

**Partnerships and Value Chain Expansion (PAVE)**  
**for**  
**Inclusive Seed System**

**Systems Change Study**

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## Executive Summary

This report presents the findings of a qualitative study to measure systemic change of the Partnerships and Value Chain Expansion (PAVE) project in two districts of Gujranwala and Sheikhpura of Punjab Province in Pakistan. The study was conducted during December 2019 March 2020 by an external consultant with support from MEDA and Engro teams<sup>1</sup>. Primary data was collected from participating and non-participating women and men farmers as well as relevant public and private sector stakeholders through focus group discussions and in-depth interviews, whereas secondary data was collected through review of project documents, research articles and newspaper reports.

The study suggests that there is a huge gap between demand and supply of certified seeds and majority of smallholder farmers do not have access to certified seeds. On an overall basis, use of certified seed in the PAVE area smallholder farmers was negligible before the start of the project. Smallholder farmers were being excluded from seed multiplication programs and the advisory services initiatives. With PAVE intervention, smallholder farmers have been able not only to use certified seeds, but they have also learned to produce and multiply these seeds at local level for selling it to seed companies, including Engro, or other farmers. PAVE farmers have also received training on modern agricultural practices like zero tillage, direct seeding of rice, happy seeding, and tunnel farming.

PAVE farmers have become good and trusted seed suppliers and are contributing in reducing the gap between demand and supply of certified seeds both in commercial and local seed supply chains. When the quality is adequate, PAVE farmers can sell certified seeds to Engro but are not bound to do so. In fact, PAVE farmers have received adequate training on seed production and multiplication and in the future, they could continue to get premium prices on the seeds as gap between demand and supply of certified seeds is still significant.

Non-participating farmers have observed the results of using certified seeds and are adopting modern agricultural practices, they have started procuring quality seeds from PAVE farmers and seeking their advice to enhance their crop yields including the production of better quality seed ('copying' in market systems terminology). PAVE interventions have converted more than 50% smallholder farmers to certified seed use. Some resource poor smallholder farmers are, however, still not able to adopt certified seed use and innovative resource conservation practices, but they are well aware of the importance of certified seeds and modern agricultural practices. This is because they do not have enough financial resources to purchase agricultural inputs in cash and they procure these items from local vendors/middlemen on credit at a much higher rate.

There is emerging adoption of PAVE practices by public and private sector institutions who are now engaging with smallholder farmers, providing training on quality seed production and multiplication ('crowding in'). The PAVE program has also been able to attract the attention of

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<sup>1</sup> Pakistan based independent consultant, Mr. Sajjad Abro, conducted this research with data collection support from Engro and comments from MEDA team, including Dr. Linda Jones.

local and international organizations that intend to adopt this program and take it even farther, while the provincial government has also initiated a move to work with and register small farmers in Punjab. Institutional crowding in will sustain PAVE activities, and more men and women farmers will benefit from the PAVE program's idea of focusing on quality seeds and working with smallholder farmers.

By actively engaging with women farmers, PAVE has brought a positive change in women's lives. Previously, women worked in the fields along with their husbands as unpaid laborers, and they were relegated to a secondary status. PAVE women farmers display enhanced confidence level, negotiation skills, and have become important economic contributors in their households. Though it will take time to achieve gender equality, the situation has changed in their favor. Women are now empowered to hold meetings with outsiders (PAVE staff), attend workshops, and visit demonstration farms and research institutions to learn. After switching over to vegetables farming, some women have also started selling vegetables locally and are educating their daughters.

# 1. Introduction

This report presents findings of a qualitative research conducted to identify systems level changes that the PAVE initiative has influenced. Engro and MEDA (Mennonite Economic Development Associates) are implementing the PAVE project in Gujranwala and Sheikhpura districts of the Punjab province in Pakistan. The two-year pilot initiative is supported by BPP (Business Partnership Platform) and Department of Foreign Affairs and Trade (DFAT), Australia.

## 1.1 Project Context and Background

Pakistan is the fifth most populous country in the world (Worldometer, 2020) and mainly depends on agriculture that engages around 42.3% of its labor force and contributes about 19% to gross domestic product of the country (Pakistan Economic Survey 2017-18). With population growth rate at 2.4% per annum, Pakistan is currently unable to meet food demands of the population. Pakistan has one of the highest rates of prevalence of malnutrition in children in the world (Asim & Nawaz, 2018) and eight out of ten children do not have access to right type and quantity of food in the country (Unicef, 2019), and approximately 60% of Pakistan's population is currently facing food shortage (USAID, 2019). Poorest segments of the community, particularly women, have limited access to an adequate and diverse diet (World Food Program, 2019). Though in 2017 report, World Food Program had reported that one third of population is unable to afford nutritionally adequate diet and nearly five percent of all the households are unable to afford a diet that meet the minimum requirements for energy alone (World Food Program, 2017). Devaluation of national currency and inflation in the last two years has further aggravated the situation. From May 2018 to May 2019, wheat and wheat flour prices increased by 8.9%, whereas prices of rice Irri-6 and rice Basmati increased by 20.6% and 4.8% respectively (World Food Program, 2019).

Though agriculture is considered as the lifeline of Pakistan's economy, there is a huge gap between potential and actual output of produce. The main reasons for this gap are said to be lack of appropriate technology, use of inputs at improper times, unavailability of water and land use and inadequate education about insect pest control (Rehman, et al., 2015). However, what is missing from this analysis is lack of emphasis on use of quality certified seeds and engagement with smallholder farmers including women.

Certified seeds meet only one-third of total seed requirement, and majority of the farmers use low-quality uncertified seeds which can easily be infected in storage and produce low yields. For major crops like wheat and rice, certified seeds lie in the hands of big private companies. In

### Implementing Organizations

*Engro:* Engro Corporation is one of the leading companies in Pakistan with businesses in agriculture, foods, energy and chemicals. Business inclusiveness and shared value is at the heart of its social impact strategy as the company looks to integrate the underprivileged, youth and women into its value chains. It is with this philosophy of inclusive growth that Engro's investments encompass the agricultural value chain from farm inputs to the consumption table.

