keener and deeper understanding not only of the particular markets, and the real-world constraints that must be taken into consideration in policy formulation, but also the shifting priorities of policy makers and windows that open from time to time for putting forward targeted and tailored recommendations as appropriate. In our recent visit to Pakistan, for example, we met key stakeholders and officials leading change in the country in Islamabad, Lahore and Karachi to share and discuss key recommendations from the project. We emphasized the need for modern markets and a mechanism to develop credible brands. This was a useful visit as we were informed about the government plan to move in that direction with some initial ground work. We shared our insights from the projects with key stakeholders and contributed to the proposed structure of new wholesale markets and how PMX's (Pakistan's Mercantile Exchange) online platform could be potentially be used to link the wholesale markets with premium buyers in the domestic market and export market as an alternative to creating international brands in the short to medium term. We also got a chance to sahre our insights with the Prime Minister's export development initiative.

5.2 Where was the work done?

The detailed fieldwork at the farm level and on horticultural markets (including urban wholesale and retail markets) was done in Punjab and Sindh, the two most populous provinces, and major production centers of mango, chilli and tomato. But some of the tomato studies were also conducted in other important production provinces of the Baluchistan and Khyber Pakhtunkhwa (KP). The study on guava, that was recently finalized, was conducted in Punjab[1].

The scope of studies in Baluchistan and KP were limited by the logistical problems of

[1] Qasim et. al (2029)

conducting studies due to security issues that drastically curtailed the possibility of foreign team members ability to visit, but NARC staff and Aliya Gul with Anwar Shah, were able to implement surveys of tomato marketing to cover those regions.

As the project evolved, while the focus remained on the three crops (mango, tomato and chilli), new components and studies were added in response to requests from government; NARC/PARC team led by Muhammad Qasim extended the scope of the project to crops such as guava.

5.3 Who was involved in the work?

The entire team was involved in research planning, and discussion of results and drawing implications at workshops and presentations, and through interaction via internet, phone calls and correspondence, providing feedback on aspects of the work, information and insights.

The foreign project partners helped to structure specific research studies to meet the overall research objectives, through all the specific studies, conceptualising the problems, developing methodological and analytical approaches, contributing to the development of questionnaires, providing critical comments and advice on analysis and results, and helping to pull together results from different strands of the research into a cohesive set of policy recommendations, and engaging in interaction with senior officials and stakeholders.

But naturally there was a division of labour in conduct of each component. Pakistan based team members were in charge of on ground farm surveys and interviews, key informant surveys, and retail market studies.

- Ahsan Rana was primarily responsible for the study on the overarching regulatory framework and function of agricultural produce markets, interacting with team leaders at the project workshops and through phone and internet communications. He and Arif Nadeem led the communication of the research results and policy reform recommendations to stakeholders in Punjab, engaging in interactive dialogue that helped to refine policy recommendations further, and contributing to the process of legislative changes that followed.
- Sisira Jayasuriya, Thilak Mallawaarachchi, Hayat Khan and Nauman Ejaz were also involved in the design of the household and marketing chain surveys, and drew on the experience of the CCAP team led by Jikun.
- Abdul Ghafoor and Tehmina Mangan had primary responsibility for Mango farm surveys. Nauman Ejaz conducted wholesale market and urban retail market studies in Islamabad and Punjab. Anwar Shah contributed to the marketing chain studies on tomato
- Tehmina Mangan had primary responsibility for the implementation of the Chilli farm and marketing chain surveys, and Ummul Ruthbah contributed to the analysis of the survey data and preparation of the report. Thilak Mallawaarachchi, Hayat Khan and Nauman Ejaz followed up with additional field visits and contributed to the marketing chain analysis
- Muhammed Qasim and the team from NARC/PARC were responsible for tomato farm surveys. In addition, Aliya Gul, at the time a doctoral student at Macquarie University, conducted her field surveys on tomatoes assisted by Anwar Shah.
- Anwar Shah conducted a preliminary investigation of the pilot project by PAC on chilli marketing.

- Zarmeen Hasan conducted a study on export potential and constraints for mango and chilli in collaboration with Arif Nadeem.
- Abdul Jalil and Hayat Khan worked with Jeff Lafrance on modeling of household demand for horticultural products in Pakistan.
- Aneela Afzal worked with Sisira Jayasuriya on gender issues in horticultural value chains.
- Ram Ranjan supervised Aliya Gul's PhD research on econometric analysis of tomato farmers marketing
- The Chinese team led by Jikun Huang conducted the field research on horticultural value chains in China, consumer demand analysis in China for horticultural products, and modeling of the impact of CPEC on Pakistan agricultural and horticultural industries (that involved a more detailed disaggregation of the Pakistani agricultural sector).
- Jikun Huang presented two seminars in August 2017:
    - "Agricultural development and policy in China: successfulness and challenges" to scientists and research leaders at NARC
    - "China's agricultural policy and the likely impacts of CPEC" to Senior Officials and Division Heads of the Planning Commission.
- Thilak Mallawaarachchi worked with Shabbir Ahmed, Nauman Ejaz and Ahsan Rana on lessons from the Australian policy reform experiences, with the ILRI team on lessons from reforms in livestock sector, and with Shabbir Ahmed on synthesis of findings from farm level studies, drawing implications for policy and future research.
- Hayat Khan and Sisira Jayasuriya worked on analysis of spatial market integration of horticultural products, with econometric inputs by Jeff. Hayat visited Monash University (June-August 2018) to assist in preparing for the midterm review.
- Sisira Jayasuriya and Hayat Khan visited Pakistan in January 2019 to interact with the Advisory committee members, team members, and key stakeholders. They undertook visits to meet market participants and officials. Ahsan Rana visited Islamabad and had intensive discussions on the reform recommendations and the legislative process. They also briefed Moeen Abbas from the Prime Minister's office about project research and had several meetings with him.
- Sisira Jayasuriya presented seminars in January 2019 at Quaid-e-Azam University and the Arid Agriculture University.
- The project team from Australia and Pakistan visited China in July 2019, led by Thilak, to participate in the project workshop and get a deeper understanding of the Chinese market and experience organized by CCAP. Other participants included Ahsan Rana, Arif Nadeem, Mohammed Qasim, Waqas Farooq, Nauman Ejaz, and Tariq Ali. Sisira Jayasuriya (indisposed from April 2019) and Jeff LaFrance (hospitalized for surgery in mid-2019) were unable to travel due to health reasons, and Hayat Khan was unable to obtain a visa in time).
- Hayat Khan visited Monash for three months (June-August 2019) and worked with Jeff LaFrance and Sisira Jayasuriya, who were unable to travel during this period. Nauman Ejaz (July 2019) and Thilak Mallawaarachchi (July 2019) also visited Monash after the China workshop, and were able to have meetings with project leaders Sisira Jayasuriya and Jeff LaFrance.
- Thilak Mallawaarachchi, Hayat Khan and Nauman Ejaz visited Sindh in October 2019 for field visits to the chilli markets and interacted with farmers, processors and key industry stakeholders.
- Thilak Mallawaarachchi, Hayat Khan and Nauman Ejaz visited Islamabad, Lahore and Karachi in January 2020 to interact with team members and stakeholders. Hayat Khan followed up with written communication of inputs relevant to national export

development strategy from project findings and recommendations prepared with Sisira Jayasuriya, and had discussions with Moeen Abbas

- After the COVID19 outbreak, drawing on the understanding of agricultural supply chains and key informant contacts developed through the project, Sisira Jayasuriya, Hayat Khan, Ahsan Rana, Nauman Ejaz, AnwarShah, Jikun Huang and Aneela Afzal conducted phone surveys of key informants and contributed recommendations to situation analysis and policy responses. These were communicated to Kazmi Munawar (ACIAR) for the Agriculture Ministry and to Moeen Abbas for the PM's office.

Throughout the duration of the project, despite frequent interruptions to planned visits caused by security and in some cases, unexpected health issues, there was ongoing interaction among team members, with regular teleconference sessions and visits to discuss milestone tracking, project issues and administrative matters, and sharing of ideas, documents and data, draft outputs and result

6 Achievements against activities and outputs/milestones

Objective 1: Investigate main features of existing marketing systems including role of policy, regulatory and institutional factors.

	Activity	Outputs/ milestones	Applications of outputs	Comments
1.1	Establish communication and stakeholder engagement for project design, implementation and impact.	Establish the Project Advisory Committee and other communication mechanisms that support efficient project delivery.	Facilitate the meeting of all project objectives	Project Advisory Committee established. It had its first meeting during the annual workshop in Lahore on 7 August 2017. The Advisory committee were also invited to the MTR (6-7 of September 2018) and discussions were held with individual members and senior government officials on three follow up visits in January 2019, October 2019 and Jan 2020. In addition, Pakistani team members met and interacted with key stakeholders regularly.
1.2	Determine crops, regions and markets to be studied and formulate structure and contents of preliminary market studies	Preliminary reports detailing the main features of selected markets	To be used to guide subsequent more detailed market studies and provide basis for choice and specification of econometric models	Crops, regions and markets to be studied were identified during the inaugural meeting in 2016. It was agreed that the project will focus on: a. Mango in Punjab and Sindh b. Tomato in Punjab, Sindh and Baluchistan c. Chilli in Sindh Subsequently, in response to requests from government officials, limited studies were also conducted for guava and onion and reports drafted.
1.3	Undertake a needs analysis of data for various components of analysis and develop a data collection approach to bridge data gaps.	An assessment of data needs and an agreed strategy to meet required data.	Assesses data needs and finalise a data collection strategy.	It was decided, as originally planned, that we will start with household level surveys and follow those up with marketing surveys as well as an analysis of the export market. The market integration studies faced some data collection issues but that was overcome through the use of an innovative model which relies on prices only. The project has delivered on all these fronts.

	Activity	Outputs/ milestones	Applications of outputs	Comments
1.4	Interview households, industry stakeholders and key informants to obtain required data on supply, market structure and demand factors	Data on production, processing and storage/transport conditions, marketing margins for case studies of selected crops: across horticultural supply chains, information on market structure and constraints	• Marketing chain surveys on the three crops completed. • Export/wholesale market analysis for mango and chili completed. Insights and results from all these studies contributed to the ongoing process of formulation of policy recommendations, interactive discussions with stake holders, and communication of policy messages to policy makers	Household and Marketing chain surveys for the three crops were completed. An analysis of these surveys and insight from interaction with key stakeholders identified the need for team visits for further interaction. The project team visited Pakistan after the MTR in • Islamabad in Jan 2018 for interaction with local team members, advisory committee members and key stakeholders. • Sindh in Oct 2019, for field visits as well as group interaction with farmers, processors as well as interaction with key stakeholders in the Sindh Province. • Islamabad/Lahore/Karachi (Jan 2020) to share outcomes of the projects with key stakeholders; get an insight into the action on the ground to make sure the project recommendations are practical.
1.5	Establish, social, legal and institutional context and incentive characteristics of horticulture sector marketing arrangements	Complete a stocktake of horticultural supply chain regulations, undertaken across the three provinces of Punjab, Sindh (and, if feasible, Baluchistan)	Stocktake information allowed strategic overview of respective roles of government and private sector in horticulture to be developed, as well as qualitative assessment of possible reform priorities. These linked to, and fleshed out, market studies	***An over-arching study of the regulatory systems and marketing institutions was prepared and presented by Ahsan Rana.*** The first version in 2017 was refined and extended in several later versions incorporating new insights as the study resulted in opening up avenues for close interactions with government and industry stakeholders. Reports on agricultural produce markets, export markets, and supply chains and gender were produced. Some of the project recommendations resulted in revision of the regulatory environment in Punjab (recently passed through an Act of the Punjab provincial assembly). It proved difficult to conduct in-depth field-work in Baluchistan, because of security concerns that drastically restricted team travel, though some limited studies were conducted by PARC staff.

	Activity	Outputs/ milestones	Applications of outputs	Comments
1.6	Design and implement detailed studies of overall marketing chain and selected key components	Preliminary reports on markets by 12/2017	• Preliminary reports guide econometric and other quantitative analyses. • Final reports feed into formulation of overall research conclusions	***Several additional studies on marketing chain and components were designed and conducted***, to follow up on issues identified in initial studies. This was a major area of research activity in the project. Draft reports on all main markets were presented and discussed at the Workshop in Melbourne in March 2018 several of them subsequently placed on Monash project website later in the year. Detailed Marketing chain surveys were conducted. This resulted in identifying the need for several focused studies, primarily but not solely, based on key informant surveys. External members of the project team were also able to visit field sites in: • Islamabad and Rawalpindi in Jan 2019 (also interacted with government marketing officials, advisory committee members and key stakeholders). • Sindh in Oct 2019, for field visits as well as group interaction with farmers, processors as well as interaction with key stakeholders in the Sindh Province. • Islamabad/Lahore/Karachi (Jan 2020) to share outcomes of the projects with key stakeholders; get an insight into the action on the ground to make sure the project recommendations are practical.
1.7	Conduct a case study of new marketing innovations such as those implemented by PAC	Report assessing performance, problems, lessons and challenges to introduction of new market innovations	Input into Objective 4	Produced a formal brief on the PAC's pilot project and how the extruding platform could be used to address key issues in the horticulture market including tapping into premium markets, including the export market.

