AGRICULTURE VALUE CHAIN STUDY PUNJAB, PAKISTAN

More yield, more outlets, more income for Pakistan
Opportunities for Dutch companies & institutes

Potato          Seed
Onion           Machinery
Tomato          Irrigation, IPM, Soil management
Carrot          Grading & (Cold) storage
Cabbage         Processing
Spinach         Knowledge transfer

RVO - The Netherlands
and
Embassy of the Kingdom of the Netherlands in Pakistan

Robert van den Heuvel
11 March 2019
De Aardappeleters, painted by Vincent van Gogh (Nuenen, 1885)

*The Dutch painter Vincent van Gogh used to picture agriculture and the life of farmers.*

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In cooperation with World in Consulting, Pakistan

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PREFACE

This report gives companies and knowledge institutes practical guidance on doing business in the agricultural sector of Punjab/Pakistan, and improving the studied value chains (potato, onion, tomato, carrot, cabbage, spinach).

The report describes bottlenecks and opportunities, and how Dutch companies can tap into these opportunities; as preparation and motivation for the Agro Trade Mission in March 2019. This study and the Agro Trade Mission are part of the ‘Overall project plan Pakistan-Netherlands Agriculture in Punjab’, initiated by RVO and the Dutch embassy in Islamabad.

The report gives options, priorities and quantitative justification. Cases studies, business cases and action points make concrete how to act. Every chapter ends with the opportunities and potential added value and local partners. Besides the value chain analysis, the report gives a politico-economic analysis of Pakistan and Punjab; and how this impacts the value chains and doing business in Punjab.

Pakistani companies, entrepreneurs and knowledge institutes are eager to learn from and to trade with Dutch organizations. We included a list of Pakistani companies and knowledge institutes for match making programs. This list is a selection of those organizations in Pakistan, which want to make next steps with the Netherlands. We spoke to all of them.

Thanks to all Dutch and Pakistani companies, organizations and government, which contributed with ideas, figures, experiences and critical feedback.

The mission in March 2019 is the perfect entry for organizations, which want to start or to expand business in Pakistan. The opportunities are for seed potato suppliers, processors, vegetable seed suppliers, and for technical companies in cold storage and machine building; but also for service providers in irrigation and soil management. Knowledge institutes like Hogere Agrarische School and WUR can play a role in knowledge transfer.

This report will guide and connect you.

Robert van den Heuvel

Measures:

1 hectare = 2,5 acres
100 Pakistani Rupee = € 0,63
MANAGEMENT SUMMARY

“Today I read in the newspaper that Dutch farmers manage to use 90% less water for their crop, and having the same yield. Could you teach us on these technologies!”

Pakistani researcher, Punjab

“I already use Dutch seed potatoes for 40 years. I do not want to have any other potato.”

Farmer in Okara, Punjab

Dutch seed potato suppliers, and Dutch farmers in general, have a very good reputation in Pakistan. Pakistani research institutes ask for Dutch agronomists and technologies. During our 3-week field study in Punjab it became crystal clear that Pakistan looks forward to igniting new-, and to expanding current business with Dutch companies. Potato sector and vegetable sector (onion, tomato, carrot, cabbage, spinach) are ready to make next steps in their development. Improved seed, irrigation technology, soil management, and machinery are business areas for the coming years. At the post-harvest side, farmers and investors need grading- and storage technology. The Punjab Board of Investment & Trade longs for investors in agro-processing. Pakistan is attractive for both already in Pakistan operating Dutch companies and for new Dutch entrants.

Pakistan’s food basket
Pakistan - and its densely populated province and food basket of Punjab - has the demographic trends, geographic location (Central Asia, Middle-East), and agro-ecological conditions in favour for further growth. Dutch companies can play a major role. A growing 200 Million and young population and shifts in consumption patterns require more volume and added value: more vegetable, more varieties, processed food. Volume needs to come from better yielding seed varieties and improved farming practices (higher yield/hectare).

Progressive farmers
If we look at the farmer landscape we see different groups of farmers, from smallholder farmers (< 0.4 hectare) to big commercial farms. Seeing the investments, absorption potential of new technology, and ambition, it makes most sense to focus on the progressive farmers and the medium- and big commercial farms. Smallholders are too small, too risky. We met absolute innovators and front-runners amongst these progressive and big farmers. They invest in advanced cold storage, and look for new agriculture concepts like an efficient storage- and transport system for tomato trade. The latter helps tackling the huge volatility in tomato prices all over the country, during all seasons. Innovative Pakistani seed dealers and farmers long for new vegetable seed varieties.

Modernizing the potato value chain
The potato sector is the most attractive area for the Dutch agriculture sector. The Dutch can bring in state-of-the-art technologies and farming practices to improving yield. During our visit three independent organizations proposed a program for ‘formal and well organized local seed potato multiplication’. This can be an accelerator for the potato crop. Currently only 0.9% of the used seed potatoes comes from abroad; this is almost 100% from the Netherlands. More than 99% is low-level and local informal seed multiplication, or just recycling from the previous crop. Low yield and diseases are the result. A formal seed multiplication in Pakistan could give a quality- and yield push to the local farmers. And such a multiplication program needs regular ‘fresh supply’ from the Netherlands, resulting in more turnover and profit. The ambition of the Potato Grower’s Association in Okara, the heart of the potato belt of Pakistan’, is to raise the import of seed potato up to 5-10%. Pakistan can be a hub for seed potato growing for Central Asia. The report gives the business case calculation, with benefits and profit for all actors in the chain. The potato sector is on the brink of shifting from local machines for potato farming to international machines. Planting- and digging machines are the first investments. Dutch machines are a serious option for those farmers, who have bigger plots of land, and for entrepreneurs, who are contracted for land preparation, planting or digging. Business calculations illustrate that Dutch machines are a good option in case of investment for three or more years. A strong local supply chain of spare parts, engineers and skills, should motivate Dutch companies to explore this attractive development of machinery in Punjab.
More outlets and cluster approach

In case we improve yield and quality of the potato crop, more outlets are needed in Pakistan. Export is promising. However, currently export is ‘hit and run’; there is no export strategy. If the potato crop in Russia is good, Pakistani potatoes flow the domestic market. A Plan B is lacking. That’s where Dutch marketeers are more than welcome. Choose the right varieties for potential markets are Iran, Afghanistan, Central Asia and Middle-East. Potato processing is the next ‘holy grail’ in the potato value chain. French fries, potato chips and starch are worth exploring. This type of ventures requires an holistic approach. Potato processing demands certain varieties (>20% dry matter), enough volume and quality. Good seed potatoes and specific varieties for yield improvement, and investments in export and processing go hand-by-hand. We recommend a cluster approach by the Dutch potato sector. We will strengthen our proposition. Since processing helps to improving the Foreign Exchange balance (import substitution, added value), you will find Pakistani government at your side. Attractive investment- and tax conditions improve the business case.

Perfect fit

Pakistan has world’s fourth biggest area of cultivated land for onion, but a miserable yield (6 Mt/acre). The Netherlands has a yield of 23 Mt/acre. 50% of post-harvest losses worsen the whole picture. Punjab has a shortage of onion, and Pakistan has export ambitions. This window of opportunities perfectly fits with Dutch seed- and technology portfolio. Short day varieties, farming practices and cold storage should be part of a broad intervention. Again, the Dutch sector can offer a cluster approach as part of a long-term strategy.

Be there!

Vegetable growing is less commercial than potato, onion and tomato. However, the momentum is there. Japanese, South Korean and Chinese companies have taken position. They sell hybrid seed, start research centers and set up contract farming schemes. It is high time to act! The good message is that Pakistani vegetable seed dealers ask for Dutch vegetable seed with special features, like disease resistant, special taste, short-day variety; seed for onion, radish, carrot, red cabbage and spinach. For example our carrot (bospeen) has a perfect fit with the Pakistani needs concerning size, colour and taste.

Macro challenges

Pakistan is difficult from a political and cultural perspective. Unrest and differences in religion and culture hamper smooth business development, and give risks. Go step-by-step; start with local dealers and partners. Choose for those partners who understand Europe. UK- or US-connected Pakistani are a perfect entry point. We spoke to Lush Green, Rafiq Agro and Karachi Seed; all reliable, innovating and comfortable companies. They are the perfect liaison for new entrants.

Pakistan has very strong and knowledgeable research institutes. They have the latest information on varieties, growing techniques and agro-ecological conditions. But they are not able to bring that to the farmers. Lack of structural farmer field schools and extension workers, make them dependent on the ‘self-exploring farmers’ and seminars. Dutch knowledge institutes could tap into this bottleneck.

Women participation is another weak spot in the Pakistani agriculture. The more or less only job, which women have in agriculture, is land labor. Only a very small number of female farmers have own land and takes its own decision. The solution starts with access to education for young girls. Specific courses for illiterate women, and actively encouraging involvement in jobs like seed purchase, admin work, and processing are ways forward.

Pakistani farmers look forward to meeting the Dutch

Doing business in Pakistan is not easy. However, the potential upswing as first mover and preferred partner are huge. The ‘Overall project plan Pakistan-Netherlands Agriculture in Punjab’ helps to position and to support Dutch companies and knowledge institutes. The business cases show attractive Returns on Investment. Pakistan has a relatively rich top layer of farmers, investors and entrepreneurs, who are able to finance innovation in seed, technology and processing.

Pakistani look forward to meeting and working with Dutch entrepreneurs and knowledge institutes. They would like to improve their yields and learning our technology to save 90% of water in agriculture.
CHAPTER 1 GOAL AND SCOPE OF THE STUDY

The scope of this study is at three levels. We study the macro level as part of the ‘Overall project plan Pakistan-Netherlands Agriculture in Punjab’. We study the ‘value chain level’ by analyzing six value chains (potato, onion, tomato, carrot, cabbage, spinach). And we map the opportunities at farmer level. The three levels are interconnected. We relate the three levels, and opportunities and bottlenecks in the value chains to Dutch companies and institutes, and their products, services and knowledge.

The goal of this value chain study is two-fold:

a. Mapping the politico-economic context and opportunities of the six value chains in Punjab (potato, onion, tomato, carrot, cabbage, spinach) on production, storage, processing and marketing.

b. Identify the local development opportunities, which will enhance the role of local (female) smallholders in these chains, in combination with business opportunities and knowledge transfer for Dutch companies and institutes.

→ We strengthen six agriculture value chains and the income position of (female) farmers in Punjab with the products, services and knowledge of Dutch companies and institutes.

Three guiding principles

The project has three guiding principles

1. ‘Focus on the value chains, which show a good match between Dutch interests and expertise, and Pakistani challenges and resources.’
   → We choose for Private Sector Development interventions, which we can directly link with assets of Dutch companies

2. ‘Priority role for the private sector as they run most of the enabling environment themselves.’
   → We develop business cases, which fit the approach of private companies and profitable/sustainable solutions. Return on Investment and commercial approach are key.

3. ‘Take seriously into account that most food is still produced by (female) smallholders. Innovations and improvement should avoid crowding out of their businesses’
   → Innovation, mechanization and scaling up are irreversible trends. We see new roles for those smallholders, who can make next steps with affordable innovations: the so-called emerging farmers and midsize farms. They invest in seed, machinery and distribution.
   Education and training are part of the intervention to maximum benefit from the innovation, and mitigate the negative consequences of innovation and scaling.
TARGET GROUP FARMERS

Focus on emerging and bigger farms
Punjab has millions of farmers. The differences amongst these farmers are in plot size, innovation grade, investments and entrepreneurship. See picture below.

Four groups of farmers
The four groups of farmers are all present within the researched value chains. Advanced small holders, medium farms and big farms commercially grow potato, onion and tomato. However, vegetables, like carrot, spinach and cabbage are not grown by the big commercial farms; these are mainly grown by the other three groups.

Most of the millions of farmers are smallholder farmers with less than 1 acre. These are too small to approach directly or individually.

A second group are the progressive farmers. These farmers have a bigger plot of land and innovate. The progressive farmer explores new seed varieties and invests in machinery. Calculations and new practices elevate his farming business.

The third group are the medium farms. These farms are again bigger, more advanced technology like international machines and exporting.

The fourth group are the big commercial farms. They have state-of-the art technology, big budgets and are dominant in the chain. The latter means that they execute and steer several links of the value chain. For example contract farming and processing, or seed multiplication and growing, or growing, collection and distribution.
Focus
Our focus is the last three groups: progressive farmer, midsize farm and big commercial farms. We can reach the smaller farmers via associations and ‘farmer-interest groups’. Although Pakistan does not have a history of farmer cooperatives, the Potato Grower’s Association is a good entry point to reaching many potato farmers. Thousands of farmers are members of this association.

Big landowners
Another entry is the group of big landowners, who assign and steer many small farmers. The challenge with this group is to having a fair share for the small farmers. The farmers are often squeezed by the shares of the landowner and the middlemen, who supply seed and storage service. Seeing the multiplier (big piece if land) new varieties and techniques can relatively easily scaled.

Emerging farmers
An upcoming group – especially in Central Punjab - are the so-called ‘Emerging Farmers’. They have no or not per se a farmer background. They have access to big plots of land and bring budget and technology. They understand the business sheet and by-pass the arthi (middleman) by setting up a direct chain to supermarket, exporter or processor. The three groups represent 2 million farmers. The drive for farm modernization and investment in these three groups of farmers, opens business opportunities for Dutch suppliers.

Chaudhary Ilyas - Innovating farmer in Islamabad

Profile
- 4 hectares of land for vegetable growing
- 3 permanent employees and seasonal workers
- Grows all kind of vegetable
- Hybrid seed from Japan, Turkey, Netherlands
- Sells to supermarket, bazaar and trader in cities
- Good income from the farm

Innovations
- He introduced new vegetable: leek, red cabbage, parsley
- Has own nursery farm, gets info from NARC
- He practices IPM, with a minimum of spraying

His strategy (example)
He has 3 varieties of broccoli: early, middle and late. These varieties can Grow in different parts of the year. Because they can handle better either hot or colder weather. He can steer harvest and selling time and optimal yield.

Ambition
He has 38 acres, on which he wants to growing citrus
CHAPTER 2  METHODOLOGY & APPROACH: THE AGRO VALUE CREATOR

This chapter describes the systemic and holistic analysis of the six value chains and ecosystem around them; and how collecting all the needed information to come to the Private Sector Development interventions. We used the approach of the ‘Agro Value Creator’.

The Agro Value Creator
The Agro Value Creator is a proven and practical methodology to analyse agriculture value chains, and to come to concrete interventions and business options for the farmers and chain partners.

The Value Creator helps farmers and other actors to figure out which opportunities they have in the value chain, in which they are active; and how to benefit from interventions. The Value Creator is applicable on all agro value chains (rice, vegetable, potato, fruit, cattle, fish) on all continents, in all countries.

The Value Creator explains the methodology to analyse value chains. We analyze the six value chains from 3 angles: function, actor and activities. We map the following perspectives: logistic, technical, commercial, financial and information. This helps us profiling the farmer (ambition, scale, skills), how the decision power in the chain, and how to shift this. It explains how to calculate Return on Investment of hybrid seed, a harvesting machine or cool storage.

Characteristics
The Agro Value Creator has the following characteristics:

- Analyzing all value chain actors and relevant stakeholders around the chain (a.o. government, banks, research institutes, regulators).
- Speaking to a broad range of farmers: smallholder farmer, innovator and big farmer.
- Collecting qualitative- and quantitative data.
- Conducting field visits to farmers, processors and other actors as reality check.
- Benchmarking on successful and innovative farmers and other chain actors pays off.
- Developing business cases with a Return on Investment of 1 - 3 years.
- Mapping (investment) opportunities in value chains for companies & service providers
- We come to practical and achievable interventions, which lead to more and better business for the chain as a whole, and to more income for farmers.
Proven and practical
This methodology is a proven and practical tool. We have questionnaires to interview value chain actors and stakeholders. We have calculation models to set up the business cases for improved seed, farming practices, storage, processing, machinery and new distribution outlets. We come to a sound analysis of the 6 value chains in Punjab.

Look beyond your farm
If the retail price for a vegetable is 360% of the farm gate price, it is logical for the farmer to aim for a higher price. Disappointing potato yields and post-harvest losses of 30-50% demand action; like investments in good quality seed and a planting machine. Changing shopping- and consumption patterns are driving farmers towards supermarkets and processors; and even to online channels.
It is clear that farmers do not have the luxury to limit their scope to the own farm. Very simple, this would mean that they miss opportunities. If they look beyond their own farm, they take the lead in improving their business. The value chain approach helps farmers to look at better inputs, understanding wholesalers, processors and consumers; and act accordingly.

Companies
Companies tap into these opportunities by introducing proven innovations like hybrid- and disease-resistant seeds, better farming practices, affordable machinery, storage- and packaging facilities, and processing techniques. They directly connect to agro value chains.

Knowledge transfer
We unfold ‘the unknown unknown’. Farmers and other value chain actors do often not know what they don’t know, and how they can improve. Education, training and knowledge transfer bridge the gap between opportunity and successful business. Knowledge providers, and also companies contribute by introducing product innovation, new techniques, machinery and marketing.
The Value Creator helps farmers and value chain actors to ‘see and understand the unknown unknown’. It is the starting point for innovating their value chains.

Make agriculture measurable
Key in our approach is collecting figures and making calculations. We collect figures on seed, crops, yield and sales. We identify and calculate achievable business cases.
‘We make agriculture measurable’
We make the case tangible. What does it mean for the yield and income of the farmer if he invests in quality hybrid vegetable seed? Are the costs of a storage facility for potatoes lower than the gains because of less post-harvest losses and better time-to-market sales? What is the extra value of processing tomato compared to the fresh product? We make the calculation and give options. That makes it easier to decide, to mobilize partners in the chain, and to convince banks.

All perspectives
We analyze the value chains from the technical side (nursery, seeds, diseases), from the logistic side (packaging, storage, efficient routing), and from the commercial side (quality, premium product, different retail outlets, branding).
We determine the critical path for the value chains. It could be that a better quality (seed, diseases) and yield (seed, farming practices, machinery) are priority before developing the distribution channel to supermarkets or export.
And we describe the politico-economic context. For example what is the role of the government, and what is the impact of the distorted Foreign Exchange balance.

Not a ‘zero-sum-game’
The Agro Value Creator intends to let the value chain grow as a whole. The whole chain improves because of better quality seed, if the yield improves, or if a processors steps in. If the gain of one actor means that another actor looses, the implementation might not work. But it is not a zero-sum-game. All actors, who add value in the chain, benefit from the intervention. The whole chain benefits.
Value Creators
Along the whole value chain - from seed to consumer - we analyze strengths and weaknesses, opportunities and threats. Where are the business opportunities? In this way we define ‘The Value Creators’. The Value Creators are those interventions, which lead to ‘more value’. More value can come from ‘more revenues’, ‘cost savings’, reduction of post-harvest losses, more outlets, and innovations in the chain.

We distinguish:
- Pre-harvest Value Creators are: quality seed, seed multiplication, farming practices and mechanisation; in fact, the production phase, which is in the hands of farmers.
- The farmer or a group of farmers (farmer cooperative) has more Value Creators: collection, grading, transport, storage and processing. For example: if a group of farmers do a central collection, it is wise to build a storage facility together. Storage of potato and vegetable reduces the risk of post-harvest losses.
- Processing is a clear value creator. This could be potato chips or starch. But also tomato paste or ketchup. Processing also means extra value, because it is an extra outlet option besides the fresh product sales. It gives a steady - sometimes even higher - price and customers. It absorbs extra produce.
- In case the farmer does not process the raw material, there is also potential for value creation by directly selling it to supermarket or export. By by-passing the middleman/trader or supplying to the supermarket, the farmer keeps more margin for itself.

- Conclusion: Value Creators are for example: quality seeds, mechanization, advanced technologies (soil scanning, drones), central collection, storage, processing, branding, and direct sales.
STEPS AND PROCESS

This chapter gives an overview of the approach and process of the value chain analysis. It pictures the steps, the timeline and staffing of the value chain study. We make use of a team consisting of Dutch consultants and a team of Pakistani consultants. See more details about the team in the chapter ‘Consultancy team’.
CHAPTER 3 THE POLITICO-ECONOMIC ANALYSIS

Introduction
This chapter describes the politico-economic stakeholder analysis and business enabling environment in Pakistan, and more specifically in Punjab. It gives the conditions and context in which the studied value chains must flourish and improve. And how this affects the business opportunities for Dutch companies.

Pakistan and Punjab

Multiple opportunities
The province of Punjab can be the food basket for Pakistan and beyond. Good agro-ecological conditions and -varieties give the farmers in this province a beneficial position. Potato is a huge and the most important crop of the province. Onion, tomato and all kind of other vegetable grow in Punjab, and are on the rise; from volume and variety perspective. The citrus belt with seven different varieties of citrus fruits is an upcoming crop for domestic- and export market, as well for processing.

The opportunities for Dutch companies are numerous. Pakistani farmers love the Dutch seed potato. However Dutch farmers only supply less than 1% of the demanded 480.000 Mt. Advanced technologies on drip irrigation and soil management are badly needed in Pakistan. The modernization of the agriculture in Punjab requires machinery and cold storage. This is the perfect timing. Japanese, Chinese and Indians are already present, and make next steps. The reputation of the Netherlands is good; however the next competition has already started. We must persevere.
Pakistan - and particularly Punjab, where 50% of the population lives - has the attractive momentum to take advance of:

- ‘Next Eleven’-country (like Vietnam, Turkey, South-Korea)
- 200 million people, young population
- Well-educated top-layer, which takes the lead in modernization (UK/US-connected)
- All agro-ecological zones available, abundant fertile land available for agriculture
- Strong Research centers at federal- and provincial level
- Innovating farmers, who adopt or willing to adopt the latest technologies and agricultural insights
- Very good road infrastructure and ICT-infrastructure (mobile- and internet connections)

And Pakistan has challenges:

- Poor- or no access to education for millions of children, especially for girls.
- Big differences in opportunities, capital and education between top layer and majority of the people. Demographic numbers worsens the balance.
- Political-religious dominance and unrest
- Poor Foreign Exchange balance and hampering public finance
- Women inequality: very limited participation of women in agriculture (except for manual labor).
- Limited water availability during the dry period (November - March)

Dutch companies in Pakistan

During my stay in Pakistan, Pakistani farmers told me the news that Dutch farmers managed to reducing 90% of the needed water for agricultural crops, and achieving the same yield. “How do you do that?” “We would like to learn from you!”.