*MEDA:* For over 60 years, Mennonite Economic Development Associates (MEDA) has been implementing innovative and effective market driven initiatives around the world. With a focus on sustainable systems change, MEDA works in inclusive financial services, value chain and market systems development, and investment led programming.

2017, 82% of certified seeds were purchased from private companies, 12% from public organizations and only 6% from imports (Aazim, 2018). Though more than 700 companies are registered with the government (FSC&RD, 2020), most of the seed supplies come from 10 to 20 leading companies (Aazim, 2018). As regards seeds of vegetables, these were almost 100% imported from the neighboring countries for the year 2017/18 (Hassan, 2019). After devaluation of Pakistani currency, the imported seeds have become very expensive and inaccessible to smallholder farmers. Introduction of new seed varieties is also very expensive because before getting these registered, companies have to test seed varieties at designated farms, and the rejection rate is very high (Aazim, 2018). This is the main reason why companies are mainly interested only in the marketing of already existing seed varieties rather than making investments in introducing new varieties.

Women's role in agriculture is not recognized. In Pakistan, 67% women are involved, directly or indirectly, in agricultural work (Pakissan, 2018), and unfortunately, 60% of their work is unpaid (UN Women, 2018). Hence, women have never been encouraged to take farming as an enterprise to make them financially secure, economically independent and an important contributor in household decisions.

It is in this backdrop that PAVE program was launched in Pakistan to actively engage with small farmers, transfer technology and skills to use certified seeds, multiply seeds as well as adopt modern best crop management practices, and empower women through engaging in quality seed production and enhancing their entrepreneurial abilities.

Main objectives of the PAVE project include:

1. Build capacity of 4,000 smallholder farmers (including at least 400 women) on quality certified seed use and seed multiplication. This includes the implementation of a rice and wheat related BCMP (Best Crop Management Practices) Package to advance their knowledge, skill set and expertise with targeted results of improving their practices, adoption, conversion to certified seed use, yields, profitability, income, livelihood, empowerment, entrepreneurship and increased likelihood to participate in seed programs on a sustainable basis;
2. Improve readiness of 1,640 smallholders (including at least 170 women) from a total of 4000 farmers to participate in the seed multiplication process to a level that commercial companies find it technically viable to work with them;
3. Convert 300 smallholder farmers (including at least 30 women) from a total of 4000 farmers as registered seed suppliers for Engro's seed business; and
4. Develop approximately 60 enterprising smallholder farmers (individually or in groups from a total of 4000 farmers) as master trainers, including at least 6 women trainers, to produce their own quality farm-saved seed for further exchange, distribution and selling among fellow farmers in nearby villages.

## 1.2 Study Purpose and Methodology

The purpose of the qualitative research was to measure systems-level impacts of the PAVE Pakistan project with a focus on the following domains and questions:

### **Smallholder farmers as suppliers of certified seed**

- Are participating women and men smallholder farmers competitive suppliers of certified seed?
  - If yes, in what ways are smallholder farmers competitive suppliers? How can they be promoted as preferred suppliers?
  - If yes, what are the factors / characteristics that contribute to making smallholder farmers competitive suppliers?
  - Based on these factors / characteristics can we extrapolate that smallholder farmers might also be competitive suppliers for other agricultural products (e.g., seeds in general, horticulture, dairy)?
  - Are there any gender differences noted between the success of women and men as certified seed suppliers?

### **Farmers' copying and institutional crowding-in**

- Are non-participating smallholder farmers copying the farming behaviour of PAVE Pakistan farmers?
  - If yes, describe the specifics of their copying and the extent of copying amongst other farmers?
  - What are the factors promoting (or limiting) copying by farmers of PAVE Pakistan activities?
- Are other public and commercial entities crowding in similar services and activities as PAVE Pakistan/Engro Corporation?
  - If yes, describe the specifics of their copying and the extent of copying amongst other farmers?
  - What are the factors promoting (or limiting) crowding-in by public and commercial entities of PAVE Pakistan/Engro Corporation activities?

### **Gendered systemic change**

- To what extent and how has the PAVE Pakistan project contributed to changing gender related social norms in the communities?
- To what extent and how has the PAVE Pakistan project contributed to improving Women's Economic Empowerment (WEE), including aspects of agency, access and decision making.

### **Sustainability of PAVE Pakistan project impact**

- To what extent are the PAVE Pakistan results likely to continue past the end of the project duration, without further external assistance?

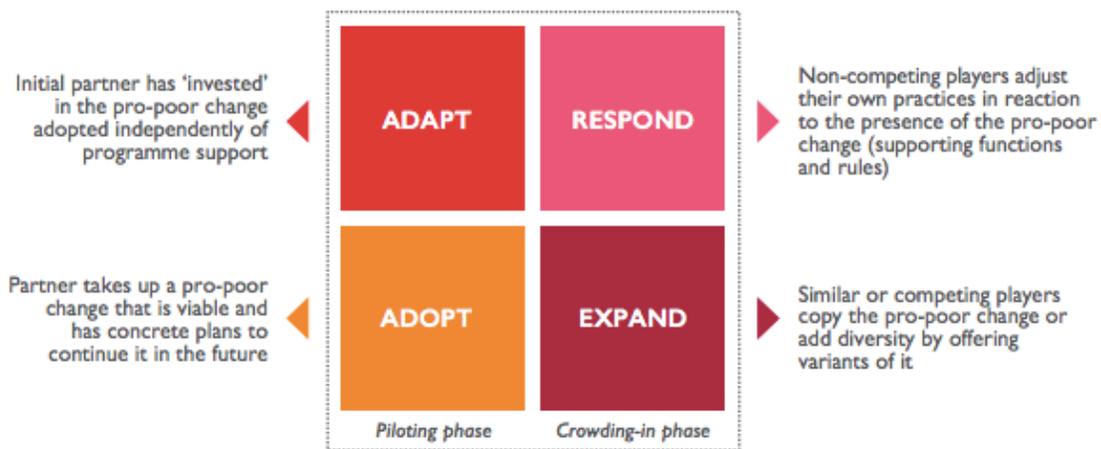
## **1.2.1 Research Framework**

For the purpose of this study, systemic change is defined as change in underlying causes of market system performance that can bring about a better-functioning market system (The Springfield Center, 2015). A 'systemic' change has three key characteristics (DCED, 2014):

- Scale: Systemic changes influence and benefit a large number of people who were not directly involved in the original intervention.

