

# Tackling food loss

Drivers for change



**Food & Business**  
Knowledge Platform







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# Summary

Many initiatives are aiming for the reduction of food loss. Companies, governments or NGOs involved in these projects may find inspiration in similar existing initiatives and experiences elsewhere in the world.

This brochure presents the results of an inventory study on the drivers for change towards reduction of food loss, and how agro-food chains can be optimised (or better organised) to prevent these losses.

Six drivers for change have been drawn from an analysis of fourteen projects worldwide, which are aiming to reduce food loss in agricultural value chains in developing countries.

The drivers and cases are intended to inspire; there is no silver bullet. Each context deserves its own analysis.

The following drivers were identified:

## 1. All chain actors have an incentive to contribute

All stakeholders along a value chain should be motivated and paid for their contributions to good performance in the chain as a whole. That is, to an end product that creates value from a consumer perspective. Incentives merely to pursue their personal profit should be avoided.

## 2. Government creates an enabling environment

The government should establish and enforce an enabling environment for value chain development through policies and regulations. It should set taxes and tariffs that create positive incentives, and is also responsible for infrastructure, which is all-important for value chain development. Government can facilitate start-up conditions beneficial to new value chain projects.

## 3. The private sector is involved

The private sector has a critical role in developing and implementing initiatives to reduce food loss, as it provides a business case for the project.

## 4. A champion is personally involved

Someone who has a personal drive to reduce food loss in the

long term, helps a lot by bringing enthusiasm, breaking down barriers and providing continuity.

## 5. Local context is taken into account

Every project has a unique context. The setting and scope, decision making processes, project partners and stakeholders, along with a project's budget can vary enormously. Understanding a project's context is critical not only to its design, but also its successful implementation. Local partners should be treated as equals, and looking at the project with a western-biased view should be avoided.

## 6. New technology is available

New or modified technology should be made accessible which can drive big changes in agricultural value chains and help considerably in reducing food wastage.