Dutch companies and knowledge institutes have a lot to offer to the agricultural sector in Pakistan. A small tour along Dutch companies like Den Hartigh, VSS Machinebouw, Bejo Seeds, Mooij Agro, FMO and others, was the ideal preparation for the field study in Pakistan. During the study in Pakistan, it was crystal clear that the Dutch organizations can solve many of the current bottlenecks in the agricultural value chains in Punjab, Pakistan. Short-day varieties for onion, cold storage for tomato, affordable soil management are some assets, which the Netherlands could bring in.

So far, most Dutch companies are reactive and opportunity-driven towards business in Pakistan. “If they ask us for a grading machine or for potato digger, we will follow-up.” Those Dutch companies, who do business in Pakistan on a regular basis, have strong dealers; front-runners in Pakistan. They prove that doing business in Pakistan is very well possible, and pays off!

The value chain study in Pakistan of November 2018 illustrates the big and achievable business opportunities for the Netherlands.
## Bottlenecks and Favorable Conditions

Analyzing the Business enabling environment, we see bottlenecks and favorable conditions.

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<td>Renewable energy solutions on the rise</td>
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<tr>
<td>Lack of cooperatives or associated farmers</td>
<td>Financial- and insurance arrangements for farmers, processors and investors</td>
</tr>
</tbody>
</table>

## Bottlenecks

### Political situation & stability

The political situation in Pakistan is ‘shaky’. The recent turmoil after the verdict and acquittal of the Christian Asia Bibi illustrates the unrest and religious risks, which house just under the surface. Religious sentiments or even extremism are a continuous threat for the stability of Pakistan. PM Imran Khan and his administration face themselves on a junction: choose for a country along the lines of democracy and respected judiciary, or a country, which is steered by Islamic fundamentalism and related unrest. This choice requires leadership and maybe even military backup. More tests for the administration and the country are expected during the next months.

### Education

Several numbers on access to education circulate. Around 23 to 50 million children have no access to proper education. They stay at home with their family or join the mother, who is working on the land. The reasons for no education are: no schools, no transport to the school, “girls do not go to school”. The main sources of information for these children are the own family and the imams. There is the risk of a big part of the next generation being excluded from a proper participation in economy. Millions of grown-ups cannot (enough) participate in the next stages of modernization, and contribute to technology and business in agriculture, like mechanization and new farming practices. Education has the highest importance and urgency. All parts of economy and agriculture will suffer from the consequences of the lack of access to education.

### Foreign Exchange balance

The poor Foreign Exchange balance is a burden for all value chains. The Pakistani government has reserves for only two more months, and the IMF knocks on the door. PM Imran Khan successfully arranged financial support from Saudi Arabia and China. The question is how long this will help Pakistan. The small basis of Foreign Exchange results in restrictions on import, like a ban on import or high import duties (40% for machines from Europe). This hampers innovation in the value chains.

On the other hand the studied value chains give many opportunities to improve the Foreign Exchange balance. The imported quality seed potatoes give higher yields than local recycling. The extra yield can be used for processing (import substitution) and export (Foreign Exchange). By choosing the right variety seed potato, Pakistani farmers can qualify for export of potato and onion.
Breeder’s Right & Seed Certification
Pakistan works on formalization of the Seed Certification system and respecting the Breeder’s Right. This requires time and efforts. Dutch seed suppliers have a fair point when they complain about violation of the Breeder’s Right. (Potato) see multiplication occurs without approval or even Dutch owners of the varieties knowing. In most cases Pakistani farmers do not pay a fee for the multiplication.

Lack of transparency in the chain (middlemen)
The arti or middlemen dominate agriculture value chains. They have the commercial networks, storage and transport. Especially the smaller framers are destined to follow their rules and prices. We see this in potato and vegetable (storage, price fluctuations). Direct chains from farmer to supermarket, processor or exporter help to keeping more margin for the farmer, and in the end for the consumer as well.

Knowledge gap between Research Institutes and farmers
Pakistan has very strong Research Institutes at federal and provincial level. Good examples are the Research Institutes for potato. What is lacking is good development based on this research. The knowledge is quite static. It has knowledgeable staff, who knows the technical side of potato and vegetable, and has the international networks. Research Institutes work on (new) varieties and farming practices. They execute trials and research diseases. However, by no way that all this knowledge and experience reach the farmers. There is a gap between these researchers and the farmers. Pakistan has not a structure like ‘farmer field schools’ or our HAS. This means that the latest insights and techniques do not (systemically) reach the majority of the farmers. It depends on coincidence, seminars (often small-scale), extra service of seed- or machine supplier, or one of the scarce extension workers. A potato farmer with 130 acres of land tells that he grows potato in the same way as his father did. Knowledge transfer is limited or very much acquired on ad-hoc basis.

Export - Have a Plan B
The export of potato, onion and some other vegetable is within the reach of the Pakistani farmers. Important export countries are Sri Lanka, Afghanistan, Iran, Russia, Central Asia and ME. The potential is there, but Pakistan is regularly surprised by the market. If the Russian potato crop is good, Russia does not need potatoes from Pakistan. If the Afghan border is closed, the export hampers.
Pakistan needs a sound export strategy for agricultural produce and processed products. This strategy must be a blend of thorough market research, clear and well-thought choices for certain crops, and igniting favorable conditions (taxes, bilateral agreements). It must be a programmatic approach, which involves companies (processors, exporters), farmers and farmer associations (Potato Grower’s Association), and government. Alerts on yields and conditions in export countries must tune Pakistan’s strategy and agility. ‘Have a plan B’. The farmers and companies must take the lead in this export strategy.
The GoP facilitates at a very instrumental level the export. For example it gives a subsidy of Rp 5/kg potato in case of export.

Import substitution - The next step forward
Processing and the production of higher value added products help Pakistan with it Foreign Exchange balance. Although Pakistan is advanced in the production and engineering of all kinds of instruments and medical equipment, the processing of agricultural produce of the studied value chains is very limited. We only see PepsiCo Lays and some French fries facilities. And they import the French fries potatoes from India and Europe, because Pakistan does not have enough potatoes with the right dry matter content (>20%). Pakistan imports potato starch (8.000 Mt per year), while the conditions for local production of potato starch are excellent. The processing of onion into onion powder and onion rings does not yet exist in Pakistan. Dutch companies should consider processing potato and vegetable. The growing middleclass of Pakistan and the young population can absorb these processed products. Citrus fruits in northern Punjab give opportunities for juice factories. And juice factories require a cold chain. In this way the Dutch companies can contribute as well to the processing Industry.
Female participation
The women play a major role in agriculture and livestock. The government of Punjab had announced the Punjab Women Empowerment Package 2012 on 8th March 2012, in order to address the social and economic issues faced by women. As in other parts of the country, rural women are amongst millions of landless laborers and small farmers. They are fighting against rural poverty, to have a job and struggle to scrap by. They have unskilled jobs in agriculture like, while men have the responsible and decision making jobs. Women in agriculture are among the identified groups in the Punjab Agriculture Policy 2017, that have to be included in all initiatives for the sake of an empowered workforce. This is far from implementation and enforcement. Women mainly have tasks around the house and the family.

No cooperatives
Pakistan has no history of cooperatives. Farmers are very fragmented and have no formal structures like a cooperative. This makes it difficult to reach big groups of farmers, especially vegetable farmers. Although a part of the potato farmers have organized themselves in the Potato Grower’s Association.
FAVORABLE CONDITIONS

Role for Federal- and Provincial government
An agrarian economy by far, Pakistan does not have a formal “Agriculture Policy”. Constitutionally, agriculture is a provincial responsibility. However, national issues such as the import and export of agricultural inputs and products, price setting, standardization and quarantine issues come under the nexus of the Federal Government. National research and inter provincial issues such as the rehabilitation, operation and maintenance of primary irrigation structure, are also within Federal Government’s mandate. The absence of a concise agriculture policy, and the recent devolution of the Ministry (Ministry of Food and Agriculture) at federal level, has compounded problems of this already vulnerable sector. Provincial government set priorities for crops and investments. Agriculture and food security are vital elements of the Government planning. All important planning documents including the Framework for Economic Growth, ‘Vision 2030’, and the Medium-Term Development Framework 2015-2020.

Physical infrastructure
The road infrastructure in Pakistan is relatively good. A vast network of 200.000 km discloses the smallest villages. Cold transport needs to be improved. The only way of having cold transport are ‘reef containers’. Railways, however, are lacking. The GoP has not done many investments in the railways during the last decades. Ports in the south give a good connection with Pakistan for importer and exporter. Except for the north, Pakistan is a flat country with not many geographical bottlenecks.

ICT- and telecom infrastructure
Pakistan has a very good ICT- and telecom infrastructure. Professional and international telecom operators facilitate affordable and quality telecom- and internet services.

200 million +
Pakistan has a fast-growing young population. This demographic figure is attractive for all agriculture crops. The domestic market can absorb many products; fresh and processed. The young population is also adopting new technologies and exploring entrepreneurship. This helps modernization of farming and doing business.

Potato Grower’s Association and other collective initiatives
The Potato Grower’s Association is the perfect entry point for innovations. Those actors who bring most of the value - the farmers - get a stronger voice and mandate. For example this association is interested to taking the lead in local seed potato multiplication.

Special Economic Zones
The GoP has introduced so-called Special Economic Zones (SEZ) for agro-processing facilities. These SEZ are planned closely to the agricultural hotspots. Sahiwal - in the center of the potato belt - looks for processing facilities for chips, French fries, flakes and potato starch. By shortening the chains by these processing facilities close to the farmers, the post-harvest losses reduce and the power of the arthi (middlemen) is broken. This gives farmer and processor extra margin.
GoP gives investors and companies, who start processing facilities in the SEZ, favorable conditions like 10 years of zero income tax and no import tax on capital goods for the factory.

Potential partners
Seed suppliers, big farms and Service providers are available to adopt and to distribute Dutch seed, technologies and services. Their knowledge is of technology and local conditions is good. And their learning curve is steep.

Knowledge transfer to farmers
We see several initiatives for knowledge transfer for farmers, which are based on new technology.
• 7272 is owned by GoP in cooperation with Telenor telecom company. Farmer can ask for information on prices and weather forecast.
• Ba-Khabar Kissan (BKK) has been started by JAZZ Telecom and Switch Telecom. This platform claims having 1.4 million subscribers. BKK has a wide range of information on weather, crops, sowing time and spraying time. BKK also has a service desk for specific questions. Segmentation of their subscribers enables tailor made information.

• There is a What’s app group for potato stakeholders. This is a very active group of Research Institutes, government and farmers. Even farmers with 5 acres of land participate in this chat group. Topics are new varieties, diseases and new technologies.

**UK- and US connection**
The top-layer of companies and farmers have connections in UK or US. These companies understand European and Dutch companies, and they know the Pakistani context. They have valuable networks in Pakistan; like government, other companies and investors. These internationally oriented companies are the innovators in Pakistani agriculture. They are innovators from technical, business model and investment point of view. These UK- and US connected companies are good entry points and potential partners for Dutch companies.

**Renewable Energy**
Energy costs are high. Pakistan has no serious fossil energy reserves. This gives more pressure on the Renewable Energy agenda. Solar energy seems to be the most logical and promising source of energy. A company like Rafiq Agro - a partner of a Dutch company - expects to operating 30% of its new storage facilities in 2019 with renewable energy.

**Finance & Insurance**
Agriculture, and especially the scaling up and modernization of agriculture, requires finance. Potato, onion, tomato and several other vegetables are in this phase of modernization. Investments in new seed varieties, machinery and processing require financing arrangements. Micro finance organizations, banks like ZTBL, and international banks (FMO) step into this space.

**ZTBL**
ZTBL, the Agro Development Bank in Pakistan, has access to many farmers. They have three types of loan:
• Credit Farm Input loan: for feed, seed, fertilizer, pesticide ⇒ easy to receive, 6 - 18 months, max Rp 0,1 million
• Non-farming production loan for livestock purchase ⇒ 6 - 18 months max Rp 0,7 million,
• Development loan: for ⇒ Mobile Credit Office checks farm, evaluation form, loan appraisal ⇒ duration 5 years, machinery = 8 yrs, solar is 10 years max Rp 1,5 million

**Opportunities and suitable for financing**
• ZTBL see opportunities in small machinery, processing, off-season vegetable, Citrus value chain, dried fruit and seed multiplication for seed potato and vegetable seed.
• ZTBL has also insurance products: crop insurance, tractor insurance

**FMO**
FMO is a suitable bank to invest in bigger projects like potato (starch) processing

**KASHF Foundation**
KASHF Foundation has mainly micro credit loans for urban programs, and are piloting a rural program.

**Interest rates**
• At ZTBL: 12,5% - 14,8%
• Micro Finance: 25% - 35%
• Commercial banks: up to 26%
THE (DECISION) POWER IN THE VALUE CHAIN

Like in many developing- and emerging countries, the middlemen (called ‘arthi’ in Pakistan) play an important role in the agricultural value chains of Pakistan. They have much power because of their network amongst farmers and wholesalers/retailers, their financial budgets, and their history. Mainly smaller farmers are destined to the decisions of these arthi (pre-selling, conditions, timing). Besides the arthi, big farms, landowners, influential families, processors and Reputable Research Institutes dominate the value chains. For small holders and the small-scale emerging farmers the middlemen play an important role. They need these middlemen to play a role in an efficient chain. Only if a processor or exporter come up (for example PepsiCo), the small farmers by-pass the middlemen. Then the role of the middleman is taken over by this processor or exporter.

Shift in the balance of power

Although the arthi are still powerful in the value chains, we also see new entrants and new concepts breaking the power of the arthi’s. The trends behind this ‘shift of power’ are: bigger and well-informed farmers, larger scale of production and logistics, modernization of agriculture with new technology (machinery, varieties), strong processors, and a more business approach of agriculture (investments, Return on Investment). Additionally, Super stores are establishing their presence, and online grocery shopping is making its head. Dutch companies can make use of these trends and even facilitate these. Important is to connecting to the right actors in the value chain. Find partners to grow with; partners who have and gain power in the value chains.

The following actors and stakeholders claim more power in the value chain.

Processors

Processors shorten the chain. For example PepsiCo has set up a contract-farming program with farmers, who supply the potatoes for the chips of PepsiCo Lays. PepsiCo makes direct agreements with farmers about volume, quality and price. Farmers directly supply to the processor PepsiCo. Margins for processor and farmer are better because of this direct chain. Seed on credit and advice from European seed suppliers for the farmer creates loyalty at the farmer’s side. If the farmers perform better than the requirement, they receive a bonus.

Investors & Innovators

Investors discover agriculture. They see better seed (new varieties), technology (machinery, Integrated Pest Management, irrigation), and the business sheet (business case, Return on Investment) as the new tools for the farmer. They bring budget and have no farmer background. They could act as just an investor, or they act as a farmer-entrepreneur themselves. Investors in cold chain and export claim a part of the margin, by positioning themselves with ‘added value’, for example cold storage and export. The costs of cold storage are high, and a next step is energy-efficient cold storage; which means again ‘added value’. (Cold) storage gives them more flexibility and a better time-to-market. Innovating and bringing added value gives them more power in the chain.

Big farms

Progressive farmers have made progress and have vast plots of land. They can do further investments in land and technology. The big farmers by-pass the arthi, by directly selling to supermarket, megastore or exporter. Again, a shorter chain reduces post-harvest losses and gives more margin for farmer and wholesaler/retailer/exporter. They have volume, which give them a more relevant position in the value chain.

Emerging farmers

Another group of farmers are those who have no particular farming background. They have big plots of land (200- 300 acres), budget, access to technology, and entrepreneurship. They have their own network and (even international) distribution channels, which reduce the power of arthi and wholesaler. They can make big steps within the value chain, and dare to invest in new modalities like processing, and in machinery and new varieties.
Supermarkets and megastores

Supermarkets and megastores invest backward in the chain. They want to secure their supply in quantity and quality. They invest in cold chain, cold storage and good packaging. A direct chain squeezes the redundant margins for arthi’s and other traders.

See overview below for the power in the studied value chains.

<table>
<thead>
<tr>
<th>Value chain</th>
<th>Who has the power</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| Potato        | Big farmers, Potato Grower’s Association, processors, Research institutes        | • Power is rather equally distributed along the chain. However, innovations like seed multiplication, machines and processing can change this.  
• The Potato Grower’s Association and Research Institutes have influence from a policy- and technical perspective. They are important organisations for knowledge transfer and the enabling environment. |
| Onion         | Arthi, especially those in Sindh, where the biggest onion production is. Some big farms. | • Arthi make use of charging big so-called ‘transport costs’. While the real transport costs are much lower.  
• They make use of the inequality in demand & supply within Pakistan.                                                                 |
| Tomato        | Arthi, and some big farms, who have access to quality hybrid seed and tunnel technology | • Tomato production is equally spread over the whole country during several seasons. Arthi make use of the price volatility by trading all over the country from season to season.  
• A strategic system of transport and storage could shift the power.                                                                 |
| Other vegetable | Arthi, who stores vegetable, and violates transparency                          | • For example cauliflower costs Rp 80/kg, and one week later the price has dropped to Rp 5/kg.  
• There are no big players to break the power                                                                 |
<table>
<thead>
<tr>
<th>Visited organisation</th>
<th>Nr. of persons</th>
<th>Role or position</th>
<th>Value chain actor</th>
<th>Business service provider / NGO</th>
<th>Knowledge provider</th>
<th>Government</th>
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<td><strong>IN PAKISTAN</strong></td>
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</table>
CHAPTER 4 THE POTATO VALUE CHAIN

Good agro-ecological conditions, ambition and demanding consumers justify investments in all potato modalities (table potato, processing, export). Punjab, and Pakistan in general, has very good opportunities for growing and selling potato. This goes along the whole value chain; from the multiplication of seed potatoes and growing potatoes, to export of potato to Central Asia and the Gulf States. Potato is by far the most important crop in Punjab. 90% of the Pakistani potatoes originate from Punjab. And the volumes are growing. The potato value chain goes from the (Dutch) seed supplier to the consumer. The consumer buys and uses table potato or processed potato, like chips and French fries. The processing of potato is on the rise. But, the potato value chain displays several bottlenecks. These bottlenecks require interventions and solutions. Dutch companies and knowledge institutes, can support, and ignite attractive business cases.

Increasing yield
Year-on-year the potato yield and the cultivated land increase (current yield is 10-12 Mt/acre. The yield improves every five years with 10%. The production of 2017 is close to 4 million Mt. On average the domestic market requires 3 million Mt, and the export market needs 1 million Mt. The majority of the potatoes is used as table potato, followed by processing into chips and French fries. Changing consumer diets show a shift from rice to potato, and towards higher consumption of processed potato (chips, French fries). The latter requires specific varieties (dry matter > 20%).

Volatile market
The volatility in the market is high. The domestic consumption increases in a steady pace. However the export causes the disturbance. If there is a good potato crop in Russia, the demand for Pakistani potatoes is low. If there are troubles at the Afghan border, there will be less export to this country. If the export hampers, the domestic market must absorb extra supply. This means lower prices for the farmers. The processing cannot (yet) be a buffer. The opposite happens as well. In case of much export, there is a shortage at the domestic market. The supply-and-demand is not yet in control.

Supply-and-demand
There are many opportunities for yield improvement and reduction of post-harvest losses. Better seed potatoes, diseases resistant varieties, crop rotation and irrigation are avenues to improving the yield. However, as soon as the yield improves the challenge is at the outlets. The market must absorb more potatoes. This could be export and processing. Conclusion: Only yield improvement is not enough in order to have a sound supply and demand. Yield improvement and developing outlets must go hand-by-hand.

Seasons
Pakistan has 3 crop seasons. The autumn crop is by far the biggest (80-90%).
- Autumn crop: September - January/February
- Spring crop: January - May (only in North Punjab)
- Summer crop: April/May/June - October/November/December (in hilly areas)

Market
- The potato hotspots are in Punjab in Okara and around Sahiwal.
- The destination of the Pakistani potato is: 78% table potato, 15% export, 5% processing and 2% seed potato.
- The current sales outlets (domestic, export, processing) are not enough to absorb the future growth in yield.
- The consumption of potato in Pakistan is 20 kg/pp per year. The average in the Netherlands is 100 kg/pp per year.
- Indian potato farmers receive subsidies on energy and transport; this makes the Indians very competitive. Pakistani farmers receive Rp 5/kg subsidy in case of export.
Bottlenecks in the potato value chain

The study displays several bottlenecks in the potato value chain. For example import regulations and disease control of seed potatoes. The choice of the variety is relevant for some export countries and processors. Most of the current varieties are all right for the domestic table potato. Many rounds of recycling potatoes and limited rotation cause lower yield and diseases. Machinery is in place for most of the farmers. But a bigger potato digger is needed when the yield reaches a next stage. Not all potato farmers face the same bottlenecks. The potato sector in Punjab as a whole, show bottlenecks as pictured below.

Main bottlenecks

*Phyto-sanitary requirements* (*‘free of soil’, Scab*)
*Variety availability:
*Violating Breeder’s Right, UPOV not signed
*Variety choice (for processing and export)*

*Low yield
Low efficiency

Limited farming practices:
*Rotation
Soil knowledge & soil preparation
Diseases
Machinery

Small or no margin for farmer
Basic or no storage
Poor packaging
Much and bumpy transport

Hampering sales
Volatile and limited export
Limited access to processing (Indian)

Lack of processors
Value Creators and business opportunities
We see several options for improvements; options for ‘Value Creation’. These could better quality, extra revenues, cost-savings, reduction of post-harvest losses, new outlets. See Value Creators for potato in picture below.

