



Center for Development of Potato Industry Tanzania CD-PIT

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4 Stawisha

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Summary

Based on a MoU between the Tanzanian and Dutch government a collaboration was started to further improve the potato value chain in Tanzania. A cluster of NL companies participated in this Public Private Partnership (PPP – in Dutch PPS) to set up a Center of Development for the Potato Industry in Tanzania (CD-PIT). The project focused on a robust, competitive sector, on facilitating private sector sustainable development and creation of jobs and capacity building of farmers and companies in Tanzania involved in the value chain for sustainable potatoes production and marketing.

The project outcomes showed big potential of potato production with high yields, when using high quality propagation materials and effective crop management. This contributed to the commitment of banks to provide loans to potato farmers and farmers cooperatives to enable them to invest more in the required inputs for a profitable potato yield. A local team was trained to enable knowledge transfer directly to farmers or via train-the-trainer concepts.

Sustainable business relations between Dutch and Tanzanian partners and improved food security, more safe and healthy food are within reach.

Keywords: Tanzania, potato production, sector development, food security.

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Report WPR-OT-982

Photo cover: WUR Field Crops – demonstration potato mechanization 3rd May, 2019

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Preface

In 2016 the inception phase of the project started based on a MoU between the governments of Tanzania and the Netherlands focusing on potato sector development of the Tanzanian potato sector. Frank Wijnands, researcher of Wageningen Research, was invited to take the lead. I had the pleasure of assisting him in this phase and we enjoyed great help from the Embassy of the Kingdom of the Netherlands. The agricultural counsellor Bert Rikken and his assistant Mrs Teddy Mcha provided the necessary guidance. After a second visit in early 2017, Frank Wijnands developed the CD-PIT project, a public private partnership. After a series of meetings and discussions, a consortium on the private side was interested to join. We owe a lot of thanks to the members of the consortium and their representatives:

- Agrico – Michel de Bruin (before: Jacob Mijnheer)
- Bayer – Albert Schirring
- Europlant – Kamal Smid (before: Jan Willem Sepers)
- HZPC – Arjan Plomp
- Hanse Staalbouw – Wim van der Slik
- Grimme – Frank Nordmann (before: Piet de Jong)
- Yara – Øystein Botillen
- Koppert Biological Systems – Peter van Duijn (till September 2019)

The project started in July 2017 with installing a project team (see co-authors of this report) consisting of Wageningen University and Research, AERES University of Applied Sciences and Pioneers Consulting.

In this period of time, Mrs Ingrid Korving was appointed Agricultural Counselor in Kenya/Tanzania. From the start she was very much engaged and provided highly appreciated support of the governance of the project in relation to the Tanzanian Ministry of Agriculture and its institutions.

Wageningen Research chose to create a new entity in Tanzania, called Stawisha, for the local implementation of the Center. The very competent staff was selected who did a lot of work on the ground in all work packages:

- Mrs Teddy Rwebogora – Mcha – managing director
- Mrs Bridget Ijumba – market development
- Noah Kitulo – business development
- Amani Toyi – trainer crop management
- Dionis Tshonde – trainer crop management
- Wim van Liere – farm manager
- Florence Mbalamwezi – assistant farm manager
- Robinson Ngalali – financial accountant

In spring 2019 I took over the project management of the project from Frank Wijnands. I could build on the strong fundamentals that were created by him, together with the Dutch project team. I want to thank the whole team and partners for their help and perseverance.

Jan Kamp
Project manager Wageningen Research

Summary

In Tanzania 220.000 hectares of potatoes are grown with an estimated 1.7 million ton production. The main growing area can be found in the southern highland regions Njombe, Mbeya and Iringa. Yet yields are still quite low due to lack of high quality planting material of appropriate varieties and sub optimal agronomic practices. The fast increasing population of Tanzania requires an increase in production in order to guarantee a healthy and nutritious diet in the future.

The governments of Tanzania and the Netherlands decided to cooperate in the field of potato production. An Memorandum of Understanding was signed in 2017. Under this MoU a Public-Private Partnership was set up in this project called Center for Development of the Potato Industry in Tanzania (CD-PIT). Seven Dutch companies (including 2 with a foothold in Tanzania) participated in this sector development project. The objective of the project was to run a Center of Development that will function as support and entrance point to introduce and test the partners technologies and their applicability in the Tanzanian context. CD-PIT accepted the challenge to substantially contribute to the professionalization and modernization of the potato value chain, the potato industry in Tanzania.

The project was started based on an analysis of the principles for improved sector development. This requires a balanced approach of creating awareness of the potential of the Tanzanian potato industry in all parts of the potato value chain, combined with creating impact in the field of crop management, technological improvements, knowledge transfer, business development and governance at all levels. Realizing the full business potential of the Tanzanian potato sector includes upgrading primary production and establishing many more and differentiated business services along the value chain to support the flow of high quality produce to differentiated markets serving their demands in volume, timing, type of products and specifications.

Potato Technology

The potato sector was mapped in terms of production volumes per region, yields and sales channels used. This created a good basis for upgrading the potato technology. On a farm in Mbeya Dutch know-how in potato production was adapted to the local circumstances and implemented. Doubling or even tripling the yield to a level of 40-60tons per ha appeared to be possible when implementing optimal crop management combined with the use of high quality seed potatoes. This finding was transferred to demonstrations on farms in the regions. Working under the practical circumstances on site with the farmers in the lead to do all practical work created a peer-2-peer learning environment with ample interaction between farmers.

Potato Academy

A training setup was created focusing on all elements of potato production. Training materials were developed (but not yet grown to full wisdom) for all aspects of potato production like variety choice, soil quality and soilborne soil & seed preparation, diseases, planting, fertilization, disease control, irrigation, harvesting, storage, mechanization and markets & farm economics. This material was used for all types of trainings, like students, (young) farmers, advisors, teachers and researchers.

Business Development

Chain actors were brought together and exchanged information on the future visions and challenges they face. Getting to know each other and acknowledging each other's position in the value chain is an important first step to effective co-operation. To enable farmers to invest in high quality seed potatoes, fertilizers and optimal disease control, loan facilities became available by connecting banks and farmers after discussion in several workshops. Two national banks opened up their credit facilities in the potato sector for the very first time. Loan requests of a first group of lead farmers and a cooperative were successfully supported. The fact that the loan facilities are still in place (after 3 years) can be considered to be one of the big successes of the project.

Market Development

An intensive review of the production volumes per region, sales channels and markets was made. The consumption volumes per type of product (boiled, fried, crisps) were analyzed. There is a rising awareness of big differences in the quality traits of varieties. A number of processors started looking for certain varieties because of their better quality and production efficiency. It shows the high potential of new high quality varieties from e.g. the Netherlands.

An important aspect of improvement of the potato sector is the availability of high quality seed potatoes. An analysis was made of the volumes of seed potatoes needed in the coming years. The development of the local seed multiplication was considered to be a commercial approach with individual seed potato companies in the lead and was thus no part of the project.

Potato Governance

The MoU between Tanzania and the Netherlands created a close cooperation that included also the Embassy of the Kingdom of the Netherlands and SAGCOT, a networking organization for actors in different food supplying value chains including the potato sector. The close connection with the so called G2G program, focusing on the institutional development of the seed potato sector, focusing on knowledge and expertise development between Tanzania and the Netherlands was very helpful. For instance, the CD-PIT project provided support to the execution of advance yield trials (AYT) as part of the registration process of new Dutch varieties in Tanzania.

Communication

The Center of Development for the potato industry as planned was under construction during the project, both physically as knowledge/content wise. By mid-2020 the Center already became known in the country. A website, social media exposure, presence on special events (like NaneNane), articles in newspapers and national TV etc. were part of the communication strategy.

In the short execution period of about 2,5 years a good foundation was created for potato sector development in Tanzania. It was proven that potato production per ha could meet its potential of at least doubling in the next period of time. The added value of Dutch knowledge, technology and seed potatoes has been demonstrated. With credit facilities of banks now available, the Tanzanian potato sector is ready for a next step in improving the potato value chain.

1 Introduction

In Tanzania 220.000 hectares of potatoes are grown with an estimated 1.7 million ton production. The main growing area can be found in the southern highlands regions Njombe, Mbeya and Iringa. Yet yields are still quite low due to lack of high quality basic material of appropriate varieties and sub optimal agronomic practices. An analysis was given of the Tanzanian potato sector in the original proposal for the Topsector.

This emerging potato industry offers excellent opportunities for the Dutch based potato value chain companies ranging from seed potato producers and traders over mechanization and storage up to logistics and processing. Dutch companies are keen on utilizing this challenge, experience however the lack of a local entrance point/anchor point/organization and subsequent aligned actions to be able to increase the probability of success of the introduction of new technologies. This holds them back at the moment.

The Ministry of Economic Affairs of the Netherlands and the Ministry of Agriculture and Fisheries of Tanzania acknowledged in their contacts over the last year the relevance of collaborating to develop the potato value chain, laid down in the LOI signed 31 May 2017 during the Tanzania agribusiness event. The Ministry initiated the possibility to cluster the interest of NL companies into a Topsector Agro PPS project end 2016. In total 7 companies from the Netherlands and two based in Tanzania participate in this Public Private Partnership (PPP – in Dutch PPS), that was inaugurated at the Tanzania agribusiness event 31 May 2017. In the plans is described that the Center of Development will function as support and entrance point to introduce and test the partners technology into the Tanzanian context. Also the collaboration with the PPP SAGCOT (Southern Agricultural Growth Corridor of Tanzania) potato platform on the Tanzanian side in the Center for development of the potato industry in Tanzania CD-PIT, was considered to be a very important element for the NL PPP partnership. Through these lines, an ideal setting was created for developing the potato industry, B2B relations and elaborate an conducive institutional environment.

Key objectives described in the PPS project proposal are:

- developing a robust, competitive sector, with focus on facilitating private sector sustainable development and creation of jobs;
- building capacity of farmers and companies in Tanzania involved in the value chain for sustainable potatoes production and marketing; creation of added value;
- sustainable business relations between Dutch and Tanzanian partners.
- improved food security, more safe and healthy food;

This report describes the overall achievements in the period July2017 – July2020. In chapter 2 the overall approach of sector development is described. In the chapters 3-8 the objectives, approaches and results of 6 work packages are described.

2 Strategy CD-PIT

CD-PIT has taken on the challenge to substantially contribute to the professionalization and modernization of the potato value chain, the potato industry in Tanzania. The potato value chain in 2016 was fragmented, poorly developed with low productivity in the primary production with only a limited number of companies having set up services along the chain. The market was informal, dominated by middle men. The potential of potato production and uptake of new technology is however enormous.

Realizing the full business potential of the Tanzanian potato sector includes upgrading primary production and establishing many more and differentiated business services along the value chain to support the flow of high quality produce to differentiated markets serving their demands in volume timing and type of products and specifications.

To realize this takes many years, lots of investments and even more expertise to be developed and professionals to fill in all jobs that are going to be created. The total change shortly described above nowadays is coined sector transformation. So CD-PIT wants to contribute to this sector transformation to boost the rural economy contributing to job creation, improve incomes and livelihood, food supply and security and business prospects for the Dutch partners in the Tanzanian potato value chain.

To accelerate and facilitate the necessary changes CD-Pit has been focusing on 5 area's for development of activities (subsequently described as work packages):

1. The potato technology: introducing and showcasing new technology as well centrally on the cd-pit premises (farm) as in practice with key partners in the further professionalization and out roll of new best practices
2. The potato business: identifying companies with ambition, analyzing the value chain and identifying opportunities that match with ambition, supporting companies in a business and fact based outlook of possible business growth.
3. The potato market: more production is possible, however the production must be adjusted to the market demands and new product market combinations identified or its introduction facilitated (promotion etc.). Knowledge of markets consumer expectations and preferences is key to link production to merchants and markets.
4. The Potato governance: facilitating import of seed potatoes, expert services from Tanzanian government institutions on import and field inspection, tax's for imports, logistic limitations...stakeholder dialogue and platform as basis for dialogue government SAGCOT
5. The Potato academy: improving the possibilities to get adequate education at vocational and academic level to build expertise on the potato sector, looking forward to the large group of professionals that will be needed, but also the training on the job the short courses.

By working simultaneously on these issues the development of the potato value chain can be accelerated. It's about introducing new technology, professionalization, business acceleration training and scaling of all these things. There is a mutual interdependency in the objectives: professionalizing the Tanzanian potato sector will increase the perspective for Dutch business, and successful introduction of NL technology can help boosting TZ potato sector.

The Center (CD-PIT) has chosen for an integral approach towards sector and value chain development, using the latest insights in innovation dynamics (lead farm network), business creation (business cases, incubator, co-innovation) and acknowledging the learning process (professionals) that has to be intensified to enable the

The ware potato business case can be considered the central theme of the project. Data collection related to farm economics (inputs, yields, prices) when using high quality seed potatoes will result in a clear view on the effects on the potato value chain. Not only for farmers, but also for seed potato multipliers and salesmen/processors.

accelerated growth. The collaboration with the private sector both from NL and the local and international context is key to this development. The Tanzanian PPP initiative SAGCOT has already established a good stakeholder platform and involvement of companies. A close programmatic collaboration between SAGCOT and the Center for Development of the Potato Industry in Tanzania was proposed and implemented.

The Tanzanian – Dutch cooperation is visualized in this scheme.

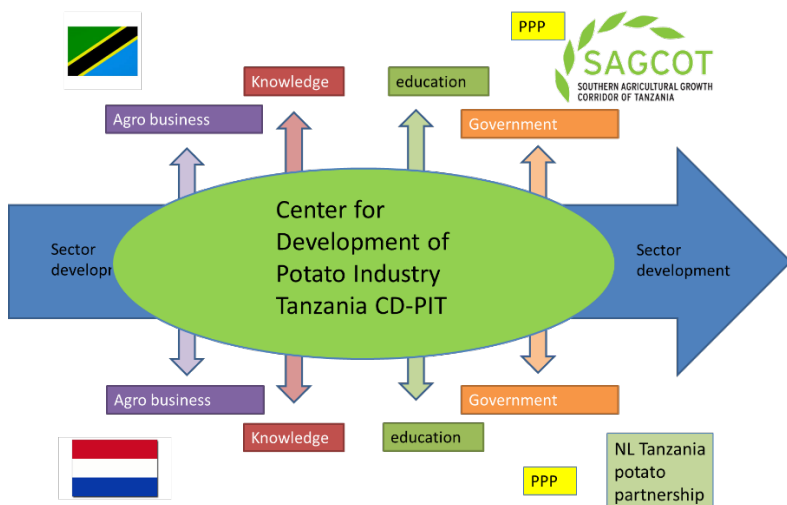


Figure 1 Schematic representation of cooperation between Tanzania and the Netherlands.