Objective 2. Assess domestic and global (including China) market potential.

No.	Activity	Outputs/ milestones	Comments
2.1	Build crop specific commodity market models	Build a commodity model to understand the dynamics of the market	1. Objective incorporated within a global economic model GTAP simulation that respecified a detailed Pakistan agriculture sector, results reported in papers. 2. Consumer demand analysis using econometric techniques initiated and two drafts produced and a third more refined version is finalised. 3. Spatial market integration analysis assessing price transmission. Related papers: Jalil, Khan and Lafrance; Huang and Cui; Ali, Huang, Xie; Khan, Sisira.
2.2	Conduct analysis of market potential in domestic markets	A draft report on domestic market trends and projected demands including likely shifts in preferences (Yr3, M6, 12/2018)	An analytical paper was produced. Final results are being incorporated in reports for publication. Related paper: Jalil, Khan and Lafrance
2.3	Conduct analysis of market potential in export markets	A draft report with quantitative and qualitative information on global trends, information on specific target foreign markets, and potential for Pakistan products and market access requirements and competition challenges (Yr3, M6; 12/2018)	Preliminary analysis revealed that potential for exporting tomato was very limited, so the export market study was confined to mango and chilli. *Issues identified in the tomato market studies included the impact of imports on producers, particularly from India*. Results conveyed to PM office and incorporated into the national Export Development Initiative. Findings are being incorporated in policy briefs and in reports for publication Related paper: Hasan Also see Ghafoor; Mangan.and Ruthbah
2.4	Conduct focused study of Chinese market potential for Pakistan horticultural products	A report with quantitative and qualitative information on Chinese market trends, potential for Pakistan products and market access requirements and competition challenges (Yr3,M8; 02/2019)	This study revealed that Pakistan has significant potential in exporting several agricultural and horticultural products to China.

Objective 3: Identify and assess extent of, and main factors contributing to, market inefficiency and low exports, and evaluate costs of inefficiency.

No.	Activity	Outputs/ milestones	Comments
3.1	Analyse marketing margins, and price differences along and across the value chain for the selected commodities and research the contributory factors	Quantify margins, identify where wastage or quality deterioration occur.	Marketing margin analysis completed for all crops (and partial analysis also for two additional crops – onion and guava. Additional follow up studies were also launched and results being processed. Related papers: 1. Mango: Ghafoor, Adeel and Maqbool; Mangan and Ruthbah; Ejaz 2. Chili: Mangan and Ruthbah 3. Tomato: Qasim, Farooq, Aktar; Shah; Aliya (completed PhD thesis); 4. Mallawaarachi and Shabbir (2018) provided a summary of results from farm surveys and a discussion. 5. Guava and Onion: Qasim, Farooq, Akhtar, Majeed and Rani;
3.2	Assess the efficiency of price transmission and market performance, and the sources of inefficiency	Reports for each crop presenting results of econometric analyses of price transmission and vertical market integration along value chains, across locations (spatial integration) and for crops that have significant current exports, price transmission between domestic and international markets (Yr3, M8; 02/2019)	(1) As no systematic time series data exists for farm gate prices, sophisticated econometric analysis was not feasible. However, key informant surveys revealed that price transmission was weak, and quality *premia* present at wholesale and retail markets was very weakly if at all transmitted to primary producers. (2) Report of spatial and vertical market integration based on co-movement of prices s being revised in response to journal referee comments with application of new methodological tools. (3) A report on spatial price transmission based on co-moment of prices in urban centres to understand the sources of fluctuation in prices across cities and provinces.
3.3	Present and discuss model results and findings with market analysts, key government officials, industry representatives and participants to gain critical qualitative insights and inputs to finalise analysis of market inefficiencies	Report on extent and causes of inefficiency in sector	• Jikun presentation to NARC and Planning Commission August 2017 • Sindh in Oct 2019 (Hayat/Thilak) • Islamabad January 2019 (Sisira/Hayat • Islamabad/Lahore/Karachi Jan 2020) (Hayat/Thilak). These were very useful in establishing close contacts with key stakeholders and in identifying important areas of improvements in the light of research evidence from the project.

Objective 4: Identify reform options, analyse their efficiency and distributional impacts, and formulate and disseminate set of concrete, practical recommendations for policy action

No	Ctivity	Outputs/ milestones	Completion date	Comments
4.1	Identify constraints and implementation challenges to reforms to Pakistan's traditional marketing arrangements that will improve producer, consumer and social welfare, including that of women and poor	Identify a set of constraints that implementation challenges to reforms	In addition to the crop-specific studies, ***several other studies*** were planned and completed to shed light on (a) gender issues in the horticultural sector that impact on not only marketing but also affects the development of modern processing and integration into modern value chains, and, (b) lessons from market reforms in the livestock sector, as well as the role of women in livestock Related papers: (a) Afzal and Jayasuriya (b) Anwar, Ibrahim and Mallawaarachchi; Amin, Mustafa, Ibrahim and Mallawaarachchi The studies that were originally planned were completed in 2019, but some further studies were undertaken to follow up on specific issues. These included further work on retail markets, traceability issues in mango – an important requirement for gaining market access to important export markets). Retail market study and traceability study on mango are now completed. This is an ongoing activity, which was accomplished by targeted visits after the MTR.	The initial plan was to conduct several policy forums but, it was subsequently decided to have smaller private meetings with key stakeholders in view of logistical problems encountered. Sisira and Hayat visited Islamabad in January 2019 when they met senior officers in government planning, and the PM office. Thilak and Hayat visited Islamabad/Lahore/Karachi in January 2020 for a week to have meetings with key stakeholders to get insight into the government plans, priorities and share our insight from the project. Hayat had discussions with staff from PM office following up on earlier contacts with Sisira. This was a vey productive visit for both sides and helped the project contribute to important discussions and development.
4.2	Conduct social cost-benefit analysis framework incorporating investment appraisal techniques to assess agricultural marketing reform options across marketing chains.	A set of Policy Guidance Principles, adapted to Pakistan context to guide the formulation of the set of concrete recommendations, integrating and synthesising the main findings of the analytical research (Yr3, M10; 04/2019)	*This particular activity was not attempted/implemented.*	This was in the project proposal, as a residual element from an early version of the project proposal, but the concept of conducting a social cost benefit analysis of reform options did not made sense to anyone in the team. This should have been taken out at an earlier stage. None of us believe that this is a realistic or practical task.

No	Ctivity	Outputs/ milestones	Completion date	Comments
4.3	Integrate and synthesise the main findings of the previous activities to develop a concrete set of policy recommendations with the specific objective of enhancing horticultural sector performance	A set of policy reform recommendations drawing on the analytical findings on the extent and main sources of market inefficiency and market potential (Yr3, M12; 06/2019)	1. The first set of recommendations came in 2018 (and evolved, refined and concretised over the next period) that was then taken through the policy process in Punjab, culminating in the recent legislative enactments. 2. Recommendations based the Chinese rural transformation were presented in late 2018, and subsequently incorporated the country's rural transformation strategy. 3. Further specific recommendations provided to the PM's department as contributions to the national Export Development Initiative, that initiated a dialogue with highest level of government. 4. Recommendations on enhancing horticultural sector performance in facing COVID19 presented to the PM office in April 2020 5. Further developing, refining and engaging in dialogue with policy and industry partners is an ongoing activity	Intensive interactions with key stakeholders took place during the January 2020 visit to Pakistan where team members (including Hayat and Thilak) the main outcome of the project's recommendations were shared with key stakeholders. This was a very fruitful interaction which helped us identify gaps and areas of priority and refinement of the project recommendations as outlined in the final report.

No	Ctivity	Outputs/ milestones	Completion date	Comments
4.4	Discuss the set of draft recommendations with the Project Advisory Committee members and key stakeholders and revise as appropriate	Integrate and synthesise the main findings of the previous activities to develop a set of consolidated policy-guidance principles and evaluation criteria for horticulture marketing reform (Yr3, M3; 09/2018)	Ongoing meetings and discussions with key stakeholders (Arif and Ahsan) Ongoing meetings and discussions with senior PARC and Planning officials (Qasim and group at NARC) Several discussions held with senior officials and industry personnel in January 2020 and members of the Advisory Committee during Hayat and Thilak visit in January 2020. Engagement with specific proposals in responding to PM office in March/April 2020 (Sisira, Hayat and Jeff). Because of the linkages forged during this project, and requests for assistance and inputs, we expect that this will remain an ongoing activity throughout 2020.	Project advisory committee members were invited to meet on all visits for discussions. Planned visits in early 2020 to discuss further dissemination and pathways to achieve impact postponed. The documents presented to the final review meeting will include further recommendations, recognising that many recommendations have already been presented to various levels of government and industry partners.
4.5	Conduct workshops and forums to facilitate exchange of ideas between Pakistan, Chinese Australian and international donor agency participants on reform strategy including concrete policy recommendations	Project papers, reports and other material presented at meetings (Yr1, M6 to Yr4, M6)	1. Workshops conducted - three in Pakistan and one in Melbourne (2018). 2. Successful workshop in China Jul 1-2 2019) 3. Multiple visits by team members including three visits post MTR (January 2019, Oct 2019 and Jan 2020). 4. Thilak presentation at the AARES meeting Feb, 2020-05-30	See above. Other planned visits postponed though many small group virtual meetings have occurred.
4.6	Produce a series of policy briefs, academic papers and initiate work on a book for wider circulation in Pakistan and internationally		Yr4,M6 This will continue through 2020	Some policy briefs on key aspects of the projects have been produced and shared with key stakeholders, but not publicly distributed as we planned to get feedback and refine them before public distribution. This will be done later this year. Academic papers in preparation, several submitted for review. More in progress. A book/monograph is planned. A leading publisher (Springer) has expressed interest.

PC = partner country, A = Australia

7 Key results and discussion

The project had multiple components but a unifying theme through its focus on horticultural market issues in Pakistan. The integration of the findings from the individual research components provided a comprehensive description of the marketing system as a whole, how markets for the different crops differed from each other in important respects, and how the producers organised their activities within the constraints of the marketing system by way of adaptations and coping strategies. In the following sections we outline the key findings that underpin our policy conclusions and recommendations. The detailed information is in the individual project reports attached to this Final Report.

7.1 Market potential and trends[2]

Domestic consumption patterns in Pakistan have changed significantly over the last fifteen years. Households have shifted their expenditure from cereal food items to dairy products, milk products and fruits and vegetables.

Our research, however, shows important shifts in demand within the bundle of horticultural commodities, with the share of household expenditure on mangoes and chilli falling, while share on tomatoes has increased. But a ***rising population and income growth will continue to increase total domestic demand for all three crops***. Taken in conjunction with global trends that indicate shifting consumer demand for higher quality and more hygienic products, increasing demand will create opportunities for charging quality price *premia*. Niche markets are also emerging and growing for *organic produce*.

The share of exports is very small in all three major crop investigated, though mangoes and chillies have good export potential. Pakistan ranks as the fourth largest producer of both mangoes and chillies globally, producing approximately 1.7 million tonnes of mangoes and 142.1 thousand tonnes of chillies annually. However, Pakistan exports only 6-7% of its total mango production annually and less than 10% of potential of chillies, which is estimated to have an export potential of USD 47 million. Pakistan is a net importer of tomatoes despite stringent import restrictions.

The global processed mango product market is expected to reach US$ 2.043 billion and US$ 31.6 billion for primary processed mango product and secondary processed mango product respectively by 2026, expanding at a compound annual growth rate of 6.1% and 7% respectively from 2018 to 2026.

In the case of both mangoes and chilli, the main obstacle to expanding exports was found to be product quality in meeting market standards and customer preferences.

The export of mangoes follows the Pakistani diaspora (and to some extent also other South Asian communities) as Pakistani mangoes are well known to them. There is very little market research on the tastes and preferences of non-Pakistani consumers, though it s known that they are often different from those from South Asia. Very little work has been done to develop the market for Pakistani mango for the non-Pakistani consumers, and other market segments. Different markets have their own requirements with regard to varieties, quality and maximum residue limits (MRLs) but overlying these requirements are the quarantine or market access requirements of each country/market.

The most critical requirement for export of chillies is quality, low aflatoxin levels and meeting of the minimum residue limit standards (TDAP). Aflatoxins are a family of toxins produced by certain fungi that are found on agricultural crops that are improperly

[2] This section is based primarily on Jalil, Khan and LaFrance (2020), Hasan (2018), Huang and Cui (2019), Ali, Huang and Xie (2019)

managed during post-harvest stages. In chillies from Pakistan, Aflatoxins are a key concern affecting chilies imports from Pakistan in several markets, in particular Europe. The European Union banned chillies from Pakistan in 2004, due to high levels of aflatoxins. Japan also followed suit. In chilies production, Aflatoxins can develop during picking, drying, handling, packing, and transportation when moisture levels are not maintained below required thresholds. In Pakistan, aflatoxin contamination often results from poor post-harvest practices, such as drying on bare ground and improper storage. This issue remains a major barrier to Pakistan chilli exports.