- Sustainability: Systemic changes continue past the end of the programme, without further external assistance.
- Resilience: Market players can adapt models and institutions to continue delivering pro-poor growth as the market and external environment changes.

To assess systemic change, the study adopted the framework developed by Springfield Centre for Business in Development (The Springfield Center, 2015). During the piloting phase, this framework calls upon facilitators to continuously reflect on: (i) how well owned behaviour/practice changes are by the programme's partners; and (ii) how players in the wider system are reacting to the new behaviours/practices of these 'early adopters'. The systemic change framework breaks down the status of 'pro-poor change' within the system into four distinct components (adopt, adapt, expand, and respond) (Nippard, Hitchen, & Elliott, 2014).



The AAER framework, presented in the matrix above, helps programs manage and measure changes in the market system. The left side of the matrix describes individuals or organizations which the program supports directly. It corresponds to the piloting stage of the program when innovations are tested with different market players. These innovations may be products, services, role changes, uptake of new or changes responsibilities, changes to business models, etc. By the end of the piloting phase, innovations should have 'stuck' with the market players that they've been trialed with - be fully owned, overseen, and paid for by the players themselves.

On the right side, the matrix refers to competing and non-competing market players that operate in the market system. The ambition of the facilitator should therefore be to encourage a market response to changes in practice (e.g. the innovations piloted), in order to improve the scale, sustainability, and resilience of outcomes.

For assessing women's economic empowerment and gender equality in PAVE, the research was informed by women's economic empowerment literature (Jones, 2016; Jones, 2012) that established a gendered access and agency framework for market systems programs. Widely used by leading programs such as Katalyst, the Market Development Facility and others, this framework sets out the need to assess not only income but also access to resources, products and services (e.g., finance, skills-building) as well as agency in financial and non-financial decision making and control over a reasonable workload.

### 1.2.2 Research Methodology

Given the objectives of the study, the data was collected from participating smallholder farmers, non-participating farmers who are copying and not copying PAVE activities, research institutes, project staff, relevant INGOs and business entities in the two districts of Gujranwala and Sheikhpura of Punjab province. The data was collected through focus group discussions (FGDs) and in-depth interviews. Details of number of FGDs and In-depth interviews is given below:

- Six FGDs were conducted with 40 participating farmers
- Four FGDs were conducted with 35 non-participating farmers who are copying PAVE activities
- Two FGDs were conducted with 17 non-participating farmers who are not copying PAVE activities.
- Six in-depth interviews were conducted with representatives of research institutes, business entities, anchor farmers, and program staff
- Twelve 'anchor' farmers and opinion leaders were also interviewed.

While the primary data was mainly collected by Engro staff. However, the independent researcher/consultant also spent two days in the field to observe changes among participating and non-participating women and men farmers.

Apart from primary data, secondary data was also reviewed that included project documents (e.g. baseline and midterm reports), research articles related to demand/supply and use of quality seeds, and newspaper reports related to agriculture in Pakistan.

The various components of data collection are described in the matrix below that shows respondents from each category.

## Participating farmers

### Farmers who continue to participate

Why do they continue to participate?  
What benefits do they get?  
How long are they expected to participate?  
What challenges do they currently face and how can these be addressed?  
Are they better suppliers?

### Farmers who quit

Why did they quit?  
Is it men or women who quit? What are the reasons? What are social, economic and cultural factors that made them quit?

## Non-participating farmers

### Farmers who copy

Do they copy the entire package?  
What sorts of behaviours do they copy? Why? To what extent?  
Why don't they copy the other behaviours? What are the challenges?  
Do men and women adopt the same types of behaviours? What are the differences? Why?

### Farmers who do not copy

Why don't they copy?  
What are the challenges?  
What do men and women think about these challenges?  
What do they think about PAVE Pakistan activities?  
What can be done to address these challenges?

## Institutional Crowding

### Institutions crowding in

Why do they crowd in?  
What benefits do they get?  
What are their perceptions about PAVE Pakistan activities?

### Institutions now crowding in

Why don't they crowd in?  
What are their perceptions about PAVE Pakistan activities?  
What problems/challenges do they face? How can these be addressed?

## 2. Study Findings

**Summary:** Before PAVE intervention, almost all the farmers used uncertified and low-quality seeds and no farmer was member of any seed multiplication group. Now all the participating farmers are members of farmers' associations and seed multiplication groups, 17% are registered seed suppliers, and 27% produce certified seeds to sell to other farmers.

PAVE farmers have become good seed suppliers. Pave farmers produce their own quality seed and seeing the positive results, non-participating farmers purchase seed from PAVE farmers. Local seed companies have already contracted PAVE farmers for future seed supplies to meet market demands for certified seeds.

Smallholder farmers usually remain indebted to middlemen who provide agricultural inputs on credit and purchase agricultural produce at lower rates. By producing their own quality seeds, PAVE farmers have got rid of middlemen, at least for seed, and sell seeds and agricultural produce at premium rates.

### 2.1 Smallholder farmers as suppliers

Initially farmers were reluctant in joining the project because they did not want to experiment with new farming techniques, which, from their perspective, might lead to increased losses. As one respondent noted:

*I am a very poor farmer with a large family. I grow wheat and rice in four acres. My land barely yielded enough crops to feed my family. If I experimented with new methods, and suffered losses, I would be in trouble. How would I feed my children?*

During baseline survey, around 95% farmers said they used home-kept seeds and could not recognize various seed varieties. The survey also noted that these farmers had never been part of any seed multiplication group (MEDA, 2018). It took PAVE team a considerable time to hold meetings with farmers, provide information about modern agricultural practices and show demonstration plots to convince them to adopt PAVE activities. PAVE's emphasis on use of quality seeds did make farmers think that seed is the basic input for any crop and use of low quality and uncertified seeds will not yield enough crops.