2.1 Project organization

The organizational structure of the CD-PIT project was not changed during the project, except for the project management which was transferred from Frank Wijnand to Jan Kamp in December 2018.

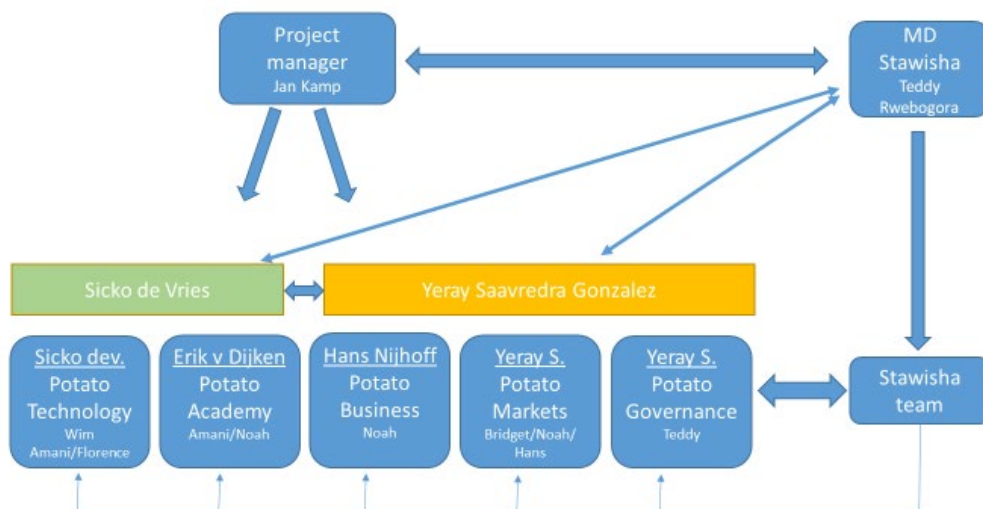


Figure 2 Schematic representation of CD-PIT project organization.

In the next chapters the objectives, rationale behind it and results / achievements are summarized.

3 Potato technology

3.1 Focus and rationale

Potato Technology is focusing on supporting and enabling the necessary modernization of the potato cultivation in Southern Tanzania. First of all intimate knowledge was collected of the current production methods, challenges and constraints as well as where the main production areas are located, which farms grow potatoes and how the value chain looks like (in collaboration with WP potato business and markets). Then modern technology is introduced, demonstrated and showcased both on a central location as well as in the key production areas. Think of quality seed potatoes, appropriate seed bed preparation and planting (power harrows and ridge formers controlling depth and position of the potato), justified and proper use of inputs such as pesticides and fertilizers and adequate harvest techniques controlling losses and post-harvest care etc. All these steps are needed to realize the potential of the potato crop in the highlands and achieve 30 ton + yields. The CD-PIT partners represent the technology needed.

Strategy

This WP focuses on four lines of actions :

1. Collecting agronomic intelligence
2. Setting up and running a demo farm.
3. Running demos in selected districts per region, in the appropriate growing season.
4. Support variety registration.

Rationale

The basis for all agronomy and dissemination work was excellent agronomic intelligence on where potatoes are grown, by who, on what farms, what acreage and with what services active in the potato value chain etc.. To address the right districts, group of farmers, companies and main issues, CD-PIT collected agronomic intelligence on a geographical (district) base from the three different regions Mbeya, Njombe and Iringa. This info forms the basis for future interventions in dissemination and collaboration (see report "Agronomic Intelligence Report Dec 2018"). In a second phase of this agronomic intelligence we zoomed in on the lead farms (>20 acre potato), to document their location, cooperation, network, production methods and ambitions. These farms form the basis for our future demonstration and business support activities. They were be considered as the possible first adopters of new technology.

To upgrade the current potato cropping practices we needed to introduce and demonstrate new technologies, and raise awareness on the benefit and support the correct use (expertise and knowledge) of these technologies to harvest the added value as quality potatoes. We chose for an approach with demos in the key districts, close to the end user involving communities and service providers in setting up and managing demonstrations. Demonstrations are raising awareness by the adagium "seeing is believing" and create a solid basis for future use of improved crop management.

Next to the regional demos it was clear for CD-PIT to have a central demonstration farm and to develop this farm into a "standard" (a reference point) where all modern technology can be seen in its use and impact on the potato yield and quality. In such a center the technologies can be concentrated and effectively used together.



Picture 1 Instruction of farmers on Stawisha farm.

Eventually also small R&D assignments can be done here in testing single technologies. It's also considered to be an ideal place for meetings with potato value chain professionals, encounters with the Dutch partners and field visits. It's a source of inspiration where the next steps can lead to, what next steps to take. Therefore CD-PIT, strongly supported by SAGCOT and regional and national authorities (anchored in LOI and MoU), developed a farm on the premises of TARI Uyole (Tanzanian Agricultural Research Institute). The CD-PIT farm in Mbeya has developed a the focal point for showcasing technology, modern potato cultivation and meeting point for training, workshops and events. On the farm we grew twice a year a potato crop in the dry and wet season, to showcase technology and attract visitors.



Picture 2 Harvest demonstration on Stawisha farm.

Finally this WP provided assistance in data collecting, on request of the G2G¹ project, for the variety registration process. Think of Advanced Yield Trials (AYT) or help with compiling farmer assessment reports.

3.2 Results – achievements

The results of the work package's activities are:

3.2.1 Agronomic intelligence

1. a base line agronomic intelligence study was performed – see report "Agronomic Intelligence Report Dec 2018"). This study shares information of the three main regions in Southern corridor (Mbeya, Njombe and Iringa) in term of area and production of potatoes, the way the production chain and markets are organized. Also farmers collaborations (AMCOS) are identified. In 2019 a report was made together with SAGCOT regarding the latest developments in the Tanzania potato sector. The ware potato value chain is analyzed in more detail in terms of producers, traders/middle men, wholesalers and processors.
2. Analysis lead farms and their network.
3. Further studies on selected topics. An example is a participatory study with farmers to identify preferred varieties for production.

3.2.2 Stawisha demo farm

The Stawisha farm of 25 ha (18ha net area) played a crucial role in the potato sector development process. The main objective was to test and demonstrate effective potato production management strategies. To be effective, it was considered to be very important to control import of soil borne diseases on the farm. A high level hygiene protocol was implemented. It contained strict procedures that amongst other elements included strict access control, disinfection of cars and shoes. And most of all, only production of potatoes based on imported planting material from the Netherlands.



Picture 3 Disinfection basin at entrance of farm location.

¹ G2G (government2government) project supports the Tanzanian government in setting up a system aiming at Improving Seed Potato Production System in Tanzania.

Knowing that a lot of soil borne diseases including potato nematodes are present in Tanzania, local varieties were only used in the regional demos (and not on the farm itself).

The farm's infrastructure was developed and based on 6 fields of about 3 ha each. An irrigation system was implemented to enable two rotations per year. This system is based on 2 boreholes, subsoil transportation pipes and a set of sprinklers for 6 ha to be irrigated simultaneously.

A crop rotation scheme was developed based on a potato crop every 4 cropping seasons, combined with wheat, dry beans and maize.

The farm was mechanized in a way that it is based on the most basic level of technology available from Western European producers. For the potato production a set of machinery was introduced that could fit the more advanced Tanzanian farm. This set consisted of soil tillage implements (subsoiler, rotovator), a two row potato planter, two types of ridging hillers, a boom sprayer for crop protection, a fertilizer spreader and 2 rows harvester (windrower). For the other crops two types of drilling machines were available. The whole set was completed with a John Deere 75HP tractor and a 9 tons tipping trailer.



Picture 4 John Deere tractor with potato ridger.

Storage facilities for potatoes were built on the farm. First of all, the partner Hanse Staalbouw has built an off-the-grid well insulated potato storage (16 * 5,5 * 4m LxWxH) with a storage capacity of about 50 tons. Off-the-grid means that the temperature control is based on the natural difference in temperatures during night and day and the optimal planning of opening and closure of doors. This storage can be transported in on a 20ft container. The product is stored in plastic crates (4000) that can easily be stacked.

The objective of this low-cost solution is to show that it's possible to store the harvested potato for a period of 3-4 months. This will strengthen the farmers' position when selling his product to local salesmen. The storage was built in October 2019 and firstly used after the harvest of the wet season 2020. The product of the harvest 2020 – wet season was closely followed up in terms of: temperature flow, weight loss and change in quality of the product over time. A good analysis was not possible due to the premature shut down of the farm by the Tanzanian government in July 2020.



Picture 5 Hanse Staalbouw potato storage.



Picture 6 Hanse Staalbouw potato storage (inside).

Also a DLS (Diffuse Light Store) was built on the farm. This is an “open storage” to enable light and soft wind to pass through, but closed with a fine netting to prevent tuber moth and other insects to destroy the stored produce.

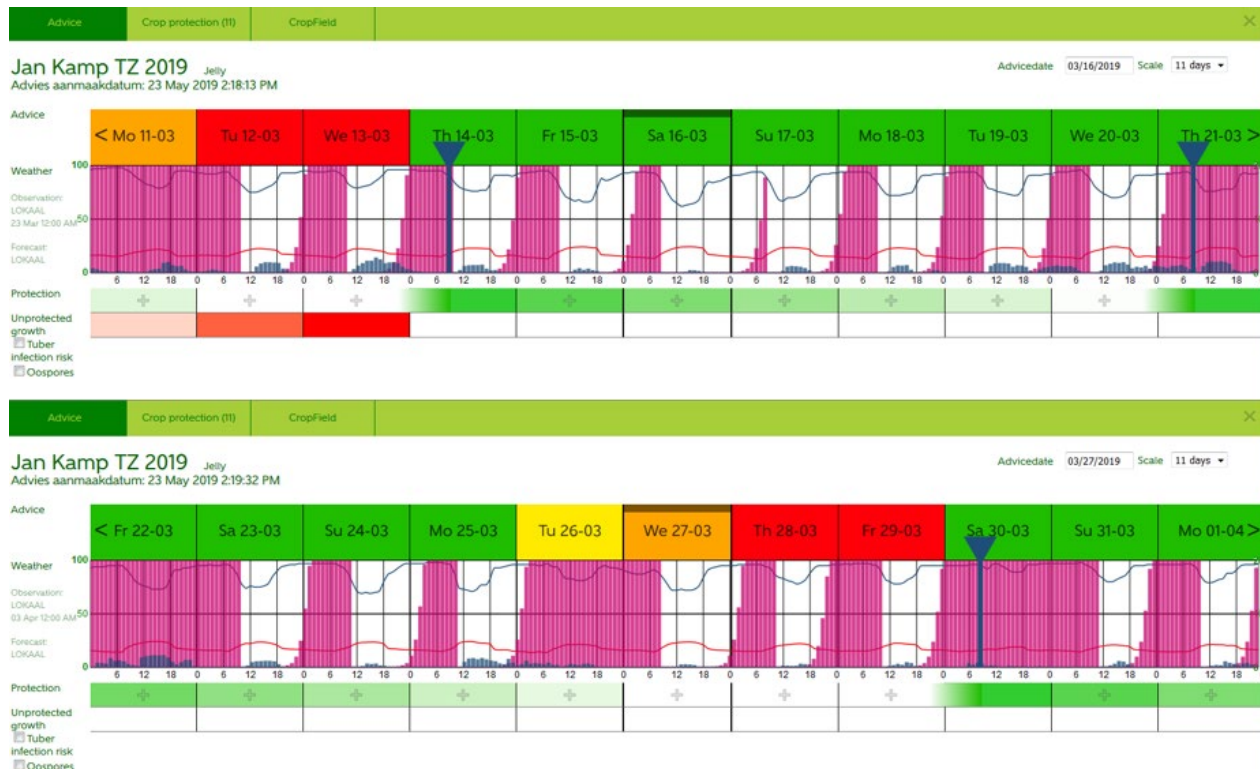


Picture 7 Diffuse Light Store.

3.2.3 Improving crop management

Optimal crop management starts with good propagation or seed material and optimal soil conditions. Besides timely action on all other aspects of production, disease control is one of major issues in potato production. Based on the experiences in the wet and dry season, a solid approach was developed in close cooperation with Bayer specialists to control all relevant diseases and pests. A decision support tool, Akkerweb Late

Table 1 Output of late blight advisory app.



Blight app, was introduced on the farm (see table: 1. Experiences on the farm were translated to the regional demos (see demo's – par 3.2.7).

Also a crop fertilization plan was developed together with Yara. On the Stawisha farm 2 levels of fertilizations were consequently tested: one based on an expected yield of 20 MT/ha and of 40 MT/ha. The objective was to show farmers the need to adapt fertilization as yield increases.

All production related management data was collected in the Dacom management system. This data formed the basis for the ware potato business case (see par 3.2.6).

3.2.4 Variety choice

The three Dutch seed potato companies (HZPC, Agrico and Europlant) have each year selected a number of varieties with an expected high potential for the Tanzanian market. These varieties were part of a procedure (outside the CD-PIT project) of variety testing focusing on entering the National Variety Catalogue of Tanzania (see par. 3.2.9 and 6.1). Besides the varieties in these tests, also a few new varieties were introduced on the Stawisha farm for a first test in Tanzania. Table 2 provides an overview of the varieties in the Stawisha farm in 2019.

Table 2 Overview of varieties presented on the Stawisha farm in 2019, with their main use and traits.

	Variety	Company	Sector	Maturity	Skin colour	Flesh colour	Shape
1	ARIZONA	Agrico	Retail fresh	Medium early	Yellow	Light yellow	Oval / Long oval
2	MANITOU	Agrico	Retail Fresh / French fries	Early	red	Light yellow	Oval / Long oval
3	MARKIES	Agrico	French fries	Late	Yellow	Light yellow	Oval / Long oval
4	JELLY	Europlant	Retail Fresh / French fries	Medium late	Yellow	Yellow	Oval
5	RUMBA	Europlant	Retail Fresh / Crisping	Medium early	Yellow	Light yellow	Short oval
6	CHALLENGER	HZPC	Retail Fresh / French fries	Medium late	Yellow	Light yellow	Oval / Long oval
7	PANAMERA	HZPC	Retail fresh	Late	Yellow	Light yellow	Oval
8	RODEO	HZPC	Retail fresh	Late	Red	Light yellow	Oval / Long oval
9	SAGITTA	HZPC	Retail Fresh / French fries	Medium early	Yellow	Light yellow	Oval / Long oval
10	SIFRA	HZPC	Retail fresh	Late	Light yellow	Cream	Round oval
11	TAURUS	HZPC	Crisps	Medium late	Yellow	Light yellow	Round / Round oval
12	VOYAGER	HZPC	Retail fresh	Medium late	Light yellow	Yellow	Long oval

3.2.5 Yield increase

The average yield of potatoes in Tanzania is estimated in 2016 to be 7-8 tons/ha. The objective of the CD-PIT project is to show the potential of high quality seed potatoes combined with optimal crop management under Tanzanian weather and soil conditions. Both on the Stawisha farm as in the demo's we managed to achieve very good yields (see table 3).