One of the main research objectives was to assess the new opportunities for Pakistan horticulture arising from the CPEC agreement that provided improved access to the rapidly growing Chinese market. and involves a suite of infrastructure projects that are under construction throughout Pakistan since 2013. With the exception of some dry nuts, there has been little export of horticultural products from Pakistan to China since the inception of CPEC.

Our analysis reveals an increasing trend in per capita consumption of horticultural crops, particularly fruit consumption, in China in future. Moreover, the structure of horticultural consumption would upgrade and diversify to satisfy the increasing demand for quality food, particularly tropical fruits, as China's domestic production will be limited in the long term by resource constraints such land and water, and rapidly rising wage costs. China may continue to export temperate fruits to other countries while its demand for imported tropical horticultural crops will increase.

CPEC offers significant market potential for Pakistan in some horticultural products.

With the CPEC fast taking its shape, and land connectivity between with Pakistan improving, the analysis shows substantial potential for increasing Pakistan exports in horticultural products, particularly in vegetables. But, again, the demand trend will be towards higher quality products.

This assessment of market potential and likely demand trends highlighted the critical importance of improving product quality to supply not only lucrative export markets but also what will be an increasingly quality conscious domestic market.

Our surveys and market studies confirm and highlight the fact that, for the three crops studied, there is little if any price *premia* for quality at the producer end of the marketing chain, though at the retail end consumers do pay more for higher quality.

Our studies confirmed that ***a main cause of underperformance in Pakistan's horticulture sector is the market structure***, which is caught in a cycle of low value, low investment, low innovation and low productivity. Pakistan's agricultural produce markets are at the heart of this sub-optimal market structure. Moving these markets from the 'low-quality-low price' equilibrium requires credible sorting mechanisms that distinguish high quality from low quality, and appropriate incentives to producers and traders to invest in quality orientated handling practices. In their absence, the market is unable to measure and reward quality. The system suffers from poor infrastructure and lack of innovation, and there is a clear need to introduce better product handling, product-specific packaging, and transit conditions that prolong shelf life, etc.

The market studies focused on this issue to understand the reasons for this situation, and how it may be overcome.

In the next section we discuss the regulatory system and how our research reveals the link between the regulatory system and the concentration of market power in the hands of a small group of licensed commission agents, and how it entrenches poor practices and impedes incentives for quality improvement. Our research shows that, while regulatory reforms are not sufficient by themselves to overcome all quality issues, they are an essential pre-requisite for addressing this issue.

7.2 The regulatory system: A source of market inefficiency[3]

The institutional structure of markets in the four provinces of Pakistan is very similar, (though there are some regional differences), and they are governed by basically similar legislation. An antiquated marketing system means farmers' hands are tied, by dictating where and to whom they can sell their produce. Government regulation permits fresh produce to be sold only through public agricultural produce markets (APM)—a post-colonial legacy of the British.

The legal framework for APMs has remained archaic and restrictive, with the structure erected in 1939 remaining in place. The original intention was to save farmers from the exploitative practices in unregulated private markets by providing better facilities and a more competitive business environment through public markets. But public markets have failed to keep pace with changing market condition.

Producers are bound by government regulation controlling the APM to channel their produce through government licensed officially approved market structures. *'Arhtis'*- Commission Agents (CAs) who conduct auctions in the public market places – have a central role in these markets. They are the most important actors in agricultural produce markets. (Note: *arhtis* are all males). They buy from a large number of suppliers; sometimes from larger farmers/growers but typically from '*beoparis*' - middlemen who buy from the farmers and aggregate small volumes, and bring the produce for auction in the market (a *beopari* who purchases pre-harvest is called *bekhar*). *Arhits* on-sell to a large number of '*pharias*' - middle men who buy large lots in auction, break them into smaller lots and on-sell to retailers; *pharias* also sell retail to individual customers. Retailers are even more numerous, with only minor (non-regulatory) barriers to entry.

The *Arhtis* are the market agents who possess and exercise market power in the agricultural marketing chain. Their licenses give them legal rights to the limited physical spaces of the markets where auctions are conducted, and their relationships with both sellers (*beoparis* and farmers) and buyers (*pharias* and retailers*)* are characterized by unequal power relationships.[4] They constitute a small group who possess and exercise market power.

Though the total number of licensed *Arhtis* in Punjab is 27,242, the number of functioning *Arhtis* is much less. Rough estimates of total earnings on commissions on trade volumes charged by them would suggest that each *Arhti* would earn between PKR 9-12 million per year from commissions alone.[5]

The APMs, set up originally to provide better market opportunities for producers, have ended up restricting opportunities for farmers to access other alternatives, and restricting competition in the APMs.

Arhtis mediate the commodity exchange relationship between agricultural producers and consumers. An *Arhiti* has a time-tested, well-developed, high-risk, high-profit business

[3] This section is based primarily on Rana (2018) and Ejaz (2020)

[4] There is a detailed description in Rana (2018) of the mechanisms and manipulations through which Arhits maintain their control over licenses and maintain market power.

[5] Most licenses are fictitious. Since physical space is limited, there can be only so many functioning *Arhtis. Arhtis* routinely sublet their premises to several close family members, who can get licenses to operate because they have a space in the market. There are two advantages from this to the *Arhti*: first, he gets a greater say wherever numbers matter; second, he improves his chance of getting a space allotted to him in case a new market is established in the notified area. One third of the 'shops' (spaces) in new markets is allocated to existing licensed *Arhtis*.

model that runs on long established networks based on mutual trust in an undocumented economy where contracts are unwritten and enforcement mechanisms are informal.[6] His strong forward and backward linkages often span over several generations, accumulating capital in the form of trust and commitment that minimize transaction costs.

Arhti is both a trader and a financer who provides credit and a range of other critical services. He is often the main source of credit for many *pharias* and small farmers, who are bound to him by a web of enduring relationships. Clients (farmers, aggregators, traders and so on) do not break these relationships easily. Even those who are not dependent on the *Arhti* for credit are reluctant to attempt to bypass him because alternatives are limited and consequences can be costly.

Marketing flexibility is further hindered by the fact that the government-controlled public market system has not kept pace with demand, being both limited in number, and size and facilities. The APM operates on a bulk commodity model, which sees vulnerable and perishable produce such as mangoes transported to market in large (typically wooden) crates, with no temperature control, to be auctioned by the truck load or half-truck load. This system impedes grading of produce and quality control, in turn leading to downgrading or wasting.

The market committees are supposed to ensure good governance of APMs. But in practice they fail both as a regulator and a facilitator. For instance, the issuance of price/rate lists that tend to serve political ends rather than market situations, the mandatory fees and charges that are not market oriented, rampant encroachments, congestion issues, etc. all reflect the inefficiencies and administrative burdens associated with this out dated institution. Legislative reforms have been undertaken to improve their role and performance, at least in Sindh, but no significant changes can be observed on ground. Small farmers do not even attempt to participate in the governance arrangements of APMs. The vast majority of tomato farmers, for example, have not even registered themselves to get the right to participate in the market committees. This is not accidental. Small farmers can exercise no real influence in the APMs, which are dominated by powerful, rich and well-connected *Arhtis.*

In practice it is practically impossible to facilitate entry and competition in the markets so long as the incumbent *Arhtis* have a legally sanctioned de facto ‘ownership’ of the limited physical market spaces. They, therefore represent an established institution. there are serious misgivings regarding the role of market committee. Many of the activities undertaken by the committee are considered superfluous and arbitrary. There is a perception that it has failed in its role both as a regulator and a facilitator. For instance, the issuance of price/rate lists that tend to serve political ends rather than market situations, the mandatory fees and charges that are not market oriented, rampant encroachments, congestion issues, etc. all reflect the inefficiencies and administrative burdens associated with this outdated institution.

The market committees need to be more market oriented rather than their current bureaucratic methods. This will inevitably mean phasing out of the government’s involvement in their constitution and ensuring true representation of all the participants on these committees. Legislative reforms have been undertaken in this regard, at least in Sindh, but no significant changes are visible on the ground yet.

[6] Note that the risks are in the tied buying and selling transactions, but garnering commissions on use of market premises involve almost no risks.

To summarise, *Arhtis* provide many important, indeed critical, services to farmers and traders (credit, risk sharing/insurance etc.) in the absence (or severe limitations) of markets for credit, insurance etc. Being both a trader and a financer they maintain liquidity in the chain by providing credit and a range of other critical services that maintain the viability of the marketing system; they bear the risks of lending to small traders and farmers with no collateral and no enforceable legal contracts. Thus they do need an appropriate return for the services they provide.

The issue is not whether Arhtis contribute a service; they certainly do. *But in providing these services, they use their control of market premises to tie farmers and small traders to relationships that enable Arhtis to restrict market competition, extract monopoly rents, and hinder the emergence of a dynamic, modern horticulture industry.*

7.2.1 Marketing arrangements and outcomes[7]

Our research shows that there are important differences among the markets of the three crops and across provinces in their marketing arrangements, though they all share the common problems of inefficiency and lack of incentives for improving quality.

Eighty per cent of in mango growers *sell their crop to contractors pre-harvest, often two years in advance*—locking them into an inflexible system, and potentially at the mercy of licensed commission agents.

But pre-harvest sales contracts are not common in chilli and tomato, where framers sell locally or travel further to larger markets when they have larger volumes to sell. In Sindh, the leading producer of red chillies, we found that chilli growers generally sold their crop through local commission agents, from whom they also often obtain credit.

There are also regional variations. In the case of tomatoes, selling at wholesale markets was more common in Baluchistan than in Sindh or Punjab. Farmers with larger volumes or better quality tomatoes travelled to larger, more distant markets, where they sold thorough traders with whom they had long standing relationships, and who provided them with market information and credit.

Such credit, in the form of cash or in kind, such as fertiliser, traps smaller farmers in the system, binding them to the *Arhti*, the commission agent, or his agent, the small trader-buyer (*beopari)*. Farmers continue trading with middlemen traders with whom they have credit-tied transactions, as they are bound to sell their produce to them until they have paid off their debts. Thus, a lack of formal credit availability forces smaller credit-constrained farmers to engage in credit-tied transactions with the middlemen, where such interlocked borrowings put farmers in a state of perpetual debt and render them continually dependent on their middlemen.

When local buyers come to the farm and purchase directly from farmers, as often happens with tomatoes in Sindh and Punjab, price is determined through visual inspection. Products are sold in lots without sorting produce into separate lots based on grading by quality. The local traders then take the produce to wholesalers in larger markets. Buyers, as a result, are not willing to pay any significant premium, and farmers do not have the incentive to produce premium quality. Since the current agricultural value chain does not reward farmers for producing a high-quality product, farmers do not make extra efforts through the lifecycle of the crop cultivation to ensure quality from the point of cultivation to post harvest and then delivery to the market.

Retail traders buy by the crate load from the wholesalers, then break into smaller lots and sell to consumers. They are small-scale traders and per unit costs are high.

At this end of the market, consumers are quality conscious and pay different prices for different quality. The retailer runs the risk that if goods are not sold quickly, quality

[7] *Ahsan Rana (2018), Ejaz (2018, 2020),Ghafoor (2018), Gul (2020), Qasim et al (2018.2020), Shah (2018)*

deteriorates and the product then has to be sold at a lower price. Retailers have to dispose of their product quickly because they have no cold storage facilities. Mangoes, for example, quickly deteriorate in quality and traders dispose them at prices that go down over time. Nothing is wasted, in the sense of being physically thrown way, but the wastage is the loss of value reflected in lower prices. However, there is no (or very little) feedback of quality related prices back to the farmer.

The system provides little incentive for quality improvement and control, and leads to downgrading of the product. The regulated premium fixed by the government, in the case of chilli for example, is not high enough to compensate farmers for their cost and effort. There is also lack of formal enforceable contracting; this allows chilli processors to use their market power to set prices informally and exploit farmers.

These marketing arrangements fail to provide credible mechanisms to certify and regulate the quality of produce, and result in very weak transmission of quality premia.

In summary, the overall picture of the marketing system that emerges from the studies is that *markets need:*

(a) Large-scale investments to upgrade physical market facilities and logistical services to improve marketing system performance and serve final customers better, **and**

(b) More competition to provide better prices and returns to producers.

Governments face severe fiscal constraints, and do not have the capacity or do not prioritise investing in modernisation and provision of adequate market infrastructure. Private investments are inadequate because new dynamic entrants are restricted from entering existing markets or operating independent markets. The regulatory barriers keep out competition and maintain rent extraction privileges for incumbent licensees, thus denying producers better returns.

In this context, alternative trading platforms, such as the PAC sponsored E-Trading platform at the Pakistan Mercantile Exchange (PMEX) that enable growers to bypass the current system can be successful at least to some extent.[8] They will be attractive to those growers, probably somewhat larger producers, who are not too tightly bound by credit and other links to the present Arhti dominated system.

But, even if APM's are made more competitive, the need will remain for greater public investment, better functioning credit markets, and accessible storage facilities for small farmers and traders.