*We had been using farm saved grains as seed. Only half of that would germinate. Low quality seed led to poor yields. Our fields had lot of weeds. Seeds from Arhatis/ commission agents were also not that good. (Focus Group Participant--- Smallholder Farmer)*

All the farmers had realization, even before PAVE project was implemented, that their yield was low and they were financially indebted to middlemen or local suppliers who provided them with seeds (usually uncertified), pesticides and other agricultural inputs. Usually, smallholder farmers do not have enough cash to purchase all the agricultural inputs, so they purchase inputs on credit from the local suppliers and pay back after selling agricultural produce. In case the farmers suffer losses due to erratic weather or other reasons, their debt increases and remain indebted to local suppliers for a longer period. Many farmers used home-kept grains as seeds, but they said these seeds did not help in increasing their yield. Majority of the smallholder farmers started participating in the PAVE program mainly after observing better yields of those who had already joined the program and adopted PAVE activities.

*First I wanted to see the results [of using certified seed]. A few people in my village had used certified seeds and adopted other practices as suggested by the PAVE team. Those farmers have almost the same size of agricultural land as I do but they had better yield than mine. It's only then that I decided to participate in the PAVE program. (Focus Group Participant--Smallholder Farmer)*

Final project survey data shows that PAVE farmers are getting better crop yields and earning more profit. According to the report, PAVE farmers got 20% more rice yield per acre than the baseline figures, and their margin of profit had doubled. Similarly, farmers experienced around 10% more wheat yields and the margin of profit was 75% more than the baseline figures.

After receiving training from the PAVE team, some farmers are not only producing quality seeds for their own use, they are also selling seeds to local farmers as well as to Engro and other companies at profitable rates. A farmer reported that “I sold a bag of quality seeds for PKR 2000, whereas a bag of 40 Kg wheat grains was available in the market for PKR 1200 per 40 Kg. I earned a profit of Rs 800”. This not only shows that selling quality seeds is profitable business, it also shows that local farmers have realized the importance of quality seeds. Project reports show that all 4,400 participating farmers are now the members of farmers aggregates and learning alliances and 300 smallholder farmers as members of seed multiplication groups.

Another factor that motivated smallholder farmers to join PAVE program was that they have usually been ignored by seed companies that mainly work with big farmers. As PAVE team contacted these smallholder farmers and held orientation meetings disseminating information about modern agricultural practices, some of them were quick to join the program as they were already not satisfied with the traditional methods.

*First, certified seeds were not available. Second, we did not know how to identify quality seeds. We were using seeds which were only recommended by the local vendors, or we used our home-kept seeds. But we did not get good results. So, when we learned that we could also produce quality seeds, it was a moment of joy for us. (Focus Group Participant—Smallholder Farmer)*

What makes PAVE farmers as competitive suppliers is that farmers do not have to go to the market to purchase seeds, and this reduces their transportation cost. Now seed suppliers are in

their own villages where farmers can easily purchase quality seeds. PAVE farmers not only get higher rates for their seeds, but they do not have to go to the market to sell their seeds either. Another reason that makes PAVE farmers competitive seed suppliers is that local farmers have already seen better crop yields of PAVE farmers and now they can trust the quality of seeds.

The third reason for PAVE farmers to be competitive suppliers is that they do not sell seeds to local farmers on strict terms and conditions. If a farmer does not have enough money, s/he can still purchase seeds and pay later without any interest. Usually, most of the farmers in a village are relatives or closely affiliated by blood or caste, and it is not difficult for PAVE farmers to sell seeds to these farmers on easy installments.

PAVE farmers are not only good suppliers of seed, they have also become good and trusted suppliers of paddy and local rice mills and rice processing plants have now become clients of PAVE farmers. Engro's rice processing plant in that area also prefers to procure paddy directly from the PAVE farmers recognizing the quality. One of the key informants from private sector noted that: "We used to procure seed and rice from other farmers, but the quality was not good. Now we are getting quality seeds and paddy from Engro as well as from PAVE farmers".

Based on the review of documents and discussions with key informants, it can be said that PAVE farmers can be competent suppliers of other agricultural products as well. These products could easily be accessible to other farmers, and in case a farmer experiences loss in the harvest due to weather conditions or other factors, he/she can still purchase agricultural inputs for the next round of cultivation on the basis of personal relationships without accruing much debt.

Another important change that was observed by the research consultant among PAVE farmers was record keeping. PAVE farmers kept small diaries to keep record of all transactions regarding purchase of agricultural inputs and sale of the produce. They also took notes about important information they received during meetings with PAVE team. Some had even maintained an agricultural calendar by putting dates for watering the land, sowing seeds, using fertilizers, and harvesting. These diaries helped them keep track of their finances to calculate expenses and income. "We usually depended on *arthis* (middlemen) about financial issues," said a farmer, "It's these *arthis* who kept record of all the transactions. We were not sure whether they put the right amount in the records or not. But now we can calculate everything. And through record keeping, we have come to know that we are earning more income after adopting practices as suggested by the PAVE team."

With financial literacy, participating smallholder farmers are now able to negotiate prices of their produce with dealers. They can decide where they should sell their produce and what margin of profit they will get. They can also calculate how much produce they can keep producing quality seeds, and how much amount of seeds could be sold in the market or to other farmers to get desired amount of profit.

There are gender differences in terms of smallholder farmers' role as suppliers. Given the sociocultural context, men farmers are suppliers of seed and other agricultural products.

Though women have received training on quality seed production, and processing but they do not sell seeds directly by themselves. Sale of seeds is generally done by men (husband, son, brother in law, father in law) due to cultural restrictions on women's mobility and interaction with market clients. However, there are interesting exceptions to this; for example, two elderly women in Sheikhpura district sell seeds in the market and determine price of seeds. This illustrates that women's empowerment has entry points. One of the strategies could be to further sensitize community members and market actors on economic role of the women farmers.