Table 3 Average yield of different Dutch varieties on the Stawisha farm.

Average yield wet season 2020	49,2 Mtons/ha (see table 5)
Average yield dry season 2020	41,3 Mtons/ha

These good results were based on the good conditions of the Stawisha farm, including irrigation in the dry season. But also in regional demos a strong improvement of yields were found (see table 4).

Table 4 Average yield of different Dutch varieties on the regional demo's.

Wet season – 2019 (Njombe, Iringa)	21,3 Mtons/ha
Wet season – Isowelu AMCOS demo 2020	26,1 Mtons/ha

The big difference in yield between the regional demos and the Stawisha farm is the result of a range of causes, like the quality of the soil (lower soil fertility, soil structure, pH level, organic matter content, *Ralstonia solanacearum*), higher disease and pest pressure from direct environment (including volunteer plants), timely disease management, etc..

Table 5 Yield on 2 fields of Stawisha farm per variety.

	Field 1	Field 2
Variety	Yield ton/hectare	Yield ton/hectare
Sagitta	57.9	63.7
Jelly	53.2	54.9
Rumba	35.8	39.1
Taurus	40.1	53.4
Panamera	51.2	49.6
Rodeo	34.9	36.8
Challenger	43.3	47.5
Markies	47.8	53.4
Arizona	40.9	46.9
Voyager	41.8	48.0
Manitou	61.5	72.2
Zarina	46.1	59.3
Average	46.2	52.1

3.2.6 Ware potato business case

An important objective of the CD-PIT project is get a good financial reference for the growing of potatoes in Tanzania. This is the basis for a business case to be developed by the seed potato companies for importing seed potatoes, reproduction of 1 or 2 seasons and followed by the production of ware potatoes. This system of reproduction has to be beneficial for all parties involved. For this reason detailed data collection of costs and financial yields was done on the Stawisha farm in the Dacom management system. The result is shared in Table 6.

Table 6 Cost-benefit overview of the ware potato business case based on data analysis of Stawisha Farm data.

	Realized incl. tracks	Corrected for tracks (10%)	KWIN (2015) - reference
Yield (ton/ha) *)	32,44	36,05	54,84
Price/kg	€ 0,16	€ 0,16	€ 0,16
Financial yield per ha	€ 5.203	€ 5.781	€ 8.774
Propagating material	€ 721	€ 801	€ 756
Chemical	€ 2.228	€ 2.228	€ 735
Fertilizer	€ 829	€ 829	€ 387
Irrigation	€ -	€ -	
Mechanization	€ 580	€ 580	
Energy	€ 188	€ 188	€ 289
Labor cost	€ 337	€ 375	
Total Costs	€ 4.883	€ 5.000	
Balance	€ 320	€ 781	

*) based on realized sales of size > 35mm

Table 6 includes some reference data from the KWIN (Kwantitatieve Informatie Akkerbouw - 2015), a Dutch economic farm production reference book. The cost of optimal disease control and fertilization are high in Tanzania compared to the Netherlands. Still there is a positive financial result possible at current yield levels.

3.2.7 Demo's in the region

One of the main strategies of CD-PIT for knowledge transfer is to organize demo's in the main potato growing regions. The focus was on the regions Mbeya, Njombe and Iringa. The objectives of these demos are demonstrating the added value of:

- high quality seed potatoes
- Dutch varieties (in the demo's also some more popular local varieties were included)
- every aspect of improved crop management

Organization of demos requires support from the local farmers (in some case organized groups like AMCOS). Good fields are selected and the farmers together have to be committed to support the demo by helping with soil preparation, planting, weed and disease management (e.g. do the spraying) and helping with harvesting (including yield measurements).

Around each demo a group of local farmers, varying in size between 20-400, are invited to meetings and field instructions, where the background knowledge of each action is explained and demonstrated in practice (see table 7 and 8). In average 4-5 meetings/instructions were organized in each group.

During the project period it was decided to decrease the number of demo's per season in order to be able to provide optimal support during the cropping season. Experiences in the first years showed that support the demo's on a weekly basis is crucial to be successful.



Picture 8 Instruction of farmers in Mtwango (Njombe region.)

Table 7 Number of demo location per season.

Number of Demo's		
2018 – wet season	9	5x Iringa; 4x Njombe region
2018 – dry season	7	Swaya, Ntokela, Unyamwanga, Lulasi, Nditu, IJoka, Kandete
2019 – wet season	6	Njombe, Iringa region
2019 – dry season	3	Lupate, Kandete, Nditu region
2020 – wet season	2	Isowelu AMCOS (Mtwango*), Mtambula

*) represents 450 potato growing farmers.

Table 8 Number of farmers participating in different farmer's groups in Wet season (2019).

Region	District Council	Village	Farmers Invited	Farmers attended
Iringa	Mufindi	Ifupira	45	63
Njombe	Njombe DC	Mtwango	55	55
	Njombe TC	Utalingolo	30	24
	Makete	Kidope	36	38
	Wanging'ombe	Ulembwe	59	61
Mbeya	Mbeya DC	Impomu	25	29
Total			250	270

3.2.8 Field days and knowledge transfer

In most years local training sessions were organized. At the end of the wet season of 2019 a Farmers Field was organized in each demo location (between 6 – 21 May 2019). These days were meant to attract not only group that has been connected the whole season, but also other interested farmers.

On October 28th and 29th, 2019 Stawisha organized a training of the AMCOS Isowelu together with HZPC, Europlant, Bayer, Yara and Silverlands for 267 farmers from Isowelu Amcos (Mtwango).

At the Stawisha farm open field days and demos were organized on:

- NaneNane 2018
- May 2nd, 2019 (315 happy participants)
- NaneNane 2019



Picture 9 Stawisha booth on NaneNane 2019

3.2.9 Support variety registration process

The three Dutch seed potato companies (HZPC, Agrico and Europlant) have each year selected some varieties with an expected high potential for the Tanzanian market. These varieties were part of a procedure (outside the CD-PIT project) of variety testing focusing on entering the National Variety Catalogue of Tanzania. These varieties are to be tested in Advanced Yield Trials (AYT's) and National Performance Trials (NPT's) and acceptance is based on a (draft) protocol called "Guidelines for the Examination of the Value for Cultivation and Use (VCU) of Potato". One of the AYT testing locations was the Stawisha farm, where this set of Dutch varieties was tested in AYT's in the dry season of 2019 and the wet season of 2020 and the dry season of 2020.

The Stawisha team supported these trials by closely following up all activities needed. This included supervision on all activities, instructing the local implementors, preparation/distribution of seeds, fertilizer, chemicals, collecting data on the different moments and sharing them with the G2G project manager.

4 Business development

4.1 Focus and rationale

In Southern Tanzania the potato industry has a high potential for further development through professionalization of growers, service suppliers, off-takers and processors. The potato value chain offers numerous possibilities in the coming years for new or existing companies that intend to deliver specific services (contract work, aggregating, storing, agro-supplies, logistics, finance, advise) or create additional value to the primary product (packaging, processing).

This potential professionalization has been supported by the activities of CD-PIT, more specifically by the introduction of the partners technology in the potato community (see chapter 3 - Potato Technology) and by supporting the learning process for professionals to acquire new competences (see chapter 7 - Potato Academy).

In this WP CD-PIT supported businesses to acquire a fact based outlook on the challenges and opportunities of strengthening or commencing business in the potato value chain. Tanzanian companies have shown great interest in exploring the possibilities for their business in the potato value chain. In a broader sense this work package aimed to ensure a behavioural change for an inclusive potato industry, in which professionalism and business practices are strengthened, for example by organizing farmers, formalizing SMEs, stimulating social responsibility among VC actors, and fostering youth and women entrepreneurship. This will contribute to broad-based economic growth, job creation, and entrepreneurship among (new) potato industry players, while at the same time realizing food and nutrition security.

Strategy

CD-PIT followed four lines of actions:

- Business intelligence: providing companies with a fact based outlook on the modern potato value chain and
- By learning on modern business management aiming to contribute to business acceleration. This will contribute to the pull for new technology coming from CD-PIT partners (next to the push effected through demonstration).
- Supporting workshops companies and farmer groups.
- Developing a Potato Value chain network and cooperating with the SAGCOT platform.

Rationale

This work package is based on supporting companies with sufficient ambition, vision and agency to get involved in planning and implementing next stages of their businesses.

A good understanding of the potato sector as a whole, and its value chains and chain actors – in particular, is the basis for all CD-PIT's interventions. CD-PIT was specifically interested in supporting companies with the ambition and possibly the ability to play a part in jointly transforming the potato sector into modern potato industry. CD-PIT has mapped these companies and carried out in-depth business interviews, focused on their capabilities and eagerness to grow their business. This gave a detailed and diversified outlook on how these companies see the present situation, what their ambition is and what problems or challenges are associated with this. Ambitions range from becoming better potato producers to getting organized as cooperative, or supplying seed potatoes to smallholder farmers customer base, or setting up contractor's activity or storage etc..

CD-PIT has been interactively collecting and sharing knowledge in which individuals and companies are interested in, depending on the type of activities in the potato value chain. This process benefited from the increased visibility of CD-PIT and its activities. Combining information and outputs from the two lines above enabled identification of areas for development and companies / groups of farmers with ambition. The first area we focused on was product aggregation and collaboration. These two elements are crucial for farmers to obtain credit facilities, therefore the need to prioritize it. Through the attendance to a workshop, participants

that have ambitions to aggregate and collaborate will be offered a professional outlook on the value chain and business perspectives. The workshop helped them structure their thoughts and ambitions.

Participants from this first meeting continued their exploration process in their own time and terms. As a follow up, CD-PIT provided, verified and quantified data first elaborated in the workshop and needed for a further step towards implementation of new functions/business (elements). After the ambition of the participants was consolidated and confirmed, a second workshop (or focused support) has been organized by CD-PIT (facilitated by NMB and later also TADB) to explore the next steps towards credit worthy plans.

The cycle of activities (need identified-workshop-follow up) is a repetitive process; new groups of VC actors were looked for and supported through this type of workshop. The meetings were organized by the local Stawisha team and supported by the NL team expertise.

By supporting a fact based outlook on the modern potato value chain and by supporting the learning on modern business management we aim to contribute to business acceleration. This will contribute to the pull for new technology coming from CD-PIT partners.

"For us to help you in growing your potato business through short and long-term loans is very possible – but there are some must-haves. For agri-input suppliers we will only finance working capital for supplying seed potato on-credit when you work with the highest-quality varieties. This will reduce the risk of low prices at the end of the chain, and with that pay-back capacity of the credit by the farmers".
Mr. Lugano, Relationship Manager
Agribusiness of NMB bank

As can be read from the above specific attention in the strategy has given to inclusion of small-scale potato producers in the Potato Value Chain. They represent the vast majority of the production volume in Southern Tanzania. For the effectiveness, cooperation with existing AMCOS turned out to be fruitful, reaching bigger numbers of farmers. The entry point of 'people, planet, profit' is an important aspect throughout the approach. This will need to be reflected in the business cases, in the partnerships between local and Dutch business case companies, and as a central message to potential financiers/funders. Throughout the entire process findings and lessons from this work package which are relevant to other work packages as well were shared, thereby optimizing integration and efficiency of the approach.

4.2 Results - achievements

1. In 2017-2018 a baseline mapping of local partners in the Mbeya, Njombe and Iringa region (total of 17 companies. This includes summarizing tables per local partners on main aspects of the analysis. These reports were finally analyzed in a more generic and a more detailed way.
2. Also in 2017-2018 a baseline mapping of the (at that moment) 8 partners was completed, including a summarizing table.
3. Together with the WP Potato Technology, an extensive inventory of potato production data in the southern corridor was made, containing production area and cropping calendars per region (and sometimes ward level).
4. Potato Value Chain Development training of agri-input suppliers, collectors/traders, organized farmer groups (AMCOS), and commercial farmers - aimed at creating clusters for inclusive potato value chain development in the Southern Highlands, Tanzania. The training consisted of workshops, both reported. Besides a good business dialogue and farm tour, it resulted in connecting potato processors to producers of well suitable varieties. In the follow up workshop, facilitated by NMB, production and business data were discussed during the workshop and verified.
5. In combination with the WP Potato Technology a list of lead farmers is produced and made available for the partners. Through the partners this list can be shared to other stakeholders.
6. In June 2019, an extensive TMT training manual (Tailor Made Training) was developed that contain all business elements of potato production along the value chain. This was part of Stawisha's contribution to the TMT training of a group of agricultural extension officers in the region of Mbeya.

7. Support given to the Isowelu AMCOS to create the proper basis for a loan from the NMB bank for financing inputs (seed potatoes, fertilizers, chemicals). This included a farm cost calculation as a basis for applying to commercial loans. This loan was approved by NMB in November 2019. The loan conditions were afterwards fully met by the Isowelu AMCOS and was the basis for an extension of the cooperation between NMB and the Isowelu AMCOS.

In spring 2020, a similar initiative of 4 lead farmers was supported by Stawisha and successfully implemented with the TADB bank.

8. Together with work packages Potato Markets and Potato Technology, an analysis of the market opportunities for new Dutch varieties (ware and seed potatoes) (February 2020) was made, containing data on market potential on the short term (1 year).

9. Success stories (8) were written based on achievements and experiences of stakeholders in the process of creating business, improving markets etc. (see table 9).



Picture 10 Signing of the NMB contract by Isowelu AMOCS

Table 9 Overview of 8 success stories.

Title	Description
Business peer networks	How Stawisha builds business peer networks with key potato sector players
Dutch companies co-invest	How Dutch companies co-invested in transforming Tanzania's potato sector
Dutch companies guide Stawisha	How Dutch companies guided Stawisha in becoming a key service provider to Tanzania's potato sector.
Government extension officers	How Stawisha trains agricultural extension officers to help potato farmers commercialize production
Linking Isowelu AMCOS to finance	How Stawisha supported organized potato farmers in being linked to training, inputs, markets and finance
Linking processor to varieties	How Stawisha linked a potato processor to new varieties, increasing its income and market share
Market data collection	How Stawisha collects consumer data to better match variety supply with variety demand
Regional B2B clusters	How Stawisha facilitates regional B2B cluster building and financing of investment plans

Conclusions

- in the project CD-PIT has developed a good analysis of the potato value chain, by mapping the main actors and their potential and challenges.
- Tailor made trainings were developed and provided to different groups of the value chain. This gave different actors good insights in the financial benefits of the potato value chain based on high level inputs and good management.
- A big success of the above approach was the increasing interest with the major commercial banks active in the agricultural sector of Tanzania, NMB and TADB. After an intensive process both banks

provided loans, for the first time, to actors in the potato sector. This enabled farmers to buy high quality inputs in bigger volumes. This provided seed potato multipliers a good basis to grow more seed potatoes: the business is actually taking off on the supply side.