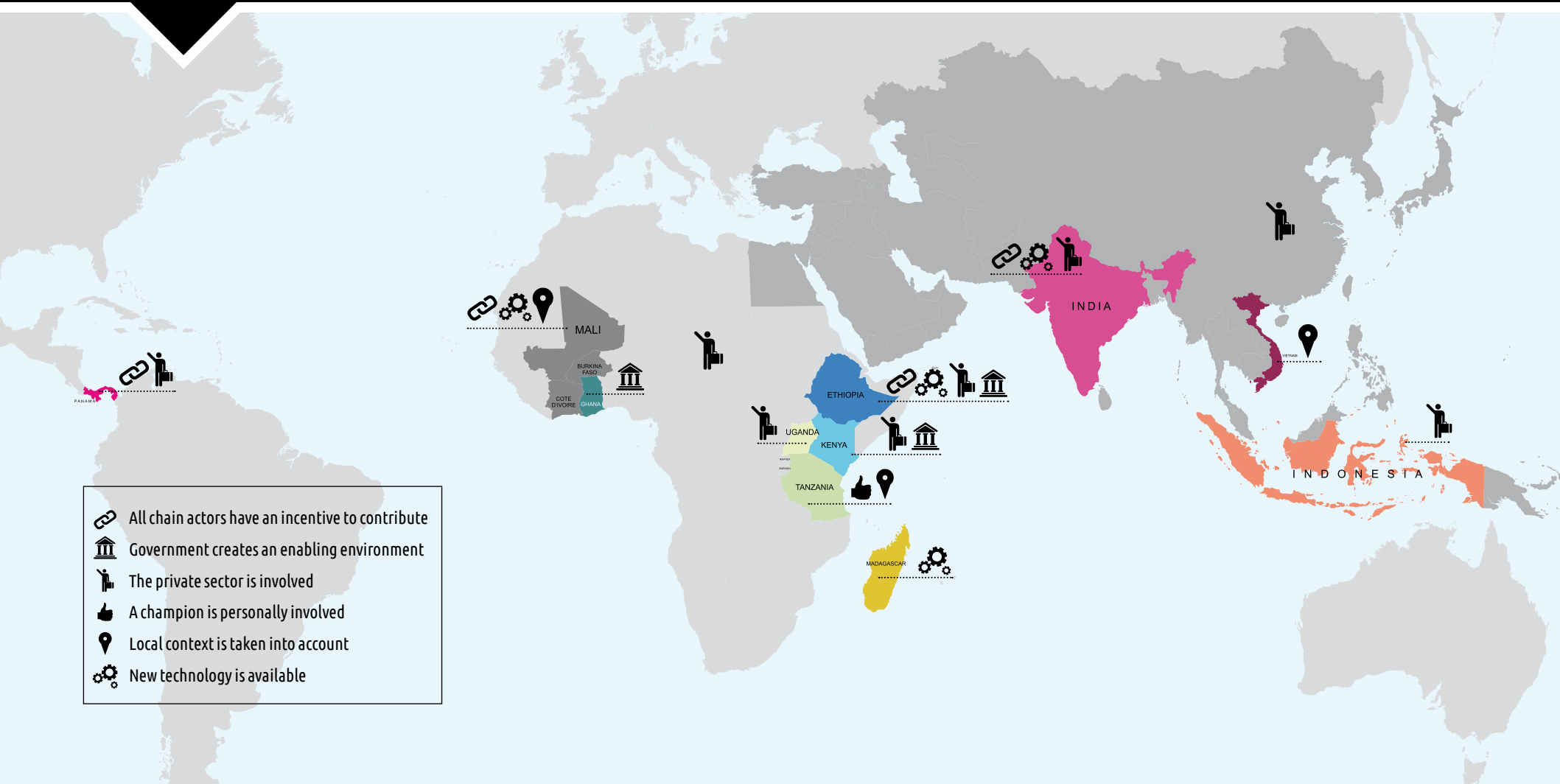


# Cases

- The crop-saving champion, Tanzania
- Fruiteq, West-Africa
- Fish project, Lake Tana, Ethiopia
- GUTS Agro Industries, Ethiopia
- Cadena de Frío - Cold storage facility, Panama

- GRATITUDE, Africa and Asia
- PT Ollopp, Indonesia
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- Flexible cold chains for fresh vegetables, Vietnam
- The impacts of reducing food loss, Ghana

- Cashew nuts for farmers' incomes, Uganda
- The apple value chain, India
- Follow the Food - Dutch agribusiness + local food security in Ethiopia/Ghana/Kenya
- Lychees, Madagascar



	All chain actors have an incentive to contribute
	Government creates an enabling environment
	The private sector is involved
	A champion is personally involved
	Local context is taken into account
	New technology is available

# Introduction

This brochure presents six drivers for change towards reduction of food loss in agricultural value chains in developing countries. These drivers for change are drawn from an analysis of fourteen projects that attempt to reduce food loss in complex food supply systems. The cases have been selected from a wider range, as suggested by stakeholders from the Postharvest Network and the Food & Business Knowledge Platform.

## Lessons learned

The aim is to highlight lessons learned from the cases and to present inspiring examples for representatives of civil society organisations, policy makers, researchers, entrepreneurs and funders of future initiatives. Understanding the drivers for change can help to clearly define the feasibility and goals at the start of the project or initiative.

Reducing (post-harvest) food loss can have multi-faceted impacts on:

- **smallholder farmer livelihoods** (as well as producers or even countries and regions) by increasing income
- **nutrition security** by improving the availability of nutrition crops, and
- **use of resources** by ensuring that resources such as land and water are more efficiently used.

It is expected and often claimed by NGOs, researchers and governments, that efforts to reduce food loss may in most cases benefit net food consumers, as more food should become available at a lower price. It may also benefit net food producers as it allows them to generate higher incomes by selling more produce at a lower cost, or better quality produce in newly defined or additional markets. The empirical foundation for these claims is, however, inadequate, as shown in a previous study, commissioned by the Food & Business Knowledge Platform.