## 2.2 Non-participating farmers copying PAVE activities

**Summary:** After observing positive results of the use of certified seed by PAVE farmers, non-participating farmers have also started using and producing certified seed. Realizing the importance of information provided by the PAVE team, many non-participating farmers started attending meetings and orientation sessions about using and producing quality seed and modern agricultural practices.

In group discussions, there were a few farmers who were not the direct beneficiaries of the PAVE project (i.e. they were non-participating farmers), but they had come hoping to know more about modern farming techniques. One of the non-participating farmers said that he regularly attended meetings organized by Engro team and had been using certified seeds for his crops.

*We usually focused on fertilizers and pesticides, but never thought about quality of seeds which is the basic item. After attending first few meetings and observing the results of certified seeds in the lands of my fellow villagers, I decided to use certified seeds. I am happy with the results. (Focus Group Participant—non-participating farmer)*

An important factor that influenced non-participating farmers' behavior to adopt PAVE activities is mobilization by Engro team. The project team held meetings not just with their target farmers, but also invited non-participating farmers and encouraged them to use certified seeds and adopt other modern agricultural practices. The PAVE Project Director explains in the local Punjabi language that influences and motivates farmers. The PD makes frequent visits to these communities, holds informal meetings with smallholder farmers and communicates information about modern agricultural practices in a very simple and understandable language with examples. The other staff belong to the surrounding areas and maintain close relationships with communities. Project engaged agricultural postgraduate women students from the same areas as women seed officers and this helped in accelerating mobilization and understanding for the communities. This practice of the project team has a good influence in changing knowledge and attitudes of non-participating farmers. One of the non-participating farmers commented:

*“As far as the seed is concerned, Engro is the only company that we have heard about which is organizing such trainings in our community. There are a lot of rice shellers, millers*

*and processors on the Narowal road but they are local businesses and don't do any such activities for the betterment of the farmers.”*

Another factor that influenced non-participating farmers is observing the result of certified seeds used by participating farmers. Even if some of non-participating farmers had not attended the meetings held by PAVE team, they did consult PAVE farmers about certified seeds and how to produce them locally.

### 2.3 Non-participating farmers who did not copy PAVE activities

**Summary**:-The resource poor smallholder farmers who have not adopted PAVE practices as they were financially bound to local suppliers who provide agricultural inputs on credit and in return purchase agricultural produce at discounted rates.

Despite the challenges with working on credit, local input suppliers might be an entry point for further interventions to move to upgraded seed as these suppliers are an integral part of the system. Majority of smallholder farmer cannot afford to purchase all agricultural inputs in cash. Low-income smallholder farmers cannot store agricultural produce to prepare quality seed because they must sell all their produce to pay back to the middlemen.

Some farmers sold low quality seed in the name of certified seed and some got their seed grains broken by outdated technology when they approached local vendors who claimed to produce quality seed. Inability of low-income farmers to recognize varieties of seed, differentiate between certified and uncertified seed as well as bad experience with inadequate technology also influenced farmers' behaviour to use home-kept seed.

There is significant number of smallholder farmers who use low-quality seeds that are stored at home or purchased from local suppliers. During group discussions with these farmers, it was found that they understand the importance of quality seeds but are usually financially bound with local suppliers to purchase agricultural inputs and sell their produce to them. A smallholder farmer reported:

*I am very poor and have only six kanals (one and a half acres) of land. Certified seeds are more expensive than ordinary seeds. I usually try to use my own seeds which I stored at my house. But I have to purchase other agricultural items from a local vendor. Since I cannot afford to purchase certified seeds, and other agricultural item in cash, I have to get these on credit. The vendor gives me these products on the condition that I will sell the produce to him only. (Focus Group Participant---non participating farmer)*

According to project baseline report, half of smallholder farmers own six to 12.5 acres of land, and one-third of farmers own one to five acres, but their margin of profit from rice and wheat crops is roughly PKR 14000 to PKR 18000 per season, which is not enough to meet household expenses and purchase agricultural inputs in cash. However, despite the challenges with working on credit, local input suppliers might be an entry point for further interventions to move to upgraded seed as these suppliers are an integral part of the system.

According to the Project Director, during last two seasons, there was much gap in demand and supply of certified and uncertified seeds. Even the local vendors could not meet the demands of the farmers which resulted in increased prices of seeds. As a result, small farmers could not afford to purchase seeds in cash, and many of them had to get seeds on credit.

Seed is not the only input farmers have to use to grow crops. They also depend on the local vendors to purchase fertilizers, pesticides etc., which smallholder farmers get on credit with strict conditions. Moreover, land takes some time to produce crops, and farmers cannot get any financial benefit until the crops are ready to be harvested and sold. So, if a low-income farmer invests all his savings in purchasing certified seeds and other agricultural inputs, it would be difficult for him to run the household till harvesting season. This situation was described by many poor smallholder farmers during group discussions. As one of them said,

*With these local vendors, we do not feel any financial burden. We will pay them after harvest. Though we know that low-quality seeds do not produce good crops, but we cannot purchase everything in cash. We are poor people and do not earn enough income. We always need money to make our ends meet. We need money for medical treatment. We need money for transportation. We need money for many other things. So, we cannot invest all our income in purchasing agricultural items. If we do, how will we survive for these few months till harvests? If we invest all our income and face losses in harvest due to bad weather or any other reason, what will we do? Who will support us? (Focus Group Participant—Non participating farmer)*

As the small farmers remain indebted to local vendors, they cannot store their produce that could be processed and sold as seed. They have to sell all their produce in order to pay back to the vendors. They also need cash to purchase other food items, seek health care and pay bills.