5 Market analysis

5.1 Focus and rationale

The work package Potato markets is about i) collecting relevant information on product flow and segmentation (volumes and prices) in the markets, ii) identifying the actors and their role in the product flow from producers to end users, iii) understanding the orientation of consumers (demands and preferences), and iv) boosting the acceptability of Dutch technology (including potato varieties) in the markets. The objective is to support lead firms and farmers in designing and delivering the best possible product or service to consumers (and is closely linked to the WP Potato business).

Strategy

This WP has been focusing on 4 lines of actions :

1. Mapping the product flow and segmentation of the markets.
2. Identifying the actors and their role in the different flows (segmentation) from producers to end users;
3. Understanding consumer orientation and preferences;
4. Designing strategies to create confidence and acceptance of new varieties in the different end-markets.

Rationale

Realizing poverty reduction, inclusive growth, and commercial success in Tanzania's potato sector are to a large extent determined by end-market opportunities. Favorable market opportunities, as well as the competitiveness of potato producers and actors in the chain, are preconditions for sustainable and inclusive growth in the sector.

Whereas in traditional development approaches often the producer's needs are put as a central issue, in this work package's approach we have put consumer needs and how lead firms and farmers can best meet these needs more central. Lead firms along the chain (farmers, trader or wholesalers) are increasingly becoming more market-oriented. Nowadays, these actors have to make individual decisions about what product to offer, when it will be offered and how the product will be offered.

Companies and farmers producing potatoes are in need to better serve the increasingly diversified end markets. In order to strengthen the links production and markets, including the physical flow, looking at the uptake capacity and growth rates, we need to understand the product flows, what product market combinations are preferred in the market, how big their segment is and what profile of demands towards the potato properties the end users have in each segment.

Simply said: why are for instance end user consumers and cottage fryers preferring certain varieties and not others. This information was used as a basis to see how the Dutch varieties can fit and also analyzed how Dutch varieties can gain traction and end user acceptance.



Picture 11 Testing different potato varieties on their frying performance.

The Dutch technology including Dutch varieties for sure can contribute to a better product for each market segment delivering quality. And experiencing this quality will be the key factor for a gradual transformation from existing varieties to the Dutch varieties in the market.

Therefore attention was paid to market acceptance by understanding the markets and then designed introduction strategies to create confidence and acceptance of new varieties. Farmers and lead firms are more likely to uptake Dutch technology when end-markets start demanding Dutch varieties. An increased demand will help reduce the risks through financial (e.g. inputs on credit), production-related (e.g. technology, training), or organizational (risk reduction mechanisms ; e.g. access to storage).

Enhancing the linkages and flows between production and end-markets can boost the uptake of market-oriented practices and technologies (i.e. inputs, storage, machinery) and drive the market acceptance of Dutch varieties.

5.2 Objectives

- Gain insight in potato value chain from production to consumption (from the perspective of the three key regions CD-PIT works in)
- Understand consumer preferences for potato products (quality, price)
- Boost acceptance and uptake of Dutch varieties in the Potato Value Chain.

5.3 Results

The following output has been produced:

1. An extensive market survey was made to understand current situation in the market (flows, segmentation, volumes, prices). This survey shows that 80% of the trade is done in retail fresh, only minimum processing in Tanzania itself and a big part of processed potatoes are imported. AMCOS manage to build good market connections including good pricing. Price fluctuation issues are depending on season, availability, imports.
2. Phase 2 market survey focusing on consumer orientation (actually all end-buyers). With help of 2 interns from Sokoine University of Agriculture, over 200 participants were interviewed in 10 regions. It shows the needs for high quality, consistent supply according to demand, the need for receiving centers in main towns and various varieties for different use. It also shows competition from Kenyan varieties. Basic dataset is available and a report will be ready by the end of first quarter of 2020.
3. Mapping of processors: a full mapping was in progress at the moment of closure of Stawisha (June, 2020). The expected need for potatoes from the market was estimated in a draft report

For 2020 a Phase 3 marketing activity plan was developed to promote the quality and suitability of the new Dutch varieties for different end market segments. On a selection of locations tastings and promotion activities were planned in different regions (Arusha, Dar, Zanzibar) to create awareness of the added value of Dutch varieties. By structuring this process an analysis of collected data, it would result in a good insight of market needs:

- step 1. Sending samples to wholesalers, retailers, processors, hotels/restaurants, individuals;
- step 2. Follow up;
- step 3. Analysis.

Other promotional market activities focusing on acceptance of Dutch varieties that were planned:

- opening Field Visitors Center - Mbeya (April 2020);
- Potato Expo-Dar-es-Salaam (May or Autumn 2020): Potato B2B event to support marketing of varieties to all kind of end users (processors, hotels, traders,..); organized by Stawisha

"Potatoes accounts for over 70% of our processing needs. And buying the traditional, poor quality potatoes not only increased our cost of production and reduced our profit margins, it also brought a lot of stress and frustrations into the processing schedules. We were unable to make proper production planning, and soon we started to lose our market share among clients"

Ernest Makena, Managing director and co-founder of BETA Products Company.

-
- Tari Demo day - Mbeya (June 2020): focus on farmers (no trials, but showing varieties, traits, tasting).
 - Swahili International Tourism Expo -Dar-es-Salaam (July 2020): participate to reach out to a big group of potato end users (lodges, hotels, ...);
 - Stawisha Open Day and TMT (Sept 2020).

This plan however could not be executed.

Conclusions

- Based on a good joint analysis of the potato value chain, by mapping the main actors and their potential and challenges, a good market analysis was made resulting in 2 valuable reports. The first one was a market survey focusing on market segments, volumes, local and imported supply. The second one is focusing on market preferences, identifying the potential of Dutch varieties in these markets.
- On many occasions tastings were organized as part of open days, showing the quality and added value of choosing the right varieties.

6 Potato Governance

6.1 Focus and rationale

Potato governance is about promoting good sector governance by which government provides efficient and convenient services to private sector actors active on potatoes. Likewise, the private sector mobilizes investments for sustainable growth according to the current regulatory environment. How can the existing constraints on investments be removed? How can the capacities of government institutions be strengthened? What policies and procedures need to be met by the private sector?

As a result, the public objectives on the potato industry will be advanced allowing also the private sector to increase the business around potatoes.

Strategy

This WP intended to therefore create synergies between the public and private sector by

1. supporting the G2G project which builds sustainable capacities in the public sector around potatoes.
2. facilitating the dialogue between the private and public sector around needs and demands for both

Rationale

The public sector has a paramount role to regulate and support the development of the potato sector. This includes enforcing regulations, enabling investments and governing the market. Good (public) governance has a positive impact on private sector development. For example, effective procedures on variety registration, seed imports or seed certification have positive impacts on the growth of the industry. Similarly, public institutions need to acquire the appropriate knowledge and skills to enforce these procedures. In the meantime, the private sector should understand public frameworks, and this starts with awareness on both sides about the needs and demands.

CD-PIT was in position to facilitate this two-way street dialogue on needs and demands, roles and responsibilities for both the private and public sector. An effective route was to closely cooperate with the existing public and private potato platform facilitated by SAGCOT, that is working on advancing the national agenda on potatoes. A good balance between government intervention and private potato initiatives is possible but needs to evolve over time.

In this WP CD-PIT worked closely together with the G2G project. Examples of this support could be hosting training programs at CD-PIT's farm for institutions like TOSCI, facilitating the attendance of TOSCI staff to potato trainings or supporting the application, and release of new varieties.

6.2 Objectives

- Contributing to efficient and effective implementation of G2G objectives.
- Supporting development of public institutions that deal with potatoes, both in terms of regulatory procedures and regulations and skills.
- Facilitating the dialogue between the private and public sectors.

6.3 Results

The following output was realized:

1. Support to the G2G project: During the project period the CD-PIT project and Stawisha supported several training activities of the project, with a practical implementation on the Stawisha farm. Stawisha served as entity to import new varieties for the G2G projects. Also supervision was provided to regional

AYT's (advanced yield trials) throughout Tanzania. Stawisha also joined a Potato Business School (Emmeloord) training and worked with TOSCI on seed certification.

2. Facilitating public-private sector dialogue: the CD-PIT project hosted a SAGCOT potato event (May 2019) and provided input to this event. Stawisha joined a workshop in March 2020 organized by the Dutch Embassy and SAGCOT to develop a National Potato Strategy, together with the major Tanzanian stakeholders including the Tanzanian Ministry of Agriculture.

CD-PIT contributed in a Tailor Made Training of regional extension officers (Mbeya), and joined a OKP TMT+ project led by the Hanze Hogeschool (Groningen) to develop a curriculum on all potato value chain aspect (started in November 2019) for the Ministry of Agriculture Training Institute (MATI) and Mbeya University of Applied Science and Technology (MUST). The project also included vocational training of staff from both organizations.

3. The project also enabled participation of several staff member of the TARI and Stawisha organization in the Wageningen Potato course in the Netherlands.
4. During the project there was a continuous highly appreciated cooperation and networking with the Embassy of Kingdom of the Netherlands. This enabled good connections with stakeholders at different levels. In the first half year of 2020 plans were developed to intensify the working relation with TARI who was already invited (and accepted) to take part in the Stawisha Ltd. Board.

Conclusions

CD-PIT has worked continuously on the improvement of potato government with a lot of stakeholders. We owe a lot of thanks to SAGCOT, who shared a big network in the potato sector. Also the cooperation with the Agricultural counselor of Embassy of the Kingdom of the Netherlands was very constructive.

7 Potato academy

7.1 Focus and rationale

CD-PIT project wants to inspire the current and future professionals in the Potato Industry. The aim of the Potato Academy was to create an improved learning environment for professionals (to be) in the potato value chain to enable them to acquire as well new knowledge as new skills. The academy worked on providing a range of different tools, instruments and approaches to support the learning, varying from group activities, classroom and outdoor training to individual e learning trajectories.

The package of knowledge has developed over time and addressed all agronomy and direct related issues for different levels of professional activity. The objective was also to do a collaborative effort with 'Technical and Vocational Education and Training' Centers or TVET, such as the MATI's in Mbeya. Besides training of students also short term training (with certificate) the focus is also in young professionals already active in this field. A bridge between education and professional practice will be created to upgrade competences for new functions in the potato value chain. The input to the academy was given by leading companies in the VC, Wageningen UR, Aeres group and educational institutes.

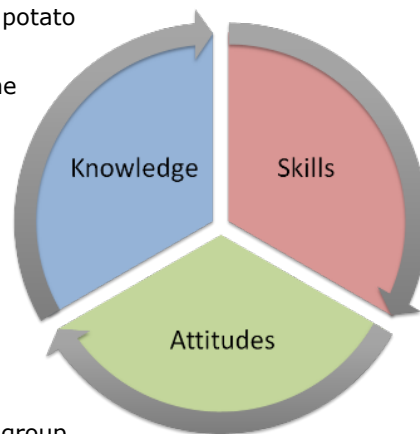
Strategy

Three main lines and one secondary lines of approach can be distinguished.

1. Implementing and facilitating a network of professionals active in the potato value chain
2. Facilitate Knowledge, skill and competence development for farmers and extension workers
3. Support and develop short term courses with certificates for specific competences in collaboration with vocational training institutions.

Rationale

There is a high need for professionalization of people active in the potato value chain. More personnel of key players (size, position, ambition) needs to gain more competences in the potato business they represent. Next to a basic understanding of the potato agronomy they also need to learn more on what they can contribute to the modernization. When we talk of competences we distinguish three different elements which makes a person a competent professional, knowledge, skills and attitudes. These three subjects are enhancing each other when developed. We want to accommodate different learning styles to enhance the competences of all professionals in the value chain.



We have been working with a mixed group of lead farmers, extension workers from the government, traders and suppliers to create a fertile ground to accelerate learning and building a network. The mixture of the group ensures that all sorts of angles into the crop production are covered and different professional skills used to share insights in optimizing production as we experienced in other countries. By including this learning group in the demonstrations, we can strongly increase our impact and outreach. These groups will be helpful to identify future needs on different levels, as on the professional competences they are looking for, or knowledge transfer or technology introduction, brokering etc.

As participants we specifically looked for private companies that have a large customer base/outreach in the potato community and a keen interest in upgrading potato production to expand their services/sales and profits related to the potato crop. These companies can potentially have a high impact when their customer base takes the next steps.

The content of the professional dialogue in and with the group shifted gradually from training by the CD-PIT on agronomy to supporting the exploration of business options in a more modern potato value chain.

This means that all work packages in the CD-PIT project brought in elements in these trainings, from Potato Technology, Potato Market to Potato Business.

In the implementation of the trainings the Stawisha Farm and the (planned) Field visitors played an important role. This location was also a good place for professional meetings with CD-PIT partners. This network acts as a collection of hubs, that organize the demonstration in the main target regions gradually introducing new potato technologies as best practices to their customer base (scaling).

We believed that it is important that we offer specifically opportunities for farmers and extension workers/field workers from private and public companies and authorities, to acquire new knowledge and skills. They are at the heart of the production, where basic product quality and quantity is determined. We worked towards offering modules for training (and demos with presentations can be part of that) on the farm and in the region and provide "certificates".

From the start we intended to work closely with the Ministry of Agriculture Training Institute (MATI) - Uyole (Mbeya) which is located next to the fields of Stawisha. In another project (see results) this was made possible.

7.2 Objectives

- Establish potato learning community, network groups in each of the selected districts
- Foster the cross learning between different participants of these platforms
- Improve the professional skills of farmers and extension workers
- Creating short term courses with certificates for identified key competences

7.3 Results

The following output was realized:

- Training framework is developed. This framework consist of 10 training components that relate to all elements of the value chain: from soil preparation to potato business aspects. Training time schedule and training materials (handouts, PowerPoints) are constantly developed and improved.
- Field Visitors Center as training facility was built and finalized in spring 2020.
- Training was given in relation to the regional demo's: about 4-5 courses connected to the stage of the crop per demo.
- Training course (2-days) to 267 Isowelu AMCOS participants (October 2019);
- Implementation of the study group concept: the first experiences were collected. The process aspects are very important and Stawisha personnel was trained on facilitation skills by WUR and Aeres staff.
- Participation in the OKP TMT+ project: In this project a curriculum for 2 levels of students is developed in this project together with staff of MUST and MATI. CD-PIT and Stawisha supported the practical training of all staff involved and also shared training materials. The Stawisha farm provided a big added value in this respect.
- Mechanization course was implemented (TVET type).