The following paragraphs picture the potential interventions and business cases for Dutch companies. The business opportunities entail not only benefits for the Dutch companies, but they give benefits for the whole value chain.
BUSINESS OPPORTUNITY: FIGHTING NEMATODES AND SCAB

The good message is that Pakistani farmers do not want anything else than Dutch potatoes. Pakistani farmers and exporters are worried about potato diseases. Russian importers complained about nematode and scab. Pakistani farmers claim that the nematodes originate from the soil at Dutch seed potatoes. However, the last time that nematodes in Dutch soil were found, is three years ago. Dutch and Pakistani officials agreed upon stricter import requirements. See picture.

‘Free of soil’
The biggest hurdle for Dutch seed suppliers is that seed potatoes must be ‘free of soil’. The problem is that the Dutch seed potatoes hardly have time to dry after harvesting, and to be cleaned before being shipped. Pakistan is the first destination for seed potatoes, which are planted in Pakistan in January (Spring crop). Quick cleaning might damage the seed potato.

UPOV & Nematode resistant variety
Another option is that Pakistani farmers have access to nematode-resistant varieties, which are new and of high value. However, this option is only possible if Pakistan respects the International Union for the Protection of New Varieties of Plants (UPOV). UPOV is an intergovernmental organization with headquarters in Geneva (Switzerland). UPOV was established by the International Convention for the Protection of New Varieties of Plants. Pakistan does not respect UPOV. It is not clear to what extent the Seed Act of 2017 in Pakistan covers the UPOV agreement.
The combination of this nematode-resistant variety and UPOV would be the most structural improvement. Because Pakistan does not respect UPOV and do not pay - in all cases - the required royalties in case of multiplication, the farmers do not get access to the latest (read: best) varieties.

See also ANNEX 2

The agreement of July 2018 says:
• There will be more tests and sampling of new crops on nematode
• Cleaning during grading
• Maximum 0,1% soil of total weight
- Maximum 0.15% scab
- From 2019 maximum 0.15% nematode

**Improve the whole Value Chain - Better farming practices**
Besides stricter import requirements, appropriate farming practices are needed, in order to avoiding diseases: crop rotation, careful with dung, and irrigation during tuber setting.

**ACTIONS**

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
</table>
| Improving seed potato: Quality and free of diseases | Less diseases Less post-harvest losses More export | • Ministry of National Food Security & Research  
• Seed certification Department | • Seed potato suppliers  
• NAO  
• NAK  
• Ministry of LNV |
| Complying to UPOV, and payment of fee in case of multiplication | Access to high quality and disease-resistant varieties | • Ministry of National Food Security & Research  
• Seed certification Department | • Seed potato suppliers  
• NAO  
• NAK  
• Ministry of LNV  
• Dutch Embassy |
BUSINESS OPPORTUNITY: CHOOSE THE RIGHT POTATO VARIETIES FOR LOCAL CONDITIONS, EXPORT AND PROCESSING

Starting points
- Pakistan grows 17-26 varieties, like: Kuroda, Bartina, Flamingo, Sagidda, Sante (all table), Asterix (table & chips), Hermes en Lady Rosetta (both chips & French fries)
- Current focus is on table potato varieties
- There is not much marketing on which potato variety is demanded by export and processing. Hundreds of potato varieties give Pakistani farmers and traders multiple options to satisfy consumer needs. It is partly the ‘unknown unknown’ for farmers.
- Choosing the right variety for processing (chips, French fries) and export is for several farmers an unchartered territory.
- Climate change directs farmers to short duration varieties (60-80 days), drought resistant, frost resistant and salt tolerant. Sahiwal is experimenting with these.
- The registration and trial period is a formal and lengthy process. In theory it is 2 years, in practice it could be 3 years.

Registration procedure
- Importing company brings a new variety into Pakistan
- Start registration at the Federal Seed Certification Department
- Import small quantities for adaptability trials (supervised by PARC)
- Test during two years at three stations
- Recommendations go the ‘Variety Evaluation Committee’ (Pakistan Agriculture Research Consultant, Federal Seed Certification Department, Potato Research Institute Punjab, Potato Research Institute KP)
- Decision on go/no go and where to grow
- Formal registration of variety at Seed Certification Department (3-6 months)
- The potato research Institute Punjab tests all new varieties. They have testing stations in six different agro-ecological zones.

Salt tolerant varieties
- After years of research on the open-air laboratory at Texel (island in The Netherlands), Salt Farm Texel discovered salt tolerant potato varieties (Metro, Red Valentine, Focus (French fries), Miss Mignonne). These potatoes thrive in salt affected areas and do not require freshwater irrigation to grow.
- Seven varieties tested in Pakistan, and three have been qualified and registered.
- Scaling up access to this potato variety will contribute to better use of lands and waters that have natural and human induced salinity. It will reduce the pressure on freshwater resources, and create new livelihood opportunities.
- Under the highly controlled conditions of Salt Farm Texel, a fertilization strategy has been worked out for saline sandy soils and receiving maximum yield.
- The salt tolerant variety itself is one thing, but more important are farming practices: measuring salt in soil, fertilizing, when irrigating with fresh water and when with salt water. This makes it more a matter of knowledge transfer than selling seed potato.
- The next step is finding first movers making a choice for salt tolerant varieties and scaling up in Punjab.

ACTIONS

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
</table>
| Selling more seed potato varieties | Right potato varieties for table, processing, export | • Seed Certification Dep.  
• Seed potato dealers  
• Farmers | • Seed potato suppliers |
| Introduction of salt tolerant varieties | Use of brackish soil for potato growing  | • Seed Certification Dep.  
• Seed potato dealers  
• Farmers | • Salt farm Texel  
• Seed potato suppliers |
BUSINESS OPPORTUNITY: LOCAL SEED MULTIPLICATION

Red alert: “China & India aim to start seed multiplication in Pakistan” (Potato Association)

<table>
<thead>
<tr>
<th>Total seed potato requirement in Punjab</th>
<th>430,000 tones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imported Seed Provision by companies</td>
<td>4.200 tons (0.9%)</td>
</tr>
<tr>
<td>Contribution from local Seed Sector</td>
<td>64 tons (0.01%)</td>
</tr>
<tr>
<td>Total improved/certified seed potato use</td>
<td>0.91%</td>
</tr>
</tbody>
</table>

Starting points
- The table above tells the essence of the story. There is a big demand for seed potatoes (430,000 Mt/year). But only 0.9% (4.200 Mt) is imported; more or less all from the Netherlands. A small part is locally grown.
- The current reality is that 99% of the seed potatoes comes from recycling the previous crop. This happens by selecting the small potatoes or cutting potatoes. Recycling happens often 5-6 times, which leads to sub-optimal yields (20-50% lower) and risk on diseases. Recycling is the result of habit and (perceived) expensive price for the seed potato from the Netherlands. The price of the Chinese seed potato is 50% of the Dutch seed potato, and has a lower quality.
- Recycled potatoes as seed potato has lower germination and 80% more cases of diseases
- The seed certification system hampers. No farmer really knows the quality, potential yield and formal origin of the seed potato. This needs to be improved and enforced.
- New ‘Seed Act’ is in place since 2017. This says to respect new varieties and multiplication fee. This is in line with UPOV.
- Ambition of Potato Research Institute Punjab is to having a formal seed multiplication system in Pakistan. And it intends to increasing import of Dutch seed potatoes to 5-10%.
- India sells seed potatoes to Central Asia.
- Chinese seed potato suppliers are exploring local seed multiplication in Pakistan.

See bottlenecks in picture below.

Unmet yield potential in Pakistan & limited import of high Quality seed potatoes from Netherlands

RVO - December 2018
**Potential solution: local seed multiplication**

- Local seed multiplication could be the solution. Three organizations at the Dutch side and at the Pakistani side raised - independently from each other - this idea.
- Local seed multiplication brings the price for seed potatoes down, formalizes the seed certification, improves the yield and gives peace-of-mind to the farmers.
- The potato Grower’s Association in Okara says that the China and India consider local seed multiplication in Pakistan as well. This could be ‘power-play’. Nevertheless China has a very aggressive strategy in Pakistan. Since the Dutch have the best reputation and biggest market share, they are best positioned to start local seed multiplication. The Pakistani welcome this idea!

A new value chain

*Wins for all*

- **Imported seed potatoes**
  - NL: Rp 7,500/50kg
  - China: Rp 4,000/50kg

- **Local Seed multiplication in hills (May - August)**
  - In Gilgit-Baltistan
    - 125 acres available
    - Yield: 10,560kg/acre
    - Price for farmer after 1 multiplication:
      - Rp 3,000/50kg

- **2nd seed multiplication in lower hills (April - July)**
  - This is optional
  - Price farmer after 2 multiplications:
    - Rp 1,750/50kg

- **Certified seed potatoes for farmers**

For potato farmers:

- Seed costs up → Quality up → diseases down → yield up → profit up

**Pilot set up:**

- Start with 100 farmers
- 20 new farmers/year join certified seed program
- 50-80% yield improvement
- Link with IFAD program

**Several wins**

- The idea is to multiplying the seed potatoes in the northern part of Pakistan (Gilgit Baltistan). This area has the best conditions. The farmers multiply the seed potatoes, which have been imported from the Netherlands in December/January. The recycling happens once or twice. The advantage of two multiplications of the seed potato is that the price of seed potatoes goes further down for the potato growers. More farmers will shift to the quality seed potato (see picture above).
- A 2nd multiplication takes place during the next season. This should be in the lower hills. The pilot project must clarify which area is most suitable for this.
- The benefit for the Dutch exporters is that the sold volumes become bigger. The extra yield from quality and certified seed potatoes, which Pakistani farmers have, can finance the extra import of seed potatoes from the Netherlands.
- Extra outlets like potato processing and export of potatoes accelerate this seed multiplication. Export and processing demand volume and quality.
- And very important: the business case shows the attractive figures of higher profits for potato farmers, importers and Dutch exporters (see further).

**Pilot seed multiplication**

The first step is testing this concept of local seed multiplication. The calculation below shows the pilot with 100 consumption potato farmers. But we can easily take a bigger number. Although farmer size in Gilgit might be a bottleneck.
<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td># Farmers</td>
<td>100</td>
</tr>
<tr>
<td># acres per farmer</td>
<td>25</td>
</tr>
<tr>
<td>Price in Rp/kg for seed potatoes from the Netherlands</td>
<td>150</td>
</tr>
<tr>
<td>Fee in Rp/kg to be paid for multiplication</td>
<td>5</td>
</tr>
<tr>
<td>Price in Rp/kg for seed potatoes multiplied in Pakistan</td>
<td>48</td>
</tr>
<tr>
<td>Price in Rp/kg for seed potatoes from previous crop or 4 times recycled</td>
<td>12</td>
</tr>
<tr>
<td># Seed potatoes in MT needed for 1 acre seed multiplication</td>
<td>1,2</td>
</tr>
<tr>
<td># Seed potatoes in MT needed for 1 acre potato</td>
<td>1,2</td>
</tr>
<tr>
<td># Seed potatoes in MT needed for 25 acres</td>
<td>30</td>
</tr>
<tr>
<td>Yield seed multiplication in Mt per acre</td>
<td>14</td>
</tr>
<tr>
<td>Yield in case of certified seed in Mt/acre</td>
<td>17</td>
</tr>
<tr>
<td>Yield in case of recycled or cut seed in Mt/acre</td>
<td>9</td>
</tr>
<tr>
<td># Cycles certified seed</td>
<td>1</td>
</tr>
<tr>
<td>Sales price on average in Rp per bag of 120 kg</td>
<td>1,500</td>
</tr>
<tr>
<td>Production costs/acre (excl rent &amp; storage)</td>
<td>61,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>START WITH 100 FARMERS</th>
<th>Previous YEARS</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
<th>YEAR 4</th>
<th>YEAR 5</th>
</tr>
</thead>
<tbody>
<tr>
<td># Farmers</td>
<td>Starts 20%</td>
<td>200</td>
<td>180</td>
<td>162</td>
<td>141</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20%</td>
<td>80%</td>
<td>60%</td>
<td>40%</td>
<td>20%</td>
</tr>
<tr>
<td>SEED NEED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total need new seed potatoes from the Netherlands in Mt</td>
<td>51.45</td>
<td>102.89</td>
<td>154.32</td>
<td>205.71</td>
<td>257.14</td>
<td></td>
</tr>
<tr>
<td>Total need certified seed in Mt</td>
<td>600</td>
<td>1,200</td>
<td>1,800</td>
<td>2,400</td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td>Total need recycled seed in Mt</td>
<td>2,400</td>
<td>1,200</td>
<td>1,200</td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost New Seed potato (Exc fee)</td>
<td>7,971.429</td>
<td>15,942.857</td>
<td>23,914.286</td>
<td>31,885.714</td>
<td>39,857.143</td>
<td></td>
</tr>
<tr>
<td>Costs certified seed potato</td>
<td>28,600.000</td>
<td>57,600.000</td>
<td>86,400.000</td>
<td>115,200.000</td>
<td>144,000.000</td>
<td></td>
</tr>
<tr>
<td>Cost recycled seed potato</td>
<td>28,600.000</td>
<td>21,600.000</td>
<td>14,400.000</td>
<td>7,200.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total seed costs</td>
<td>65,571.429</td>
<td>95,142.857</td>
<td>124,714.286</td>
<td>154,285.714</td>
<td>183,857.143</td>
<td></td>
</tr>
<tr>
<td>PRODUCTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production per seed quality in Mt</td>
<td>8,500</td>
<td>18,000</td>
<td>17,000</td>
<td>13,500</td>
<td>9,000</td>
<td>4,500</td>
</tr>
<tr>
<td>Production of 100 farmers in Mt</td>
<td>26,500</td>
<td>30,000</td>
<td>24,500</td>
<td>18,500</td>
<td>12,500</td>
<td>4,500</td>
</tr>
<tr>
<td>OTHER COSTS (Exl rent &amp; storage)</td>
<td>152,500.000</td>
<td>152,500.000</td>
<td>152,500.000</td>
<td>152,500.000</td>
<td>152,500.000</td>
<td></td>
</tr>
<tr>
<td>SALES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra sales</td>
<td>3,125,000</td>
<td>181,250,000</td>
<td>431,250,000</td>
<td>481,250,000</td>
<td>531,250,000</td>
<td></td>
</tr>
<tr>
<td>MIDFIT</td>
<td>173,178,571</td>
<td>133,607,143</td>
<td>154,035,714</td>
<td>174,464,286</td>
<td>194,892,857</td>
<td></td>
</tr>
<tr>
<td>Sales for exporter</td>
<td>2,774,286</td>
<td>15,428,571</td>
<td>23,142,857</td>
<td>20,807,143</td>
<td>36,571,429</td>
<td></td>
</tr>
</tbody>
</table>

**Pilot group of farmers**
At the start, the group of 100 potato farmers consists of 20 farmers, who use certified seed potatoes. Every year a new group of 20 farmers (of the 100) shift from recycled seed potatoes to certified seed potatoes. After 5 years all 100 farmers use certified seed potatoes.
Quality seed potatoes: higher investment, higher yield, higher profit

- Extra seed potatoes from the Netherlands mean extra costs for the group of farmers. But the local multiplication and higher yield compensate or justify the high price.
- The seed potatoes from the Netherlands give certified seed potatoes.
- The certified seed potatoes give higher yield.
- The higher yield compensates the extra costs for the imported seed potatoes
- The higher yield results in higher sales and profit for the 100 farmers.
- The extra sales of seed potatoes results in higher sales and profit for the Dutch exporter

Fit with Dutch harvest season.
The picture below shows that the Dutch harvest season of seed potatoes has a good fit with the seed multiplication season in Gilgit Baltistan.
The Dutch seed potatoes are being harvested in October. And the multiplication in GB starts in May.

<table>
<thead>
<tr>
<th>Origin</th>
<th>SEASONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dutch seed potato season</td>
<td>Seed potatoes</td>
</tr>
<tr>
<td>Pakistan Seed multiplication</td>
<td>Seed potatoes</td>
</tr>
<tr>
<td>Pakistan table potato</td>
<td>Spring crop</td>
</tr>
<tr>
<td>Pakistan table potato</td>
<td>Summer crop</td>
</tr>
<tr>
<td>Pakistan table potato</td>
<td>Autumn crop</td>
</tr>
<tr>
<td>Jan - March</td>
<td>April - June</td>
</tr>
<tr>
<td></td>
<td>July - Sept</td>
</tr>
<tr>
<td></td>
<td>Oct - Dec</td>
</tr>
</tbody>
</table>

Summary seed multiplication
Goals
- Bring better quality and better varieties into Pakistan
- Affordable certified seed potatoes for Pakistani farmers, with better yield
- More sales for the Dutch seed supplier

Strategy & Approach
- Lead at Mr Masood Ahmad of Potato Grower’s Association Pakistan
- Mr Masood knows area, worked and set up contract farming at PepsiCo
- Start with pilot of 100 potato farmers using certified seed potatoes
- The 100 potato farmers import/purchase the Dutch seed potatoes
- Organize logistics of imported seed potatoes to GB
- Franchise model for seed potato farmer
- Work closely with Seed Certification Department (Breeder’s Right)
- Multipliers: ten thousands of farmers, growing population, regional export of seed potatoes
- Link to the ‘Economic Transformation Initiative Gilgit-Baltistan’, a program of IFAD and Pakistani government
Considerations & decisions

- Enforcement by the Seed Certification Department is key (UPOV)
- What is the fee, which Pakistani farmers pay as 'Breeder’s Right fee’?
- In hills or plains: hills better conditions, smaller plots & requires transport
- 1 or 2 seed multiplication crops? And location for 2nd multiplication?
- Recycle the first consumption potato crop?
- Higher yield means extra outlets needed: export, processing (variety, plan)
- Business opportunity: Match variety with export and processing demand

Value chain actors and stakeholders

See table below with involved value chain actors and stakeholders.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Role in value addition</th>
<th>Gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dutch seed supplier</td>
<td>Quality export, variety</td>
<td>More sales (&gt;0,9%)</td>
</tr>
<tr>
<td>Research Institutes (Islamabad, Punjab, KP)</td>
<td>Support with local knowledge &amp; insights</td>
<td>Know where and how to grow seed potatoes</td>
</tr>
<tr>
<td>Importer</td>
<td>Variety, timing</td>
<td>More sales</td>
</tr>
<tr>
<td>Potato Grower’s Association Pakistan</td>
<td>Managing seed multiplication, and motivate potato farmers to switch</td>
<td>Higher quality potato growing</td>
</tr>
<tr>
<td>Seed potato farmer</td>
<td>Growing quality seed potatoes</td>
<td>Attractive new business</td>
</tr>
<tr>
<td>Potato farmer</td>
<td>Use of certified seed potato</td>
<td>More yield &amp; profit</td>
</tr>
<tr>
<td>Local trainer</td>
<td>Train farmers on seed multiplication</td>
<td>Professionalization sector</td>
</tr>
<tr>
<td>Seed certification Department</td>
<td>Certifying seed</td>
<td>Better formal seed system</td>
</tr>
<tr>
<td>Government of Gilgit-Baltistan and IFAD</td>
<td>Connect seed potato multiplication to existing program</td>
<td>Seed potato multiplication fit in broader rural development</td>
</tr>
</tbody>
</table>
BUSINESS OPPORTUNITY: MACHINERY FOR POTATO FARMERS

The potato farmers in Punjab rapidly modernize and mechanize their farms. Dutch machine builders and suppliers.

Starting points:
- Machines are for farmers from 5 acres
- Machine can be owned by (bigger) farmer, contractor or farmer/contractor
- Laborers rather prefer a 1-year job in town, than 3 months harvesting. So availability of manual labor is not reliable and limited; especially during planting- and harvesting season.
- Bad practices like using a plough for digging potatoes
- Order of purchasing and using machines: Ridger, Planter, Digger, Rotavator
- We see the following machinery and options for investments.

Entry point for Dutch machines
Pakistan has local suppliers of small and basic machines. A next size of machines is imported from India and China. Although quality of these machines is disputable. The field crops like wheat and maize make use of big machines, which have been purchased abroad. Currently potato farmers mainly procure their machines in Pakistan. Vegetable growers in Punjab hardly invest in machinery, since it is (in many cases) not a commercial crop.

So the best entry point for Dutch machines is the potato sector. Use the good Dutch reputation and Pakistani network in the potato sector. And very important, if potato farmers have made the decision to purchase a new machine from abroad, Dutch machines must be an option.

The picture below illustrates the current situation, and the strategic moves, which Dutch machines builders could make.
Business calculation
The challenge is to find out which farmers are ready to make a shift to Dutch machines. In order to get an idea of the investment costs, Return on Investment and farm size in case of such a shift, we made a business calculation. See tables below.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GREENLAND (LOCAL) HARVESTING MACHINE</strong></td>
<td></td>
</tr>
<tr>
<td>Purchase price machine</td>
<td>170000</td>
</tr>
<tr>
<td>Service fee/acre</td>
<td>2500</td>
</tr>
<tr>
<td>Needed # hours/acre</td>
<td>1.5</td>
</tr>
<tr>
<td>Costs for maintenance &amp; spare parts/year</td>
<td>10000</td>
</tr>
<tr>
<td>Costs per liter fuel</td>
<td>100</td>
</tr>
<tr>
<td>Lifetime in years</td>
<td>10</td>
</tr>
<tr>
<td><strong>DUTCH HARVESTING MACHINE</strong></td>
<td></td>
</tr>
<tr>
<td>Purchase price machine including transport</td>
<td>1455000</td>
</tr>
<tr>
<td>Service fee/acre</td>
<td>2500</td>
</tr>
<tr>
<td>Needed # hours/acre</td>
<td>0.5</td>
</tr>
<tr>
<td>Costs for maintenance &amp; spare parts/year</td>
<td>20000</td>
</tr>
<tr>
<td>Lifetime in years</td>
<td>10</td>
</tr>
<tr>
<td>Harvesting time in days per year</td>
<td>60</td>
</tr>
<tr>
<td>Financing costs</td>
<td>10%</td>
</tr>
<tr>
<td>Working hours/day</td>
<td>8</td>
</tr>
<tr>
<td>Costs per liter fuel</td>
<td>100</td>
</tr>
<tr>
<td>Costs for tractor/hour</td>
<td>1250</td>
</tr>
<tr>
<td># Liters/hour for tractor</td>
<td>5</td>
</tr>
<tr>
<td>Import duty on machines</td>
<td>40%</td>
</tr>
</tbody>
</table>
Decisions by farmers
The farmers must make a well-thought decision in case of purchasing a machine.