Studies documented the numerous constraints that face small farmers, and small traders, Farmers face the lack of certified good quality seeds, technology and other inputs, and good transport facilities. Both small farmers and small traders lack access to credit, and good storage facilities. None of these issues will be resolved solely through market reforms. But what market reforms can do is to open up the markets to more dynamic firms, who can bring capital and technology and forge linkages with farmers to overcome these major obstacles to modernisation and improvement. International experience shows that new forms of institutional structures, such as contract farms, can emerge in a more dynamic, competitive setting.

7.2.2 Spatial and Vertical market integration[9]

An important aspect of the project was to assess the extent to which internal trading links move goods across markets in different locations in response to arbitrage opportunities

[8] Shah, Raza and Khan (2020)

[9] Khan and Jayasuriya (2018 and 2020)

arising from supply or demand shocks and the vertical transmission of shocks between the wholesale and retail markets. The major problem we faced was unavailability of the required data.

We developed and used a novel approach to analyse spatial and vertical market integration even with limited data (an alternative to the standard time-series analysis requiring long time series data) that also permits us to assess the market-specific differences in price response to shocks. This was important because key informant interviews had suggested that market structures in different locations may differ in substantive ways. This not only helped us in our particular analysis in this project, but also to make a contribution to market integration studies more generally through this methodological innovation.

Whereas markets are generally spatially integrated across cities in the long run, there are city and province specific variations which points towards significant inefficiencies in the marketing system and also spatial variation in market inefficiencies. For example, it was noted that prices of tomatoes were consistently lower in some regions than others, not only during their harvesting season but even in the deficit periods when they are net importers. One conjecture is that market inefficiency levels differ from market to market: i.e. some markets are relatively more competitive and their marketing systems relatively more efficient. But data limitations and time constraints did not permit deeper investigation.

7.2.3 International and other national experiences

The project drew on Australian and Chinese experiences and the wider international experience. – while recognising the important specificities of the Pakistani situation and context.

From the very inception, the project research framework and the methodological approach were influenced by the Australian experience with regulatory reforms linked to application of competition policy principles to horticultural markets. The need for regulatory reforms to both stimulate private sector responses, and the need for complementary private-public partnerships and interventions continues to influence the team thinking about the policy package needed in Pakistan.

The Chinese experience of market reforms and the associated spread of modern value chains into the rural sector was documented by Jikun and colleagues, and presented to senior scientists and government officials in Islamabad.

Though the socio-cultural conditions of rural China is vastly different to Pakistan, and the rural sector transformation in China was an integral part of the broader development strategy of opening up and modernisation of the economy, the rapid commercialisation and modernisation of small farm agriculture in China holds some lessons for Pakistan. The revitalisation of Chinese agriculture was closely linked to regulatory reforms to agricultural marketing that allowed less controls over farmers' ability to sell their produce In addition, opening up the agriculture sector to market forces has allowed an explosive improvement of productivity and standards, and the integration of smallholders into modern supply chains, including international agri-business firms.

7.2.4 Gender in agricultural value chains[10]

Females make a large labour contribution, into most agriculture industries, including the three crops we studied, and in the livestock sector. In fact formal labour force participation of women is higher in rural areas than in urban areas. But they have very little role in marketing of crops, though they have some limited role in marketing of poultry

[10] Afzal, Jayasuriya and Meehan (2020) and Amir, Mustafa, Ibrahim and Mallawaarachi (2019).

and livestock products when the transactions do not involve much direct contact with outside males.

The situation of rural women reflects the extreme overall gender inequality in Pakistan which ranks as low as 136 in world in the Gender Inequality Index (UN Human Development Report 2019), and is 151 in the Global Gender Gap index (which measures the gap between men and women in four categories: economic participation and opportunity, educational attainment, health and survival and political empowerment) (World Gender Gap Report 2020). The situation is particularly bad in the agricultural sector and rural areas. Over 80 percent of the women are disempowered in terms of ownership of assets, control over income earned, and control over use of income earned despite their large contribution to productive activities (Ahmed, Hameed, Khan, and Rafi, 2016: p.415). Female wages were on average only 55% of male wages in 2012 and it is less than 50% in agriculture which employs the vast majority of women. This gap has been widening over time (World Bank, 2016; Zaidi and Farooq et al, 2016). These gender inequalities in wages are only one part of large gender gaps in most indicators of wellbeing. Women not only have lower rates of labour force participation and wages, but also have significantly lower health and nutrition levels, literacy, and mobility, with greater gaps in rural areas.

International experience shows that integrating rural producers into modern value chains to enhance productivity, and linking them to distant markets and deliver better quality products is a potential avenue for improving the conditions of rural women. Well-designed market reforms can facilitate improved price transmission and incentivise modern firms to invest in direct links to small producers. But rural women in Pakistan confront socio-cultural barriers that continue to significantly constrain their access to resources, education and skill acquisition, markets, and occupational mobility. In particular, female participation in factory-based occupations is very low due to social attitudes about working in shared spaces in the presence of non-family males.

Currently there are no major modern firms involved in chilli, mango and tomato industry value chains. We therefore looked outside the crop sector to explore the likely impact of modern value chains on rural women. We found that the multinational firm Nestle has successfully developed a modern value chain in the Pakistan dairy sector involving rural women where the firm provided animal health and nutrition related skills to women in farming households, and sourced milk for collection centres that were then transported for modern processing. We undertook a case study of two villages where Nestle operates and found that female participation remained restricted to specific on-farm tasks, while their direct access to marketing and incomes are quite restricted. But there was evidence that household incomes went up in participating households, and women felt that their situation has improved due to the increase in family income. Further, there were indications that skill transfer and training of women improved their status within the household, and in household decision-making. In other words, women seemed somewhat more empowered.

Experience in other countries such as Bangladesh and Indonesia indicates that change in female involvement in economic activities and markets occurs when economic incentives are enhanced. The Nestle dairy project experience shows that, even in rural Pakistan, firms can profitably involve more rural females in modern value chains if they implement innovative approaches tailored to the specific socio-cultural circumstances of the Pakistani rural situation.

International experience and project research on Nestle experience strongly suggests that improving market efficiency – the central research objective of this project – will facilitate entry of dynamic firms into the industry and enhance the position of rural women by generating new employment opportunities. While we can only speculate to speculate as to what specific strategies such firms can or will use to involve females in sharing the

benefits of value chain modernisation, as demonstrated by Nestle, firms can and will find a way to employ women if the incentives are there.

The key to improving the position of these women involved in rural areas is through expansion of employment opportunities, and by facilitating their ability to acquire skills and resources. In the immediate future, the ability of rural females to work in factory settings is likely to remain limited, thereby restricting the scope for females to gain from market reforms and affecting Pakistan's ability to exploit its competitive strengths in horticultural production. But marketing reforms will improve the position of women as they will help to attract modern firms into the sector and incentivise them to expand horticultural (and agricultural processing). More remunerative employment and greater access to skill acquisition for women will in turn facilitate social changes.

8 Impacts

8.1 Scientific impacts – now and in 5 years

A large number of important papers and reports have been produced that contribute to the wider literature, beyond the immediate needs of the project.

1. Analysis of agricultural market structure and implications for regulatory reforms: M Ahsan Rana

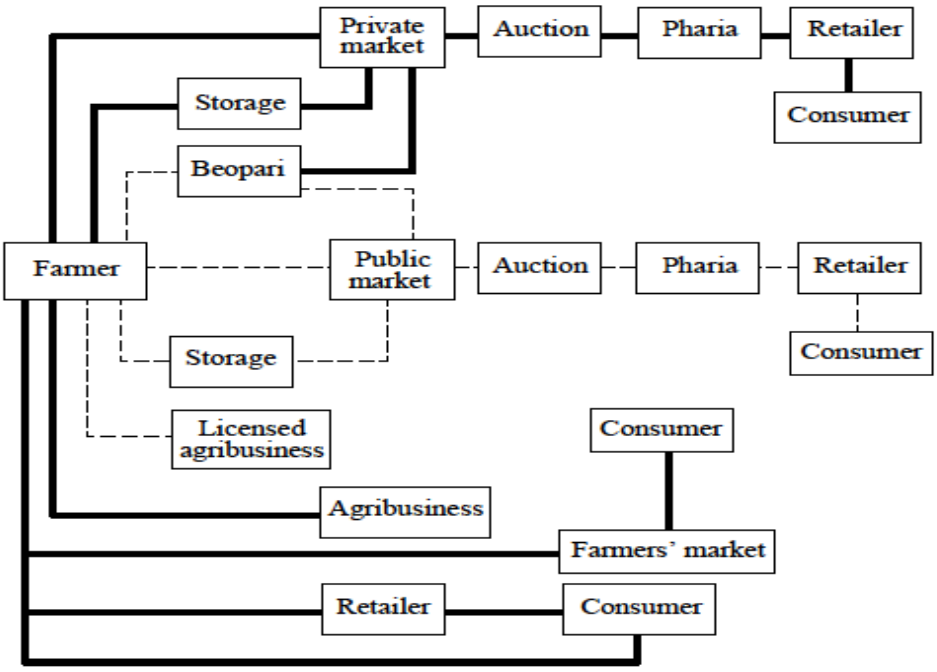
The detailed analysis of regulatory framework (Rana 2018), an important contribution to the literature on horticultural markets in developing countries, has already translated into a new enactment by the Punjab provincial assembly (Punjab Agricultural Marketing Regulatory Authority (Amendment) Act, 2020 (see attachment)).

Key findings from the detailed analysis were presented to government officials at various levels. Two project members (Ahsan Rana and Arif Nadeem) became members of the Prime Minister's Working Group on Agriculture, which provided them an opportunity to present at the highest forum proposals for reform of the regulatory framework for APMs. Intensive engagement with Punjab government and the Pakistan government by several project members gradually generated the momentum where the Punjab government undertook a lengthy process of legislative changes. This process culminated in passing of the above-said Act by the Punjab provincial assembly.

After the passage of the Act, farmers' freedom to market their produce has increased substantially. They can sell in bulk and retail to whomsoever and wherever. Figure 1 (below) shows the existing options in *dotted lines* and additional options created by the amendment in *unbroken* lines.

This, to some extent, reduces their dependence on *Arhtis* since they are no longer legally compelled to sell their produce through the *Arhtis* in the APMs. With more selling options, their bargaining power vis-à-vis the *Arhits* increases, and the capacity for rent extraction decreases.

Figure 1: Farmer's Marketing Options



The new legislation has put in place stakeholder-led governance structures for each public market. It has also reduced the bureaucratic requirements for setting up of new private markets. This will facilitate investment by entrepreneurs and consequently enlarge options for producers and buyers. Another important legislative change is the shift to a value-based (instead of the previous volume-based) collection of market fees on all transactions in APMs. This creates a dynamic revenue stream for the government for investment in market infrastructure. The full impact of these legislative changes will transpire over the next few years as new private markets are set up, retailers (and large commercial consumers, such as restaurants) start buying directly from farmers, and government improves market infrastructure and facilities using the additional resources generated from value-based levying of fees.

2. *An Econometric Analysis of Marketing Challenges Faced by Horticultural Farmers in Pakistan: Case Studies from Punjab and Khyber Pakhtunkhwa*: PhD thesis by Aliya Gul

This is a scholarly contribution to the analysis of horticultural markets in Pakistan, and also has with wider relevance to agricultural markets in developing countries. It investigates how inefficiencies arise when farmers are restricted to sell their produce to licensed traders in regulated markets, when they engage in credit-tied transactions or when they face credit and information barriers. When farmers face these constraints, they tend to rely heavily on middlemen for producing and marketing their crops. The study highlights the importance of public policy and institutional initiatives to enable farmers to overcome these constraints. (Abstract attached).

immediately

3. Methodological innovations in econometric analysis of spatial market integration to handle location-specific differences in market structures and non-availability of long time series of prices.
4. Adapting lessons from international experience to Pakistan horticultural sector development, drawing on lessons from reform experiences in Australia and China in particular.
5. Gender in agricultural value chains and implications for agricultural modernisation

8.2 Capacity impacts – now and in 5 years

1. The most important contribution to capacity building in Pakistan has been through the involvement of several Pakistani researchers (see list of team members plus Aliya Gul, a female Pakistani researcher, who has now successfully completed her PhD). They have gained from exposure to the international literature on agricultural value chains, have established international research linkages, and gained skills in:

    a. Market structure analysis
    b. Policy analysis
    c. Communication and dissemination of policy messages
    d. Policy advocacy,
    e. Econometric modelling of commodity markets and household demand
    f. Gender analysis in agricultural value chains

    In addition, two MPhil theses were completed by two students at Arid Agriculture University, supervised by Aneela Afzal, drawing on the project methodology and training:

- "Value chain management and gender: A case study of Pakistan tobacco company" by Fatima Shafqat

- "Rural development through creating shared value (CSV): A case study of Pakistan Tobacco Company" by Nasir Mehmood

8.3 Community impacts – now and in 5 years

The immediate community impact is primarily comes from the attitudinal changes towards agricultural market reforms. Following the legislative changes in Punjab, is no longer considered to be in the 'too hard' basket of reforms. With public concerns intensifying about the need for pro-competitive agricultural market reforms in the wake of the Sugar Commission report released recently, the momentum for deepening and extending the reform process can gather momentum.