Conclusions

- The CD-PIT project developed a toolkit for training activities of all elements of the value chain. These trainings were successfully implemented. The level of implementation in terms of number of trainings (and entrepreneurs, advisors and students reached) was just about to take off in 2020.
- Good facilities in terms of a training center and a location with a growing crop and all mechanization and tools available are a big advantage.
- Mixed training groups (see also the workshops in work package Potato business) are successful in understanding other actors' role in the value chain.
- Study groups as a tool for constant learning are expected to be successful, but were just started (and therefore not really implemented) by mid-2020.

8 Communication

8.1 Focus and rationale

The Center will set up specific communication channel to the different stakeholders and target groups:

- Companies: In Tanzania a network of lead farms will be created that convenes regularly and will be seeing/discussing showcases, get masterclasses from NL expert and companies etc. The NL farms will be informed by internal progress newsletter as the Tanzanian stakeholders in the SACOT platform.
- Extension and other value chain professionals: Over the years an increasing group of professionals will be trained and supported to become more knowledgeable on the potato crop, the potato value chain and the Tanzanian and NL business partners, technology and collaboration/innovation opportunities.
- Farmers, through flyers, farmers journals, television items, telephone apps. Demonstrations and showcases. And through extensionists trained by the Center.
- Education, bilateral collaboration will be explored, creating work space for MSc students and in-field practice / research internships. Eventually also contributing to curriculum development.
- Institutional environment, dedicated workshops and meetings addressing the challenges, part of the potato platform meetings of SAGCOT.
- Scientific community, scientific articles on the private sector development and co-innovation, the scaling issue.

Moreover the Center itself is an important communication tool, with the demonstrations on site. The Center has the potential to become over time a place to consult and to get advice on starting business and business opportunities.

8.2 Results / output

In the previous chapters many forms of output (reports, inventories, workshop, demo's) are shared. In this chapter only specific and additional communication activities are described.

The following additional output has been produced:

1. Farm facilities: in 2020 the Field Visitors Center (FVC) including 3 offices has been finalized as the basis of a physical center. This was the last step in the process of having a center with all relevant and necessary facilities in place. Besides the FVC the center has available 2 storage facility for potatoes (Hanse Staalbouw and a Diffuse Light store), a machine storage, a tractor and machinery for potato and bean/cereal production and 6 fields with irrigation facilities in a protected environment (fences, gate, security). These facilities are a perfect set-up for knowledge transfer related to potato production to all target groups.
2. Open days Stawisha: every year at least one open day was organized, enabling "the public" to visit the farm and experience the potential of potato production for Tanzania. Having the location of the Stawisha Center opposite the NaneNane fairgrounds, it was a perfect opportunity to invite farmers to do an organized visit on the farm.



Picture 12 Open Field day May 2019: Grimme instructing a group of future farmers.

3. Participation of the NaneNane Fair (one week of farming related exhibition with a Stawisha booth).



Picture 13/14 Field visitors center (training location and offices)

4. Development of promotion material and a website: a glossy booklet was produced in which the CD-PIT partners promoted their role and products in relation to the sector development in Tanzania. An intern from Hanze Hogeschool (Groningen) developed a plan for the website in 2020. The website itself wasn't finalized.
5. Article for Berichten Buitenland: see link
<https://www.agroberichtenbuitenland.nl/landeninformatie/tanzania/achtergrond/latest-developments/cd-pit-project>

9 Evaluation / recommendations

The objective of this project is to work on sector development of the potato industry. Such a transition cannot be expected to be realized in a short time frame of a few years. Most probably 10 year or more are needed before all actors in the value chain cooperate in different way and – in this case - at a higher technological level with consequences in value chain governance. Considering the short period of execution of the project (July, 2017 – July – 2020) much has been achieved in terms of sector development, with restrictions to specific areas.

The project was started based on a thorough analysis of the principles behind sector development. This requires a balanced approach of creating awareness of the potential of the Tanzanian potato industry in all parts of the potato value chain, combined with creating impact in the field of crop management, technological improvements, knowledge transfer, business development and governance at all levels. The idea of this project was to work towards knowledge center for the potato sector that would be pivotal in the information exchange and knowledge transfer in the entire potato value chain. Such an infrastructure is missing in Tanzania. In the CD-PIT project a basis for such a center was created and it is recommended to investigate a good embedment of such a center in the Tanzanian institutional setting.

For the governance part, the close connection between the G2G program between Tanzania and the Netherlands was very supportive. The G2G program worked on the institutional development of the seed potato sector, focusing on knowledge and expertise development for a quality control system for seed potato imports and national reproduction. The CD-PIT project supported the execution of advance yield trials (AYT) as part of the registration process of new Dutch varieties in Tanzania. The delays in the approval of new varieties showed that the process of registration needs evaluation to create clarity on the interpretation of the regulations.

Besides this, continuation of the close cooperation with the Embassy of the Kingdom of the Netherlands and SAGCOT, a networking organization for actors in different food supplying value chains including the potato sector is very important.

For improvement of the potato technology the project used 2 main approaches. First to create a demo farm where all newest insights regarding optimal crop management are tested and demonstrated. This farm turned out to be a successful tool for presenting the added value of Dutch potato varieties as well as for knowledge exchange with farmers, processors and suppliers of inputs. It is recommended to combine a potato center with such a demo facility for sharing the effect of different crop production strategies to the practical farmer. In this way the slogan “seeing is believing” can be implemented.

The second approach is to organize demonstrations on farms, under the practical circumstances on site, with the farmers in the lead to do all practical work, thus creating also interaction between farmers instead of linear but interactive knowledge transfer. The number of demo locations per season was reduced in time to ensure optimal support of these groups. This second strategy for “seeing is believing” was very successful and it is recommended to continue this approach.

The effective interaction in this field between Stawisha and the partners HZPC, Bayer and Yara also turned out to be very successful. It is recommended to increase involvement of partners, advisory services and input suppliers to create a bigger community that can reach out to farmers and farmers cooperatives. In this way a train-the-trainer approach will create more impact.

Training materials were developed (but not yet grown to full wisdom) for all aspects of potato production: variety choice, soil quality and soilborne soil & seed preparation, diseases, planting, fertilization, disease control, irrigation, harvesting, storage, mechanization and markets & farm economics. It is recommended to make this material available for a trained group of potato advisors and specialists.

As part of market development in the potato industry a good overview of the state of the art of all parts of the chain was made. It included both an intensive review of the production volumes per region, sales channels and markets as well as the consumption volumes per type of product (boiled, fried, crisps).

It is recommended to raise the awareness of quality traits of varieties, even though a (limited) number of processors were already specifically requesting certain varieties with a better quality and production efficiency. It will create a higher demand for new high quality varieties from e.g. the Netherlands when these product characteristics are well known.

An important next step to create consumers awareness was planned in the project but had not taken off. It is important to include this in a sector development process.

An important aspect of the improving the potato sector is the availability of high quality seed potatoes. An analysis was made of the volumes of seed potatoes needed in the coming years. Yet, importing high quality seeds or produce mini tubers is too expensive for farmers, so multiplication of seeds for one or two years in Tanzania is needed to make a bigger volume available at lower price. The development of the local seed multiplication is considered to be a commercial activity with individual seed potato companies in the lead.

Business development is part of the process of sector development. In the project chain actors were brought together and exchanged information on the future visions and challenges they face. Getting to know each other and acknowledging each other's position in the value chain is an important first step to a successful transition. It is strongly advised to continue this type of interaction.

For growth of the high quality potato production optimal inputs are needed. To enable farmers to invest in high quality seed potatoes, fertilizers and optimal disease control, loans were made available for the first group of lead farmers and a cooperative. Two national banks opened up their credit facilities in the potato sector for the very first time. Through an intensive process banks and farmers learned from each other was needed for a successful deal. This can be considered to be one of the big successes of the project since this loan facility is still in place and growing. Further expansion to a bigger number of farmers is very much recommended.

The Center of Development for the potato industry as planned was under construction during the project, both physically as knowledge/content wise. By mid-2020 many elements were in place and the center already became known in the country. Social media, presence on special events (like NaneNane), articles in newspapers and national TV etc. already had impact. It is recommended however to put more emphasis on communication. A website was under construction as well as building a strategy for sharing knowledge and materials through this website, but was not fully in place by the end of the project. Combining a good website with a strong social media campaign will definitely increase impact.

In the short execution period of about 2,5 years a good foundation was built for sector development. It should be clear from the start that such a process will most probably take 10 year or more. As part of "expectation management" this message should be clearly and frequently communicated to all actors in the value chain, as well to project partners, ministries and embassies. With more time available, Tanzanian and Dutch cooperation can make it possible to develop the Tanzanian potato industry to the next level.

Annex Success stories

Success story

How Dutch companies co-invested in transforming Tanzania's potato sector

“We see an attractive potential in Tanzania, with 120,000 hectares under potato production, potentially providing us with a solid market but at the same time with an unknown commercial viability since little on-the-ground information is available for European breeders” said the three Dutch potato seed companies when interviewed in 2018. Europlant, Agrico and HZPC are Dutch market leaders in their field, and with considerable export activities. The general feeling was that while the Mediterranean export market for their high-quality seed potatoes was saturating, East Africa shows considerable growth potential.

Transformation of Tanzania's potato sector will increase yields, create jobs, raise incomes, reduce malnutrition, and support a rural economy on a path to middle-income growth. Drivers of agricultural transformation are multidimensional and interrelated. They continue to change over time. Generally, they are organized into three categories that support planning and implementation. The first driver of transforming the sector is 'transformation readiness'. This deals with required changes in Tanzania's institutional framework, governing mechanisms, and political environment in order to make the transformation a success. The second driver relates to the quality of the national agricultural strategy. Both the first and second driver look at 'what to do'.



Exposure visit to Stawisha's farm, training on commercial potato production

The third transformation driver deals with delivery mechanisms and defines what is needed to translate the CD-PIT project plan into on-the-ground impact. How does it manage decision making and progress against targets? How does it use change agents to support large-scale behavioural change, among the thousands of potato farmers? Does it work, and how does it result in transformation? The third driver looks at 'how to do it'. The willingness to change (of companies, government, donors, civil society) is a leading factor in this driver. This success story zooms in on the Dutch private companies that took the risk by investing in the CD-PIT project. What drives these Dutch companies to invest in transforming a potato sector far away from home? What was and is their willingness to change, and join the project?

Willingness to change

In 2018, each Dutch seed potato companies mentioned that they wanted to see if the project could support them in entering the Tanzanian as well as other East African potato markets – Rwanda, Kenya, and Uganda. Some already established a Tanzanian company to be ready for project implementation. The first container of seed potatoes was exported in a combined effort by these competitors in 2018, carrying 12 new varieties destined for trial at the project's experimental and demonstration farm in Mbeya. One company also initiated a partnership with two local mini tuber production companies. During the interviews, all three were determined to build market share in Tanzania through their offering of high-quality seed potato varieties.

"We want to increase average Tanzanian ware potato yields from the present 8-10T/hectare to 30-40T/hectare" said one of them. Based on their experience in Kenya, this could be achieved in a 5-7 years period. *"Seed potato production with our material can result in 30T/hectare, and production of ware potato can go as high as 50T/hectare. In Zambia we do 60T/hectare. For starters it must be possible for Tanzanian farmers to reach minimum 25T/hectare, which is the point where the cost of the high-quality seed is earned back"*. The companies also mentioned that they were looking for partnerships with solid local players. One of them described the criteria: *"Our local partner needs to register and control the new varieties, and search for agents per group of varieties. Agents need to establish a portfolio based on market segmentation and build awareness among potential clients. Technical support to the agent will come from the project, from the local partner, and from us"*. Besides agents, the Dutch companies want to work directly with larger seed multiplication farms and with large input suppliers such as Bayer and Yara.

"As input suppliers we have a broad range of products with high effectivity available for the potato market, covering weed, fungal and bacterial disease control, as well as insect and nematode control solutions" said project partner Bayer during an interview in 2018. To grow their business in Tanzania, the company knows it needs to show farmers that adoption of new technology results in higher production. *"Our goal is to switch the farmers' mindset, through trials and demonstrations, from 'input-cost' thinking to 'cost-benefit' thinking"* he said. Bayer looks for distributors in Tanzania that have sufficient working capital, agronomist skills, a storage and distribution infrastructure, including proper safety and handling of these facilities. At the start of the project Bayer already implemented 10-15 demonstration fields in potato farmer communities, aimed at communicating that *"With higher, more efficient input appliance per hectare we help you increase your potato yield from 12T to 25-30T per hectare"*.

"Our comparative advantage is in the harvesting part" said project partner Grimme in 2018. Their machines work in any type of environment, offering high quality yield, speed of harvest, as well as excellent planting, soil preparation, ridging, and hilling. Grimme sees the potential in the Tanzanian market. *"But demonstrations are essential to create interest in mechanisation and its benefits. The project will act as our demonstration farm and a sales hub"*. Grimme wants Stawisha's experimental and demonstration farm to be the location where potential clients see the equipment in action, after

which a Tanzanian dealer can follow up. *“Our local partner in the future will look after machine sales as well as training of the users. We have learned in other countries that this combination is crucial to avoid negative views resulting from lack of knowledge and poor maintenance”.*

Hanse Staalbouw joined the project at the time it started producing and marketing its new low-cost, low-technology storage concept. The warehouse has a life span of 20-30 years, offering a high return of investment. Since initial costs of potato storage are high the company targets investors that are both non-farmers, interested in the speculative effect of storing potatoes (or onions) or farmers – either cooperatives of small-scale farmers or larger commercial ones. The Dutch company sees the project as its steppingstone partner to enter the market, from where a future relation with an agent will be established. Hanse explains that yield increases highly depends on storage at the farm. *“Only storage will truly provide higher income from sales of higher yields, and thus brings the opportunity to re-invest profits in high-quality seed, inputs and mechanisation”.*



Training of farmers on crop protection methods, at a rural demonstration plot

Challenges ahead

The key challenge in transforming the Tanzanian potato sector is the region's shortage of storage facilities. Also, the high costs of land (to expand production to commercial levels) and the high disease pressure (pests, bacteria and fungus) that make farmers think twice to invest are holding back sector growth. On the market side, the sales infrastructure is highly fragmented, where traders have market power and high margins, resulting in a stagnation in farmer investments in high quality inputs, including seed potatoes. On top of this, the average consumer seems not to notice any real difference between local and imported varieties.