As stated earlier in the report that there is a huge gap between demand and supply of certified seeds, and not every farmer can procure such seeds. In certain cases, some small farmers who wanted to get their seeds cleaned and graded by local middleman, had bad experience. Their seed grains were broken, and they suffered losses. Unavailability of certified seeds, and bad experience with local seed processors/ graders. Cleaning and grading negatively influenced farmers' behavior and they were compelled to use traditional methods of cleaning seeds with sieves and fans.

Many non-participating farmers in non-intervention areas said they cannot identify quality seeds, and they have been defrauded by the local vendors who sold them low quality seeds in the name of certified seeds. "The arthi (middleman) sold me a bag of seeds and said these are the best seeds. However, when I used those seeds, I did not get as much produce as I had expected. It was even less than that of previous season", remarked one farmer.

These farmers also wanted to use technology for seed cleaning and grading, but such kind of technology was either not available locally, or they did not know where they can get this

facility. Some of them said they are willing to invest in seed production, if they are provided technology through reliable and trusted sources.

Apart from the non-participating farmers, there are some farmers who initially joined PAVE program but quit participating in project activities. However, the number of such farmers is small and the reasons for their leaving PAVE program are not mainly related to program design. According to PAVE team, those who left the program were not full-time farmers and did farming only as a side business. They were already engaged in other business activities and could not attend meetings. There were some people who were government employees, and some earned living by daily wage labor, and could not spare time for training activities. PAVE team further informed that some farmers had started milk collection business and quit farming; and some participating young girls got married and left the village.

In order to get an idea about how many small farmers have adopted PAVE practices, the researcher asked participants of group discussions, “Suppose there are hundred or fifty (depending on the size of the village) small farmers in your village. Out of these, how many small farmers use quality seeds?” The response of majority of the project participants was around 40%. This means 60% small farmers have not adopted certified seed use fully. But the conversion and switch over was said to be improving. This should not be taken at face value, because this was not a large-scale quantitative study. However, the responses are close to the figures given in the midline survey report.

In the Midline survey, 27% respondents said they produced their own seeds. But this raises important questions about why some farmers adopted PAVE practices, and why others did not. As majority of the small farmers usually remain indebted to *arthis* for purchasing agricultural inputs, why and how were some farmers able to get rid of *arthis*? Since PAVE program did not provide certified seeds free of cost to these small farmers, and these seeds were rather sold to them at premium cost, how did these farmers manage to purchase these seeds? Is it because 40% farmers who adopted PAVE practices were better-off than the rest of the small farmers? Did they have other sources through which they were able to manage to procure certified seeds? During group discussions all the participants said they were smallholder farmers, but the present study did not collect data through quantitative household survey to assess socio-economic status of each individual. There can be various factors that can affect purchasing power of the individuals. Family size is closely associated with household’s ability to manage finances. Whether agricultural land is owned by the family or on lease, also affects income of the farmers. Whether all family members depend on agriculture or some of them are engaged in other income generating activities, can also affect purchasing power of the household. Hence this requires more-in-depth study at a larger level to understand the underlying mechanisms that favored some farmers to adopt PAVE practices, while others remained indebted to *arthis*<sup>2</sup>.

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<sup>2</sup> One important aspect is that only the willing and eager smallholder farmers from the villages were included and targeted for aggregation and capacity building. Project was designed in a way that early adopters be trained and impact spreads through peer-to-peer learning.

## 2.4 Institutional Crowding In

**Summary:** PAVE project has attracted attention of public and private institutions and they have started adopting project practices. Some local companies are working with smallholder farmers, including women farmers, to build their capacity on modern agricultural practices and seed production.

The government has initiated a program to register farmers and provide them certified seed. Centre for Agriculture and Bioscience International (CABI) has not only adopted the PAVE activities, the organization also plans to expand it by providing training to smallholder farmers on marketing of their seed and agricultural produce.

Some of the activities of PAVE program have been adopted and implemented by public and private organizations. For example, a few rice mills in the areas have formed farmer groups, started providing training to them on water saving, use of quality seed and its multiplication. During an interview, Deputy Director, Directorate of Agriculture Extension, Punjab, a few other seed companies in Sheikhpura and Gujranwala have also formed clusters of smallholder farmers and introduced modern agricultural practices, including production of quality seeds. These companies have even hired ex-employees of PAVE program to carry out these activities.

*PAVE is very good project and its concepts can be copied and replicated. We procure Paddy from PAVE farmers as well. Now we have started a program to train and give advisory services to farmers around our rice mill. We also purchased seeds from Engro for our seed program. We know PAVE farmers produce pure and high-quality seed as we observed and witnessed PAVE seed plots. (Key Informant—Private Sector Company)*

Some seed companies depend on farmers for seed multiplication. Since PAVE farmers have been trained and possess adequate knowledge about seed production and multiplication, these seed companies prefer PAVE farmers for this task.

Previously, no organization worked with women and engaged them in farming activities. Now some private companies (e.g. Rice Partners Ltd) has adopted this concept of PAVE and formed women farmers groups, and another rice mill (Galaxy Rice Mills) also intends to work with women. These companies are inviting PAVE farmers in their workshops to train other farmers.

PAVE collaborated with Ayub Agriculture Research Institute, University of Agriculture, Faisalabad, to provide hands-on experience to PAVE farmers about modern

*The PAVE project is a pioneering model and nobody else has ever tried this idea. Throughout my service of 10+ Years, I have not seen any company doing that for women and men smallholder farmers. I have witnessed the overwhelming response of the women farmers when they visited our institute. This will go a long way in terms of its replication, scaling and copying. (Key Informant—Ayub Agriculture Research Institute)*

farming techniques. According to the project team, this is the first time any public research institute has worked with small farmers and established linkages with them to provide regular information about modern agricultural practices. However, the role of the institute is mainly

about building capacity of the small farmers, and the collaboration between the institute and PAVE was for two years, but in order to make its efforts more sustainable, the institute has developed information technology based ‘Community Outreach Centers’ in the houses of some smallholder farmers through which they can access agriculture related information.