- Compare costs of manual labor to costs of machinery
- How many own acres can you service with your machine, or do you have access to?
- How to financing the machine
- Purchase machines with a group of farmers
- Are local maintenance, repair and spare parts available
- Weeding machine instead of chemical spraying gives export chances for safe vegetable
- Other machines like planting machine and ripper machine show similar business cases.

Who invests in machinery
The study shows several options of who invests in machinery. See options below.

<table>
<thead>
<tr>
<th>Asset</th>
<th>Medium Farmer</th>
<th>Big Farmer</th>
<th>Potato Grower’s Association</th>
<th>Entrepreneur (service provider, contractor)</th>
<th>Processor or Trader (contract farming)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget</td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
</tr>
<tr>
<td>Access to land</td>
<td>X</td>
<td>XX</td>
<td>XXX</td>
<td>XX</td>
<td>XXX</td>
</tr>
<tr>
<td>Experience to operate machine</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
<td>XX</td>
</tr>
<tr>
<td>Time to operate the machine</td>
<td>X</td>
<td>X</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
</tbody>
</table>

Local supply chain
When selling a machine from the Netherlands to Pakistan, local maintenance, repair and spare parts are important conditions to having in place. Mechanical engineers and black smiths are available. We mapped knowledgeable and skillful companies and shops to pick up the repair, maintenance and spare parts for Dutch machines. These companies already make investments in CNC-machines to make high quality spare parts. In the future they could become the next local ‘Bijlsma Hercules’ or VSS Machinebouw of Pakistan. Pakistan has a strong track record of engineering and making all kind medical instruments and equipment. These mechanic craftsmen and engineers are ideal actors in the value chain, which can be connected to Dutch machine suppliers. Once the Dutch machines match with the local supply chain of repair service and spare parts, the market entry is much easier.
Connect international and domestic value chain

Notes
- For a Dutch company, a good partner in Pakistan is needed (Joint Venture)
- Connect to the local supply chain of mechanic, service, repair and spare parts
- How is competition from China and India? → market study
- There is a market for small hand-held machines based on appropriate technology. This could be the entry point for smallholder farmers
- Another next step is a joint venture between a Dutch- and a Pakistani machine builder.

Strategy & Approach
- Find the right entry points and potential buyers amongst potato growers
- Make and validate the business case calculation
- Check the local supply chain for repair, maintenance and spare parts
- Execute a study on Indian and Chinese machines, and compare these to Dutch machines
- Use the good Dutch reputation in the potato sector
- Potato diggers and rotavators for potato can also be used for onion and carrot.

ACTIONS

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
</table>
| Introduce small machinery for potato farming | Faster, more capacity, lower costs within 3 years | • Potato Grower’s Association  
• Potato farmers  
• Processors  
• Investors/service providers  
• Black smiths (Cast Metal Engineering)  
• Local machine builders | • Machine builders/sellers (VSS and others) |
| See to what extend the potato machines could be used for vegetable (onion, carrot) | Faster, more capacity, lower costs within 3 years | • Vegetable farmers  
• Black smiths  
• Local machine builders | • Machine builders/sellers |
| Knowledge transfer of machine maintenance, repair and spare parts | Building a local value chain for repair, maintenance and spare parts (cheaper, jobs) | • Potato Grower’s Association  
• Mechanics shops  
• Farmers  
• Black smiths  
• Local machine builders | • HAS  
• Machine builders/sellers |
BUSINESS OPPORTUNITY: ENERGY EFFICIENT COLD STORAGE

Current situation
There is in principle enough cold storage capacity for potatoes and seed potatoes. Although in case the export dips, there is an over-capacity of cold storage. And new cold storage facilities are still being built. The cold storage prevents potato crops from post-harvest losses.

The operation of the cold storage is expensive. This is more or less break even business for the owner of a cold storage. The main reason for the high operation costs is the energy costs for the cooling and dehydration; this is 85% of the total costs. There is a demand for energy-efficient storage facilities.

Storing the harvested potatoes is also expensive for farmers. The costs are Rp 430/bag, while the sales price for potatoes is on average Rp 1500/bag. It means that the storage costs are close to 30% of the sales price. The government supports by mandating that the storage price is not allowed to exceed Rp 380/bag.

Need
The need is better insulation of cold storage facilities and cheaper energy supply, for example by solar energy. The company Rafiq Agro expects to have 30% of its cold storage facilities on solar energy in 2019.

Investors:
Investors for energy-efficient storage facilities could come from all directions: Farmers, Potato Grower’s Association, Traders, Supermarkets & megastores, Processors or Entrepreneurs/investors.

Grading & Cleaning
Grading and cleaning are closely related to a good storage. Megastores and supermarkets invest in this kind of facilities.

ACTIONS

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
</table>
| Energy-efficient cold storage | Cost savings for cold storage operator and for farmers | • Potato Grower’s Association  
• Potato farmers  
• Cold storage dealers (Rafiq Agro)  
• Investors | • Omnivent  
• Celtic  
• Mooij Agro |
| Grading & cleaning        | Less post-harvest losses                 | • Potato Grower’s Association  
• Potato farmers  
• Dealers (Rafiq Agro)  
• Investors | • Bijlsma Hercules |
BUSINESS OPPORTUNITY: DEVELOP A MARKETING- AND EXPORT STRATEGY

Observations

- Pakistan has already for several years, a steady yearly export of 1 million Mt/year to Afghanistan, Central, Asia, Russia, Iran, Sri Lanka and ME.
- The export of potatoes plays a pivotal role in Pakistan. If this export hampers, all farmers suffer. Immediately. If Russia has a good potato crop, the domestic price nosedives, because of an over-supply. And the foreign exchange balance suffers.
- If export peaks, the prices in local market soar.
- Pakistan needs to grow its export options, to be less dependent on the local market and the current unpredictable export market.
- And to avoid the price volatility.
- And if the yield improves, there will be an over supply at the local market.

Value Creators: Improving export fresh potatoes

Potato Value Chains

- Tackle diseases (scab, nematode → Russia)
- Select- and develop demanded varieties
- Good cleaning & storage (less losses)
- Energy efficient cold storage
- Appropriate packaging (quality bag, #kg/net or bag)
- Meet the Q-control in Russia
- Market research: Demanded variety in Russia, Central Asia, ME
- Alert on export opportunities to Europe and other countries: How do crops & yields perform in Export countries?

<table>
<thead>
<tr>
<th>Already doing</th>
<th>Partly, more coming years</th>
<th>Not yet</th>
<th>Added value</th>
</tr>
</thead>
</table>

Strategy & Approach

- Make proactively a Plan B for in case regular export hampers (e.g. good crop in Russia)
  o Explore regional markets and build in alerts on crops & yield
  o Explore export to Europe and ME, esp. if crop in Europe fails (2018: 15-25% lower production) → take use of pesticides/herbicide into account
  o Expand export options in order to absorb extra yields
- Let big farmers - via a direct chain - concentrate on export; smaller farmers focus on domestic market
- Good technical performance and knowledge of these export markets are the two pillars in the export strategy. The first, technical performance, concerns no diseases (scab and nematode determined in Russia), good cleaning and grading, cold storage and the right packaging.
- The second pillar is marketing. Know which varieties are demanded, how the crops in export countries perform, and where further business development is needed.
- Especially the marketing needs attention. The farmers are not very pro-active.
- Big potato farms, Potato Grower’s Association and exporters could work with Dutch schools and universities on the marketing and export strategy. LUMS University in Lahore as Pakistani knowledge partner, who plays a role in the market study.
Regional dynamics
The regional export market is very sensitive and dynamic. Afghanistan and Central Asia are important destinations for the Pakistani potato. The Indian potato finds its way to these markets as well. And since last year Indian seed potatoes have been sold in the Central Asian states.

The Afghan market gives headaches; for example 2017-18: 50% less export because the border with Afghanistan was closed. Since last year Afghanistan restricted the weight of trawlers carrying potatoes to 30 Mt per truck, from 40-45 tonnes normally transported. So transport costs increased by 30%. Afghanistan has started growing potato as well, since water supply improved in parts of the country.

Support from the Netherlands:
- Develop and supply demanded varieties: 80-120 grams, long shelf life
- Cold chain & storage building
- Knowledge transfer:
  - Test new varieties in agro-ecological zones of Pakistan (farmers & researchers)
  - Support on developing a market research and export strategy (Potato Associations)
- There are no funds at the Pakistani side available for this knowledge transfer

ACTIONS

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
</table>
| Develop an export strategy and plan (knowledge transfer) | More sales channels, less price volatility | • Potato Grower's Association  
• Potato farmers  
• Exporters  
• LUMS University | • HAS  
• A.o. Nyenrode |
BUSINESS OPPORTUNITY: PROCESSING

Processing potato is very good for value addition. Processing is an extra outlet for potatoes, and it saves foreign exchange because Pakistan does not have to buy processed potato abroad (chips, French fries, starch). Import substitution. See picture below.

The picture above approaches the potato value chain from a processing perspective. It shows the bottlenecks for processing and its potential added value. The case illustrates the mismatch of Pakistani potato farmers, who do not grow the right variety potato to supplying potatoes for French fries. Now the potato comes from India and Belgium.

Key Success Factors for processing
- Start at the end of the chain: what is needed concerning variety, quality, timing
- Location & Logistics → hot spots (close to farmers) or efficient storage & transport
- Educate farmers: soil management, drip irrigation, precision farming (small pilots)
- Buy and lease back & contract farming: provide quality seed and machinery
- Suitable investors: Supermarkets, wholesalers, entrepreneurs, big farms, FDI

Special Economic Zones
Punjab Board of Investment and Trade (PBIT) has launched a couple of so-called Special Economic Zones (SEZ). These SEZ aim to attracting agro-processing industry. For example the SEZ for potato processing is in Sahiwal, the heart of the potato belt. The incentives for these SEZ are:
- Zero income tax for 10 years
- No import tax for capital goods (building a factory)
- 100% Repatriation of profits is possible
- Employees are close-by (building, operation, maintenance)
- Farmers are close-by
- Facilitation by PBIT
Business & knowledge support from the Netherlands for processing

- Suitable seed potato varieties → French fries needs >20% dry matter (Lady Rosetta: 21% DM in Pakistan and 24/25% in Europe) → take agro-ecology into account
- Rafiq Agro: “We need an agronomist from the Netherlands. He/she can help us with variety, local conditions and fertilizer use.”
- Rafiq Agro: “Good varieties for processing are Royal (Danispo), Alverstone Russet (HZPC) and Santana (STET Holland).”
- French fries factory or starch factory from the Netherlands

Potato starch factory
There is a good momentum for starting a Potato Starch Factory in Punjab. The ideal location would be the SEZ in Sahiwal, the center of potato growers. The supply of potatoes and the opportunities for yield improvement are there.

Commercial
- 8.000 Mt current import of potato starch in 2017, yearly increase of 20%
- You can make good deals for rejected potatoes
- The starch factory can be connected to a factory for French fries or chips
- Average potato price of €0,05/kg is lower than price in the Netherlands (€0,07/kg).
- Starch factory has outlets for food and non-food (paper); domestically and regionally
- The growing population can easily absorb extra supply, and increasing supply
- Favourable conditions from Punjab Board of Investment & Trade (PBIT)

First steps
- Feasibility study:
  - for sourcing (variety, quantity, location)
  - sales outlets (food, non-food, distance)
  - favourable conditions (financing, tax)
- Partners: PBIT, Rafiq Agro, farmers for contract farming
- Learn from PepsiCo-model

PepsiCo Lays - a frontrunner on processing in Pakistan
PepsiCo Lays has started its facility for potato chips production in 2006. They have two factories (Lahore, Multan). These two factories cover 80-85% of the potato processing market in Pakistan. They source all potatoes locally from 150 farmers, with 250 acres on average. They have set up a contract farming scheme with clear requirements (Dry Matter %, volume, quality) and incentives (premium in case of DM>22%). PepsiCo Lays imports the seed potatoes for the farmers, and pays them as an advance of the potato purchase. So the potato farmer needs less working capital.

Soil management, (drip) irrigation and precision farming are offered to the farmers. 5% of the farmers, who supplies PepsiCo Lays is female farmer (own decision making). PepsiCo selected landholding females, who could participating in the program.

The Key Success Factors of PepsiCo Lays are:
- Loyal, dedicated and professional farmers → contract farming
- Direct chain →local sourcing & share the margin
- Latest technology and continuous improvement
- Clear requirement and incentives
- Working capital for farmers

ACTIONS

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
</table>
| Building a potato starch factory (or other processing) in Special Economic Zones | Less post-harvest losses, less price volatility, import substitution (FX), jobs Could be besides a French fries factory | • Punjab Board of Investment & Trade  
• Potato Grower’s Association  
• Potato farmers  
• Investors (e.g. Rafiq Agro) | • AVB  
• Seed potato suppliers  
• FMO |

RVO - December 2018
**SWOT-ANALYSIS POTATO VALUE CHAIN**

This paragraph describes the SWOT-analysis, which gives the Strengths, Weaknesses, opportunities and Threats, for the potato value chain. See pictures below.

### Opportunities & Threats in the Potato Value Chain

**Seed potato**
- Opportunities: Very limited competition
- Opportunities: Strong demand for processing varieties (size, DMI)
- Opportunities: Willingness for local seed multiplication (NL/PAK)
- Opportunities: Suitable agro-eco zones for multiplication

**Threats:** Chinese competition

**Farmer**
- Opportunities: Availability of Dutch expertise
- Opportunities: Direct sales to mega stores and supermarkets
- Opportunities: Introduction of water management from NL (drop irrigation)

**Threats:** High input costs
- Threats: International investors push smaller farmers out
- Threats: Lowering water levels and expensive pumping
- Threats: Everything must go alright, otherwise loss leading

**Collector/Trader/wholesaler**
- Opportunities: Affordable, reliable, quality machinery in the market.
- Opportunities: Transfer of knowledge from NL to Pakistani mechanics
- Opportunities: Link between Dutch and Pakistani manufacturers
- Opportunities: Energy-efficient cold storage
- Opportunities: Good local dealers for cold storage

**Retailer/Exporter/Processor**
- Opportunities: Potential regional export markets
- Opportunities: High demand for processed potato
- Opportunities: PepsiCo as model processor
- Opportunities: Special Economic Zones with good conditions and incentives (tax, re-patriating profit)

**Consumer**
- Opportunities: Big population rate
- Opportunities: New consumption patterns (chips, French fries)
- Opportunities: Exporting halal potential upswing (NL: 140kg/pp/year)

**Threats:** Price volatility
- Threats: Scarcity (e.g., 2013-2014)

### Strengths & Weaknesses in the Potato Value Chain

**Seed potato**
- **Strengths:** Dutch seed potatoes well accepted
- **Strengths:** Relation between Dutch supplier and Pakistani dealer
- **Strengths:** Many varieties
- **Strengths:** Good timing of Dutch crop and Pakistani crop
- **Strengths:** Dutch reputation

**Weaknesses:**
- Poor Seed certification system
- Local farmers have experience on seed multiplication
- Habit of much recycling and cutting seed potato, only
- Cold storage for seed potato

**Farmer**
- **Strengths:** Potato Association
- **Strengths:** Good model farmers inclined to learn new practices
- **Strengths:** Good agro-eco conditions
- **Strengths:** Availability of water
- **Weaknesses:** Illiteracy
- **Weaknesses:** financing
- **Weaknesses:** No good use of collective of Potato Association (purchase, learn, collective sales)
- **Weaknesses:** Small land holding

**Collector/Trader/wholesaler**
- **Strengths:** Aarthi as a financier
- **Strengths:** Aarthi stabilize the market
- **Strengths:** Good repair & maintenance skills, and spare parts in the market

**Weaknesses:** Bulking by aarthi
- **Weaknesses:** No grading system in place
- **Weaknesses:** Too heavy bags (120kg)
- **Weaknesses:** Energy-consuming cold storage

**Retailer/Exporter/Processor**
- **Strengths:** Contract farming by e.g. PepsiCo
- **Strengths:** Good quality potato
- **Strengths:** Cheap labor

**Consumer**
- **Strengths:** Nutritious
- **Strengths:** Abundantly available if season is good

**Weaknesses:**
- Not aware of the nutritious value
- No habit of eating potato
- People think it makes you bulky
From SWOT to strategic options

Based on the SWOT, and by ‘confronting’ the Strengths, Weaknesses, Opportunities and Threats, we come to strategic options. See example below.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pakistani farmers have knowledge on multiplication</td>
<td></td>
</tr>
<tr>
<td>• Dutch quality seed</td>
<td></td>
</tr>
<tr>
<td>• Many varieties available</td>
<td></td>
</tr>
<tr>
<td>• Good timing - seasons</td>
<td></td>
</tr>
<tr>
<td>• Old habits of recycling &amp; cutting seed potato lead to low yields</td>
<td></td>
</tr>
<tr>
<td>• Importance of seed is neglected by farmers</td>
<td></td>
</tr>
<tr>
<td>• Limited experience on multiplication</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>Growth Strategy</th>
<th>Improvement Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Good agro-eco zones for multiplication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Willingness from Pakistani &amp; Dutch side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Better climate for storage in the north</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Start seed multiplication in hilly areas of Pakistan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Potato Grower’s Association takes the lead</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Select 30 seed farmers to start with multiplication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Select 100 potato farmers to start using the seed potatoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Secure Breeder’s Right fee, involve Seed Certification Dep.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Do strict record keeping on results: prices, yield, diseases</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THREATS</th>
<th>Defense Strategy</th>
<th>Retreat Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Chinese competitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Diseases when recycling seed potatoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Secure Breeder’s Right fee, involve Seed Certification Dep.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Selecting and growing the best seed & yield
MATCH MAKING PROGRAM FOR THE POTATO VALUE CHAIN.

The table summarizes the areas of interest (bottleneck & solutions/added value).

<table>
<thead>
<tr>
<th>Area of interest</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phyto-sanitary requirements</td>
<td>Commissioner Quarantine, Potato Grower’s Association (Mr Maqsood)</td>
<td>LNV, EZ, Embassy, Seed potato suppliers, NAK, NVWA</td>
</tr>
<tr>
<td>Matching varieties with different Agro-ecological zones</td>
<td>FAO, NARC (Mr Shahid) and Potato Research Institute Sahiwal (Mr Hassan), Potato farmers</td>
<td>WUR, HAS, Seed potato suppliers</td>
</tr>
<tr>
<td>Seed multiplication</td>
<td>Potato Grower’s Association (Mr Masood Ahmad), Lush Green, seed potato farmers</td>
<td>Seed potato suppliers (Den Hartigh)</td>
</tr>
<tr>
<td>Machinery &amp; supply chain</td>
<td>Greenland, Rehman, Cast Metal Engineering, Potato farmers</td>
<td>VSS Machinebouw, Bijlsma, Allround</td>
</tr>
<tr>
<td>Farming Practices (soil management, irrigation, IPM)</td>
<td>Farmers, Potato Grower’s Association, dealers, Jaffer Agro service</td>
<td>WUR, HAS, Dutch trainers &amp; consultants, Seed potato suppliers</td>
</tr>
<tr>
<td>Salt tolerant varieties</td>
<td>Farmers, Potato Grower’s Association, dealers</td>
<td>WUR, HAS, Salt Farm Texel</td>
</tr>
<tr>
<td>(Energy-efficient) cold storage</td>
<td>Rafiq Agro, Potato farmers</td>
<td>Mooij Agro, Celtic, Omnivent</td>
</tr>
<tr>
<td>Marketing &amp; Export</td>
<td>LUMS University, Potato Growers Society, Potato Grower’s Co-op (Masood Ahmad), Lush Green dealer</td>
<td>HAS, Commercial schools, Nyenrode</td>
</tr>
<tr>
<td>Starch factory or chips factory &amp; SEZ</td>
<td>PBIT, Rafiq Agro, PepsiCo</td>
<td>AVB, Aviko, FMO</td>
</tr>
</tbody>
</table>
CHAPTER 5 ONION VALUE CHAIN

Current situation
Onion is a big crop in Pakistan. Pakistan is the 5th biggest producer of onion in the world. Pakistan has the number 4 position in the world of cultivated land for onion. However, Pakistan has a miserable yield of 6 Mt/acre (75th position worldwide). The Netherlands has 23 Mt/acre (3rd position). It is crystal clear that there is a big window for improvement for Pakistan. And Dutch organizations can support and develop business. If we can combine the vast area of cultivated land in Pakistan, with a significantly improved yield, Pakistan makes a big jump in production.