As Bayer explains: *“Tanzanian input suppliers and farmers the like need to recognize that high-quality inputs, from seed to fertilizer to crop protection, imply a higher cost price; a cost that is earned back after harvest. Only this mindset can support building a sustainable potato sector with win-wins for all involved”*. Already in 2018, Bayer defined the lack of disease-awareness among Tanzanian farmers as a key bottleneck to success. This is still the case: with the exception of late blight disease, other diseases are hardly recognized or understood by the average potato farmer. Disease prevention is not applied, and most farmers invest in cure only when the problem is visible – and then it is usually too late. This restricts farmers from investing in quality inputs and creates the risk that even if these investments are made the lack of disease awareness is blamed on new varieties.

Success story

How Dutch companies guided Stawisha in becoming a key service provider to Tanzania's potato sector

“We wanted a physical space where like-minded players develop business models and become potato industry representatives. Where research is done on markets, consumers, and prices, and where awareness is created among farmers – by sharing knowledge on the importance of clean seed”, says one of the Dutch investors. Under the guidance of Dutch companies, Stawisha became the project's local office representing the potato sector in which Tanzania and Netherlands come together. Transformation of Tanzania's potato sector will increase yields, create jobs, raise incomes, reduce malnutrition, and support a rural economy on a path to middle-income growth. In agricultural transformation, one driver deals with delivery mechanisms and defines what is needed to translate the CD-PIT project plan into on-the-ground impact.

This success story looks at how the Dutch companies that invested in the CD-PIT project guided Stawisha managing office of the transformation. A key question was how business peer networks and leadership skills could be built on the ground, and how day to day challenges could best be dealt with.



Sorting, grading and packing of different high-quality varieties, at Stawisha's farm

Managing transformation

Agricultural transformation is not just a planning exercise. It takes good local management of activities over time. Experience had learned that establishing a local project management office (PMO) would

greatly increase the chances of carrying out the foreseen large-scale change program. In general, a PMO gives the opportunity to concentrate talent, monitor implementation, act as a source of truth, and help get things done. Most large-scale private sector-driven transformations in agriculture use versions of PMOs.

The project's PMO, Stawisha, was officially established as CD-PIT's local implementing organization in 2018. With the Dutch partners it was agreed that Stawisha, as PMO, would carry the flag of Dutch potato industry companies that were willing to take the risk to invest in Tanzania. Stawisha is in the process of building and training a local team of potato experts that will assist local seed potato producers to import, multiply and market new varieties; train potato farmers on professionalizing ware production; and in general help Stawisha in becoming the potato sector hub where growing numbers of local companies show their interest in becoming partners, agents or clients of the Dutch investors.

In line with expert knowledge of the Dutch investors, Stawisha designed and developed its own 30 hectare experimental and demonstration potato farm in Mbeya. *"We implement numerous trial schedules of high-quality Dutch varieties that are new to the country, in combination with different crop protection inputs. Our local staff communicates proven production opportunities to farmers and processors, connects farmers and buyers, supports investment planning trajectories, and uses its on-farm research and showcasing equipment to provide training to government and private actors"*, says Stawisha's Managing Director. The PMO also ensures ongoing communication with government officials and supports government agencies with the registration processes of new imported varieties. Stawisha has grown to become the country's main potato training centre and showcasing hub, where agronomists are taught how to operate machinery and equipment and promote the use of it among farmers, almost as indirect sales representatives for the Dutch investors. *"We foresee a one-stop shop for potato industry players to be directed to independent institutes and organizations, and for connecting the Tanzanian market to Dutch knowhow"* explained one Dutch investor in 2018.

Now, mid-2020, experience has learned the project that the positives of establishing Stawisha as formal PMO (improved coordination, management of progress toward targets, increased ability to learn, adjust implementation over time) greatly outweigh the challenges (costs, potential complexity due to higher visibility).

Needs & solutions

The interviews held in 2018 helped define the direction of Stawisha's activities today. Dutch seed potato companies continue to underline the importance of up-to-date market information and of structuring value chain coordination to assist them in identifying the solid local players. *"We need knowledge on varieties and production volumes and insights on producers, marketing channels, licensing, royalties, market fees, import licences support, quality and capacity, demand-supply ratios, and the viability of Tanzanian farmers buying directly from the container"* says one company. Stawisha's presence in local communities and among input suppliers is essential, with specific focus on the key potato growing areas Mbeya and Njombe. Local multiplication of their varieties can best be done in these high-altitude areas to overcome the high disease pressure in Tanzania. Farms in these areas, to be identified by Stawisha, should preferably have 50 hectares or more land, and be managed by experienced staff.

At the same time, on the farmer, processor and consumer side, Stawisha supports promotional activities to stimulate demand for the new varieties imported to the country. As one company puts it, *"These promotions are based on the specific benefits of a variety and involve demonstrations at the various points in the value chain – from farmers, traders and processors, to retail, hotels and restaurants, and consumers"*.

Crop protection company Bayer needs Stawisha to produce deeper insights in crop production and crop protection data in Tanzania, including a list of key potato producers in the two key production areas Mbeya and Njombe. Insights in the potato value chain, specifically on prices at each part, is also essential to the company. Stawisha also has a key role to play in crop protection training, specifically on how to use the products. *“Trainings on effective disease control, based on spray programs with minimum number of applications to secure plant health, are key in our business”,* says Bayer. *“This includes training on the crucial aspect of proper planning as to make control more effective”.* Other important topics for training in which Stawisha can play a leading role are soil sampling, knowledge on residue levels, and integrated pest management.



Training of farmers in planning and applying crop protection in potatoes, at Stawisha's farm

Both Grimme (mechanization) and Hanse (storage) need Stawisha's support in defining potential for initial commercial sales to farmers. These should come from the Mbeya and Njombe, and from commercial potato farmers or potato-related companies that are active in these regions. Market price levels for seed and ware potato, per season or year, are crucial data to do cost-benefit ratio calculations for their potential buyers and agents. Grimme emphasizes that *“for mechanisation to be introduced in the country, the local agent must have the capacity to invest in spare parts and hold sufficient stock of these parts. This can be imported together with the machines. This is also important for maintaining interaction and feedback with the farmer, and for defining required support and service delivery”.*

For its storage solutions, Hanse states that for upscaling sales of its storage units, it needs a storage operator that rents space to others and uses space for own storage. Attracting farmers to rent space will support marketing of Dutch seed potatoes as well: *“The storage unit then becomes a proof of concept, showing farmers how it is done, followed by a discussion on possibilities for next commercial steps”,* the company explains. The agent should have a long-term vision and be able to define what

concept works best for what client. Stawisha should play a role in supporting the preparation of the client's business case and help with submitting the funding proposals to potential financiers in its business peer network.

Business peer networks, B2B clusters, and leadership skill building

In private sector driven transformations, business peer networks and leadership training are key elements. When the goal is to improve the lives of thousands of people, the return on investment for doing this right is huge. Mapping of potato sector players is a time-consuming activity. Farmers or companies of sufficient size are busy people, while intake discussions with them require a face to face setting. After personal visits to their farms or companies the most relevant are invited to Stawisha's business peer network meetings. These are held in Mbeya so participants can also visit Stawisha's experimental and demonstration farm.

Once business peer network meetings result in a solid group of serious potential investors, covering all aspects of the potato value chain, a more high-level B2B cluster workshop is organized. During this workshop the chain actors, preferably representing a geographic area, already know each other and now get to work: planning of flows (inputs, seed potato, ware potato) and linking these to the actors (input suppliers, seed potato producers, ware potato farmers, processors, traders and other). Stawisha has currently worked out two initial B2B cluster plans with key players in Mbeya and Njombe.

Leadership skills building works best when it is connected to real work and practical problem solving. With this in mind, there is great value in creating Stawisha's knowledge centre approach, and in building skills of a next generation leaders to guide the potato sector's transformation.



Exposing local traders and input suppliers to Grimme mechanisation equipment, at Stawisha's farm

Some of the Dutch seed potato companies use two business models for entering the Tanzanian market. The first is to export to local companies, that buy, import and multiply their seed potatoes, after which they harvest and market to local farmers. The second is to sell genetics of seed potato varieties, through export or local production of mini tubers. *“The genetics model is widely used outside Tanzania”* says the Dutch company involved in this, *“In fact, in South Africa 50% of all our seed potato varieties is locally produced in this way; without exporting one single seed potato tuber”*.

For both business models, Stawisha has contributed by linking the companies to its business peer networks of local players in Tanzania, and by creating awareness among farm leaders on the benefits of imported high-quality varieties. Stawisha builds business networks, selects future potato sector leaders, supports their business growth, and trains their staff. It assists in creating an overall supply-driven, profitable and manageable potato market that benefits all.

Like crop protection company Bayer says: *“We want to test to what extend our crop control products are cost-effective under specific modes of action – with low dose rates, working for longer periods, and providing higher safety for the user and the environment. These trials are ongoing”*. Already most of its products are now being trialled under various circumstances at the experimental and demonstration farm of Stawisha. Through Stawisha, the company has created a business peer network with distributors of fertilizers, crop protection products, and seed, as well as with commercial farmers and organized small-scale producers (AMCOS). Bayer’s strategy is to provide value-added return on investment. *“The promotion of our products to this network requires demonstrations in the field, including on demo’s organized by Stawisha staff, and by offering cost-free trials to lead farmers in the community”*. Bayer’s main competitor in entering the market are Chinese-sourced crop protection products – which are low cost and low performance.

Before the project took off, Grimme already had a sales dealer in Tanzania, yet with little results. *“We expect that the project will connect us to a commercial network of larger commercial farmers, organized groups of small-scale farmers, and to contractors”*, says Grimme. *“By investing in the project, we ask Stawisha to provide us with better insights in the local situation, in terms of mechanisation users, dealers, and drivers; and then select their leaders and jointly plan for sales and after-sales services”*. Grimme thinks that sales will take off soon because current potato yields will accelerate once imported seed is available and adopted by farmers. Improved varieties and higher yields will go hand in hand with specialized mechanisation. *“Mechanical planting and harvest with depth regulation, ease of use, and high-quality equipment is non-existent in most parts of Africa. This combination is our long-term comparative advantage over others”*, says Grimme.

Hanse so far supplied one potato storage facility to Stawisha’s experimental and demonstration farm – a showcase model that is at this moment in full operation and with good results. Hanse is ready for the next step is to be part of Stawisha’s business peer network to connect to financed AMCOS and medium and large commercial farmers. As Hanse explains, contribution of storage to yield increase is evident: *“When imported seed potatoes arrive, they need to rest in a storage facility for one month, to gain back energy. After planting this cooled resting period results in a 10-15% higher yield, and once harvested the storage can add another 20-30% increase in income by delaying sales”*. Looking at the bigger picture, Hanse foresees a growing demand for its stores. *“Imagine, just one imported container brings in 24T of high-quality seed potatoes. After one multiplication this can become 200T of seed potatoes that, at a planting ratio of 4T per hectare, will cover 50 hectares. At a maximum production of 40T per hectare, a potential 2,000T of high-quality ware potato will be harvested. This kind of volumes can only be profitable when investing in speculative pricing strategies through robust storage solutions”* he says.

Success story

How Stawisha builds business peer networks with key potato sector players

“Based on my experience as processor when trying Dutch variety samples from the Stawisha farm, the quality of my end product is much higher than what I am used to with local varieties”, says Ernst Makena. He explains that when using samples of Dutch varieties in processing, there is considerably less wastage and quality of crisps is now close to perfect. *“We are now moving into an era where we are informed on which variety is suitable for what end-product”* he says.

The financial benefits of professionalizing potato production are starting to settle well in the minds of farmers, as does the need for working together to achieve this. Since the first business peer network meeting bringing together players from the Southern Highlands, Stawisha stayed in close contact with the growing group of peers. Most are based in Mbeya and Njombe and the companies and farms were visited by Stawisha’s agronomist.



Business peer network members discussing the use of Dutch varieties with Stawisha’s farm manager

Some companies in the business peer network left, while new ones joined. Data was meanwhile collected on farmer costs and income figures per acre, to feed today’s discussion on where and how margins can be improved, and how. Production data from Stawisha’s experimental and demonstration

farm in Mbeya, as well as from other Stawisha demo plots in rural areas in Mbeya and Njombe, have shown that huge improvements in farm income are feasible if high-quality farm inputs are applied. During today's peer meeting the presentation shows that traditional potato varieties give a farmer an 8T per acre harvest, while 20T per acre is feasible with high-quality Dutch varieties. To communicate this, awareness, demonstration and training activities are organized with farmers in the group, showing that investment in high-quality Dutch seed potato gives better results than using less-costly local seed. Importation and local multiplication of the Dutch seed potato varieties have received much support from Stawisha, including on the formalities of testing and inspections to ensure varieties can be produced, certified and marketed in Tanzania. The varieties were tested and demonstrated in combination with different types and levels of crop protection and fertilizer, informing on best farming practices.

The group of entrepreneurs present today are interested in sharing experiences. All 16 peers are eager and ready to be part of the change. Jointly, they represent four major farmer organizations (incl. AMCOS), five commercial farms, three collector and trading companies, three agri-input suppliers, and one farm importing and multiplying Dutch seed.

The peer network meeting will today need to set the scene for the next step: creating regional B2B clusters; one in Mbeya and one in Njombe.

Mr. Lugano, Zonal Relationship Manager Agribusiness of NMB bank, welcomes the participants and underlines the importance of working together in clusters. According to him, this is the next step, from peers to business-to-business partners. *"Contracts between chain actors will give NMB peace of mind; it shows us that partnerships are in place and income is assured for the payback of input credit and loans"*, he says. Acknowledging the importance of regional business partnerships participants sit in two groups representing Mbeya and Njombe. Goal is to come up with an initial mapping of data that would show the feasibility of organizing clusters.

The Mbeya group presents first. It has its planting season in March-April. This is when high-quality varieties of seed potato should be available. Harvest of ware potatoes takes place in the period July to September or October. At first estimation, among potato farmers there is a seasonal need for in total 1,000T of high-quality seed potato, while there is far as they know 0T (zero) seed potato produced in the area. The potato farmers can jointly produce between 5,000-10,000T of ware potatoes, while in that period of the year the traders and processors from the area (some present at the workshop) need around 100,000T. The Njombe group (incl. Makete) has a planting season in October-November, which is when high-quality varieties of seed potato must be available. Harvest of ware potatoes happens in the period February-March. The farmers have a joined seasonal need of 1,000-2,000T of high-quality seed potato. There is approximately 1000T high-quality seed potato produced in this cluster, by two large-scale farms. The potato farmers could produce around 5,000T of ware potato, while among the same traders and processor roughly 80,000-100,000T is required in that period.