Over time, by contributing to Improve market structure (and agricultural value chains more generally), the project findings and activities will enhance rural incomes and employment, and consumer welfare in urban communities by providing better quality, more affordable, horticultural products that contribute significantly to the total nutrient intake in household diets.

8.3.1 Economic impacts

8.3.1.1 Reforms to marketing legislation and government investments in new markets

As noted above, policy recommendations and advocacy based on research findings resulted in fundamental reforms to the agricultural marketing legislation in Punjab. The basic law from the colonial times (Agricultural Produce Markets Act, 1939) was repealed and the Punjab Agricultural Marketing Regulatory Authority Act, 2018 was massively amended in March 2020 to incorporate most of project recommendations.

The Federal government has been receptive, in July 2019, the Prime Minister announced a PKR 309 billion national agricultural 'emergency' program, including a PKR 23.6 billion (A$223 million) scheme to transform Punjab's agricultural produce markets when the legislative processes were underway in Punjab, This involves establishing four new markets, and upgrading infrastructure in 54 existing markets.

At this point in time it is difficult to quantify with any degree of precision the anticipated economic impact of these changes. However, the Punjab government has estimated the additional revenue expected from the shift to value-based charging of market fees. In 2017-18, the existing volume-based system generated PKR 1.04 billion (around AUD 9 million at exchange rates prevailing in mid-June, 2020) from the entire province. As against this, even a very low market fee rate of 1% is expected to generate PKR 5.45 billion (around AUD 48 million) per annum. This is a very substantial increase in Punjab government revenues that will have been achieved through an efficiency improving tax reform. Since market fees can be used only for maintaining and improving market infrastructure, it is not unreasonable to foresee substantial investment in market infrastructure and facilities over the next few years.

This also provides an indicative figure for the cost savings to market participants that can be expected to flow in future. Even if reforms produce a 1% reduction in marketing costs, that will be of a similar order, i.e. over PKR 5 billion per year.

8.3.1.2 Contribution to Pakistan government's export development strategy

The project findings on potential and constraints to exports and policy recommendations to address were communicated to the government, initially through contacts established at personal level, and trust and confidence built up through dialogue with Sisira on broader

regulatory and competition policy issues from 2018 onwards with Mr Moeen Abbas, who became Senior Associate to the Prime Minister of Pakistan. At his request, following previous discussions with Sisira, Hayat held further discussions with him in Islamabad, and we prepared a brief policy note for him in January 2020 (see list of publications). In an email to Sisira he commented as follows:

" Counting on Hayat's note sent earlier we have already included Chilli and Mango in PM's Exports Development Initiative. We, at PM Office, really liked your project because it suggests very specific interventions. Most of the other projects that we studied offer suggestions too broad and generic to be even implemented." (Extract from email to Sisira, 12 March 2020; later forwarded to Howard Hall).

This dialogue with the PM's office that is continuing has had important additional flow-on impacts:

(a) We helped to establish direct contact between Moeen Abbas and Howard Hall (ACIAR). Though a proposed meeting in April did not take place due to COVID 19 travel restrictions, this relationship will hopefully lead to more interactive discussions between the government and ACIAR on priority policy issues, and contributions from all ACIAR policy projects to be better integrated into government policy formation with greater on-ground impact. (email correspondence copies can be presented if required.)

(b) We have been able to provide continuing inputs through an ongoing dialogue into the government's policy discussions on responses to COVID19 related issues both on agricultural policies as well as on wider economic policies (if required correspondence can be produced for viewing in confidence).

The full impact of these developments is too soon to be assessed and measured. But clearly it is a *major achievement that project findings and recommendations are being taken up at the highest level of government*. This reinforces the legislative reforms in Punjab by linking market reforms to the country's high priority national goal of increasing exports, and sets the stage for market reforms to be taken up on a national scale as part of the country's overall development strategy.

8.3.2 Social impacts

In addition improved incomes of smallholders, less expensive and better horticultural and other food (with resulting positive impact on nutrition), quality market reforms will also contribute to greater female empowerment through employment, incomes and direct access to incomes, as modern horticultural value chains increase processing, grading, sorting and other activities.

These changes will be facilitated, as documented in project research on the lessons from Nestle's diary industry projects, when firms take active steps to involve women in horticultural industry initiatives tailoring their strategies to the specific socio-cultural circumstances of rural Pakistan. Government must implement complementary measures to incentivise firms to involve women in modern supply chains and assist rural women to access skills, education, assets and finances.

8.3.3 Environmental impacts

Improvements in horticultural production and processing to ensure reduced chemical residues and pollutants, increase organics to and more traceability, and related Improved quality produce likely to have some positive impact over time.

8.4 Communication and dissemination activities

8.4.1 In addition to numerous less formal meetings, discussions and presentations, project findings were presented as follows during 2017-20 (Incomplete list):

1. *Ahsan Rana*
   - Series of presentations to the Prime Minister's Working Group on Agriculture
   - Presentation at a policy dialogue in LUMS attended by Punjab Finance Minister, Chairman Planning and Development, Finance Secretary and Secretary Agriculture
   - Multiple presentations to and discussions with senior leadership of the Punjab Agriculture Department including the Minister and Secretary of the Department (on going)
   - Lectures at LUMS to participants of Executive Certificate in Agribusiness and to graduate students in Environmental Studies
   - Lecture to participants of National Management Course at the National School of Public Policy
   - Numerous presentations at various stakeholder consultations

2. Jikun Huang

   - Two presentations in August 2017 on Chinese experience to Pakistani scientists in PARC/NARC and to Planning Commission

3. Aneela Afzal
   - Presentations of versions of the gender in horticultural value chains paper at 3 international conferences (all *externally* funded, no project funds used):
     - *Actions for a sustainable world: from theory to practice*, University of Messina, Italy: 14 June 2018
     - *International Conference on Agriculture, Animal Sciences and Food Technology*, Sultan Zainal Abidin University, Malaysia, 31 October 2018
     - *Seeds of Change conference*, University of Canberra, 2-4 April 2019.

4. Thilak Mallawaarachchi

   - Mallawaarachchi T, Ejaz N, Rana A, Khan H (2020) Horticultural market reform in Pakistan: A platform for rural transformation. Paper presented at the Mini-Symposium: where to next for applied economics and policy research in Australia's international development effort? AARES2020, The University of Western Australia, Perth, 11-14 February,
   - Mallawaarachchi T. (2020) Horticultural market reform in Pakistan: A platform for rural transformation. Paper presented at the AIK SATH Workshop of UQ ACIAR Pakistan project group, The University of Queensland, Brisbane, 21 February,

9. Conclusions and recommendations

9.1 Conclusions

The project produced a comprehensive body of analytical research on (a) marketing systems and channels from farm gate to final markets, and (b) market performance, and prospects (including export prospects to China following CPEC), provided skills and training in many aspects of agricultural value chain modelling and analyses, and exposure to lessons from international (including Australian and Chinese) experience. We found that all three studied crops (mango, tomato, and chilli) face increasing demand, and mango and chilli also have good export potential, but need to improve quality, reduce wastage, raise standards, and conduct better marketing. To achieve these the horticulture sector must be moved from its 'low quality-high-cost' equilibrium to attract new dynamic firms, and integrate smallholders into modern value chains.

From the analysis of research data from a variety of sources, including key informants, that provided a rich picture of the complexities of the marketing channels and market structures, and the application of rigorous theory in the analytical work. In seeking sources of market inefficiency in the market structure, we looked for sources of non-competitive behavior. We discovered that the Commission Agents were the only market agents who have legislatively protected source of market power. The revenues that accrue to them are not very much on a per unit basis but very large given the volumes of transactions). Thus it became clear that this should be the focus of legislative reforms in these markets.

The high costs incurred in the marketing chains are not only a result of rent extraction by the *Arhtis*, but also a result of under-developed markets for capital and insurance, and the costs of small-scale trading and poor quality public and private facilities. *Arhtis* also provide a range of vital services to producers and small traders, including the supply of credit and mechanisms for risk sharing. The *ties between them and Ahtis endure – and will continue to endure – so long as there are no viable alternatives in the present circumstances.*

This means that a ***combination of legislative/regulatory changes and complementary institutional reforms is necessary***. First, the archaic regulatory system that concentrates market power in the hands of a small group of licensed Commission Agents (*Arhtis*) who control market access must be reformed. Second, initiatives involving public-private partnerships must be implemented to ensure that the many essential services currently provided *by Arhtis* continue to be provided, with *Arhtis* themselves able to operate but in a more competitive environment.

Our set of policy recommendations takes account of this reality. Legislative reforms that weaken the monopoly power of Arhtis in markets will be a positive step as that will enhance competition in that space, but more efficient alternatives must be developed over time to complement the legislative reforms. In other words, institutional reforms (and institutional innovations) are also necessary.

We would not have achieved the successes and impact without our rigorous and honest analytical approach, and clear formulation of realistic, practical, concrete policy recommendations. But the project success also owes much to the emphasis we placed on building up of relationships with key stakeholders during the research process. As Place and Hazell (2018), drawing lessons from country programmes of the International Food Policy Research Institute (IFPRI) pointed out, while developing relationships of trust and credibility with local policy makers and stakeholders are essential, it should be noted that "establishing credibility and trust takes time, good research, and good partnerships" (p.22). We invested the time and effort.

Our experience also highlighted the need for policy projects to have strong involvement not only with scientists but also with influential industry stakeholders and senior

government officials involved in formulating agricultural sector policies affecting prices, tariffs, taxes and subsidies, marketing and export promotion etc. In this project, we were particularly fortunate to have a person of the calibre of Mr Arif Nadeem involved from the very inception; his extensive experience, deep commitment, strong links with both the public and private sectors, and understanding of the political systems and processes, was a key factor in guiding the project through to achieve successful policy impact.

It is a well established lesson in policy research literature that policy impact takes time, requires investment in building up interactive relationships with key personnel, and there is a high pay off for the continuation of those relationships. The confidence and trust built up in Pakistan among senior public service officials and private sector personnel for our policy research and expertise is a very valuable asset that should be maintained and fostered for effective research engagement in future.

9.2 Recommendations

Our central policy recommendation is to ***reform the archaic regulatory system that concentrates market power in the hands of a small group of licensed Commission Agents (Arhtis) who control market access***.

This recommendation has already been acted on by the Punjab legislature.

We hope that similar reforms will be extended to all markets in the country.

These reforms to the regulatory system must be followed up with *complementary institutional reforms to ensure that the many essential services currently provided by Arhtis continue to be provided*. *Arhtis* should be able to continue to operate in a more competitive environment.

As mentioned earlier, Pakistan's agriculture markets are locked in a 'low-quality-low price' equilibrium due to lack of credible mechanisms for certification of quality. In the absence of quality certification, buyers (including potential foreign buyers) do not have the incentive to pay a premium and producers do not have the incentives to produce premium quality. Moving these markets from the 'low-quality-low price' equilibrium requires credible sorting mechanisms that distinguish high quality from low quality, and appropriate incentives to producers and traders to invest in quality orientated handling practices. In their absence, the market is unable to measure and reward quality. The system suffers from poor infrastructure and lack of innovation, and there is a clear need to introduce better product handling, product-specific packaging, and transit conditions that prolong shelf life, etc. This is important in the context of both local and international market.

The specific recommendations for market reforms also link up with recommendations for export development below. Well-functioning markets that generate incentives and transmit them through the marketing chain are essential for achieving the required quality improvements to deliver better serve Pakistani consumers, and to penetrate export markets.

The following are recommendation with overlapping objectives and targets.

9.2.1 Build a country reputation for food safety and quality

In export markets for horticultural products, it is important to develop and establish a country brand for quality, both for entry into foreign markets, and for targeting potential customers. While private sector initiatives are the driver of export growth, government also have a major role here.

A reputation for quality is very important for *market entry* as food products need to meet importing countries' Sanitary and Phytosanitary (SPS) standards and other quality specifications. Private exporters confer both good and bad externalities to each other in

terms of the country brand. A consignment from one firm that fails to meet standards and is rejected from a country raises costs not only for that firm but also for all other exporters from that country; all exports from that country can be penalise, subjected to greater scrutiny and costly testing, or being excluded altogether. This is illustrated by the difficulties experienced by Pakistan in exporting chill, once some exports were found to have high levels of aflatoxins.

Government must (a) set up a strong, credible, well enforced, regulatory regime to ensure that exports are inspected and certified before leaving the country, so that the country establishes and maintains a reputation for meeting standards of hygiene and safety, and (b) government invest to provide testing and certification facilities in a country where horticulture is dominated by smallholders and small firms.

This is also essential for penetration of niche markets, such as those in *organic products*, where credibility of quality controls and standards, traceability etc. is essential for market success.

9.2.2 Build a Pakistan brand[11]

In global markets for food products, typically the product is differentiated by country of origin – think of French wine, Indian mango, Ceylon Tea, NZ kiwi fruit.

There is no such market recognition for Pakistan mangoes, despite their distinctiveness and high quality. It is practically unknown outside the Pakistan (and some segments of the South Asian) diaspora.