Seasons
- Punjab: harvest April - June
- Sindh: harvest November - April
- KP, Balochistan: harvest January - March

Starting points
- Punjab is the biggest consumer of onion, but has only 15% of onion production.
- The onion cultivation is in south- and central Punjab
- Most farmers have 5 - 10 acres of land, in south- and central Punjab
- Yield of Punjab crop 4-5 Mt/acre, Sindh has 8 Mt/acre.
- Onion has post-harvest losses of 50%
- Punjab is still expanding its cultivated land for onion; while yield improvement is more efficient.
- The big crops of Sindh and Balochistan determines the market and price
- The gaps in harvesting time / season lead to price volatility.
- There is no storage to buffer this volatility.
- There is big demand for quality seed; now 85% is local OPV seed. There is a shortage in the market for quality seed. Farmers want to pay for the seed, as long as they know it is no fake seed.
- This, in combination with perishability, leads to a shaky supply & demand
BUSINESS OPPORTUNITIES: MORE YIELD AND REDUCTION OF POST-HARVEST LOSSES

- The Netherlands has the 3rd best yield (23 Mt/acre) in the world, and Pakistan has the 4th largest cultivated land for onion and a very low yield (6 Mt/acre).
- Aim for more self-supply by Punjab: yield & cold storage
- Yield improvement: variety, farming practices, disease control
- Find more outlets for the big crop of Sindh and Balochistan. Increasing export is the only option

Strategy - higher yield as basis for export
- Study the agro-ecological zones, and come up with advise concerning onion varieties
- Establish a formal seed system. The expected difference is an increase of 30%.
- Test several varieties: early variety, short- and intermediate day variety.
- Consider local seed multiplication (similar as for potato) in Balochistan (insolated areas).
- Cold storage will immediately save up to 50% of the crop (reduction of post-harvest losses). Onion with less than 70% water content will help as well.
- Onion can be stored for 9 months. This is enough to bridge the seasons and avoid the consequences of scarcity in Punjab. And it makes export feasible.
- Improve the yield → production costs per kg lower → storage is affordable → export is competitive
- Explore export opportunities for Central Asia, Bangladesh, Sri Lanka, Malaysia, ME and Iran (white variety, timing)
- Build up a solid and strategic storage and transport system. A good yield is required to make this feasible.

Knowledge support from the Netherlands:
- Soil management → SoilCares
- Systematic and efficient planting → seed suppliers, schools
- Match of ‘variety - agro-ecological zones - seasons’ → University & schools
- Irrigation → AP Holland, HortiMax and University
- Yield improvement → University & schools
SWOT-analysis and strategic options

SWOT & Strategy matrix: Improving onion yield

**Better yield, own supply, more export**

<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>Growth Strategy</th>
<th>Improvement Strategy</th>
</tr>
</thead>
</table>
| • Dutch have top 3 yield in the world: 23ML/acre  
• Dutch have needed varieties (short day)  
• Regional export markets  
• Domestic: salad, fast food | • Match agro-eco zones and right varieties  
• Decide about market: domestic (own supply Punjab), regional export  
• Choose a province for production: Punjab or Sindh  
• Knowledge transfer on farming practices (lower costs/kg)  
• Decide about which variety for export and domestic. Short-day variety can be stored for a limited time (domestic) and long-day variety can be stored longer (export)  
• Determine strategic locations for cold storage | |
| **STRENGTHS** | **WEAKNESSES** | |
| • Pakistan has nr 4 position in cultivated land for onion  
• Big demand  
• Open to international quality seed varieties  
• Strong Research institutes to guide farmers | • Low yield: 6 ML/acre  
• Limited seed varieties  
• No (cold) storage (50% post-harvest losses)  
• Limited marketing  
• No export |

**DEFENSE STRATEGY**

• Short season in Punjab  
• Tough competition from Sindh and Balochistan

**ACTIONs**

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
</table>
| New seed varieties  
Match with Agro-Ecological zones | • Higher yields, off-season crops, less post-harvest losses  
• Knowledge transfer  
• Export | • Research Institute  
• Onion farmers  
• Vegetable seed dealers (Karachi Seed, Millan Agro) | • Bejo Seeds a.o.  
• WUR  
• HAS |
| Local seed multiplication of quality seed | Formalized (certified) seed multiplication, higher yield (at least 30% higher) | • Research Institute  
• Onion farmers  
• Vegetable seed dealers (Karachi Seed, Millan Agro) | • Seed suppliers |
| Soil management, irrigation, planting, and other farming practices | • Higher yield, less post-harvest losses  
• Export becomes an option if costs/kg go down | • Onion farmers  
• Seed suppliers | • HAS, WUR  
• SoilCares  
• Dutch companies in drip irrigation and other technologies |
| Mechanization | Planting and harvesting machines increase yield and quality of crop | • Onion farmers  
• Local supply chain (blacksmith) | • VSS Machinebouw and others |
| Cleaning & Grading Cold storage | Less post-harvest losses, better prices, export | • Onion farmers  
• Exporter  
• Investors | • Bijlsma Hercules  
• Omnivent, Celtic, Mooij Agro |
| Explore export | Extra sales, FX, export strategy and -plan | • Onion farmers | • WUR |
| Explore the provinces Sindh and Balochistan | Largest cultivated plots for onion | • Onion farmers  
• Vegetable seed dealers | • Seed suppliers  
• Cold storage |
CHAPTER 6  TOMATO VALUE CHAIN

Starting points

- Tomato grows all around in Pakistan, with several seasons. During the whole year Pakistan has the availability of tomato (10 Mt/ha, 56116 ha)
- Currently the only market for tomato is domestic fresh. There are a few ketchup factories, but they are small.
- Tomato is not so much a commercial crop, although it has the potential for that.
- Karachi Seed: “Tomato farmers in Punjab only make a profit if something goes wrong with the crop in Sindh or Balochistan (disease, water problem, late harvest).”
- Japanese tomato seed (SAKATA) are widely present in the Pakistani market.
- Hybrid varieties and tunnel technology are available. However, yield improvement and availability is not enough. Yield improvement needs to go hand-by-hand with new, extra outlets in export or processing.

See picture below for the opportunities in tomato.

Cold storage as profitable regulator in the tomato market

Rafiq Agro has the idea to start a concept of building a very efficient network of cold storage facilities for tomato all around in Pakistan. Currently the price of tomato fluctuates from €0,05/kg to €1/kg. An efficient, well-located and dense network of storage and transport can reduce the volatility, and could finance itself. There is no storage yet. Ozon spraying and other techniques can make tomato dormant, and increase the storage time. 2-3 weeks of extra storage in combination with an efficient transport system could craft the business opportunity. If a new tomato processing factory starts, these storage facilities can immediately be connected to this processor.
BUSINESS OPPORTUNITY: HIGHER YIELD IN COMBINATION WITH EXPORT PLAN

The calculation below displays the potential extra yield of hybrid varieties (source: Karachi Seed company).

Reducing the price per kg tomato
Better varieties give a higher yield for tomato. Tunnel technology gives an additional extra yield, because of less diseases and long harvest season. A third factor, which helps reducing the costs per kg tomato, is reduction of post-harvest losses, which is currently 25%. Cold storage is one of the solutions. This extra produce and reduction of post-harvest losses, only make sense if there are more outlets for the tomato.

New outlets
The first goal is to neutralizing the import of tomato from Iran, Afghanistan and India. Secondly, Pakistan should look at export. So yield improvement needs marketing and an export plan. Once the export increases, cold storage is needed. The third option is increasing the production of tomato paste, ketchup and the likes. These products find its way to domestic- and export markets.
**SWOT-analysis and strategic options**
The picture below shows the SWOT and strategic options.

### SWOT & Strategy: Export and yield improvement

**Make tomato an attractive commercial crop in Pakistan**

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year around tomato in Pakistan</td>
<td>Limited outlets, in fact only domestic fresh; export is lacking</td>
</tr>
<tr>
<td>First good experiences with high yield varieties and tunnel technology</td>
<td>No cold storage facilities</td>
</tr>
<tr>
<td>Dutch organizations</td>
<td>No planning of crop &amp; sales</td>
</tr>
<tr>
<td>Pakistani organizations</td>
<td>25% post-harvest losses</td>
</tr>
</tbody>
</table>

#### OPPORTUNITIES
- Hybrid varieties and tunnel technology can improve yield
- Cold storage at strategic locations gives power in market

#### SWOT Growth Strategy
- Start a strategy of yield improvement and export
- Develop an export plan for tomato
- Improve yield with hybrid varieties and tunnel technology, and reduce post-harvest losses. This makes the price/kg tomato lower and more competitive for export market
- Build cold storage facilities around Pakistan, and manage the time-to-market in Pakistan and export market

#### THREATS
- Over-supply in case of no export & processing
- Price volatility

#### ACTIONS

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exporting Dutch tomato seed</td>
<td>Higher yield</td>
<td>Seed dealers (Karachi Seed, Millan Agro Seed), Farmers</td>
<td>Seed suppliers</td>
</tr>
<tr>
<td>Tunnel technology (200.000 acres in Punjab)</td>
<td>Higher yield, longer harvest season, compete with Sindh crop</td>
<td>Farmers</td>
<td>Dutch companies in tunnel technology</td>
</tr>
<tr>
<td>Selling cold storage technology</td>
<td>Less post-harvest losses, better time-to-market</td>
<td>Rafiq Agro, big farms</td>
<td>Celtic, Omnivent</td>
</tr>
<tr>
<td>Marketing plan</td>
<td>More efficient domestic market Export markets</td>
<td>Farmers, Rafiq Agro</td>
<td>HAS, universities</td>
</tr>
</tbody>
</table>
CHAPTER 7  OTHER VEGETABLE (CABBAGE, SPINACH, CARROT)

Karachi Seed in Punjab: “Sell us vegetable varieties with special features; like short day, off-season, special taste, disease resistant.”

Current situation
Since many years 2% of the cultivated land of Punjab is used for vegetable growing. Apparently the yield improvement keeps pace with the population growth. It is local production for local consumption. Most of the vegetables are not very commercialized. Currently some progressive farmers and bigger farms are starting with new vegetable varieties (new for Pakistan) and larger plots. There is no processing, hardly export and no storage of vegetable. The latter means that the price volatility is big. One week a cauliflower costs Rp 80/kg, and the next week Rp 5/kg. Arthi and uncontrolled supply cause this volatility.

Starting points
• The agro-ecological conditions of Punjab are excellent for vegetable growing.
• Vegetable growing gives farmers more income than field crops like wheat and maize.
• Punjab has most of the vegetable cultivation of Pakistan.
• Vegetable is very much demanded by the increasing middleclass, which adds vegetable and fruit to its diet of staples.
• Vegetable farmers have started with ‘back yard farming’ and do not have much education on farming. So there is much room for improvement (knowledge, techniques, seed).
• Off-season vegetable is very profitable. So good timing and seed variety are key, and rewarding.
• Punjab is experimenting with tunnel farming and drip irrigation. Support is needed.

Karachi Seed - Innovator in vegetable
Karachi Seed is an ambitious and smart reseller/dealer for vegetable seed. They are based in Karachi and Lahore, and were the first importer of hybrid seed (Japan, South Korea and China) in Pakistan. They sell seed for tomato, cauliflower, cabbage, bitter gourd and many others. Karachi Seed sells under its own label. They stay in close contact with their customers (farmers). They organise farmer field days, on which they compare results of the hybrid seeds and local seed (OPV).
Karachi Seed looks forward to meeting Dutch seed suppliers. Karachi Seed can take the lead in the registration process and adaptability trials. They focus on maximum 3 varieties per vegetable. They are interested in seed with a special feature, like short day, off-season, disease-resistant. They request seed for red cabbage, spinach, broccoli, radish, short-day varieties of cauliflower. And they look for partners in onion, especially big size (250 grams), short-day variety (5-7 hours), white onion, disease resistant.
**BUSINESS OPPORTUNITY:** IMPROVED SEED, SPECIAL FEATURES IN COMBINATION WITH FARMING PRACTICES

**Strategy & Approach**
Special vegetable seed varieties and farming practices (soil management, IPM) are the best opportunities for Dutch companies. Make use of the good reputation in potato to enter the Pakistani market. The good message is that Pakistani farmers explore and purchase international seed varieties. The bad message is that seed suppliers from Japan, South-Korea and China are ahead. They are setting up a whole system of vegetable production. See below.

**Needs from the Netherlands**
- Explore options for export (Marketing)
- Seed: early and disease-resistant varieties
- Seed for: onion, radish, tomato (low T), red cabbage, spinach, broccoli, short day varieties of cauliflower and cabbage
- Soil management
- Disease control (IPM): Wilt, Late blight, Grey mold
- Small machinery
- Salt tolerant varieties

**Carrot growing**
- Carrot is very popular, fast growing volumes, and has a big potential upswing of its yield. The yield hardly increased during the last 20 years, because of traditional farming practices.
- The Dutch carrot variety could be a good fit with Pakistani taste, and climate. The current seed comes from India, China and Pakistan.
- Carrot has three crops per year and is the main Rabi crop (Autumn/Winter).

**Spinach and cabbage**
- Spinach and cabbage are being grown at a small scale, not very commercially.
- The next step is that big farmers start commercial vegetable growing and pick up quality seed and farming practices for these vegetables.
- New varieties and international seed are welcome.
SWOT-analysis and strategic options
The picture below shows the SWOT and strategic options.

**Bospeen to Pakistan**
Carrot is a very popular vegetable in Pakistan. Around 300,000 Mt/year, of which 75% grows in Punjab. However there is only one crop per year. Carrot is a rotation crop for potato. The most eaten one comes from the local carrot seed T-29, which has many similarities with the Dutch ‘bospeen’. Maybe the T-29 is a little bit juicier. But color, size and softness of bospeen are in line with the Pakistani demand. So we could relatively easy introduce the Dutch variety. The opportunities for Dutch vegetable seed suppliers might be in the fact, that the Pakistani farmers hardly see any increase in yield per acre over the last 20 years; and secondly, more varieties, like an ‘early variety’, could give a longer crop season or extra crop of the carrot. Punjab Vegetable Research Institute is eager to learn from Dutch farmers and universities.
## ACTIONS (see Annex 1 for names of companies and Research Institutes)

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality seed: radish, tomato (low T), red cabbage, spinach, broccoli, short day varieties of cauliflower and cabbage. Especially the Dutch carrot matches with local taste and demand.</td>
<td>Higher yield, new varieties, disease-resistant</td>
<td>Vegetable seed dealers • Vegetable farmers</td>
<td>Vegetable seed suppliers</td>
</tr>
<tr>
<td>Small machinery</td>
<td>Higher yield, saving labor costs</td>
<td>Vegetable farmers</td>
<td>Machine builders</td>
</tr>
<tr>
<td>Introduction of salt tolerant varieties</td>
<td>Use of brackish soil for vegetable growing</td>
<td>Seed Certification Department • Seed dealers • Farmers</td>
<td>Salt farm Texel • Vegetable seed suppliers</td>
</tr>
<tr>
<td>Soil management, tunnel farming, drip irrigation and disease control (IPM, Wilt, Late blight, Grey mold)</td>
<td>Higher yield, longer season, less diseases. Professionalization and commercialization</td>
<td>Research Institutes (NARC and Punjab) • Seed dealers • Farmers</td>
<td>WUR, HAS • Seed suppliers</td>
</tr>
</tbody>
</table>

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### Saeed Anwar - farmer in Ameenpur

**Profile**
- 13 Acres of land
- Grows potato, cabbage, tomato, carrot, cauliflower, radish, fodder
- 2-3 employees, 5-6 seasonal labor
- Has small machines: digger, rotavator
- Good income from the farm

**Bottle necks**
- Gets information from input dealer and arthi, who are connected, and from 7272 (GoP) → information is questionable
- Price of cauliflower dropped within one week from Rp 85/kg to Rp 5/kg → fodder, loss leading
- Domestic market is too limited

**Ambition**
- Purchasing more land
- Buying quality seed at Karachi Seed
MATCH MAKING PROGRAM FOR THE VEGETABLE VALUE CHAINS.

<table>
<thead>
<tr>
<th>Area</th>
<th>Pakistan</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onion varieties (a.o. short-day, early)</td>
<td>Karachi Seed, Millan Agro Seed, Onion farmers</td>
<td>a.o. Bejo, RijkZwaan, Enza Zaden</td>
</tr>
<tr>
<td>Hybrid seed of a.o. red cabbage, radish, carrot, cabbage, spinach</td>
<td>Karachi Seed, Millan Agro Seed, vegetable farmers</td>
<td>a.o. Bejo, RijkZwaan, Enza Zaden</td>
</tr>
<tr>
<td>Beef tomato</td>
<td>Karachi Seed, Millan Agro Seed, vegetable farmers, Rafiq Agro</td>
<td>a.o. Bejo, RijkZwaan, Enza Zaden</td>
</tr>
<tr>
<td>Onion in Sindh province</td>
<td>Onion farmers in Sindh</td>
<td>a.o. Bejo, RijkZwaan, Enza Zaden</td>
</tr>
<tr>
<td>Cold storage for tomato and onion</td>
<td>Rafiq Agro</td>
<td>Celtic, Omnivent, Mooij Agro</td>
</tr>
<tr>
<td>Machinery for onion (harvesting, grading, cleaning)</td>
<td>LUMS University, Potato Growers Society, Potato Grower’s Co-op (Masood Ahmad), Lush Green dealer</td>
<td>VSS Machines, Bijlsma, Allround</td>
</tr>
<tr>
<td>Extension services at farmer level</td>
<td>Karachi Seed Company,</td>
<td>a.o. Bejo, RijkZwaan, Enza Zaden</td>
</tr>
</tbody>
</table>
CHAPTER 8  CITRUS VALUE CHAIN

Although not planned, we bumped into the great opportunity of citrus fruit in Punjab. Around Sargogha the citrus belt of Punjab is yearly growing. Seven different varieties of citrus supply fresh products to domestic- and export market, as well to processors.

*Kinnow and other varieties of citrus*

Pakistan is one of the bigger citrus producing countries of the world. Among the citrus varieties, Kinnow contributes a lion share (95%) to citrus export. Citrus is a prized fruit of Pakistan, and holds number a one position among all fruits, both for area and production in the country. There was an average production of 2.6 million tonnes in 2015-2016. Citrus is the major exportable fruit of Pakistan. Total export of citrus during 2017-2018 amounted to 397.000 tones. Among exportable citrus varieties, kinnow is the major one. Its share to the total citrus export is more than 98%. According to the estimate, about 95% of world total Kinnow production is produced in Pakistan. The export season lasts for four months, starting from mid-December to mid of April.

Opportunities for the Netherlands are in cold storage and cold chain, packaging and import. Mango value chain shows similar opportunities

**ACTIONS**

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling cold storage and cold chain technology</td>
<td>Less post-harvest losses, better time-to-market, export</td>
<td>Citrus farms, processors</td>
<td>Celtic, Omnivent</td>
</tr>
</tbody>
</table>

RVO - December 2018
CHAPTER 9 KNOWLEDGE TRANSFER

The modernization and innovation of the Pakistani agriculture requires knowledge transfer. It works best if this knowledge transfer is combined with delivered products and services, like seed, machinery, irrigation technology and soil scanners. The absolute missing link in Pakistan is the transfer from academic level to farmer level; there are no farmer field schools, and only a limited number of extension workers.

Observations

- Strong research institutes at federal- and provincial level
- Many talks about demo plots for farmers; “but where are they?”
- Several initiatives for the farmer level: BKK (Jazz), 7272 (Telenor/GoP). These are sms or chat services with information on weather, spraying time and prices of seed and fertilizer.
- Even a big farmer (130 acres) says: “I farm in the same way as my father did.” (flat learning curve)
- Farmer Saeed Anwar: “I get my information from input dealer and arthi.” (bias?)
- Farmer knows about the technology, but he does not know how to apply.

Bottlenecks

The following key bottlenecks hamper an enabling business climate:

- There is no infrastructure of farmer field schools, where children and young people (future farmers) learn farming, including the latest techniques and practices.
- Low school attendance by farmer’s children (basic- and secondary education) maintains the knowledge gap.
- Much information on prices, seed and inputs comes from bias sources.
- There is limited cooperation between European countries and Pakistan on latest technologies. This is because of geo-politic reasons.
Technical & commercial knowledge transfer

We could split the knowledge transfer in three groups:

1. Practical advice and farming practices, like land preparation, planting potato, row sowing vs broadcasting
2. Instruction in combination with a sold product, like new seed varieties, drip irrigation technology, maintenance of a potato digging machine.
3. Commercial knowledge on how to explore export opportunities and developing a marketing plan.

THREE CONCRETE OPTIONS FOR K2K PROJECTS (MORE DETAILS ON NEXT PAGES)

Seed multiplication

Goal
- Pakistani farmers learn how to execute the local seed multiplication

Objectives
- Agreement and set-up in 2019
- First pilot in 2020
- First crop in 2020

Partners Netherlands
- Dutch seed potato suppliers, NAO, Dutch embassy

Partners Pakistan
- Potato Grower’s Association, Seed potato farmers, Potato farmers, dealers/importers of Dutch seed potato

Execution
See description in Chapter 4, page 30

Farming practices

Goal
- Pakistani farmers learn how to grow potatoes and maintain the soil

Objectives
- Better farming practices
- Higher yield
- Less diseases (nematodes, scab)

Partners Netherlands
- Dutch seed potato suppliers, NAO, Dutch embassy

Partners Pakistan
- Potato Grower’s Association, Seed potato farmers, Potato farmers, dealers/importers of Dutch seed potato

Execution
See description in Chapter 4, page 27

Developing an ‘Export Plan for Potato’

Goal
- Pakistani farmers and sellers develop an export plan

Objectives
- Mapping the export opportunities and requirements
- Understand which varieties are most wanted in countries like Russia, Iran and Central Asia
- Build in a risk analysis (what if one export opportunity fails)

Partners Netherlands
- Dutch University or school (HAS) Dutch embassy

Partners Pakistan
- Potato Grower’s Association, Seed potato farmers, Potato farmers, Ministry of Trade

Execution
See description in Chapter 4, page 40
BUSINESS OPPORTUNITY: BETTER FARMING PRACTICES THROUGH KNOWLEDGE TRANSFER AND TRAINING

Growing potato or vegetable is a very sensitive and time-consuming activity in Punjab. If everything goes well during the growing period, and the sales is as expected (good price at domestic market, sufficient export), the farmer has a small profit. If a few things go wrong, the crop is loss leading; especially for potato growers. The activities for the farmer are: soil management, ridge making, planting scheme, fertilization, spraying, irrigation, harvesting, cleaning and grading.

We identify a couple of areas where Dutch companies and knowledge providers can add value, like soil management, irrigation and spraying.

Soil management
The field trip learned that farmers do not have a well thought plan for the soil. Only progressive farmers and larger farms regularly test the soil, and apply needed inputs accordingly. When the farmer does a proper measurement of soil structure and nutrient content, the farmer can determine the right fertilization and dosage for different parts of the plot. Affordable soil scans and a tailored fertilization schemes save costs and contributes to better yields.