When combining the areas, it is clear that there is a realistic high demand for high-quality seed potato annually (jointly, different seasons). Only little currently produced. Among traders and processors, the demand for ware potatoes is huge, while only a small portion of this is currently produced. *"Yes, there is a clear potential and we can finance investments"* says Mr. Lugano, *"If your plans are based on a good business case, and on payback from cashflow, we can provide finance"*. He sees high potential for investment in production flows in the two clusters.

Mr. Lugano explains that the figures now presented should be worked out in more detail. This should include profit and loss calculations per month, per business network participant, for the duration of a

possible loan. “How much cash comes in and goes out, on a monthly basis?” he wants to know. Another condition is for farmers to be organized in AMCOS prior to loan application. The NMB foundation can support and train existing farmer groups in making that step. The foundation can also support partnerships between commercial farmers. He once again underlines the importance of the clusters. “We need to see supply contracts between suppliers of inputs or seed potatoes and potato farmers, and between these farmers and off takers of their harvested crop”, he says.



The Mbeya and Njombe regions show enormous potential for further professionalization

This second business peer group meeting has been successful in the sense that it had created two groups of potato chain actors to go to the next level: working out the B2B cluster business plans as requested by NMB.

To support this process Stawisha and NMB prepared the NMB-approved format and will distribute this to the lead companies and AMCOS present at the peer network meeting. Stawisha experts can support the next B2B phase by helping cluster actors to put ideas on paper and in draft profit & loss calculations per company. With those active in developing the regional B2B clusters, a follow up workshop will be organized, which will concentrate on getting the overall and individual business plans in paper. New lead firms in the clusters can meanwhile be welcomed.

Success story

How Stawisha facilitates regional B2B cluster building and financing of investment plans

“The way forward for us is to work in B2B partnership with others – with farmers, agriculture banks, donor programs, and government agencies” says Mr. Deo from Mtwele Company in Njombe. *“Only by offering farmers inputs on credit can we really grow our input supply business; we work with loan-cash combination payments for our inputs, and also need to invest a lot in demonstration plots to show results of application of our inputs.”*

Mr. Lazaro of Raphael Group, a key player in Mbeya’s cereals processing and distribution is serious about moving into the potato business. A B2B potato cluster will help him in connecting the dots. *“It is important for us to keep innovating and add different crops to the portfolio over time”* he says. *“I see good potential in potato processing, and even in multiplying high-quality seed potatoes. This will allow me to sell good material to farmer groups and buy back their crop, securing my supply for processing”*. *“But”* he continues *“we will need financial support from a bank, for sufficient working capital and for investment in cold store units and potato processing equipment”*.



Only through B2B partnership coordination will farmers be able to invest in mechanization

Stawisha has a brokering role in potato business development. From its business peer networks it has selected most serious farmers and companies and organized for them the regional B2B cluster building

workshop. In total 12 entrepreneurs have been invited to join the workshop in Mbeya, in September 2018. Jointly they represented key value chain functions in both the Mbeya and Njombe cluster: input suppliers, farmer groups and commercial farmers, collectors, and processors and traders.

The goal of the workshop is to have lead companies work together on the B2B business case for their respective potato clusters. During the first day they work out the two potato business cases. Financial challenges were set aside for now, and the focus is on realistic flows of potato in the two areas. An initial mapping performed during business peer network meetings serves as the entry point. From own market intelligence and research carried out by Stawisha, each potential B2B cluster is quantified, and roles and collaboration modes are attached to product flows.

Input suppliers calculate that the Njombe B2B potato cluster could include 20,000 small-scale farmers that already grow potatoes and another 10,000 farmers that would join once the market would be made accessible. This would roughly translate to 10,000 acres under potato production, or 2,500 acres per season with a 1:4 crop rotation. Input suppliers worked out a model for joint offering of inputs on 50-50% credit basis and extension services to this huge market opportunity. In the Mbeya B2B potato cluster, through the joint network of input suppliers, 4,500 small-scale potato farmers were counted, with another 2,000 that are likely to do so if a cluster would open up the market. This would translate into roughly 7,500 acres under small-scale production, and another 425 acres owned by commercial farmers present at the workshop.

Stawisha announces that the regional B2B cluster approach opens the door for agriculture financing. In both clusters, investment needs were mapped by its key members. For input suppliers these are storage facilities, working capital to supply farmers on 50% credit, and additional trucks for distribution to as many farmers as possible during the short planting season. Traders and processors, buying the harvested crop and confident of market uptake of calculated volumes, would require additional trucks, and sorting, grading and packaging equipment. For collection of harvest in the rural areas, through own efforts or by hiring collectors, extra working capital to pay farmers on the spot would also be needed.

“For us to help you in growing your potato business through short and long-term loans is very possible – but there are some must-haves”, said Mr. Lugano, Zonal Relationship Manager Agribusiness of NMB bank, to the entrepreneurs. “For agri-input suppliers we will only finance working capital for supplying seed potato on-credit when you work with the highest-quality varieties. This will reduce the risk of low prices at the end of the chain, and with that pay-back capacity of the credit by the farmers”.

Addressing the farmers, he explains that *“we prefer to work with established AMCOS, and we will require full commitment from all members. AMCOS leaders must get a written go-ahead from each one of them, and again loans for buying seed potatoes on credit will only be given for high-quality varieties”.* *“In general, we support creating potato business platform collaboration very much because, as NMB, we provide loans to farmers based on multi-party contracts that include an input supplier for seed on one side and an off-taker of ware potatoes on the other side. A platform gives the opportunity to make such arrangements”.*

Mr. Lugano further explained how they should be able to show a reliable business track record, hold an NMB bank account for minimum six months (or in case of another bank prove healthy turnover with bank statements), show long-term commitment to the potato operation, and have a strong business case that shows how the loan will be paid off from cashflow.

By bringing together the entrepreneurial minds per B2B cluster and focus on common opportunities, the idea of B2B cluster building was further worked out during the workshop. Potato flows and roles were calculated, and investment needs were listed. These were welcomed by NMB bank, assuring that

financing requests of investments in the potato sector are very welcome. The seed for further serious B2B cluster building was sown.



Understanding what it takes to bring the potato value chain to a next level, at Stawisha's farm

Mr Mgaya of Lusitu agribusiness group in Njombe concluded the workshop: *"Many of our farmers were producing good potatoes yet were still complaining that business was bad. After we did our research, we found that the problem was in the marketing, not in our production. Over the past year we dedicated a lot of time and effort to building direct B2B market linkages with good buyers. We now sell directly to lead firms, such as a large potato processor, without middlemen, and incomes have improved"*. Mr Mgaya believes that the foreseen regional B2B clusters are key to success. In his mind he is already planning Lusitu's next investment: high-quality seed potatoes, sorting & grading equipment, and a cold store.

Success story

How Stawisha collects consumer data to better match variety supply with variety demand

“How can we invest in Dutch seed potato varieties if we have no knowledge on market segments and consumer preferences?” said the commercial farmer. He was one of the nearly twenty lead companies in the Southern Highlands that was interviewed by Stawisha early 2018. Understanding markets and end users’ preferences was obviously a main obstacle for them to invest in planting the new Dutch varieties. *“To select a variety and penetrate the market with it, we first need to know which varieties appeal to different end-users”* he said, *“then we need knowledge and training guides on the production methods to understand the different characteristics of each variety”*.

All producers and buyers agreed that the Tanzanian potato market is highly unpredictable. They see high price fluctuations, lack of communication between chain actors, and hardly any means of doing business to business networking. A common approach by some large producers of seed and ware potatoes is to first test the new varieties with the ‘mamas’ at the market. *“These ladies work at each wholesale market and understand consumer preferences; together with the brokers they cover a network to different segments of end consumers. They test potatoes on their consumer network criteria; for example, on percentage oil consumed during frying, cooking time, change in colour, soft versus hard content, and suitability for chips making”*. It seemed as if seed potato producers would only enter the trajectory of registering new varieties if the mamas would approve them. This was perceived as the only guarantee that farmers would buy the new seed potatoes because brokers and traders would buy their harvest.



Storage of different varieties in Hanse storage, after arrival of Dutch container at Stawisha's farm

The only three companies involved in seed potato import and multiplication at the time, end 2017-early 2018, all agreed on the huge opportunities of introducing new varieties. Either via imported disease-free seed potato tubers from Netherlands, or through tissue culture. The Southern Highlands

region has the perfect climate conditions in place for a potato industry to boom. But, they said, imports are costly, and multiplication requires expertise. The risks are high due to high costs and unpredictable weather conditions. “So far experience shows that the new imported varieties cannot compete with some traditional ones” said one of them “Although this is caused by a lack of awareness on the end-user’s side”.

Now, in 2020, production of new seed potato varieties is still at its early stages. One company we spoke to a year and a half ago has stepped out of the business. Besides the two other companies, no others really stepped in. They were joined and supported by Stawisha, which so far imported and planted 14 new Dutch varieties at its 30 ha. Stawisha demo farm in Mbeya, and at another 8 smaller demo locations in various potato farmer communities in the Southern Highlands. The variety demos are also used to optimize fertilizer and plant protection application in relation to each variety, and for training of groups of farmers.

Late 2019, Stawisha also undertook a major market study on consumer preferences. The team conducted field research by interviewing in total 50 farmers and 40 professional buyers in Dar es Salaam, Arusha, Zanzibar, Mtwara, Dodoma, Morogoro, Mwanza, Shinyanga, Geita, and Songwe. Among buyers, interviews were held with wholesalers, processors, hotels, restaurants, cottage fryers, retailers, supermarkets and kiosks. Local government authorities and public agencies were interviewed as well and involved in the planning.

The study found that, in general, there is a huge disconnect between market needs and supply by farmers. As one wholesaler put it *“farmers often just produce varieties that have fetched higher prices in previous seasons or choose for varieties that give a high yield or a bigger in size. This makes the potato chain supply-driven rather than demand-driven”*. One processor also points out that farmers do not meet the preferred sizes and supply whatever is available. Overall, there is a high need for means to communicate preferences to farmers, and for farmers to aligning to these specific demands. The effect of this is that buyers search for most preferred varieties as soon as potatoes are harvested, with only small volumes being available at the market, forcing them to buy whatever is available afterwards. In different regions different varieties are preferred, and preferred varieties first sell with a mark-up until they run out.

Stawisha collected and structured data on how buyers score characteristics of different varieties, and on which varieties are preferred and not preferred, and why, and on possible product-market combinations (variety-market segment combinations). Buyers explain that they are often uncertain of what they buy. The length of the buyer-seller relationship is viewed as a crucial aspect. Especially buyers from hotels and restaurants indicate that the lack of traceability and accountability in the supply chain as a big obstacle. Different varieties and sizes often end up in one and the same bag.

One Arusha-based wholesaler says that *“Farmers do not care as long as they get their money, especially in the rainy season. They will put small, medium and large sizes all in one bag, and throw in other varieties or even stones just to fill it up and make the weight. They pack muddy potatoes, which means I now have to worry to get these potatoes sorted and to the market before they rot”*. There is of course not one supermarket, hotel or restaurant that will even consider buying potatoes this way, he concluded. Compared to other areas, Southern Highland farmers have a poor reputation among buyers. On top of that, a number of buyers are reluctant to buy from the region because their potatoes are seen as more exposed to chemicals – due to its rainy climate.

The Stawisha team also found that among cooks of food outlets, restaurants and hotels there is little knowledge of using different varieties for different usage. Most admit using the same variety for different dishes and say that at times clients complain about the quality of the potato dish that is

served as result. Data shows also that at a household level, most potatoes are consumed fried, followed by boiled vegetable. Potato crisps consumption is on the rise in urban areas. Consumers prefer big size and white skin potatoes, a high dry matter content and good frying qualities.



Testing different potato varieties on their frying performance, at Stawisha's farm

Based on the network with buyers now established, and knowing their individual preferences, Stawisha will follow up on the market survey by sending potato samples to selected buyers. This is a first step towards matching varieties with customer usages. Stawisha will follow up on the test results from buyers through a feedback mechanism. It will analyse overall results, which then provides input for further coordination with potato chain actors: the buyers indicating required volumes of specific varieties, farmers that will grow these varieties, possibly under contract, and producers of seed potato that will supply the specific varieties to the farmers. By linking these actors based on variety requirements, supply contracts at different levels in the chain can be achieved, paving the way for agriculture finance and investments.

Success story

How Stawisha trains agricultural extension officers to help potato farmers commercialize production

“There are just very few companies that really invest, the rest is still business as usual” says one extension officer. His colleague adds that *“No-one invests in professional storage facilities, or in mechanization so that we can grow potatoes on large plots of land. And there seem to be no large processors of potato products either, only small ones”*. All participants in the training agree that a modern potato industry still seems far away in Tanzania. Present are 16 persons in total. Agriculture extension officers of the Mbeya District Council, agriculture researchers of the Mbeya agriculture research institute, and tutors of Mbeya’s agriculture college. With much laughter they look back at their one-week potato technology training at Stawisha’s demo farm.



Training extension workers on practical aspects of commercial potato production, at Stawisha’s farm

That training was followed by a period of bringing the new knowledge into practice. *“As extension officers, we went in as team and visited farmers during planting season, see how they do the spacing in planting; we directed them to do it the right way”* says one officer. *“We hear the challenges, also on getting good seed potato varieties – this is their biggest problem, so they replant old stock and then face diseases. Because of small plots they re-plant the same crop in the same field, and we advised them to break the cycle of diseases, to use crop rotation with other families like beans and maize”*.

This new follow-up training will zoom in on business and governance aspects of building a potato industry. How can extension officers act as consultants or coaches to farmers, on 'farming potatoes as a business'? How can they train farmers on importance of crop budgets? What coaching methods are available – as technical expert, or as value chain coordinator – and which are most suitable in the Mbeya situation?

The training looks at the value chain concept. Extension officers, researchers and tutors define where in the chain they could best offer their services. One of the researchers explains: *"As TARI research team, we went to Mbozi and met with potato farmers and trained them on good agricultural practices, and how to identify diseases and how to control them. Most farmers cannot differentiate between diseases. They go to agri-dealers and buy whatever pesticide is there. We showed them different approaches to identify what disease it is before going to the agri-input shop"*.

When concluding on how District extension officers can help bring the potato sector to a higher level, the group defined two main roles: 1) Knowledge brokering – by realizing their generalist roles and from there knowing to which specialists to link when needed; and 2) Linking farmers to seed potato suppliers – training farmers not to grow own seed but rather link them to a network of professional multipliers of high-quality varieties.