This is an urgent issue that needs a government initiative to establish public-private partnership.

A country brand is not the same as a specific company brand. Companies can develop their own distinctive brand and also leverage off the national Pakistan brand.

Building a country brand requires a *coordinated effort* that brings both private exporters and the public sector into joint action. Private firms will not invest (or invest adequately) in building up a country band because competing other firms can free ride on their investment. In any case, the initial investment is high, and support from government agencies and trade promotion agencies is needed.

Country branding for agriculture more generally will develop the image of Pakistan as a producer of quality agricultural produce, enabling long term export development of a range of agricultural commodities In the case of mangoes, Europe and China represent an opportunity for increasing of mango exports of Pakistan to an international audience beyond the Pakistani diaspora.

The key initial step is to clarify jurisdictions between TDAP and PHDEC and then develop long term targeted and on-going marketing programs focused on the international consumer experiencing the Pakistani mango. This would include working with international retail channels, as well as demonstrating usage of and tasting of Pakistani mangoes.

9.2.3 Links with Super Markets and Export Expos:

Whereas creating credible International brands and quality assurance might take sometime, the following strategies might be useful in the short to medium term.

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[11] See Hassan (2018) for detailed analysis of export market issues

1. Create links with super market chains for export, devising a mechanism to guarantee quality. This would require a wider group of customers instead of the traditional Pakistani diaspora that is settled overseas. There is lack of basic research on the taste and preferences of the targeted markets.
2. Organize export expos: The government of Punjab started a 'Model Form Project" led by Kashif Jamshed, a member of our advisory committee. The project is due to be completed in June 2021, which created clusters of farmers as an intervention to guide them from farm-to-plate. Clusters comprise of 10-15 farmers with combined land ownership of 500 acres/cluster. This initiatives provides professional training to farmers, leading to certification, and encourage them to market their produce directly than through a middle man. These farmers grade and sort products into different grades using plastic crates (the idea of plastic crates was picked from our project and their project benefited from our primary reports). PAMRA holds biannual expos in Lahore where 40-50 buyers are invited from international markets (all expenses paid) and introduced to the local farmers. Most belong to the Middle and Far Eastern countries. In addition, exporters are linked with the clusters in the hope that they can act as patrons.

9.2.4 Use a third party (PMEX) to guarantee quality:

Whereas it is useful to organize export expos and create links with Super Markets, PMEX (Pakistan Mercantile Exchange) could play a pivotal role in efficiently connecting potential buyers through its online platform; expanding the market; as well as, serving as a guarantor of quality (which is one of the major hinderance to export). PAC (Pakistan Agriculture Coalition), one of the partner in this project, had a pilot project on Chilli, using a similar model where PAC and PMEX guaranteed quality. PMEX online trading facility could be used to connect premium buyers domestically as well as internationally with producers (clusters) and wholesale markets. The wholesale markets, however, needs to be modernized.

9.2.5 Connect Wholesale markets with premium buyers online.

The government, as we know during our meetings with key stakeholders, is working with ADB to develop four model wholesale markets. This is a timely initiative. These new wholesale markets could be connected with premium buyers, including exporters through PMEX (Pakistan Mercantile Exchange) online trading where PMEX could guarantee the quality (like the PAC Chilli pilot project). This would be critical in the absence of credible brands and establishment of loyal clientele in the domestic as well as international market.

9.2.6 Agri-development hubs with an export orientation: integrate into modern value chains

Establish agricultural development hubs as public private producer partnerships (PPPP) and be based on financially sustainable and for profit models in farming areas.

The New wholesale market initiative by the government is a timely initiative. These new wholesale markets could be connected with premium buyers through PMEX (Pakistan Mercantile Exchange) online trading where PMEX could guarantee the quality like in the PAC Chilli pilot project. This would be critical in the absence of credible brands and establishment of loyal clientele in the domestic as well as international market.

They can equip smaller farmers to export, to provide stable supplies for exporting farms, export readiness trainings and certification (GAP etc.), transport, centralized sorting, grading, packing and value addition processing and cold storage facilities. These will enable more farmers to enter the export arena by acting as regional support hubs and enable export-oriented firms to integrate directly with farmers. They may also facilitate contract farming on modern lines.

Meeting export market requirements requires good agricultural practices and testing and certification facilities, but increasingly many export markets also require traceability of the product. This is almost totally lacking in Pakistan, but research shows that if growers perceive benefits from traceability, and they can be provided with necessary training, they can be motivated to implement it.[12] Contract farming and similar institutional mechanisms can play an important role here too.

9.2.7 Special Agricultural Economic Zones: CPEC

Special economic zones are being established along the CPEC. However, they are not primarily focused on agriculture, but rather along industry and energy power. To enable mango farmers as well as other crop farmers to benefit from CPEC, special economic zones with agri-development hubs focused along the agriculture regions that CPEC passes through, should be developed. The node cities that the corridor passes through key agricultural belts.

9.2.8 Streamlining the data collection and dissemination

One of the concerns we have had throughout the course of this project is the non-availability of reliable data on several important variables. Although collecting daily data on auction prices and quantities in the wholesale markets throughout the day is the mandate of the market committee, there are serious concerns in this respect. For instance, in all the major markets the participants indicate that representatives of the committee are not present at all the auctions and tend to rely on commission agents to provide them with auction information.

An important data gap that needs to be remedied quickly Is the absence of systematic regular collection of farm gate prices. When supply chains get disrupted, as during restrictions and other factors during the COVID19 eruption, farm gate or village level prices are very important to get a reliable picture of conditions in rural areas, and the impact on supply chains.

Further, the collected data is often not publicly available, except in Lahore where data on prices and, more recently, arrival quantities is stored electronically and made available to the general public (www.amis.pk). However, this is a relatively recent practice. Information is available before that with the committee but on paper/forms. If, in the medium term, this available data may be systematically organised electronically in major cities that will be a source of information for more reliable estimation of costs, revenues, product flow, profit margins, etc.

More immediately, a feasible way of gathering information on daily arrivals/volume, place of origin, freight charges etc. may be to collect data at points of entry to the destination city. At these points the vehicles have to pass through tax collection points (*mehsool choongi*) and pay excise based on the bill of lading. This will create a map of the source and sink markets which is very useful for analysis.

The analysis of spatial market integration pointed to some puzzling behaviour across markets, such as persistently lower prices of tomatoes in some regions (compared to others) not only during they harvest period (when they net exporters), but also during their non-harvesting period when they are net importers. These require further analysis but necessary data on product flows over time are lacking.

The sector will benefit greatly from using technology in creating a digital record of this data. This will not only create a credible source of information which will quite useful in

[12] Ghafoor (2020)

academic research but will also facilitate modernisation of the marketing system by improving the flow of information, allowing authorities to identify the source of the supply in case of emergency, improve the transmission price and better connect the wholesale markets with progressive farmers.

Such information, for example, can help us to provide a solution based on the cobweb pattern of production in the horticulture sector seemingly in clear conflict with the conjectures of rational expectations models of behaviour; if produce is sold at a higher price in one year the farmers receive a signal for increasing production in the following year but when all the farmers produce the same good, the oversupply of the produce leads to low prices leading to low production and higher prices in the year that follows. Lastly, this would also help the government in documenting this important sector and improve price transmission.

9.2.9 Gender equity

Market reforms will also contribute to greater female empowerment through employment, incomes and direct access to incomes, as modern horticultural value chains increase processing, grading, sorting and other activities. Government must incentivise firms to involve women in modern supply chains and assist rural women to access skills, education, assets and finances. They may be actively involved in the data streamlining project as suggested in recommendation 9.2.8.

10. References

10.1 References cited in report (not included in list of publications produced by the project)

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10.2 List of publications produced by project

All outputs will be placed in a drop box.

Papers:

1. Rana, M., A. 2018. Commissions and Omissions: Agricultural Produce Markets in Pakistan. Working Paper No. 01/18 for ACIAR Project No. ADP/2014/043. Monash University.
2. Ali. T, Huang, J. and Wei, X. 2018. Effect of China-Pakistan Economic Corridor on Bilateral Trade withFocus on Horticultural Commodities. Working Paper No 02/18 for ACIAR Project No. ADP/2014/043, Monash University. (Revised, 2019)
3. Huang, J. and Cui, Q. 2018. Food consumption Pattern Change and Horticulture Consumption in China. Working Paper No. 03/18 for ACIAR Project No. ADP/2014/043. Monash University.
4. Jalil, A. and Khan, H. 2018. Consumption Patterns and Demand Elasticities of Selected Horticulture Products in Pakistan. Working Paper No. 04/18 for ACIAR Project No. ADP/2014/043. Monash University. (Revised, 2020)
5. Afzal, A., Jayasuriya, S., and Meehan, S. 2018. Gender Issues and Horticulture Markets in Pakistan. Working Paper No. 05/18 for ACIAR Project No. ADP/2014/043. Monash University. (Revised, 2020).
6. Mallawaarachchi, T. and Ahmad, S. 2018. Improving Market Performance of Pakistan Horticulture Industries:Some Initial Insights. Working Paper No. 06/18 for ACIAR Project No. ADP/2014/043. Monash University.
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12. Khan, H, and Jayasuriya, S. 2020. The sources of Tomato price fluctuation across cities in Pakistan. Project working paper (unpublished). ACIAR Project No. ADP/2014/043.
13. Ali, Tariq, Huang, J., and Xie, W. 2020. Assessing economic impacts of China-Pakistan Economic Corridor on Pakistan and China. Project working paper (unpublished). Project working paper (unpublished). ACIAR Project No. ADP/2014/043.
14. Ghafoor, A. 2020. Assessing the Knowledge and Attitude of Growers towards Traceable Mango Value Chain in Pakistan. Project working paper (unpublished). Project working paper (unpublished). ACIAR Project No. ADP/2014/043.

15. Mallawaarachchi, T., Ahmad, A., Ejaz, N. and Rana, A. 2020. Making Pakistan's horticulture more responsive: Some insights from Australian reform experience. Project working paper (unpublished). ACIAR Project No. ADP/2014/043.
16. Anwar, J., Ibrahim, M. , N, and Mallawaarachchi, T. 2020. Developments in livestock marketing in Pakistan: a case study of Cattle Market Management Company operated model markets and traditional cattle markets in Punjab. Project report. Project working paper (unpublished). ACIAR Project No. ADP/2014/043.

Reports:

1. Mangan, T. and Rutbah, U. 2018. Preliminary Report on the Growers'and Marketing Channel Surveys (Chilli) in Sindh. Draft Report No 01/18 for ACIAR Project No. ADP/2014/043. Monash University.
2. Mangan, T. and Rutbah, U. 2018. Draft Report on Mango Farm Survey in Sindh, Pakistan. Draft Report No 02/18 for ACIAR Project No. ADP/2014/043. Monash University.
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9. Ghafoor, A., Adeel, A. and Maqbool, A. 2020. Supply Chain of Mango in Pakistan. Draft Report (unpublished) for ACIAR Project No. ADP/2014/043.
10. Anwar, J., Ibrahim, M. , N, and Mallawaarachchi, T. 2019. Livestock marketing: a case study of Cattle Market Management Company administrated and traditional cattle markets in Punjab,. Draft Report (unpublished) for ACIAR Project No. ADP/2014/043.
11. Qasim, M., Farooq, W., Akhtar, W., Majeed, S., and Rani, S. 2020. Production, Marketing and Value Chain Issues, of Guava in Punjab. Draft Report (unpublished) for ACIAR Project No. ADP/2014/043.

Policy Briefs:

1. Rana, M., A. 2019. "Agricultural Produce Markets in Pakistan". Policy brief (unpublished) for ACIAR Project No. ADP/2014/043.
2. Ejaz, N., Shah, A., Khan, H. 2019. Issues and Problems in Mango Marketing. Policy brief (unpublished) for ACIAR Project No. ADP/2014/043.

3. Shah, A., Raza, H. and Khan, H. 2020. E-Trading of Agriculture Commodities on PMEX: Pakistan Agriculture Coalition's Pilot Project on Chill and its scalability. Policy brief (unpublished) for ACIAR Project No. ADP/2014/043.
4. Khan, H. and Jayasuriya, S. 2018. Understanding Export Challenges and Potential for Mangoes and Chillies. Policy brief (unpublished) for ACIAR Project No. ADP/2014/043.

Other:

1. Gul, A. 2020. An Econometric Analysis of Marketing Challenges Faced by Horticultural Farmers in Pakistan: Case Studies from Punjab and Khyber Pakhtunkhwa. PhD Thesis, Macquarie University.
2. Gul, A 2020. Impact of Middleman-Reliance on Marketing Choices and Profitability of Tomato Growers in Punjab (unpublished paper – under revision)

11. Appendixes

11.1 Appendix 1 (a) and 1(b): MTR review report and response

Response to the Review Report

We attach a revised Final Report that addresses the main comments and recommendations of the Review Report and the lessons from the project experience for future ACIAR policy projects as requested by Howard Hall.

We are very pleased that the reviewers have recognised and accepted that this project has over-achieved in terms of impact.

The monograph currently in preparation – expected to be ready for publication by April 2021 - describes the methodology and approach, the main research findings and policy recommendations, the impact and achievements so far, and elaborates on the lessons for future ACIAR policy projects.