Crop rotation practices and cover crops are the low-threshold practices, which should start first.

Irrigation
Irrigation is key towards germination, diseases and post-harvest losses.

Drip irrigation saves water in Punjab province, where water is regularly an issue. A right timing of irrigation, for example during the tuber setting, avoids diseases and improves the growth. However, drip irrigation is in most cases too expensive. Laser land leveling is more common and more affordable. The practices like sprinkler and drip irrigation are used under tunnel farming, and in the areas where relatively high temperature and/or frost occurrence prevails during the season. But only the commercial midsize- and big farms can afford these technologies. Nevertheless, these innovators are present in the Pakistani market. See Annex 3 for more details on irrigation

Integrated Pest Management (IPM)
“Pakistani farmers love spraying.” A hoeing machine cuts the weeds and less spraying is needed. Disease resistant varieties, crop rotation and in time spraying avoid too much use of herbicides and pesticides. IPM is a topic, on which Dutch farmers and knowledge institutes can support the Pakistani farmers.

Diseases
A number of disease attacks on potato crop. The diseases with mycoplasma pathogens and soil borne diseases cause serious problem in major potato growing areas of Punjab. Powdery scab, potato cyst nematode, aphids and white grub are the most damaging ones.

Regarding tomato, the most damage causing diseases are fusarium wilt, bacterium wilt, early blight and damping off. In onion, downy mildew, purple blotch, grey mold and basal/pink rot are the relatively more destructive ones.

For increasing supplies of agricultural crops, protection is equally important as of production. Production without protection generates yield uncertainties. It is quite unfortunate that very little research on monitoring (annual or periodic) the diseases spreads, losses and control at farm level is available. What so ever is available, is highly scanty, and plot level rather than based on some area or agro-ecological zone. Under these circumstances, before starting any R&D efforts, there is a need to conduct and exploratory survey with the growers of these six crops, consultation with the scientists at vegetables research institutes and extension departments. The information to be gathered should not only be pertained to damages caused by various diseases in different agro-ecological zones, the data on the probability of incidence also need to be collected. Such gathered information then should be utilized for setting the priorities about initiating the R&D activities and determining the sizes of the disease control projects.
**Agro-ecological zones**
The FAO has recently re-defined agro-ecological zones for the Punjab province. This attempt has been made after nearly 4 decades. This will not anticipate on change in the planting areas of potato or vegetable. These zones are for R&D purpose, not for any administrative control in production and marketing. As far as the marketing patterns is considered, the progressive and large farmers have marketing contacts with commission agents of different districts in Pakistan, they plan their output supply strategy on the basis of daily auctioned/wholesale prices in these markets. Research projects could be started from the perspectives like variety, season and post-harvest. Meetings with the scientists of the Research Institutes are needed to know about their current research agenda, and further research issues/problems on which some research project could be started.

**Financing**
The finances for the designed projects should come from the government, private sector and international donors. Services of Dutch experts would certainly be useful in this regard. However, as the current financial situation of the government is very weak, it would be nice if Dutch government initiate such activities in Pakistan; and later on private sector may be involved.

**Training farming practices**
Before starting any training, it is important to convince the trainee farmers about the importance of the training and after getting the training, the gained knowledge shall be applied. The progressive and medium farmers need to be convinced about the benefits of trainings in different areas; like adopting improved crop management practices, managing soil fertility, effectively controlling diseases and insects/pests attacks and acquiring Global GAP (Good Farming Practices) certification. Convincing the farmers upon training benefits like getting higher prices of their produce, by-passing the conventional marketing channels which are highly exploitive, and the importance of providing healthy food to human population. Arranging foreign trips for interacting with farmers of developed countries shall not only increase their exposure to the world, it will also help changing their mindset towards more progressiveness in their business.

We would suggest to beginning with training on improved water management and disease control. Soil management and compliance to the practices necessary for getting Global GAP certification should come at the second stage. Those who are already registered for Global GAP, their exposure must be further widened through arranging their trips abroad, particularly the countries where their produce is ultimately sold.

**The Netherlands**
A successful utilization of the Dutch experience and technology in vegetables production can make a breakthrough in vegetables production in Pakistan, making the country a significant net-exporter to neighboring country, particularly China --- a vegetables loving society.
ACTIONS

The opportunities in the table below are propositions of a commercial product or service (technology) in combination with a knowledge transfer. This makes the transfer more feasible, sustainable and affordable.

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Added value</th>
<th>Pakistani organizations</th>
<th>Dutch organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales of technology and transfer of farming</td>
<td>Better soil management and IPM</td>
<td>• Research Institutes</td>
<td>• SoilCares</td>
</tr>
<tr>
<td>practices for potato- and vegetable growing</td>
<td></td>
<td>• Seed Certification Dep.</td>
<td>• Companies specialized in IPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rawalpindi University</td>
<td>• Seed potato dealers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Seed potato dealers</td>
<td>• WUR, HAS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Farmers</td>
<td></td>
</tr>
<tr>
<td>Irrigation technology for potato- and vegetable</td>
<td>Irrigation practices to save water, better germination, and better yield</td>
<td>• Midsize- and big farms, who invest in tunnel technology and safe vegetable</td>
<td>• Companies specialized in irrigation</td>
</tr>
<tr>
<td>growing</td>
<td></td>
<td>• Rawalpindi University</td>
<td>• WUR, HAS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Research Institutes</td>
<td></td>
</tr>
<tr>
<td>Knowledge transfer of growing potato</td>
<td>Better farming practices in order to improving yield</td>
<td>• Potato Research Institutes</td>
<td>• WUR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Seed potato dealers</td>
<td>• HAS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Potato Grower’s Association</td>
<td>• Seed potato dealers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Farmers</td>
<td></td>
</tr>
</tbody>
</table>

**What’s App group for potato**

Pakistani stakeholders in potato have set up a ‘Potato Stakeholder Groups App’. This is a very active group on internet with farmers (from 5 acres to very big), traders, researchers, policy makers, consultants and processors. Topics like prices, diseases and seminars pass by. A next step could be that insights and opinions within this app group are being shared with farmers, who do not participate in the chat, or for whom it is too academic. Again, let’s see how we can disclose the very useful information of these chats to the farmers.
MATCH MAKING PROGRAM FOR THE KNOWLEDGE TRANSFER.

<table>
<thead>
<tr>
<th>Area</th>
<th>Pakistan</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato research</td>
<td>Potato Research Institute Sahiwal (Mr Hassan), Okara Potato Grower’s Association (Maqsood),</td>
<td>WUR, HAS, NAK, NAO</td>
</tr>
<tr>
<td>Agro-ecological zones &amp; varieties (better match, higher yield)</td>
<td>FAO, NARC (Mr Shahid) and Potato Research Institute Sahiwal (Mr Hassan), Potato farmers</td>
<td>WUR, HAS, Seed potato suppliers</td>
</tr>
<tr>
<td>Salt-tolerant varieties</td>
<td>Vegetable Department Faisalabad (Dr Chishti)</td>
<td>Salt-farm Texel Seed potato suppliers</td>
</tr>
<tr>
<td>Potato Seminar (1/yr)</td>
<td>Okara Potato Association (Maqsood)</td>
<td>Seed potato suppliers</td>
</tr>
<tr>
<td>Vegetable seed development New varieties</td>
<td>NARC (Mr Naseeb Khan), PMAS Agriculture University (Dr Hafiz), Vegetable Department Faisalabad (Dr Chishti, Dr Cheema)</td>
<td>WUR, HAS</td>
</tr>
<tr>
<td>Machinery &amp; repair &amp; maintenance</td>
<td>Cast Metal Engineering, School for mechanics</td>
<td>VSS, Allround, Technical school</td>
</tr>
<tr>
<td>(Energy-efficient) cold storage</td>
<td>Rafiq Agro, Potato farmers</td>
<td>Mooij Agro, Celtic, Omnivent</td>
</tr>
<tr>
<td>Drip irrigation, IPM and hydroponics (yield, less resources)</td>
<td>Rafiq Agro, Potato farmers, Karachi Seed Vegetable Department Faisalabad, farmers</td>
<td>WUR, Specialized companies, HAS</td>
</tr>
<tr>
<td>Soil management (yield, less post-harvest losses, Q for export)</td>
<td>Vegetable Research Institute Faisalabad (Dr Chishti), Associations, Rafiq Agro, farmers</td>
<td>SoilCares, WUR</td>
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<td>Farmer field school (structural better farmers)</td>
<td>Agriculture Extension Department</td>
<td>WUR, HAS</td>
</tr>
<tr>
<td>Export plans, market research</td>
<td>Potato farmers, Potato Grower’s Association, vegetable farmers, Investors (Rafiq)</td>
<td>WUR, Universities</td>
</tr>
</tbody>
</table>
CHAPTER 10  GENDER

Current situation and observations - Three symptomatic stories

Simple work and no school for the children
‘We visited vegetable farmers in Punjab. They have female laborers, who work on the land. The women bring their children, when they work. The children do not go to school because there is no school in the surroundings; therefore her children are not able to attend school. One of the woman’s year contracts is ending with the current farmer and she is planning to join another farmer where she can send her children to school.’

No research work for women
Interviewing a Research Institute for vegetable seed in Punjab, the Director of the institute does not see women have other jobs than taking care of the family. Maybe some agricultural work, which is close to home, could be part of her duties; but no responsible job at the farm. Working at the Research Institute is out of the question.

PepsiCo assigns female farmers
PepsiCo has a large contract farming program with potato farmers, who supply the potatoes for the potato chips production. 5% of their farmers are female. This 5% corresponds with average of female landholders. Once in the program, PepsiCo offers the female farmers learning programs and technical trainings.

Figures
• 60-70% of the women are illiterate and only listen only to the imam and their husband.
• 23 million children have been excluded from school. Most of them are girls.
• 25-30% of farm labor is woman, mainly in grading and cleaning.
• 5% of the landholders in the researched crops is woman.
• 1-2% of workers in processing are women.
• The salary of women is 25% lower than men’s salary.
• The women are often working for only a half day

Role of the Pakistani government
The government has initiated trainings and workshops for women in general, and definitely also for women in agriculture. This concerns financial literacy, financial management.

Benazir Income Support Programme (BISP), a flagship social protection programme of the government is providing social assistance to women. BISP also gives interest free financial assistance to the female beneficiaries under their Waseela-e-Haq (Micro-Finance) programme to start their own business. Vocational and technical training of one month to a year’s duration, to the female beneficiary or her nominee has been provided under the Waseela-e-Rozgar. Waseela-e-Taleem (Primary Education) encourage the beneficiaries families to send their children ages 5-12 years to school through a co-responsibility cash transfer of Rs 200/- per child (limit to three per family ).

Pakistan Poverty Alleviation Fund (PPAF), is working through its Partner Organisations (POs) across rural areas of Pakistan specially focusing on women to mobilise, provide technical and vocational training, empower and provide grants/loans (as per the programme design) for start-up their own business including in agriculture sector. PPAF POs have developed thousands of Community Organisations (COs) at helmet, village and Union Council (UC) level for enhancing the role of women.

Access to knowledge
In addition to education, women in agriculture face acute shortage of assets and financial resources. In most of the cases, their family owns less than one acre of land, which is hardly sufficient to meet their day-to-day financial requirements. They lack in latest trends in farming and rely heavily on the traditional methods, which, they learned from their parents or grand-parents; or at best with their peers who are equally ill-equipped with knowledge.
Access to finance
Access to finance plays an important role in bringing a change for the better. However, since the women do not have collateral, they do not receive credit from traditional banking systems. Even micro-finance banks (like ZTBL, Khushhali Bank etc) do not consider them worthy to do business. Ultimately, they end up getting loans from other sources on exorbitant rates.
The Kashf Foundation provides micro loans to female workers and farmers. Although they mainly have (semi-) urban programs, they have started a rural program in 2018.

Change
To bring a change in their situation, it is required to engage them in such a pattern where substantial change could be seen in a few years’ time. Pakistan, under the umbrella of different projects, has been working on organizing women in rural areas through a three-tier system community mobilization approach, which is spearheaded by local NGOs. Under this system, women are organized, they are provided with training, and provided either interest-free loan or on a very nominal rate along with assets (mostly livestock).

Potential interventions to empower female farmers.

Gender & Women involvement
How to empower female workers in agriculture

- Seed handling
- Nursery farming
- Admin work & calculations on growing & yield
- New jobs in machinery
- Managing demo plots
- Admin and calculations on storage and collection
- New jobs in processing
- Direct sales from home

Targeting women and female farmers is especially necessary for the next generations. This makes them capable to find incentives and initiatives in the Agriculture sector, rather than leaving them with no guidance or skill, making them equal to an unskilled laborer.

Potential avenues for change:
- Adult literacy classes
- Skills training in modern crop management techniques
- Nursery raising techniques
- Contract farming gives an entry to involve female farmers (PepsiCo)
- Access to micro credit facility (KASHF, NRSP Micro finance bank)
- Basic financial management techniques
- Give girls schooling and training
Dutch agriculture interventions
Dutch companies may consider utilising the above approaches with the local NGOs in Punjab, such as Rural Support Programme Network (RSPN), National Rural Support Programme (NSRP) and Punjab Rural Support Programme (PRSP).

RECOMMENDATIONS

Critical path
The critical path for gender equality in agriculture in general, and for potato, onion, tomato and other vegetable as well, is as follows:
1. The culture, conservative codes, early marriages, and religious habits hamper women equality.
2. Girls/women hardly have any education; this keeps them illiterate. The access to schools is very limited. That’s the most important reason that they have been destined to work as laborer on the land. They are not involved in decision-making and responsibility.
3. Once women have a certain degree of education, landholding is the next step. Only 5% of the land is owned by women; which means that women have are the decision maker for that plot of land.
4. Once a woman has education and land, she must be seen as serious business partner. The research showed that - even at the highest level - men do often not take women as a serious business partner.
5. Women are mainly excluded from the more advanced tasks and responsibilities in agriculture, like making choices on crops, new techniques, sales and financial management.

Advice
The advice to the Dutch embassy and corporate sector is as follows.
• Bullet point 1 is very difficult to influence from the Dutch side. Maybe the item of 'early marriages' could be addressed. Helping to ban this issue is the basis for more education and, more advanced and equal jobs.
• Execute a G2G strategy, in which the Embassy addresses 'Education' (point 2). Better education is a spearhead for NGOs and has support from the international community. And listening to most of the companies and other organizations, which we spoke to, women education is seen as a logic part of economic development. The New Administration has addressed this in her new policy. More schools, and more and safe transport to schools is an important first step. The Dutch Embassy could take the lead in advocating education for girls and women.
• Landholding for women (point 3) is a next project. This often follows on point 2, better educated women. The fact that 5% of the land is in the hands of women is encouraging, or at least a starting point. Dutch companies could - similar to PepsiCo - encourage female farmers. The seed potato multiplication program is a good entry for engaging female farmers. Specific female assets like seed handling and record keeping are important in case of seed multiplication (point 5). Since the Dutch are a partner in this seed multiplication program, they can influence (point4).
• Connect to the by the government initiated training programs for women. These programs have started, and have the support of the government. The Netherlands could enrich these programs with education and technical knowledge from Dutch institutes (point 3 and 5).
• Dutch companies could specifically ask for female farmers. However, doing business in Pakistan is already difficult. Addressing and acting on the gender topic, makes it even more difficult and sensitive. That makes gender more a G2G task, than a B2B task. In other words: Dutch companies are primarily interested in doing business, and will concentrate on business development, but are encouraging working with female farmers (point 4). Parallel to this business development, the Dutch embassy and NGOs - in cooperation with the companies - take the lead at the execution of the gender topic.
CHAPTER 11 ROLE OF THE FEDERAL AND PROVINCIAL GOVERNMENT

Pakistan is governed by their pillars i.e. Federal government, provincial government and district government.

Role of Federal Government in Agriculture Sector:
After the 18th amendment of the constitution, agriculture is a devolved subject. Federal government is limited to few actions including:
- Coordination of research with provincial research institute
- Coordination with international agencies
- Seed registration
- Import and export decisions with relation to a particular commodity
- Imposition of taxes on import or provision of subsidy in case of export

Role of Provincial Government
Agriculture in Punjab is responsible for two-thirds of the country's total food production, and thus plays a key role in food security. Legislation, policy formulation and sectoral planning regarding:
- Agriculture Education, Training and Research including Agricultural University, Faisalabad, and Pir Mehr Ali Shah University of Arid Agriculture Rawalpindi and pre-service/in-service training at Agriculture Training institutes
- Adaptive Research and Research Farms
- Improvement of agricultural and water management methods
- Protection against insects, pests, prevention of plants diseases and quality control of pesticides
- Soil Fertility and Soil Conservation
- Mechanization, reclamations of land, use of agriculture machinery ploughing, tube-wells and installation and research Agricultural Engineering (Agricultural Machinery and Implements), Water Management Training and Research Institute, Lahore
- Agricultural Information and publications/training
- Agricultural Statistics
- Preparation and review of agricultural production strategy in coordination with district agriculture extension

Private sector in the lead
Punjab government has refrained from direct activities in production, marketing and distribution, which are left increasingly to the private sector. Government is restricting itself to provide policy and support to the civil society in creating enabling environment, public infrastructure, and regulatory enforcement and empowering women for inclusive growth.

Role of District Governments:
District government role is more towards extension services. However, this is a big challenge due to lack of resources both technical and financial.
Connection Government and business opportunities
The picture below illustrates the role of the government for the business opportunities, which we present in this report.

Government as ally or at arm length
Facilitating the next step in agriculture

- Phyto-sanitary agreement
- Seed Certification Authority for potato and vegetable
- Signed Seed Act (2017)
- Import duties on machines and seed
- Subsidy on exports (Rp 5/kg for potato)
- Services in potato and vegetable processing
- Close relations with ME, Sri Lanka, Iran and Central Asia
- FX-policy and import substitution
- Special Economic Zones for processing
- Infrastructure
- Job creation
- Nutrition programs for potato and vegetable
MAIN RECOMMENDATIONS

Potato diplomacy
Use potato as entry point. Pakistani love our seed potato and our knowledge! The Netherlands has a very good reputation in the potato sector. This gives us a kick-start; also for soil management, irrigation, machinery and storage. We can use this reputation for vegetable seed, and for farming practices (tunnel farming, nursery, IPM).

Pitch the cluster
Practice a cluster approach. We cover the whole potato value chain: seed (potato), local seed multiplication, farming practices (WUR, HAS), machinery (planter, digger, cleaning & grading) (VSS Machinebouw, Bijlsma), cold storage (Mooij Agro, Omnivent, Celtic), processing (AVB, varieties), and marketing (WUR, universities). By offering a cluster approach to Pakistan, we illustrate our attractive knowledge and complete partnership. Dutch companies can add value at every stage/link in the chain.

Be less reactive, and more pro-active
Currently Dutch companies only consider business in Pakistan if they are being approached (“Could you make an offer for a potato digger?”). The Japanese, Korean and Chinese do not wait. They are already in Pakistan with vegetable seed, big farms and machinery. And they march on. So, make the extra step, explore opportunities. This will give immediate business chances. There is much ‘low hanging fruit’ and Pakistani love Dutch agriculture.

Mobilize local representatives
A own local operation as first step might be too tough, and too much of a risk. Having a strong, well-positioned partner could be a good starting point. Start with a local agent or dealer. Pakistani know the local market, speak the language. This makes the threshold for Dutch companies lower. Investments and risks are less, compared to entering Pakistan with your own operation.

Improve Foreign Exchange balance
Explore options for Foreign Exchange improvement, and you will find the GoP at your side. Support Punjab by developing an export strategy for its agro-products. Other options are import substitution by local seed multiplication, and the training of local mechanic engineers. Processing agricultural produce, which currently happens abroad, is a desired contributor to the Foreign Exchange balance.

Know the competition
What do the Japanese, Chinese and Indian seed suppliers or machine builder bring? What are the yield and features of their seeds? Do their machines match with the Pakistani supply chain of spare parts and repair skills? Where could we do better? Do your homework

Do more than yield improvement
Yield improvement and creating new outlets must go hand-by-hand. Extra outlets like more domestic demand, processing and export need to absorb the extra produce. In case we manage - together with Pakistani farmers - producing more yield, but no extra sales options, prices will drop and farmers might shift to other crops. If we develop extra outlets, the demand for more yield will come.

Processing
Craft options for processing. There is much unmet potential for processing (potato, onion, vegetable). Chips and potato starch are the most realistic and attractive options. Dutch companies have a track record and know the potato value chain.
Make agriculture measurable
Collect figures on yield, price, post-harvest losses. Validate the figures and make the
business calculations. It does not make sense if we only mention the bottleneck and
potential solution. Make the business case. For example at which price point might a Dutch
potato variety or potato planting machine be attractive. And what is the Return on
investment of such a machine, and at how many acres per year. If we make it quantitative,
Pakistani have something to choose. Involve the Pakistani companies in the calculations.

Shorter chains - cut the middle
Shorten chains, for example by setting up a direct chain from farmer to supermarket,
processor or exporter. PepsiCo and its contract farming system is good example for this.
The middlemen have been skipped, the farmer directly supplies to the processor.

Start at the market side
When adding value to the chain, start at the end. What is the market demand? Which seed
potato variety is needed for processing or export? What must be the cost price for 1 kg of
onion or tomato to be competitive in the market? Does the taste of our carrot match with
the taste of the Pakistani and their local carrot. Once we know the market demand, we will
go back in the chain: which storage and transport is needed, How to getting the costs down
(big plots, machinery) in order to meet the retail price and having an attractive margin.

UK-connected
Our research showed that those Pakistani, who have a background in UK or US, are best to
deal with. They understand the European, and they can handle the local Pakistani context.
And these ‘UK Pakistani’ are more into innovations than more traditional Pakistani.