The Government of Punjab has started an initiative to register 5.2 million small farmers and provide them with certified seeds at subsidized rates. The government has introduced an e-voucher system which farmers will cash directly into their mobile accounts for purchase of fertilizers and certified seeds (Mahmood, 2019). It is however not clear to what extent PAVE program has any contribution in influencing the government. But it is encouraging that the government is taking interest in small farmers and production and distribution of certified seeds at local level. Agriculture Extension Department and Federal Seed Certification and Registration Department have visited farms of PAVE farmers and inspected them for certification and approval.

Center for Agriculture and Bioscience International (CABI) has adopted many PAVE activities, though its current focus lies mainly on vegetable seeds. It works with smallholder farmers and provides training on quality seed production. CABI will introduce training on marketing and establishing linkages between smallholder farmers and buyers.

*PAVE is the best program I have ever seen in my career, and we'll not only work with PAVE farmers, but will also engage them in marketing activities to enhance their profitability. Once they know where to sell their and how to sell it, they will earn more income than they have ever thought. (Key Informant—CABI Representative)*

## 2.5 Gendered Systemic Change

**Summary:** Prior to the PAVE interventions, women were not allowed to and did not feel comfortable meeting outsiders but now women participate in meetings, visit demonstration plots and attend training workshops. Compared to non-participating women farmers, PAVE women farmers are more confident, run their businesses at village level and actively engaged in vegetable farming and seed production.

PAVE women farmers no longer perceive themselves as unpaid workers merely supporting their husbands in the fields. They are contributing household members who are now being consulted by their husbands for important decisions at household level.

Women's dependence on men has reduced and PAVE women farmers are earning enough to educate their daughters.

Women have become successful vegetable seed entrepreneurs after vegetable seed production was introduced to encourage greater women participation.

Traditionally, women have been performing farming activities in the target districts, but they were usually considered as supporting labor force and were rarely paid for their work. Farming was never considered as an enterprise that could make women income earners and contributor to household income. Hence, it was a challenge for PAVE team to encourage women to join the program. So, PAVE encouraged women to learn about kitchen gardening and vegetable farming. Seeds for vegetable farming were distributed free of cost among women to incentivize women to participate. Some women not only grow vegetables, but also run a vegetable shop in their villages to earn more income. Women have also been trained on seed production. Men and women farmers believe that vegetable farming is more profitable than rice and wheat farming. Quality seeds produced by women were highly demanded by other local non-participating men and women farmers in their respective villages and in the adjacent villages. Though vegetable seeds are sold by the husbands or fathers, PAVE women farmers are considered an integral part in seed production system now.

Some women have also visited demonstration plots and attended workshops arranged by the project. *Allowing* women to go outside their village with PAVE team to see plots and attend workshops shows trust of the community in the project.

Majority of women are doing vegetable farming, and men are engaged in rice and wheat crop production. This distribution of men and women's tasks in crop and vegetable production

may, at first sight, appear discriminatory, but this is how the program was designed considering

*We would never allow our women to accompany outsiders to go to any other area. This was the matter of honor for any family. But now circumstances have changed. PAVE staff are nice people. They also have female workers. We trust them. Our women have now got more knowledge and have become entrepreneurs.* (Focus Group Participant—Smallholder Farmer)

the local traditions and culture of the target communities. According to the Project Director, “this was the first and major program in these communities, and we knew that we won’t be able to change gender norms and roles overnight. So, in the given circumstances and local customs, we decided to engage women mainly in vegetable farming, and men in rice and wheat crop seed production.” PD further explained that one-fourth of women farmers are also engaged in rice and wheat crop production and almost the same proportion of men is engaged in vegetable farming.

Despite being engaged mainly in vegetable farming, most of the work related to seed production like cleaning, processing and grading is done by women. PAVE have trained women to produce seed for summer and winter vegetables such as okra, peas, garlic, onion, spinach, carrot, turnip, radish, coriander.

Though women’s position in the community is still lower than men and women are dependent on men, however, there has been some change in the attitude of society towards women and their economic role in the society. For instance, women had to wait for their husbands to bring vegetables and other food items to prepare meals for the family members, but now PAVE women farmers no longer have to do this. They have their kitchen gardens and can prepare meals whenever they want to. They do not have to ask their husbands for money to purchase grocery items. PAVE women are earning their income to meet their routine needs. Some women are even saving their income to educate their children.

The project has supported some women to become independent entrepreneurs who earn money and contribute to household income. Societal perceptions – especially parents’ and husbands’ – about these entrepreneurial women have changed. There are anecdotal instances about changes in gender related norms. During a field visit to a PAVE targeted village, an elderly man requested the Research Consultant to see vegetables grown by his daughter. “I want to show you how my daughter has managed to grow vegetables,” he said proudly, “She grows vegetables, and I sell these in my shop. She is not a daughter; she is a son. She is the one who runs the household.”

Compared to non-participating women, PAVE women farmers participated in group discussions confidently and in some cases their participation was more vigorous than their male counterparts. During group discussions with men, at the end of the comments by each participant, the researcher had to ask the other participants to share their views about PAVE program. But in discussions with women, it seemed that everyone wanted to share their stories and they were just waiting for their turn to speak. Whenever a woman ended her comments, another woman would start sharing her views.

*If you had visited us before PAVE program, no woman would have talked to you. Women would not have gathered as they have now. Our men would not have allowed us to talk to strangers. But today, we are talking to you. We can take pictures with you. (Focus Group Participant—Women Smallholder Farmer)*

It was not an easy task to bring this change even at individual and household level. PAVE team had to make many efforts to mobilize and sensitize communities to allow women to engage in the training and farming activities. They held meetings with community and identified a few members who held positive views about girls' education and their empowerment. Additionally, the project hired women staff to meet village women and encouraged them to engage in farming activities. "Centuries old traditions do not go away so easily. But thanks to PAVE team, they changed views of our community members, made them realize that women can also be good earning members of a family", said a young female farmer

It is also an interesting finding that many male farmers in non-intervention areas (i.e. non-participating farmers) expressed willingness to engage their women in vegetable farming. They said their women were already engaged in seed production activities, though using traditional practices, and they would be happy to grow vegetables if provided quality seeds and training. This means that change in social norms is already taking place in intervention and non-intervention areas, but the project has accelerated this change in its target areas by actively engaging with men and women and transferring knowledge and skills to them.