Positive potato statistics underline the need for their support roles. Small-scale potato producers in Mbeya District have own land and complement this with rented land from neighbours. The area has 2,500 acres under continuous potato production. Through training in good agricultural practices farmers can harvest around 12 T per acre, resulting in a total 30,000 T of ware potato the Mbeya area. A total of 2,500 T of high-quality seed potato will be required for the area, every season (1 T per acre planted). A group of commercial farmers jointly own another 2,000 acres that they use for potato production – with 1:3 crop rotation they have another 480 acres under continuous potato production and need another 480 T of high-quality seed potato per season.

For Mbeya farmers, access to high-quality certified seed potatoes is difficult, says the tutor of the agriculture college. *"As trainers we learned the importance of good seed and have used that in class. The question that always came up from farmers was where and how we can get this good seed. "Now we just buy to a bag and we never really know what we get", they say. I do not really have the answer then and being able link them to suppliers of this seed is very important for us"*.

Mr. Chesco, chairman of the Isowelu potato farmers AMCOS in Njombe, a guest speaker at the training, knows the journey from start to success probably better than anyone. He sees a big need for extension officers' support: *"The extension officer should always be involved in a guiding role – I refer to our saying that "Alone you go fast, together you go further"*. We need collaboration at all levels. He explains that his growth started by being part of Stawisha's business peer network meetings, and from there was selected to be part of a regional B2B cluster workshop. This resulted in being linked to high-quality seed potato supply and to buyers in the market.

Impressed by the success of Isowelu, the participants formed three groups to identify the key support activities of District extension officers. Taking as a starting point that they are no potato specialists; some realistic directions were proposed. The first is appointing one focal extension officer per geographic area to deal specifically with the potato sector, and to create a mindset among farmers that potato can be a good cash crop. Second is helping already organized farmers in their next step to establish an AMCOS; by connecting them to financial institutions, input suppliers, and providers of training and technology.

In the process, one group brings to the table that their support should not just go to small-scale farmers but also to companies that take a risk by investing own funds in the sector. As one extension officer put it *“A potato farmer can become more market oriented by using good varieties. Rather than blaming others in the chain that they earn too much money in the potato trade; they should invest themselves as well. Private companies are key to investments in storage, mechanisation, and processing. Organised small-scale farmers must organize themselves in groups so they can buy quality inputs and machinery through bank loans”*. The group put forward a third key support activity by which the District office facilitates these companies in doing the investments – through planning and implementing targeted policies on land, road, electricity, water, and permit issues. With the goal of creating an environment that supports public-private cooperation.



Extension workers being trained in yield prediction and disease identification, at Stawisha's farm

Mr. Chesco agrees. *“With these three levels of support in place, we would have moved much faster. A coordinating role by extension officers is critical to farmers – to have a one-stop Q&A shop in the field that links them to trainings, to chain actors, and that helps them in organizing meetings, discussions, and joint planning and action. This will minimise the challenges that AMCOS face”*.

Extension officers, researchers and tutors decided to work out concrete follow-up action plans. They formed three groups around three main potato production areas: Rungwe, Busokelu, and Mbeya. For each, actions were defined in a two-step approach: first to form small study groups with serious potato farmers, and from there to support the process of clustering successful groups into AMCOS. Stawisha and NMB bank agreed to facilitate the next steps by hosting regular follow up meetings to monitor progress and offer help where needed.

Success story

How Stawisha supported organized potato farmers in being linked to training, inputs, markets and finance

“We are in great need of training guides on how to produce potatoes in a professional way” said Mr. Chesco in November 2017. *“We also need market information on buyers that want to work with us through pre-defined contracts – so we can plant while knowing that we will sell at a known price”.*

The interview was one in a series that Stawisha held with key potato players in Tanzania’s Southern Highlands, end-2017. Stawisha wanted to get good insights in who the players were and how they could lead in developing a potato industry. Isowelu Agricultural Marketing Cooperative Society Ltd. (AMCOS), situated in Mtwango, near Njombe, had been established officially just a few weeks earlier.



Training Isowelu’s farmers on proper planting techniques, at Stawisha’s demo plot in Njombe

Isowelu’s management team consisted of a dynamic group of potato farmers. Besides the chairman, Mr. Chesco, other members of the AMCOS were proudly present: Mr. Michael, the secretary, Mrs. Asia, the treasurer, and board members Mr. Ernest, Mr. Humphrey, Mr. Jali, Mr. Johnface, and Mr. Emanuel. *“Our AMCOS did not come easy”* said Mr. Chesco, *“It were not the formalities that slowed us down – the biggest problem was uniting our own people”.*

“For us, this is what success looks like” he continued, waving with the official AMCOS certificate. *“This certificate will help us become different people”*. AMCOS’ members came from four villages, consisting of 14 groups of in total 284 farmers. They grew potato on their own 1-2-acre plots, and as a group they rented another 25-acres. They grew local varieties – Tengeru and Asante – and income from the shared plot was used to purchase new seed and to pay school fees.

As an AMCOS they could now rent more land from the local government. *“Our bottleneck for growing bigger was so far the costs of inputs”* says Mr. Michael *“We think that now, with our certificate, we can get a 50%-upfront and 50%-after-harvest deal from an input supplier, making growth more feasible for us”*. They expressed their hope that Stawisha would train them in potato growing and link them to the right people in the market. *“With this certificate we can actively market ourselves as a potato producing company”* said Mr. Chesco. *“The buyers we know now are middlemen that offer low prices – what we need is to be connected to final buyers, become their contract farmers”*.

One and a half year later, in April 2019, Mr. Chesco is a guest speaker at a potato business cluster workshop organized by Stawisha, in Mbeya. Present are over 15 companies that represent the full potato value chain: farmer groups, commercial farmers, a seed potato importer and multiplier, input suppliers, traders, a crisps processor, and NMB bank.

“Isowelu AMCOS has benefited a lot from being formally organized”, he says. *“We thank Stawisha for the support it has given us so far, and we hope for more”*. Since that day in November 2017, Isowelu’s present 400 members have participated in numerous trainings from Stawisha, other programs and the government. It managed to receive discounts from input providers, such as Yara, for buying in bulk, and training on application of the inputs. It gets higher prices per bag than individual farmers, the result of the AMCOS board making price arrangements with traders. It has access to new, Dutch seed potato varieties that are locally multiplied, and managed to buy these at a discount. And it has become a knowledge-based operation, which shares best practices between them, plans collective seed and inputs needs in advance, and arranges supply of crop to buyers in advance.

But this did not come easy. *“Getting all farmers on board took a long time and opportunities were missed. We even had to ask the Regional and District Council to intervene as to speed up the formation process”* he says. Land or other assets of members often had no title deeds, which meant that banks denied them requested loans. *“We then approached input companies directly, for inputs on-credit arrangements, and thanks to the guarantee of District extension officers we could move on without official collateral”*.

Later, a good relationship developed with NMB bank, and learning on how to apply for loans begun. It is not the individual farmers that do the loan application, but the AMCOS as entity. The loan is then spread among small groups that form the AMCOS. *“Understanding this process and preparing for it took a lot of time”*, Mr. Chesco explains. Then there are audits: internal and external ones. The internal are affordable and provided for by the government. But external audits are far too costly for the AMCOS. This remains a challenge for Isowelu. Hiring a junior accountant to prepare financial statements in advance seems the best solution for now, and to make use NMB’s offer to train individual members on preparing for these statements.

Isowelu successfully applied for a loan with NMB. Normally, a supply contract with a buyer of the harvested potatoes had to be in place. *“We did not have such contract. But thanks to Stawisha’s business network building workshops we had made contact with the network of traders in Mabibo market, through their umbrella organization Vibindo Society. Vibindo was interested to offer us the requested contract, which provide proof of a future transaction for the bank. NMB then checked our bank statements and income statements. This gave them sufficient evidence of our past sales and turnover in the past”*.

Mr. Lugano, NMB's Zonal Relationship Manager Agribusiness, smiles, remembering the hectic moments in the loan application process. *"If we think about it, and looking at the Isowelu case, there are four types of support that should be offered to make formation and operationalization of AMCOS a success"* he says.



Signing of loan agreement with NMB bank, for purchase of high-quality seed and inputs, in Njombe

First is governance support, the actual establishment of the AMCOS. Here NMB provides trainings in 'good governance', while there are also other governance service providers such as Agriterra. Second is technical support. This concentrates on potato production techniques. Stawisha is a key player in this, while NMB gives trainings in entrepreneurship skills. Third is market support, in which Stawisha has the role to link the AMCOS to its potato value chain network and facilitates networking events. NMB provides trainings in pricing & costing and business plan development. And fourth is financial support, in which NMB can provide working capital for activities related to the actual production of potatoes, and long-term finance for capital investments. NMB also provides trainings in loan administration and record keeping.

"Isowelu is the perfect example of how Stawisha can facilitate these support services" Says Mr. Lugano. He and Mr. Chesco both see an overall improvement among farmers. They see a clear shift from old-style traditional farming to a new-style farming as a business. including the multiplier effect by which most potato farmers start using new certified seed". Mr. Lugano agrees. *"And now"* he says, *"the key points for your AMCOS way forwards are: better availability of improved seed, more technical training, supply contracts to assure market uptake, access to NMB financing of inputs, and access to NMB financing of storage facilities in 1 or 2 years from now"*. Stawisha experts and Mr. Lugano agree to continue working together and make this a reality.

How Stawisha linked a potato processor to new varieties, increasing its income and market share

“We plan to expand our businesses to other markets as well, like Mwanza and Nairobi, where they have expressed demand for our high-end products” says Ernest enthusiastically. He lives and operates his company in the northern highlands of Tanzania, in Arusha. His goal is to transform his business from low-quality crisp production into high-quality, with products for different markets segments in Tanzania and throughout East African.

In 2015, Ernest Makena left his international job with the UN and starting a family-run agro-processing business in the remote area of Olmotonyi in Arusha. Together with his wife, Mr. and Mrs. Makena had a great passion-driven plan to build a successful company with the name BETA Products. The goal was to become a main supplier of high-end crisps products, to retail chain branches in the region, such as Nakumatt supermarket. Although their plan was good, the unavailability of preferred high-quality potatoes to make the crisps soon became a bottleneck to meet their customer’s quality and quantity standards. *“Potatoes accounts for over 70% of our processing needs, and buying the traditional, poor quality potatoes not only increased our cost of production and reduced our profit margins, it also brought a lot of stress and frustrations into the processing schedules. We were unable to make proper production planning, and soon we started to lose our market share among clients”*, says Ernest, managing director and co-founder of BETA Products Company.



Damage caused by poor harvest, which after peeling and removal leaves too little potato to process

With a processing capacity of 2T (2,000 kg) per day, the maximum he could process was 2 bags or 120 kg of raw potatoes per week. This resulted in 20 kg of processing per day. Out of these 120 kg were potatoes that he processed into crisps, 50% (60 kg) or more did not meet the basic quality standards

that he had set for himself. Sourcing from the local market meant that he had no control over the variety of the potatoes, nor over the size and quality. Potatoes were mixed varieties, often rotten, of uneven sizes, with damaged skin, cultivated under poor agricultural practices, and poorly handled.

Because there seemed to be no solution to fix the problem of sourcing high-quality potatoes suitable for crisp processing, Ernest and his wife decided to close the potato processing unit in 2017. While in the stage of doing so, they were introduced to new potato varieties that were imported from the Netherlands by their long-time friend Mr. Mushobozi. He owned a potato breeding laboratory for mini tubers in north Tanzania. Triggered by the availability of new varieties, Ernest decided to still attend a workshop organized by Alliance for Green Revolution in Africa (AGRA) in Dar es Salaam. As possible consortium partner in AGRA's upcoming project 'Partnership for Integrated Potato Value Chain Development in Tanzania' he was welcomed by many potato stakeholders.

One of these was the Managing Director of Stawisha and sitting next to her he explained his frustration with quality potatoes for crisps processing being unavailable. Stawisha's MD looked calm and with a reassuring expression. *"At first I thought that she had problems understanding the frustration potato crisps processors encounter. But contrary to that, she had first-hand experience with the problem I faced – not only from a processor's view but from a general and countrywide potato consumer view"* says Ernest. She later introduced herself to him and explained the ins and outs of the CD-PIT project. They exchanged contact details and promised to work together.

To show that Stawisha understood the problem and is there to support the potato sector at large, Ernest was invited to join Stawisha's regional B2B cluster workshop in Mbeya, which was the result of various business peer network meetings. He met with many likeminded entrepreneurs from all across Tanzania's potato value chain, specifically from the Njombe and Mbeya areas. The meeting included a field visit to Stawisha's experimental and demonstration farm, where he was exposed to the many new Dutch varieties being grown there – including new varieties specifically meant for potato processing. The meeting gave hope and trust in a processing restart of BETA Products. The meeting had shown him how it was now possible to make informed decisions and become part of a professional potato value chain.

"The workshop expanded my thinking about the potato industry in Tanzania, and it renewed my hope in our potato crisp processing business" says Ernest. *"The proposed AGRA 'Partnership for Integrated Potato Value Chain Development in Tanzania' project never took off, no one really knows why not. But it opened up a new and trusted relationship with Stawisha, which I know will bring good business"*. So far, Stawisha supplied BETA Products with 12 new (Dutch) potato varieties for trial in his processing business. Four came out as being highly suitable varieties. In June 2019, BETA started to receive frequent shipments of potatoes from Stawisha, with on average 10T per month. These shipments of new varieties have revived BETA's crisp processing into a growing business. In the period that he was processing using traditional potatoes, wastage accounted to almost 50% of all potatoes used. With the new Dutch varieties that come from Stawisha, wastage has dropped to less than 10%, mostly caused by too small sized potatoes that should not be in the bag as they do not fit processing standards.

The new varieties have been a game changer for BETA's business, with monthly incomes increasing by over 300%. *"We now have over 60% market share in our segment in most of the prestigious supermarkets such as Shoppers, Food Lovers, All-Mart, and Total service stations, in Arusha, Moshi, Dodoma and Dar es Salaam"* said Ernest. BETA hired seven additional permanent staff, from 3 to 10, to manage his growth. With the assurance of having access to sufficient supply of new, high-quality varieties, BETA Products recently invested in re-branding its products, including in improving its packaging. It also increased the number of flavours, from three flavours to nine, providing customers

with a wide range of choice while further expanding its market base. BETA also imported a new packing line from India, known as a nitrogen filling machine, which is due to arrive mid 2020.



New varieties, new packaging, and a new future for BETA products

Finally, Ernest explains a new plan for the near future. *“BETA now works closely with Stawisha and the Arusha Regional Office on a plan to develop a sourcing structure for its processing company from local farmers. The plan is to engage around 120 small-scale farmers in both the Northern and Southern Highlands in contract farming for BETA”*. If all goes as planned, the 120 small-scale potato farmers will be linked to the processing market in 2021.

To explore
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quality of life



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