Knowledge transfer as side-kick
New seed varieties, machinery and drip irrigation are welcome in Pakistan. However, all
these products need ‘knowledge transfer’. Explain farmers, local entrepreneurs and
business providers how to use, implement, maintain, repair the new technology. And do
that from the beginning, otherwise it does not work. Product sales can also follow
knowledge transfer. Selling a weeding/hoeing machine to avoid chemical spraying. Or
diseases resistant seeds varieties as part of Integrated Pest Management (IPM).

Connect to Punjab policies
Connect to the local agriculture programs and priorities. Potato, onion and citrus are
important crops in Punjab. New technology like hydroponic is highly appreciated. Punjab
has incentives for local seed multiplication and processing. Make use of these government’s
choices. But keep the government at arm length, to avoid bureaucratic slowdown.

Gender: education, education, education!
Advocate for education for girls and women landholder ship.
Support and initiate education programs on agriculture for girls and women. Tap into
existing government-driven programs.
Female teachers from Dutch knowledge institutes smoothen the process.
Potato: Along the whole value chain
The whole potato value chain can make next steps: seed variety, local seed multiplication, machinery, export, processing. Develop the business intervention in combination. For example yield improvement in combination with extra export or processing.

Onion: new varieties, farming practices and cold storage
The introduction of short/mid-day and low water varieties are welcome in Pakistan. Farming practices to improving the yield is priority number one. Cold storage helps reducing the huge post-harvest losses. Both - better yield and reducing post-harvest losses - must reduce the price/kg and make Pakistan competitive on onion.

Tomato: High yield varieties and cold storage
The tomato farmers ask for high yield varieties. An entrepreneur is working on a business concept for cold storage facilities at strategic locations in the country.

Other vegetable: new varieties and advanced farming practices
Use the two important and realistic entry points for the Dutch companies: At first come with seed varieties with special features (high yield, short-day, off-season, disease-resistant). Carrot, cabbage, spinach, red cabbage and radish have been requested. Secondly introduce appropriate farming practices (soil management, irrigation, IPM).

Citrus: cold chain
Tap into the fast-growing citrus belt of Punjab. Domestic- and export fresh requires cold chain and cold storage, and so the processors.
### SUMMARY OPPORTUNITIES

The table below gives a summary of opportunities for the studied value chains.

<table>
<thead>
<tr>
<th>Indicator or area</th>
<th>Potato</th>
<th>Onion</th>
<th>Tomato</th>
<th>Carrot</th>
<th>Spinach</th>
<th>Cabbage</th>
<th>Citrus</th>
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<td>+</td>
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<td>+</td>
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<td>+</td>
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<td>+</td>
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<td>+++</td>
<td>+++</td>
<td>0</td>
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<td>Soil management</td>
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<td>+++</td>
<td>+++</td>
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<td>(Drip) irrigation</td>
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<td>Integrated Pest Management</td>
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<td>Mechanization</td>
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<td>(Energy) efficient cold storage</td>
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<td>Potential for Dutch companies (# opportunities)</td>
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<tr>
<td>Potential for Dutch knowledge Institutes (# opportunities)</td>
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<td>+</td>
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</tbody>
</table>
ANNEXES
ANNEX 1  Details of visited companies and organizations in Pakistan. Highlighted organizations are most suitable for visits and match making

<table>
<thead>
<tr>
<th>Organization/Program</th>
<th>Person</th>
<th>Rational</th>
<th>Contact details</th>
<th>Date &amp; location</th>
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</thead>
<tbody>
<tr>
<td>FAO</td>
<td>Muhammad Banaras Khan, Program Officer-Resilience</td>
<td>Ecological Zoning in Punjab and insights on macro data</td>
<td>NARC Premises, Park Road, Chak Shahzad, Islamabad T: 00 92 51 0925 5452 C: 00 92 346 854 4169 <a href="mailto:Banaras.khan@fao.org">Banaras.khan@fao.org</a></td>
<td>Islamabad 17 October, 2018</td>
</tr>
<tr>
<td>Awan Garden Centre</td>
<td>Mr Saaqib Awan</td>
<td>Regional Seed supplier</td>
<td>Shop# 12 Hashim Palaza F-8 Markaz, Islamabad C: 00 92 300 5100 975</td>
<td>Islamabad 20 October, 2018</td>
</tr>
<tr>
<td>Ayub Agriculture Research Institute</td>
<td>Dr Saeed Chishti Professor</td>
<td>Experienced on vegetable seed (onion, carrot, tomato, and others) and farming practices</td>
<td>Vegetable Research Institute, AARI, Faisalabad C: 00 92 303 917 8644</td>
<td>Faisalabad 25 October, 2018</td>
</tr>
<tr>
<td>Ayub Agriculture Research Institute</td>
<td>Dr. Kaiser Latif Cheema Professor</td>
<td>Experienced on vegetable seed (onion, carrot, tomato, and others) and farming practices</td>
<td>Vegetable Research Institute, AARI, Faisalabad C: 00 92 332 663 9320</td>
<td>Faisalabad 25 October, 2018</td>
</tr>
<tr>
<td>Cast Metal Engineering</td>
<td>Nadeem Mukhtar Director Plant</td>
<td>Farm Machinery Spare Parts Manufacturer</td>
<td>Cast Metal Engineering Plot No 50 B S.I.E No 2 Khiali bypass Gujranwala T: 00 92 55 428 4860 C: 00 92 300 944 0899 <a href="mailto:nadeemg06@hotmail.com">nadeemg06@hotmail.com</a></td>
<td>Gujranwala 22 October, 2018</td>
</tr>
<tr>
<td>CIMMYT, National Agricultural Research Centre (NARC)</td>
<td>Dr Mansab Ali, Consultant</td>
<td>Expertise on innovation to reducing post-harvest losses</td>
<td>CIMMYT, National Agricultural Research Centre (NARC) T: 00 92 51 925 5522 C: 00 92 306 533 0313 <a href="mailto:mansab.ali@cgiar.org">mansab.ali@cgiar.org</a></td>
<td>Islamabad 18 October, 2018</td>
</tr>
<tr>
<td>Dutch Embassy</td>
<td>Ms Ardi Stoios-Braken, Ambassador Winnie van der Wal, First Secretary, Economic Affairs</td>
<td>Connection with Dutch and Pakistani companies and knowledge institutes in the Netherlands and in Pakistan</td>
<td>Street 15, Sector G 5</td>
<td>Diplomatic Enclave</td>
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<tr>
<td>Dutch Embassy</td>
<td>Winnie van der Wal, First Secretary, Economic Affairs</td>
<td>Intake</td>
<td>Street 15, Sector G 5</td>
<td>Diplomatic Enclave</td>
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<tr>
<td>Dutch Embassy</td>
<td>Josephine Frantzen Counsellor/Deputy Head of Mission</td>
<td>de-briefing</td>
<td>Plot 167, Street 15, Sector G5, Diplomatic Enclave Islamabad T: 00 92 51 200 4210 C: 00 92 300 850 6511 <a href="mailto:josephine.frantzen@minbuza.nl">josephine.frantzen@minbuza.nl</a></td>
<td>Islamabad 5 November, 2018</td>
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<tr>
<td>Organization/ Program</td>
<td>Person</td>
<td>Role</td>
<td>Contact details</td>
<td>Date &amp; Location</td>
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<td>Dutch Embassy</td>
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<td></td>
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<td>T: 00 92 51 200 4229 C: 00 92 302 855 6391 <a href="mailto:sundus.munawar@minbuza.nl">sundus.munawar@minbuza.nl</a></td>
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<tr>
<td>Engro Fertilizers</td>
<td>Muhammad Hasnain</td>
<td>Fertiliser Distributor</td>
<td>4th Floor, Mezan Executive Tower, Liaquat Road Faisalabad</td>
<td>Faisalabad 26 October, 2018</td>
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<td></td>
<td></td>
<td></td>
<td>T: 00 92 41 264 1453 C: 00 92 301 877 0232 <a href="mailto:muhasnain@engro.com">muhasnain@engro.com</a></td>
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<tr>
<td>Federal Seed Certification and Registration</td>
<td>Masood Qamar Quershi</td>
<td>Seed registration and multiplication</td>
<td>G-9/4, Mauve Area Islamabad</td>
<td>Islamabad 7 November, 2018</td>
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<tr>
<td></td>
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<td>T: 00 92 51 926 0126 C: 00 92 300 434 8835 <a href="mailto:gmasood1960@gmail.com">gmasood1960@gmail.com</a></td>
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<tr>
<td>Field Visit</td>
<td>Saeed Anwar, Bilal Husain and others</td>
<td>Carrot, Cabbage, Reddish Farmers</td>
<td>Faisalabad</td>
<td>Faisalabad 26 October, 2018</td>
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<tr>
<td>Horticultural Research Institute, Potato Programme, National Agricultural Research Centre (NARC)</td>
<td>Shahid Riaz</td>
<td>Potato Research Institute at Federal level</td>
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<td>Islamabad 18 October, 2018</td>
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<td></td>
<td></td>
<td>C: 00 92 312 565 5445 <a href="mailto:potatonarc@gmail.com">potatonarc@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Taj Naseeb Khan, Principal Scientific Officer/ In-Charge, Vegetable</td>
<td>Apex body for Vegetable Research at Federal level Coordination with Provincial Research Institutes Role of new variety development and part of VEC for Imported varieties</td>
<td>NARC Premises, Park Road, Chak Shahzad, Islamabad</td>
<td>Islamabad 18 October, 2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C: 00 92 300 723 1962 <a href="mailto:tajnaseeb@gmail.com">tajnaseeb@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dr. HidayatUllah, Principal Scientific Officer hidayatu_2003@yaho o.co.uk</td>
<td>Apex body for Vegetable Research at Federal level Coordination with Provincial Research Institutes Role of new variety development and part of VEC for Imported varieties</td>
<td>NARC Premises, Park Road, Chak Shahzad, Islamabad</td>
<td>Islamabad 18 October, 2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C: 00 92 336 541 9085 <a href="mailto:potatonarc@gmail.com">potatonarc@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td>Karachi Efficient Seed</td>
<td>Shazab Zaheer</td>
<td>Importer and distributor of Sakata seed and other seed suppliers</td>
<td>Near Mini Sports Complex, Sheikhupura Road Gujranwala</td>
<td>Lahore 31 October, 2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T: 00 92 55 427 5722 C: 00 92 321 648 7787 <a href="mailto:effseed@gmail.com">effseed@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td>Karachi Efficient Seeds</td>
<td>Mr Tahir</td>
<td>Importer and distributor of Sakata seed and other seed suppliers</td>
<td>Near Malik Travel Service, Sheikhupura Road, Gujranwala C: 00 92 321 927 011</td>
<td>Gujranwala22 October, 2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T: 00 92 55 427 5722 C: 00 92 3000 642 901 <a href="mailto:effseed@gmail.com">effseed@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td>Karachi Efficient Seeds</td>
<td>Muhammad Usman Dar</td>
<td>Importer and distributor of Sakata seed and other seed suppliers</td>
<td>Near Malik Travel Service, Sheikhupura Road, Gujranwala</td>
<td>Gujranwala 22 October, 2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T: 00 92 55 427 5722 C: 00 92 3000 642 901 <a href="mailto:effseed@gmail.com">effseed@gmail.com</a></td>
<td></td>
</tr>
</tbody>
</table>

RVO - December 2018
<table>
<thead>
<tr>
<th>Organization/Program</th>
<th>Person</th>
<th>Rational</th>
<th>Contact details</th>
<th>Date &amp; location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kashf Foundation</td>
<td>Zainab Saeed</td>
<td>Head of Research</td>
<td>Micro Finance Organization. Received a 5 million loan from Dutch bank FMO</td>
<td>Lahore 29 October, 2018</td>
</tr>
<tr>
<td>Lah Peer University of Management Sciences (LUMS)</td>
<td>Dr Fazal Jawad</td>
<td>Seyyed</td>
<td>Knowledgeable on potato growing, export strategy and marketing</td>
<td>Lahore 21 October, 2018</td>
</tr>
<tr>
<td>Lush Green Agro Service</td>
<td>Muhammad Naeem Siddique</td>
<td>Agent of seed potato for Den Hartigh, HZPC and others. Member of Seed Potato Importers Association of Pakistan, Supports idea for seed potato multiplication</td>
<td>Old Mall Mandi Road, Okara</td>
<td>Okara 24 October, 2018</td>
</tr>
<tr>
<td>Ministry of National Food Security &amp; Research</td>
<td>Dr. Muhammad Khurshid</td>
<td>Joint Secretary</td>
<td>Food Security Policy at Federal Level, regulatory affairs wrt vegetable seed and seed potato</td>
<td>Islamabad 5 November, 2018</td>
</tr>
<tr>
<td>Ministry of National Food Security &amp; Research</td>
<td>Dr Syed Waseem ul Hassan</td>
<td>Food Security Commissioner</td>
<td>Food Security Policy at Federal Level, regulatory affairs wrt vegetable seed and seed potato</td>
<td>Islamabad 5 November, 2018</td>
</tr>
<tr>
<td>PepsiCo</td>
<td>Zahid Saleem</td>
<td>Head of Agro</td>
<td>Potato Processing Industry, has set up a contract farming program, invests backward in the value chain (seed, machinery)</td>
<td>Lahore 30 October, 2018</td>
</tr>
<tr>
<td>PMAS-Arid Agriculture University</td>
<td>Professor Dr. Nadeem A. Abbasi</td>
<td>Dean Faculty of Crop &amp; Food Sciences</td>
<td>Insights on Pakistani knowhow and technology for agriculture. Policies and priorities</td>
<td>Islamabad 17 October, 2018</td>
</tr>
<tr>
<td>PMAS-Arid Agriculture University</td>
<td>Dr Ishfaq Ahmed Hafiz</td>
<td>Chairman Dep of Horticulture</td>
<td>Insights on Pakistani knowhow and technology for agriculture. Policies and priorities</td>
<td>Islamabad 17 October, 2018</td>
</tr>
</tbody>
</table>

Note: The table above lists the organization/program, person, rational, contact details, and date & location for various entities involved in the Agro value chain study in Punjab.
<table>
<thead>
<tr>
<th>Organization/Program</th>
<th>Person</th>
<th>Rational</th>
<th>Contact details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato Growers Co-op Society Pakistan</td>
<td>Ch. Masood Ahmed</td>
<td>Chief Co-ordinator</td>
<td>Seed potato grower in GB Lahore. C: 00 92 300 800 1746 C: 00 92 331 620 4506 <a href="mailto:mashir86@gmail.com">mashir86@gmail.com</a></td>
</tr>
<tr>
<td>Potato Growers Co-Op Association Pakistan</td>
<td>Ch. M. Akmal Naveed</td>
<td></td>
<td>Potato Farmers Association, active on: seed potato, regulatory topics, farming practices, export and marketing A-Block, Model Co-Op Housing Society Okara. T: 00 92 44 251 3898 C: 00 92 301 733 6491 potatosociety; <a href="mailto:696@gmail.com">696@gmail.com</a></td>
</tr>
<tr>
<td>Potato Research Institute</td>
<td>Dr. Syed Ijaz-ul-Hassan</td>
<td>Director</td>
<td>Provincial Potato Research Institute. Active on: research, seed potato, new varieties, seed multiplication, export Vili-B/319, Khawaja Gareeb Nawaz Chock, Fatah Shair Colony Shaiwal. T: 00 92 40 446 1322 C: 00 92 312 6931 708 <a href="mailto:syedejazqutbi@yahoo.com">syedejazqutbi@yahoo.com</a></td>
</tr>
<tr>
<td>Progressive Farmer</td>
<td>Ch. Ilyas</td>
<td>Linked by Dr Hafiz Understanding of Progressive Farmers approach in Islamabad</td>
<td>Islamabad Farm House, Near Faiyazabad C: 00 92 300 529 9118</td>
</tr>
<tr>
<td>Progressive Farmer and Cold Storage Owner</td>
<td>Muhammad Umar</td>
<td>Progressive Farmer and Cold Storage Owner</td>
<td>Okara</td>
</tr>
<tr>
<td>Punjab Agriculture Commission</td>
<td>Ch Maqsood Jatt</td>
<td>Vice President</td>
<td>Potato Farmers Association: seed potato, machinery, export, processing, policy making Punjab Agriculture Commission (43-44), A Model Housing Coop Society Sikendar Iqbal Road Okara C: 00 92 300 698 2641 <a href="mailto:maqsood.jatt@gmail.com">maqsood.jatt@gmail.com</a></td>
</tr>
<tr>
<td>Punjab Board of Investment and Trade</td>
<td>Jahangzeb Burana</td>
<td>Chief Executive Officer</td>
<td>Investment opportunities in agro-processing 23-Aikman Road,GOR.1 Lahore T: 00 92 42 9920 5207 C: 00 92 312 943 3333 <a href="mailto:ceo@pbit.gop.pk">ceo@pbit.gop.pk</a></td>
</tr>
<tr>
<td>Punjab Board of Investment and Trade</td>
<td>Rana Waqas</td>
<td>Additional Director</td>
<td>Investment opportunities in agro-processing. Contact for Agro Trade Mission 23-Aikman Road,GOR.1 Lahore T:00 92 42 9920 5201-6 C: 00 92 334 991 4944 <a href="mailto:rana.waqas@pbit.gop.pk">rana.waqas@pbit.gop.pk</a></td>
</tr>
<tr>
<td>Punjab Board of Investment and Trade</td>
<td>Saqib Shah</td>
<td>Deputy Manager</td>
<td>Investment opportunities in agro-processing 23-Aikman Road,GOR.1 Lahore T:00 92 42 9920 5201-06 C: 00 92 344 544 7706 <a href="mailto:nabeel.saqib@pbit.gop.pk">nabeel.saqib@pbit.gop.pk</a></td>
</tr>
<tr>
<td>RAFIQ AGRICO</td>
<td>Saleem Khalid Rafique</td>
<td>Manager Director</td>
<td>Agent for Mooij Agro (NL) on cold storage for potato &amp; onion, innovator, potato farmer, investor (cold storage for tomato, French fries factory) Rafiq Cold Store Muhammad Pur Road Sahiwal. T: 00 92 40 455 0457 C: 00 92 300 869 1177 <a href="mailto:saleem@rafiqagrico.com">saleem@rafiqagrico.com</a></td>
</tr>
<tr>
<td>RAFIQ AGRICO</td>
<td>Kesar Rafique</td>
<td></td>
<td>Agent for Mooij Agro (NL) on cold storage for potato &amp; onion, innovator, potato farmer, investor (cold storage for tomato, French fries factory) Rafiq Cold Store Muhammad Pur Road Sahiwal. T: 00 92 40 455 0457 C: +92 (0) 344 866 644 <a href="mailto:keesar@rafiqagrico.com">keesar@rafiqagrico.com</a></td>
</tr>
</tbody>
</table>

Organization/Program  | Person  | Rational  | Date & location |
|----------------------|--------|----------|----------------|

RVO - December 2018
<table>
<thead>
<tr>
<th>Company/Programme</th>
<th>Contact Person</th>
<th>Role/Function</th>
<th>Address/Contact Information</th>
<th>Date</th>
</tr>
</thead>
</table>
| Rafiq AGRICO      | Faisal Rafiq   | Agent for Mooij Agro (NL) on cold storage for potato & onion, innovator, potato farmer, investor (cold storage for tomato, French fries factory) | Rafiq Cold Store Muhammad Pur Road Sahiwal  
T: 00 92 40 455 0457 | Sahiwal 24 October, 2018 |
| Rehman Agro Engineering | Muhammad Parveez | Farm Machinery Equipment Manufacturer | Lahore Road Okara  
T: 00 92 44 251 2994  
C: 00 92 300 696 0952  
rehmanagropk@gmail.com | Okara 25 October, 2018 |
| Rural Support Programme Network (RSPN) | Ms Shandaha Khan | | 3rd Floor, IRM Complex, Plot No 7, Sunrise Avenue (Off Park Road), Near COMSATS University, Islamabad (Cell 00 92 300 500 9506) | Not spoken to |
| Switch Solutions | Aisha Saifullah Khan, Business Development Manager | Information sharing platform (prices, farming practices, weather forecast) mainly funded by cell phone companies Jazz and Telenor | 20-A Street No. 21, F-7/2, Islamabad  
T: 00 92 51 260 9387  
C: 00 92 314 955 5539  
aisha.saifullah@switchsolutions.com.pk | Islamabad 17 October, 2018 |
| Zarai Taraqiati Bank Ltd. (ZTBL) | Abdul Qadeer Jawaid, Acting Senior Vice President | Availability of (micro-)credit to small and medium farmers (especially women) | Zero Piont, Islamabad  
T: 00 92 51 925 2712  
C: 00 92 300 919 0044  
qadeer2864@hotmail.com | Islamabad 19 October, 2018 |
| Zarai Taraqiati Bank Ltd. (ZTBL) | Muhammad Afsar Khan, Head of Credit Division | Availability of (micro-)credit to small and medium farmers (especially women) | Zero Piont, Islamabad | Islamabad 19 October, 2018 |
| Zarai Taraqiati Bank Ltd. (ZTBL) | Sanaullah Credit Operational Department | Availability of (micro-)credit to small and medium farmers (especially women) | Zero Piont, Islamabad | Islamabad 19 October, 2018 |
ANNEX 2  REGULATORY DOCUMENTS AND AGREEMENTS

Document below is guideline for import from the Pakistani Ministry of National Food Security & Research

- Pakistani side informed the NPPO, Netherlands not to allow any seed potatoes and flower bulbs shipments without considering import permit and meeting phytosanitary measures specified on it. Netherlands side agreed to only issue phytosanitary certificates for shipments for which the NPPO, of Pakistan has issued an import permit.