## 2.6 Sustainability

A major factor that contributed in the success of the project is implementing organization's (i.e. Engro) reputation. Engro is a brand name that has been known to farmers for decades and they trust the company. According to one key informant, farmers' trust in Engro can be gauged from the fact that it promoted new paddy variety (Basmati -515) a few years ago, and it became very popular and highly demanded in Sindh and Punjab provinces; and local rice mills and rice mills in Sindh are big buyers ~~are~~ procuring Basmati 515 paddy from the farmers who use Engro's Basmati-515 seeds.

*The PAVE program would not have been successful if it had been launched by another company. Its success is mainly because of Engro and its dedicated team. Another company had also started a similar project in the same area, but it was not successful. Many other companies came here and provided new concepts, but they failed. Engro is trusted by the farmers, and that is why this program was successful. (Key Informant—Private Sector)*

But, can this program be implemented by another agency at another place where there is no intervention by Engro? There are more than 700 registered seed companies. These companies usually work with big farmers who purchase seeds in bulk, it is the PAVE project that engaged smallholder farmers which constitute majority of the farmers. Realizing importance of engaging with local farmers and producing quality seeds at local level, now the government as well as some seed companies have also adopted PAVE activities. Government institutions are inviting PAVE farmers in their workshops to share success stories regarding the use of quality seeds and application of modern agricultural practices.

Since there is huge gap between demand and supply for seeds, production of quality seeds at local level has a great potential to be a good business.

Currently, few big commercial organizations and rice mills in the PAVE intervention areas like Galaxy Rice Mills, Rice Partners Ltd and CABI-are also adopting PAVE's smallholders' aggregation concepts and sustainability approaches. Small companies have their businesses with small seed volumes. This PAVE model is good for medium to large companies to follow. If small seed companies cannot adopt PAVE practices, it is not because the project has been poorly designed, rather it is because these companies lack adequate resources. The big companies, with sufficient resources have already started adopting PAVE practices, and if the seed production increases, a few more companies may adopt the program in future.

Similarly, PAVE farmers are not likely to face any challenges from local seed suppliers or middlemen because the latter cannot supply required amount of seeds, and there is always huge demand for more quality seeds. Local seed suppliers/middlemen would rather procure quality seeds from PAVE farmers to maintain their clientele by providing supplies to their permanent clients.

What makes the PAVE project more sustainable is the transfer of knowledge to the smallholder farmers and development of hundreds of community champions, master trainers and seed entrepreneurs. Village based seed enterprises and community centres will continue spreading seeds and knowledge. Moreover, many PAVE farmers are now invited by government agencies to participate in awareness workshops, where they also gain knowledge about modern agricultural practices. Networking and links of the PAVE farmers with the University of Agriculture, research institutions, millers and quality seed buyers will open new avenues for them.

### 3. Conclusions

The study findings suggest systemic change has been initiated at the individual, community and institutional level and these changes are likely to continue.

Participating smallholder farmers have not only adopted PAVE practices but have also influenced their friends and relatives to follow them. The finding that PAVE farmers sell quality seeds to their fellow villagers suggests that even non-participating farmers have realized the importance of using quality seeds.

PAVE farmers have become better seed suppliers because there is already a huge gap in demand and supply of certified seeds, and PAVE farmers are trying to reduce this gap. All the smallholder farmers, whether participating or not, knew the importance of quality seeds, but they had no access to such agricultural inputs, and a large majority of farmers were and still are bound to purchase low-quality and uncertified seeds from *arthis*, who provide financial assistance to them or provide agricultural inputs on credit.

Non-participating farmers, who can afford, can easily procure quality seeds from PAVE farmers, and the latter do not have to go to the nearest market to sell their seeds. Hence buyers and sellers are within proximity neither party has to depend on *arthis*. Since local market cannot meet the demands of farmers regarding certified seeds, PAVE farmers will not have to face any resistance from the market forces. *Arthis* would rather prefer to procure quality seeds from PAVE farmers to fulfil demands of their own clients and maintain their clientele.

At institutional level, change will still take more time as most of the seed companies are mainly marketing companies and they are interested in only sale of their products. They prefer purchasing produce or seeds from farmers but are not involved in any other capacity building activities. However, a few companies have started working with smallholder farmers and providing training to them on seed production. These companies are working with male and female farmers, encouraging them to form farmers' associations, inviting them in workshops to enhance their knowledge and skills and registering them as future suppliers of certified seeds. Public research institutions have also realized to work with small farmers and are providing training to them regarding modern agricultural practices.

CABI, an international organization, has collaborated with Engro to jointly continue PAVE practices, and intends to take it even farther by building capacity of smallholder farmers in marketing of their products i.e. seeds as a part of their Strengthening Vegetable value Chain in Pakistan (SVVCP). PAVE farmers know how to produce and multiply certified seeds and CABI will further train them on other aspects and will help them understand market dynamics and few other avenues in the seeds value chain-

Majority of the women do vegetable farming, and some are also engaged in seed crop production. Though women have traditionally been involved in agriculture, they did not take it

as an enterprise, and they only followed local customs of supporting their husbands in the lands. They worked as unpaid laborers and had no knowledge of modern farming practices. Participating women farmers have received training, visited demonstration plots, and are engaged in quality seed production now. Some PAVE women farmers are selling their vegetables and seeds in their village and have become economic contributors to their households. Though important household decisions are still made by men, but some PAVE women farmers said they are at least being consulted now. Some of them are now educating their daughters with the income they get through selling vegetables.

An important change at individual level has occurred in the behavior of PAVE men and women farmers. Frequent meetings with PAVE team, interaction with PAVE project staff, and exposure visits have enhanced level of confidence among them. Some men are invited by public organizations to share their success stories in awareness seminars. Women farmers can talk to outsiders without hesitation and some of them can even negotiate prices of their vegetables with the clients.