We agree broadly with the reviewers that (a) the initial selection of the team in Pakistan (which was not made by the Project Leaders in Australia) could have been done better, (b) that the team became larger than optimal and cumbersome to work with because we had to add new members to address clear weaknesses but could not drop others, (c) not all (Pakistan) team members benefited equally in terms of capacity development, and (d) that there were no concrete recommendations for improving gender equity.

In this note we will first summarise how we have addressed their specific recommendations (presented below in italics), and also respond briefly to other issues they have raised.

Review Report Comments/Recommendations and our responses:

We make the following recommendations to the Project Team:

1) Project documentation needs to be made available to the global audience as soon as possible. We recommend the project team approach Gerard McEvilly to set up a project website within the Aik Saath program. All project documents currently in Dropbox should be made available on this website plus any other documentation (presentations, meeting notes etc.),

2) The Final Report should address the following points:

a. A clear list of project documents. The current Excel file does not make it easy for the reader to peruse the list of documents. This list of project documents will then make it easier to cite more clearly the documents prepared for each activity within the activity tables in the Final Report (Section 6 of the Final Report),

b. We raise concerns that there remain the gaps in the research. We ask the project team to either mention how they did address these points, or provide reasons for these gaps:

- Estimation of the costs of market inefficiency,
- The efficiency and distributional impacts of policy recommendations on producer and consumer welfare with particular attention to gender and poverty dimensions,
- Demand projections for horticultural crops and likely shifts in consumer preferences, and
- Reasons for assumed poor export market potential for tomatoes,

c. Other remaining research gaps and opportunities for future research. We ask the research team to highlight these gaps and opportunities for consideration by ACIAR in future projects,

d. A clear and detailed publication plan to show how they will seek to publish material in a book/monograph and/or journal articles for each project output

e. How the project team intends to make survey and other data openly available.

In addition, they also suggest elsewhere in the report that: "*We recommend that the Final Report include all recommendations from the project, outlining those that have been achieved and those that have not*" and, "*The Final Report does not clearly summarise what the team did, how they did it and why it succeeded. This is discussed in the body of the report, but requires the reader to dig into the detail to understand this. We recommend these aspects of the project be summarised in the Executive Summary*."

We address all of the above in the attached revised version of the Final Report. We will respond positively to any requests from ACIAR to assist with the dissemination of project findings and follow up activities, while pursuing dissemination through normal academic channels of journal and book publications as planned and scheduled.

Our responses to the specific recommendations are as follows.

A. Review Comment on project documentation

- A clear list of project documents. The current Excel file does not make it easy for the reader to peruse the list of documents. This list of project documents will then make it easier to cite more clearly the documents prepared for each activity within the activity tables in the Final Report (Section 6 of the Final Report),
- Project documentation needs to be made available to the global audience as soon as possible. We recommend the project team approach Gerard McEvilly to set up a project website within the Aik Saath program. All project documents currently in Dropbox should be made available on this website plus any other documentation (presentations, meeting notes, etc.).

Response:

- We have prepared and attached a (hopefully clearer) version of the list of project documents to the revised Final Report (hereafter RFR). See 10.2
- These and all other related documents will be provided to Gerard McEvilly as soon as possible to be placed on a website within the *Aik Saath* program.

B. Review Comment: The Final Report should address the following points:

a. A clear list of project documents. The current Excel file does not make it easy for the reader to peruse the list of documents. This list of project documents will then make it easier to cite more clearly the documents prepared for each activity within the activity tables in the Final Report (Section 6 of the Final Report)

Response: A new list has been prepared and attached to the RFR.

C. Reviewer Comment on concern about research gaps:

"We raise concerns that there remain the gaps in the research. We ask the project team to either mention how they did address these points, or provide reasons for these gaps:

- Estimation of the costs of market inefficiency,
- The efficiency and distributional impacts of policy recommendations on producer and consumer welfare with particular attention to gender and poverty dimensions,

Response: Yes, we did not quantify the costs of market inefficiency for reasons elaborated below. We focused on achieving the major goals of the project, rather than mechanically conduct all the research exercises that we had planned before we got into the actual research process and understood the complexities and ground realities of the situation.

We elaborate below in detail the reasons for not quantifying welfare changes because the comments of the reviewers are based on a flawed understanding of the underlying theory and related empirics of welfare analysis in multi-stage markets where market intermediaries have market power.

As our fundamental motivation and focus of this research project was on the efficiency of the marketing system, and because our analysis of domestic market integration confirmed the existence of market inefficiencies, we could not (and did not) make the conventional, but quite unrealistic, assumption that the marketing system is a well-functioning, perfectly competitive system.

Making that assumption would have been tantamount to assuming away the central problem of market inefficiency, the focus of our research (see Sexton, 2013, for a general review).

The methodological approach and models followed the modern approach to analysis of food supply/value chains in treating the system not as a simple single stage production-distribution system but as a multi-stage system with one or more intermediary stages between producers and consumers. This general approach drew in particular on the methodological and analytical literature on competition policy, including the comprehensive OECD report (2014) on *Competition Issues in the Food Chain Industry*, and also on the broad conceptualisation of issues as set out in the seminal Australian report, The *National Competition Policy: Report by the Independent Committee of Inquiry* ('Hilmer Report').

We conceptualized the marketing system, in its simplest form, as being formed of, at least, three stages: the farm-level production, the marketing intermediaries, and the retailing stage. The value added produced by the marketing chain is distributed among all the players in the marketing chain. In the presence of market power at any stage of the chain, some agents might extract monopoly or monopsonistic rents at the expense of producers or consumers. In other words, marketing margins charged by the intermediaries would be higher than warranted by economic costs of the services provided. This has important implications not only for price transmission through the marketing system, but also for conventional economic welfare analysis, including analysis of the impact of tariff and other 'border price' changes (see McCorriston, and Sheldon, 1996).

In particular, *the standard approach to quantifying welfare gains for consumers and producers breaks down in the presence of market intermediaries with market power*. Typically, when market intermediaries are able to exercise market power, price transmission is inefficient. changes in tariffs or other exogenous impulses are not fully passed through and changes in consumer surplus will be lower than that commonly measured by conventional analysis. Thus, for example, if import tariffs are reduced, then the conventional measure of the increase in consumer surplus overestimates actual change, with the extent of overestimation depending on the nature and degree of market power. In principle, producers and consumers may also have market power, and the impact on welfare and price transmission will depend on the specific circumstances.

Economic theory on this issue is clear and unambiguous: If there are market intermediaries, the analysis must know the extent and nature of their market power to draw conclusions about the extent of price transmission, and hence of changes in welfare associated with any exogenous impulses.

This is why, with respect, we do not accept the suggestion by the reviewers to adopt the approach used in the ACIAR Pakistan pulses project to quantify welfare changes. That methodology assumes that market intermediaries are efficient. This is theoretically invalid

and empirically misleading in the context of agricultural markets that have market intermediaries and are not perfectly competitive, as in Pakistan (and indeed in most countries). By assuming that tariff changes are fully passed through to consumers and farmers, the analysis overestimates, by an unquantifiable extent, the actual welfare changes.

The issue here is not whether partial equilibrium analysis or general equilibrium analysis is used – both can be used for welfare analysis; the issue is unavailability of good reliable accurate data to model and quantify the monopolistic behaviour patterns of the intermediaries.

As explained in the final report, it was impossible to obtain the necessary numerical data for a theoretically valid analysis. That is why we relied on, and emphasised the value of, a 'mixed methods' approach – a combination of quantitative analysis and qualitative information. As mentioned in the final report, and as Nauman Ejaz, Ahsan Rana and Anwar Shah explained in their presentations, Commission Agents (*Arhtis*) and other intermediaries were unwilling to provide such data. Such data is also not provided to public marketing or taxation authorities, and is not available in the public domain.

We spent a lot of time and effort – described and detailed in the papers and in the presentations at the workshop – to dig deep and understand the nature of the marketing chain and the roles of the intermediaries, by working through industry contacts to meet and interview many people involved in the marketing chain, including Commission Agents (CAs -*Arhtis*). Many CAs gave us a lot of qualitative information and some quantitative information on a strictly confidential basis because our researchers were introduced by trusted industry sources. We used all these data we could collect to identify sources of inefficiencies and to pin down the reason behind the inefficiencies which led to concrete and practical recommendations. For example, we used our survey data to quantify marketing margins at different nodes, explained what inefficiencies explain those margins and, using economic theory, analysed the manner in which large – but not precisely quantifiable - monopoly (a single seller) and monopsony (a single buyer) rents were extracted.

This made it possible for us to differentiate between the very important services CAs provide and the market power they have and use through their privileged access to market spaces through licences. This allowed us to provide a much more accurate and nuanced description of their role in the marketing system, rather than paint them as 'middle men who exploit farmers and consumers'. Many reports of marketing systems in Pakistan had pointed to high margins between producer and consumer prices and concluded that all of that was exploitation by middlemen. We managed to change this mind set and drew attention to the real reasons why CAs are able to extract some monopoly and monopsony rents (unjustified margins) while part of their revenues were quite justified because they provide some essential services.

Our nuanced analysis of the specific roles of middlemen convinced policy makers that we were not simply 'bashing' commission agents, and helped us to convince policy makers that enabling (in practice) an enduring monopoly over market licenses in the APMs was detrimental to marketing efficiency and industry performance. Our study was not seen as a crude number crunching exercise. Policy makers respected our findings because they showed the depth of understanding we had gained through meticulous research about the complexities of the marketing system. Fortunately, policy makers understand that market intermediaries (Commission Agents) do not, and will never, release such data that expose their monopoly profits. They are fully aware of the enormous profits made by CAs, and that's why they mentioned many times (even at the final review workshop) that 'reforming markets' is the hardest challenge of all.

For the same reasons, we did not provide quantitative assessments of the impact of policy reforms. Without reliable data on intermediaries' actual costs - that is realistically impossible for us, or any other researchers, to obtain in the current circumstances (as the

recent Pakistan's high court case on sugar millers illustrated) - we cannot quantify with any degree of accuracy the magnitude or the relative distribution of those benefits between consumers, producers, the poor, and women.

This is not a matter of our not trying, or of being constrained by time and resources. Such data is, realistically and practically impossible to get, not only in developing countries like Pakistan, but even in developed countries. This is why rigorous quantification of the impact of market power in food chains and the quantitative measurement of the impact of their removal is so rare.

Fortunately, they are not essential for the purposes of a policy project. Policy makers do not have a quantification fetish that many economists have. They can be convinced by sound arguments backed up by evidence, including qualitative data when rigorous quantification is not possible.

Yes, we didn't produce numbers for welfare effects, but we marshalled a large body of evidence, and made the case, *in ways that were sufficiently persuasive to policy makers*, that marketing reforms that enhance competition, improve efficiency and facilitate entry of new dynamic players into the horticultural industries will have positive effects. *For example, we pointed out that even if reforms produce a (very small) 1% reduction in marketing costs, that will imply gains of over PKR 5 billion per year. Such effects will not only benefit producers, consumers and the poor, but, possibly, also help to improve gender equity because the industry is likely to be able to attract new dynamic firms.*

We have added further clarification in the RFR; see 5.1.2 d

D. Review comment on demand projections and tomato exports

- Demand projections for horticultural crops and likely shifts in consumer preferences, and
- Reasons for assumed poor export market potential for tomatoes

Response: As mentioned in the final report, we reviewed the large existing literature on horticultural crops and concluded that we did not require detailed new projections to recognise that with growth of population, income, and urbanisation, demand for all three products will continue to grow very substantially, while supply has continued to increase. There was a consensus among industry experts and policy officials that the major policy issue in the case of mangoes and chilli was domestic constraints on meeting standards to penetrate external markets. This being a policy project, we decided, correctly we believe, to focus on how these constraints could be addressed through marketing reforms.

However, as mentioned in our report, our demand system analysis provided information on consumer demand shifts: growth of domestic mango demand will lag behind income growth, ensuring enhanced potential for export growth without a large impact on domestic prices, while demand for tomatoes will outstrip domestic income growth placing ongoing pressure for larger imports.

We did not conduct analysis of *export potential for tomatoes,* because in the case of *tomatoes*, a politically sensitive food crop, domestic demand has been increasing substantially, while domestic prices have been quite volatile. Though Pakistan occasionally exports small quantities of tomatoes to Afghanistan, it is primarily a net importer. Available studies of international competitiveness suggested that, absent a major leap in productivity, Pakistani tomatoes would be unlikely to have high export potential. Meeting domestic market demand is likely to remain the major challenge, at least in the medium term.