- After deliberations, both sides finalized and agreed the following offshore phytosanitary measures and their specification on the phytosanitary certificate in term of additional declaration for seed potato export season 2018.

  a. "The seed potatoes are inspected during active growth by a duly authorized inspector regularly and found free from Globodera rostochiensis, Globodera pallida, Heteroder a chitwoodi, Meloidogyne fa latax, Clavibacter michiganensis subsp. Se pedonicus,Ralstonia solanacearum."

  b. "The production site was sampled, tested and found free from Globodera rostochiensis and Globodera pallida."

  c. "The seed potatoes in this consignment have been inspected, tested and found free from Clavibacter michiganensis subsp. se pedonicus - Ralstonia solanacearum."

  d. "The seed potatoes are grown in a production site free from Synchytrium endobioticum."

  e. "The seed potatoes in this consignment have been inspected and found free from Ditylenchus destructor, Ditylenchus dipsaci, Meloidogyne enterobii, Meloidogyne chitwoodi, Meloidogyne fa latax, Phoma exigua var. Exigua, Theonectria solani, Promotrypes spp., Leptinotarsa decemlineata."

  f. "The seed potatoes in this consignment are free from potato andean potato mottle virus, Potato Andean latent tymovirus, Arracacha B virus, Potato deforming mosaic, Potato yellow vein crinivirus, Potato black ringspot nepovirus, Potato yellowing alfamovirus, Potato yellow dwarf nucleorhabdovirus, Potato T tepovirus, Potato spindle tuber viroid, Potato purple-top wilt & stolbur mycoplasmas."

  g. "The lot is free from soil (max 0.1% by weight)."

- However, these additional declarations will enter into force once the Department of Plant Protection, National Plant Organization of Pakistan has signed the agreed work plan. The Pakistani side indicated that a couple of months are needed for this because it requires an adaptation of current Pakistani regulations. Until that moment, the present Additional Declaration remains in force.

- The Pakistani side acknowledged that in case of non-compliance, a notification of non-compliance will be sent to NPPO, Netherlands.

- As to the trade in flower bulbs, the Pakistan delegation has informed the Netherlands side that flower bulbs will be fumigated with methyl bromide upon import into Pakistan. Fumigation with methyl bromide is not allowed in the EU / The Netherlands.

- With regard to Narcissus bulb fly, Eumenis strigatus, it was agreed that the Netherlands delegation would verify whether instead of methyl bromide, a post-harvest hot water treatment of Narcissus bulbs could be introduced as an alternate mitigation option.
Certification requirements for importing potato into Pakistan.

Landenoverzicht exporteisen Aardappelen.
Land: Pakistan

Overzicht van de laatste wijzigingen:
versie

a en Globodera rostochiensis.
Certificeringseisen
Bijschrijving
Poot
“The seed potatoes in this consignment are inspected regularly during active
growth by a duly authorized inspector and found free from Globodera
rostochiensis, Globodera pallida, Meloidogyne chitwoodi, Meloidogyne fallax,
Clavibacter michiganensis subsp. sepedonicus and Ralstonia solanacearum.
The production site was sampled, tested and found free from Globodera
rostochiensis and Globodera pallida.
The seed potatoes in this consignment have been inspected, tested and found
free from Clavibacter michiganensis subsp. sepedonicus and Ralstonia
solanacearum.
The seed potatoes are grown in a production site free from Synchytrium
endobioticum.
The seed potatoes in this consignment have been inspected and found free from
Ditylenchus destructor, Ditylenchus dipsaci, Meloidogyne enterolobii, Meloidogyne
chitwoodi, Meloidogyne fallax, Phoma exigua var. exigua, Thecaphora solani,
Premnotrypes spp. and Leptinotarsa decemlineata.
The seed potatoes in this consignment are free from Andean potato mottle virus,
Andean potato latent tymovirus, Arracacha virus B, Potato deforming mosaic,
Potato yellow vein crinivirus, Potato black ringspot nepovirus, Potato yellowing
alfamovirus, Potato yellow dwarf nucleorhabdovirus, Potato T tepovirus, Potato
spindle tuber viroid, Potato purple top wilt mycoplasma and stolbur mycoplasma.
The lots are free from soil ( max 0.1% by weight).
Consumptie "The consignment is free from potato wart (Synchytrium
endobioticum), golden nematode (Globodera rostochiensis) and Colorado beetle
(Leptinotarsa decemlineata). The crop was not grown in the vicinity of unhealthy
potato crops; the crop was inspected and found substantially free from all
injurious insects, pests and diseases; no case of pests and diseases as specified a
bove was recorded within 2 km from growing places during the last 12 months.
Overige voorschriften
Re-export
Consumptie herkomst EU
Voor consumptie-, voer- en industrieaardappelen, herkomst Europese Unie, mag
die geen Nederlands FC worden afgegeven. Re-export kan alleen plaats vinden
middels model 20 en een origineel fytosanitair certificaat van het land van
herkomst dan wel een voor origineel gewaarmerkte fotokopie.
Consumptie herkomst Derde landen
Re-export middels afgifte model 20 en een origineel fytosanitair certificaat van
het land van herkomst dan wel een voor origineel gewaarmerkte fotokopie.
Verpakking Schoon, nieuw en insect-proof. (jute zakken voldoen aan de eis
insect-proof)
Chemische middelen (geen vermelding hierover in tekst van importcondities
per 02-08-2018): geen
Hoewel de NVWA dit document op zorgvuldige wijze en naar beste weten heeft
samengesteld, kan niet worden ingestaan voor de juistheid en volledigheid van de
beschikbaar gestelde informatie. Aan de beschikbaar gestelde informatie kunnen geen
rechten worden ontleend.
Een afdruk kan verouderd zijn. Een actuele versie is op de website van NVWA beschikbaar.
Meeting notes 20 July 2018: Dutch and Pakistani delegation

Date - 20 JULI 2018 -
Re: meeting notes

Dear Dr. Maken,

Herewith I would like to thank you and your delegation of the Department of Plant Protection for your recent visit to The Netherlands. I trust the results of the visit will contribute to the further development of our bilateral relations on agriculture and to safe trade in plant products.

Please find attached the meeting notes of our final meeting that took place on July 6th, co-chaired by Deputy Director General Mr. Aldrik Gierveld and yourself. Also included is the text of the additional declaration that was agreed in our technical meetings. We took good note that the implementation of the use of the additional declaration awaits the adaptation of the relevant Pakistani legislation.

I am looking forward at receiving your confirmation of our joint conclusions.

With kind regards,

Yours sincerely,

Philip De Jong
Chief Phyto sanitary Officer

Cc Embassy of The Kingdom of The Netherlands, Islamabad
Cc Mr Johan Roman, NPPO-NL
Meeting notes

On July 6, 2018 a meeting took place between representatives of the Ministry of National Food Security & Research, Department of Plant Protection of Pakistan on the one hand and representatives of the Plant Health Department, Ministry of Agriculture, Nature & Food Quality and the National Plant Protection Organisation of the Netherlands on the other hand.

Delegation of Pakistan:
- Dr Abbas Maken, Secretary of the Ministry of National Food Security & Research
- Dr Syed Waseem-ul-Hassan, Plant Protection Advisor & Director General, Department of Plant Protection
- Mr Muhammad Sohail Shahzad, Deputy Director (Quarantine), Department of Plant Protection
- Mr Syed Mahmood Hassan, Commercial Counsellor, Embassy of Pakistan, The Hague

Delegation of The Netherlands:
- Mr Aldrik Gierveld, Deputy Director General of the Ministry of Agriculture, Nature and Food Quality
- Mr Philip de Jong, Chief Phytosanitary Officer, Ministry of Agriculture, Nature and Food Quality
- Mr Robert Stunt, deputy Chief Phytosanitary Officer Ministry of Agriculture, Nature and Food Quality
- Mr Frederik Vossenaar, Project Attaché, Agro Business Development Unit, Ministry of Agriculture, Nature and Food Quality
- Mr Johan Roman, Senior Policy Officer Plant Health, Netherlands Food and Consumer Product Safety Authority (NPPO-NL)

The closing session of the meeting was attended by the Ambassador of the Pakistan in the Netherlands, H.E. Mr. Shujaat Ali Rathore.

The meeting was held at the Ministry of Agriculture, Nature & Food Quality and had as objective to wrap up the visit of the representatives of Pakistan, which they paid to the Dutch potato and bulb sectors. An agreement was reached on the phytosanitary import conditions of Dutch seed potatoes and the wording of the Additional Declaration for the 2018 export season for seed potatoes (see attachment).

This Additional Declaration will enter into operation once the Department of Plant Protection, National Plant Organisation of Pakistan has signed the agreement. The Pakistani side indicated that a couple of months are needed for this because it requires an adaptation of current Pakistani regulations. Until that moment the present Additional Declaration remains in force.

The additional declaration specifies which phytosanitary requirements for seed potatoes will have to be met when importing them into Pakistan. The Pakistani side acknowledged that in case of a non-compliance, a notification of non-compliance will be send to the NPPO of the Netherlands.

Furthermore the Netherlands side agreed to only issue phytosanitary certificates for shipments for which the NPPO of Pakistan has issued an import permit.

As to the trade in flower bulbs the Pakistani delegation has informed the Netherlands side that flower bulbs will be fumigated with Methyl Bromide upon import into Pakistan. Fumigation with Methyl Bromide is not allowed in The EU/The Netherlands.

As to Narcissus the Pakistani side stressed the importance of Narcissus bulbs being free from the narcissus bulb fly, Eumerus strigatus. It was agreed that the Netherlands delegation would verify whether instead of methyl bromide, a post-harvest hot water treatment of Narcissus bulbs could be introduced as an alternative mitigation option.
Attachment

Phytosanitary requirements seed potatoes destined for Pakistan

Additional declaration as from export season 2018:

The seed potatoes are inspected during active growth by a duly authorized inspector regularly and found free from Globodera rostochiensis, Globodera pallida, Heterodera chitwoodii, Meloidogyne fallax, Clavibacter michiganensis subsp. Sepedonicus, Ralstonia solanacearum.

The production site was sampled, tested and found free from Globodera rostochiensis and Globodera pallida.

The seed potatoes in this consignment have been inspected, tested and found free from:
- Clavibacter michiganensis subsp. sepedonicus
- Ralstonia solanacearum

The seed potatoes are grown in a production site free from Synchytrium endobioticum.

The seed potatoes in this consignment have been inspected and found free from Ditylenchus destructor, Ditylenchus dipsaci, Meloidogyne enterolobii, Meloidogyne chitwoodii, Meloidogyne fallax, Phoma exigua var. Exigua, Thecaphora solani, Premnotrypes spp., Leptinotarsa decemlineata

The seed potatoes in this consignment are free from potato andean potato mottle virus, Potato Andean latent tymovirus, Arracacha B virus, Potato deforming mosaic, Potato yellow vein crinivirus, Potato black ringspot nepovirus, Potato yellowing alfamovirus, Potato yellow dwarf nucleorhabdovirus, Potato T tepovirus, Potato spindle tuber viroid, Potato purple-top wilt & stolbur mycoplasmas.

The lot is free from soil (max 0.1% by weight).

The Hague
July 7 2018
ANNEX 3  IRRIGATION BOTTLENECKS AND SOLUTIONS FOR PUNJAB

Bottlenecks
From irrigation perspective, the vegetables which are only planted in the fields, laser land levelling is a major issue; particularly on marginal and small sized farmers. Crops like potato, onion, carrot and cabbage are planted on ridges, while tomato on beds and spinach on flat fields & ridges. In Punjab, tomato and onion are also grown in tunnels. In Punjab, the vegetables are generally grown where the underground water is best suitable for irrigation and/or water table is relatively high.

Solutions
In Pakistan, at present, water saving technologies like sprinkler and drip irrigation are highly capital intensive or expensive. Therefore, most of the farmers confine themselves to laser levelling of their vegetables growing parcels, applying lean irrigation and avoid applying undue irrigations. The practices like sprinkler and drip irrigation are used under tunnel farming and in the areas where relatively high temperature and/or frost occurrence prevails during the season.

Lot of opportunities in adoption of water saving technologies do exist, provided these are not cheaply available and are not adopted as a full-package. Moreover, while adopting the practices like sprinklers and drip irrigation methods, our farmers’ consider that the cost per hectare (capital cost + application time + energy/electricity cost) are considerably higher than simply practicing irrigation in furrows and beds in laser levelled fields. The dream of “more crop per drop” is not yet materialized in Pakistan effectively. Therefore, such practices are adopted for growing vegetables on a very limited scales and under tunnel farming.

Dutch innovation
Health safe food production by using Hi-tech in every field of agriculture has made Netherlands the second biggest exporter of food in the world. Netherland is world’s largest exporter of tomato in the world. By using rainwater and city-recycled water, tomatoes are successfully produced in Netherlands. Dutch Green House technologies for vegetables production are world-famous best technologies and are a game-changer in Africa. The automated system of supplying water and limiting soil born disease incidence through vegetables production under hydroponically are salient attributes. Netherlands have rich experience in cheaply growing the six vegetables under consideration. On the other hand, Pakistan is a highly water-scarce country and is at preliminary stage of shifting its vegetables farming from open fields to tunnels. Much more could be done in collaboration with Dutch experts for upgrading tunnel farming to Green House Vegetables production technology on the lines of shifting from simple poultry farming to control-sheds technology.

Drip irrigation
At present, very limited potato production with drip irrigation is taking place in Pakistan. One farmer, Mr. Muhammad Iqal from Khudian Khas, Kasur District is successfully growing potato by using drip irrigation. In case of tomato, onion, carrot and cabbage, the use of drip irrigation is quite successful and a number of farmers are using it with plastic mulching (in open fields) and tunnels. However, it is still quite simple and considerable space exists for the improvements. The Dutch experience shall be certainly fruitful for Pakistan for achieving wider diffusion of drip irrigation under vegetables production in Green Houses.

Knowledge transfer
Dutch companies can invest in vegetables production under Green Houses and universities can help our universities in designing joint research studies at M.Phil. and Ph.D. and Post-Doc levels for capacity building of the Pakistani manpower in producing vegetables using Hi-Tech agriculture. A trip of representatives of frontline Dutch companies and professors from different agricultural universities can explore major and minor areas where collaboration with Pakistani investors and joint R&D projects can be designed and implemented.
ANNEX 4 SUBSIDIES AND INCENTIVES FOR BUSINESS DEVELOPMENT IN PAKISTAN

SUBSIDIES AND INCENTIVES IN THE NETHERLANDS FOR BUSINESS DEVELOPMENT AND KNOWLEDGE TRANSFER BETWEEN PAKISTAN AND THE NETHERLANDS

The following Private Sector Development instruments are available for business development and knowledge transfer in Pakistan at the Netherlands Enterprise Agency:

DGGF is financing (SME) entrepreneurs, who intend to investing in emerging markets and developing markets. The investments or export must contribute to the development of the particular country.

SIB stimulates entrepreneurs and companies to export. SIB gives vouchers for coaching, participation in trade missions and fairs, and hiring an expert.

**Partners for International Business (PIB, www.rvo.nl/pib)**
The program Partners for International Business (PIB) aims to positioning Dutch (top) sectors at promising and attractive international markets. The Dutch government, Dutch companies and knowledge institutes contribute.

**Subsidy scheme for demonstration projects, feasibility studies and investment preparation studies (DHI, www.rvo.nl/dhi)**
The DHI scheme supports Dutch enterprises (including enterprises in the overseas parts of the Kingdom of the Netherlands) that want to invest in or execute a project in emerging markets and in developing countries. Next tender program opens 15 January 2019.
- Demonstration projects: presentation of a technology, capital goods or service in one of the DHI countries.
- Feasibility studies: assessment of the profitability of a foreign investment in a product or service.
- Investment preparation studies: assessment of the technical and commercial profitability of an investment in a company in one of the DHI countries.
ANNEX 5 – INDICATORS TO BE USED BY IMPLEMENTING TEAM

**Indicator 1:**
Number of (female) smallholders identified as potential beneficiaries of Value Chain improvement

- Smallholders: 3.5 million (60% of farmers), 20% of cultivated land area
- Advanced smallholders: 2 million (35%), 45% of cultivated land area
- Medium farmers: 120,000 (4%), 17% of cultivated land area
- Big commercial farmers: 40,000 (1%), 18% of cultivated land area

**Indicator 2**
Number of farmers (indirectly) involved in the study: 30 and min. of 30% female farmers involvement

- Via Potato Grower’s Association 2,500 farmers (130 very active members). In total 130,000 acres of land.
- 5% of these farmers are female.
- We visited and spoke to 30 potato farmers and their labourers (7 female)
- We visited and spoke to 10 vegetable farmers labourers (4 female)
- We visited PepsiCo with 150 potato contract farmers, of which 10 female farmers

**Indicator 3 & 5**
Number of identified business opportunities: 5
Number of bottlenecks for enabling environment 5
Most feasible- and/or important follow-up projects (highlighted)

<table>
<thead>
<tr>
<th>POTATO</th>
<th>Bottleneck</th>
<th>Business opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pakistan has not signed UPOV, only a basic substitute (Seed Act). This hampers the import of quality varieties of seed potato</td>
<td>Dutch seed potato suppliers have Quality–variety seed potatoes: disease-resistant, high Q, high yield, suitable for processing</td>
</tr>
<tr>
<td>2.</td>
<td>Disagreement and no clarity on phyto-sanitary requirements, which hampers export of seed potato to Pakistan</td>
<td>In case this is solved with clear agreements and enforcement, more Dutch seed potato suppliers are interested in Pakistan</td>
</tr>
<tr>
<td>3.</td>
<td>Poor use of seed potato by recycling and cut potatoes for new crop, which leads to lower yield</td>
<td>Local seed multiplication guarantees use of high quality seed potato, improves yield for Pakistani farmer, and improves Dutch export</td>
</tr>
<tr>
<td>4.</td>
<td>Local machines for potato have low efficiency</td>
<td>Dutch machines (planting, harvesting) are within 3 years more profitable than local machines</td>
</tr>
<tr>
<td>5.</td>
<td>Cold storage captures 25% of total costs because of high energy price</td>
<td>Energy-efficient cold storage is a solution</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bottleneck</th>
<th>Knowledge-to-knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Not much knowledge on local seed-multiplication</td>
<td>Knowledge transfer by Dutch on seed multiplication</td>
</tr>
<tr>
<td>7. Poor farming practices, based on tradition and habits. No farmer field school</td>
<td>Introduce trainings and demo projects on crop rotation, soil management, irrigation, spraying</td>
</tr>
<tr>
<td>8. Export is a very weak spot. If the first export opportunity fails, there is no ‘Plan B’</td>
<td>Develop an export plan with several options, countries, and where to beat the competition (India)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ONION</th>
<th>Bottleneck</th>
<th>Business opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Poor yield of onion (20% of Dutch yield), because of low-yield local varieties</td>
<td>Introduce the short-day varieties (have good yield when days are shorter) and Hybrid varieties</td>
</tr>
<tr>
<td>10.</td>
<td>50% post-harvest losses because of poor storage, poor transport, and timing</td>
<td>Stronger varieties, cold storage</td>
</tr>
</tbody>
</table>
### OTHER VEGETABLE

<table>
<thead>
<tr>
<th>Bottleneck</th>
<th>Business opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Very limited number of vegetable varieties. Karachi Seed:</td>
<td>Tomato, carrot, radish, cabbage, broccoli, spinach. Off-season, short-day varieties</td>
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<tr>
<td>“Bring us vegetable seed with special features!”</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Bottleneck</th>
<th>Knowledge-to-Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Poor farming practices, based on tradition and habits. No</td>
<td>Introduce trainings and demo projects on crop rotation, soil management, irrigation, spraying</td>
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<tr>
<td>farmer field school</td>
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</table>

### CITRUS

<table>
<thead>
<tr>
<th>Bottleneck</th>
<th>Business opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Booming crop in Punjab, but lack of good cold storage</td>
<td>Energy-efficient cold storage is a solution</td>
</tr>
</tbody>
</table>

### GENDER

<table>
<thead>
<tr>
<th>Bottleneck</th>
<th>Government-to-Government</th>
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</thead>
<tbody>
<tr>
<td>14. Millions of girls have no access to school. They enter illiterate and</td>
<td>Program on education for girls and women with local NGOs (e.g. Pakistan Poverty Alleviation Fund)</td>
</tr>
<tr>
<td>with very little skills the labor market, or are destined to stay at home</td>
<td>Develop targeted trainings for female farmers on seed handling, irrigation, record keeping</td>
</tr>
<tr>
<td>15. Low-percentage of female landholders</td>
<td>Develop programs with international and local NGOs for female landholders (Kashf Foundation)</td>
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</tbody>
</table>

### Indicator 4

**Number of participants at the presentation sessions on study**

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Topics</th>
<th># Participants</th>
<th>Profile participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lahore, Punjab</td>
<td>Debrief of field study, and sharing bottlenecks and opportunities with local actors and stakeholders</td>
<td>15</td>
<td>Potat Grower’s Association</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Potato Research Institute</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Rafiq Agro (importer/distributor seed potato and cold storage)</td>
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<td></td>
<td></td>
<td></td>
<td>Karachi Seed (importer/distributor vegetable seed)</td>
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<td></td>
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<td></td>
<td>LushGreen (importer/distributor seed potato)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Potato farmers</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Vegetable farmers</td>
</tr>
<tr>
<td>Islamabad</td>
<td>Debrief of field study, and sharing bottlenecks and opportunities with local actors and stakeholders</td>
<td>4</td>
<td>Dutch embassy</td>
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<tr>
<td>Amersfoort</td>
<td>• In mission interested companies and institutes</td>
<td>20</td>
<td>Seed potato farmers</td>
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<tr>
<td></td>
<td>• Debrief of field study, and sharing bottlenecks and opportunities with local actors and stakeholders</td>
<td></td>
<td>Machine builders</td>
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<td></td>
<td></td>
<td></td>
<td>Cold storage suppliers</td>
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<td></td>
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<td>Service providers</td>
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<td>Ministries</td>
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<td>NAO</td>
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<tr>
<td>Individual presentations</td>
<td>Debrief of field study, and sharing bottlenecks and opportunities with local actors and stakeholders</td>
<td>10</td>
<td>Seed potato farmers</td>
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<td></td>
<td></td>
<td></td>
<td>Machine builders</td>
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<td>Vegetable seed supplier</td>
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<td>Pakistani Embassy The Hague</td>
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</tbody>
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