Our review of the literature, our discussions with industry and government agricultural trade policy officials, the urgent and pressing challenge for Pakistan – both immediately and in the foreseeable future – is how to meet rapidly rising domestic demand. (Pakistan does export small quantities of tomatoes in the peak supply season when, because of an absence of adequate storage and processing facilities, it disposes of regional gluts to

neighbouring countries such as Afghanistan at very low prices.) The inability to meet domestic demand, despite significant supply increases, has resulted in persistent pressures to import. According to the most recent Global Tomato Industry Report 2020, "…*Pakistan emerged as the fastest growing importer in the world, with a CAGR of +27.5% from 2007-2018",* despite the fact that Pakistan tried to reduce imports by banning imports from India (for balance of payments reasons as well as political reasons). But it has been forced to switch to imports from other countries, such as Iran, to bring down domestic prices and placate irate consumers. As anyone who follows Pakistani news and economy knows, high domestic prices of tomatoes are a trigger for consumer protests (a quick Google search shows Pakistani news media headlines about 'skyrocketing' tomato prices in both 2019 and very recently in 2020).

This is well known and recognised by industry, government and all well-informed academic experts.

The policy issue of relevance and interest in the Pakistan tomato industry is how to enhance domestic supplies and, to the extent possible, efficiently store production in the peak season to meet low season demand. Marketing reforms that can facilitate entry of modern supply chains and investments in storage and processing can contribute to meeting this real policy challenge. We focused on that rather than diverting our time and efforts to analysing the global market potential for Pakistani tomato exports. That would have been a futile exercise, having no policy relevance in the foreseeable future.

We have added an explanation along these lines to the RFR – see the discussion of tomatoes in 5.1.2 subsection c.

E. Review Comment on research gaps and opportunities:

- Other remaining research gaps and opportunities for future research. We ask the research team to highlight these gaps and opportunities for consideration by ACIAR in future projects,

Response: We have added a list of remaining research gaps and opportunities in the RFR; these are related to some of the major recommendations in section 9.2 which are now extended. These recommendations are broadly classified into four categories, and point towards directions for future research.

1. **Lack of a credible mechanism to certify quality:** Our report argues that Pakistan's agriculture sector is locked in a 'low-quality-low price' equilibrium due to lack of a credible mechanism to certify quality. Buyers do not have the incentive to pay a premium and producers do not have the incentives to produce premium quality. Moving these markets from the 'low-quality-low price' equilibrium requires credible sorting mechanisms that distinguish high quality from low quality, and appropriate incentives to producers and traders to invest in quality orientated handling practices. In their absence, the market is unable to measure and reward quality. The system suffers from poor infrastructure and lack of innovation, and there is a clear need to introduce better product handling, product-specific packaging, and transit conditions that prolong shelf life, etc. This is important in the context of both local and international market. Please see recommendations 9.2.1 and 9.2.2 in the context of international market.
2. **Practical solutions to guarantee quality in the absence of credible brands**: We recommend that steps should be taken establish links with super markets and organizing export expos and that the planned wholesale markets should be connected with premium buyers, including exporters, through PMEX (Pakistan Mercantile Exchange) online trading where PMEX could guarantee the quality (like the PAC Chilli pilot project). This would be critical in the absence of credible brands and establishment of loyal clientele in the domestic as well as international market. Please see recommendations 9.2.3 to 9.2.7.

3. **Development hubs and Special Agriculture zones** as in recommendation 9.2.6 and 9.2.7 respectively.
4. **Streamlining the data collection and dissemination:** A major challenge faced by research projects on the horticultural markets in Pakistan is the non-availability of micro- and meso-level secondary data. Consequently, researchers have to resort to collection of primary data through surveys and interviews. We therefore recommend that the data collection be streamlined and receded digitally (Please see recommendation 9.2.8. We argue that the sector will benefit greatly from using technology in creating a digital record of the data available at different nodes of the market. This will not only create a credible source of information which will quite useful in academic research but will also facilitate modernisation of the marketing system by improving the flow of information, allowing authorities to identify the source of the supply in case of emergency, improve the transmission price and better connect the wholesale markets with progressive farmers. This could potentially create opportunities for the involvement of women in the Agriculture marketing chain.

F. F. Review Comment on publications:

B. A clear and detailed publication plan to show how they will seek to publish material in a book/monograph and/or journal articles for each project output

Response:

We are on track to disseminate research findings to a wider global audience on schedule and as planned in accordance with the timetable of activities in the project proposal.

There is a statement in the review report where, after referring to the legislative success and government adoption of our key policy recommendation, it goes on to say that: “This adoption pathway was not followed up with the extension of research findings to a wider global audience.” This is misleading because there was no failure on our part to follow up; we have followed the timelines and sequence of activities indicated in the project proposal.

We planned from the outset of the project to leave preparation of journal and book publications to the last stage of the project – *explicitly shown in the timelines in the approved project proposal* – because we wanted to focus on conducting research and undertaking dissemination with a focus on policy impact.

We recognised from the outset that our priority was to understand in-depth the real complexities of the market issues, interact with stakeholders to develop realistic, practical policy recommendations, and then distil that experience and key findings to the wider global audience.

This involved a sacrifice on our part because for us, as academic researchers, the main payoff is in international publications.

Not every single project output will find an international audience but a significant proportion will. As the reviewers should appreciate, at this stage, publications in leading international journals can mean only *submissions* or *plans for submission* to journals, as final publications depend on journal referees and the time lag between submission and publication in leading international journals can be anywhere from 18 months to three years.

The main team output that pulls together the body of research findings and highlights the lessons for policy projects more generally is the monograph that is being drafted by Hayat Khan in collaboration with the team at the moment. This draft is expected to be finalised by the end of April 2021.

Most of the working papers and many of the draft reports are being prepared for journal submission by their authors. There have been several journal submissions already, some are being revised in light of review comments, and currently several team members are preparing more papers for submission to journals. We confidently expect several journal paper publications in well ranked journals.

A book that focuses on the regulatory market reform issues to be published by one of the world's best-known publishers of scientific research is being drafted by Ahsan Rana and Sisira Jayasuriya.

G. Review Comment on data:

C. How the project team intends to make survey and other data openly available.

Response: As explained, some information was provided on a strictly confidential basis by key informants accessed through our contacts. This was unavoidable given the circumstances in Pakistan's horticultural markets. All other survey data will be made available subject to standard confidentiality restrictions; this will be made available through a Dropbox accessible to ACIAR and project partners.

H. Review Comment on improving gender equity:

We undertook a detailed analysis of the role and involvement of women in the production and marketing of selected crops, and confirmed the findings of many other studies (see the list of references in the working paper on gender) that women contributed a lot to ***production*** in chilli and tomato (and to a lesser degree in mango) but had negligible involvement in marketing.

We did not undertake any case studies of women in marketing in these three crops, simply because such cases do not exist.

As described in the Working Paper on gender issues, the strong and deep-rooted cultural practice – including the specific manner in which 'Purdah' in Pakistan is practiced – severely restricts females from involvement in marketing activities where they may have to interact with non-family males, as well as from managerial control over farm assets. The Pakistani literature on this issue is vast – a representative set of references is provided in the paper. This cultural taboo also restricts the potential for female employment in factory-based activities. As shown in the paper, Pakistan has the lowest female participation in the garment and textile industry, one of the world's most female labour-intensive industries.

In the case of the three crops studied in this project, our focus was to explore the likely consequences and impacts of marketing reforms for these three crops. In the absence of any Pakistani cases that could provide direct case studies, we undertook an exhaustive review of the international experience. Unsurprisingly no such cases exist because there had been no marketing reforms in these industries in Pakistan.

The large international literature (surveyed in the Working Paper) shows that marketing reforms facilitate entry of new dynamic firms and modernisation of supply chains. *The primary impact on females is through the positive effect on labour markets, enhancing overall demand for labour and providing incentives for firms to expand female employment*. The increased demand for labour arises from the expansion of processing activities. Typically, that occurs through the establishment of modern factories in rural areas, i.e. through rural industrialisation. But in the case of Pakistan, the existing cultural taboos are likely to be a serious constraint in the foreseeable future – at least in the medium term - on factory-based female employment.

In this context, we could have easily made a set of very 'correct' recommendations that Pakistan should eliminate such cultural taboos, as many projects do. We do not need much research to make recommendations that call for 'elimination of discrimination against females in employment', etc. But long and extensive international experience, including Pakistan's own history of the struggle for gender equality, has shown that such

recommendations are not of much use in generating any real improvement in the conditions of women. Presenting such recommendations may satisfy the researchers' consciences or the reviewers' need to sign off that recommendations have been made, but they have no actual impact on real policy changes.

Instead of coming up with a set of high sounding but in practice empty recommendations, we looked for some relevant case studies outside the three crops to get a handle on how market reforms may affect rural women.

We were fortunate to have Aneela Afzal, a young female Pakistani researcher on our team with a background in agricultural extension and in sociology, significant exposure to international research (she was a Fulbright scholar at UC Davis), familiar with the international literature on gender, as well as having personally lived the reality of Pakistani women. Aneela was familiar with the case of Nestle, the multinational dairy company that has been active in Pakistan, successfully integrating small rural producers in their modern dairy operations. Nestle has claimed significant successes in their dairy projects, including successful engagement of rural women (several articles, reports, book chapters, and international fame, including mention in the Harvard Business Review). We conducted some initial studies of the Nestle projects, and the implemented detailed case studies (including surveys) in several villages where they operate. We found that Nestle had indeed used some innovative ways to involve women and they had achieved some success. They adopted methods to involve women that were socio-culturally acceptable, did not conflict with the practice of Purdah, and are practical. While the specific practices in the Nestle projects may not be directly relevant to horticultural crops, the approach is very relevant: *Pakistani rural women can be integrated into modern food supply chains provided dynamic firms enter the market and generate higher demand for labour, including female labour, AND innovatively develop socio-culturally acceptable practices*.

Unfortunately, this message from a younger female Pakistani researcher was not welcome to some of the senior scientists in Pakistan who had strong views about what kinds of gender studies must be undertaken and insisted that she follow their instructions. To her credit she stood her ground. That was not well received by some of the senior males, in contrast to the very positive reception in several national and international fora by researchers with expertise in gender studies.

We believe that our work on gender issues meets the objectives of this project. International experience and project research on the Nestle experience strongly suggests that improving market efficiency – the central research objective of this project – will facilitate entry of dynamic firms into the industry and enhance the position of rural women by generating new employment opportunities. We cannot and do not want to speculate as to what specific strategies such firms can or will use to involve females in sharing the benefits of value chain modernisation, other than point to the fact that, as demonstrated by the innovative approach adopted by Nestle, firms will find a way to employ women if the incentives are there.

Our concrete, realistic and practical policy recommendation for improving gender equity is therefore to move forward for fast implementation of market reforms, so that increased labour demand in crop processing will enable rural women to access formal employment and enhance their incomes.

> We have expanded this section to emphasise these points (7.2.4) and added to the list of policy recommendations; see 9.2.5

We would also like to draw attention of ACIAR to the need to nurture and empower female researchers, particularly junior young researchers, involved in gender studies in policy projects. They must be encouraged to take initiatives and present their viewpoints without feeling intimidated by males in senior positions, and their work must be assessed and reviewed by those with genuine expertise in gender studies.

I. Review Comment on capacity building:

D. “Collaboration across members of the team was at times weak, resulting in improvements in skills and knowledge capacity amongst some but not all project collaborators. Institutional and group practice change was not a strength of the project, with some project team members under-utilised in communication and extension processes.”

Here we want to point out that Project Leaders cannot always achieve optimal levels of group interaction and collaboration however much they try. While only one week-long training was done dovetailed with the Melbourne workshop, there were innumerable Skype calls and small group discussions. Not everyone participated, despite spending much time and effort to get them to participate and interact by Australia-based project leaders team as well as by other Pakistani team members.

The initial determinations on team size and Pakistani team member selection were made by the Research Program Manager, not by the Australian project leaders. The RPM wanted representation from as many important agricultural universities as possible.

With hindsight, it is clear that the initially selected team was not the ideal team for a policy project of this nature.

Unfortunately, the team lacked anyone with marketing expertise.

The team was a mix of some highly motivated and committed people and others who were not. A results and impact oriented policy project required researchers with a desire to learn new methods, to be flexible, to reach out to industry and policy stakeholders, and to establish interactive relationships that could facilitate a mutually productive collaborative learning process.

Some team members – fortunately not many –were not willing to make the effort to interact and equip themselves with a different approach, techniques and tools, and to devote time and effort to engage in the personal interactions with stakeholders required for a policy project.

Project leaders added new team members to ensure we could achieve project objectives, but avoided expelling researchers from the team to maintain harmony. This was a pragmatic choice, based on the desire to avoid unpleasant (and possibly counterproductive) disruptions to relationships in Pakistan, but meant the team size ended up being larger than optimal, and increased the administrative workload several fold.

The lesson that should be drawn is that initial team selection should be done very carefully to ensure that the team size is not overly large, but includes people with the right skills, expertise and motivation to achieve the specific project objectives.

In this project, we were particularly fortunate to have a person of the calibre of Mr. Arif Nadeem involved from the very inception; his extensive experience, deep commitment, strong links with both the public and private sectors, and understanding of the political systems and processes, was a key factor in guiding the project through to achieve successful policy impact. This is another important lesson for team selection for policy projects: *policy projects must ensure that the team has involvement not only with agricultural scientists but, very importantly, also with influential industry stakeholders and senior government officials involved in formulating agricultural sector policies affecting prices, tariffs, taxes and subsidies, marketing and export promotion etc.*