It is good to keep in mind that food loss cannot be solved at a single stroke. Setting up interventions, finding the right partners and building trust in order to form partnerships takes time. Also, interventions, although important, often do not make a significant contribution on their own, but can do so when embedded in a broader and integrated value chain or food system approach with an eye on context-specific circumstances.

## No blueprint

The drivers for change presented here should not therefore be seen as stand-alone, or as a blueprint. Solutions are case-, location- and situation-specific. In most cases, we see that a combination of several drivers is speeding up change, supporting the reduction of food loss and positively impacting the triple bottom line.



*Understanding the drivers for change can help to clearly define the feasibility and goals at the start of the project or initiative.*

## Driver 1

# All chain actors have an incentive to contribute



*A truly market driven value chain means everyone in the chain is fully informed and engaged, and able to meet increased demand, from primary production through to delivery to the consumer.*

All stakeholders along a value chain should be motivated and incentivised to contribute to optimal performance in the chain as a whole and not merely to pursue their personal profit. That is, they should base management decisions on what is required to create value from a consumer's perspective. Their core focus should be on developing the resources, infrastructure, processes and relationships necessary to satisfy or exceed the expectations of consumers. For this, all actors should be rewarded and paid for their contribution to a good end product. Having the correct incentives in place is a crucial factor in determining the success of any value chain initiative.

This also means that actors in a value chain should to some degree cooperate and form a strategic coalition, which requires a shared vision and strategy. It also requires mind-sets suited to formalising a business structure oriented toward maintaining strong relationships and creating value for consumers. For smallholder farmers and middlemen in

developing countries, however, it can be rather difficult to understand and form an overview of the value chain as a whole, nor can they influence it. It therefore takes considerable time to build capacity, and create transparency, mutual understanding, trust, partnerships and understanding of the costs and benefits per stakeholder.

### Effective supply chains

From a consumer perspective, a 'good end product' needs to fulfil individual consumer requirements. Product quality and cost are usually strong consumer requirements that need a value chain approach in which all chain actors contribute to an effective supply chain, especially where fresh produce is concerned. Otherwise, quality will decay and food loss will be relatively high, leading to high value chain costs that, in the end, are paid by the final consumer.

Even though none of the fourteen cases showed quantitative evidence that effective supply chains lead to a reduction in food loss, most interviewees

involved in successful cases mentioned that incentives to contribute lead to effective supply chains that face relatively low food loss.

Each party is most likely to positively contribute only when all parties gain from a new situation. If a farmer has to invest, the new situation also brings uncertainty about his future income. Guaranteeing a base income and being transparent about all costs and revenues in the value chain will help the farmer and other stakeholders to establish the necessary steps.

A truly market driven value chain means everyone in the chain is fully informed and engaged, and able to meet increased demand, from primary production through to delivery to the consumer. To drive this ambition, many parts of the sector may need help to overcome several of the market driven supply chain issues they face. For example: the export of mangoes (Fruiteq case) necessitated quality requirements and needed market volume to be known by farmers so that

all farmer efforts were related to the production of the appropriate volume of the correct quality. The Fruiteq case used two important tools to establish incentives for the contributions of all value chain actors. The first was a thorough analysis of the actors in the value chain and the way in which contracts between them are shaped. This led to insight into existing incentives that are not in line with mutual value chain related goals. The second tool was creating transparency about costs, quality, and risks among all actors, including middlemen in the value chain, to pave the way to mutually beneficial long-term partnerships, using contracts based on value chain supporting incentives.

### Poor results

Taking into account the long-lasting efforts of the Urker community for the fisheries at *Lake Tana*, the results are poor. The absence of this essential driver is a principal argument for this. Because the local people and fishermen do not feel that they are the owners or stake-

holders, the investments in knowledge and money have not been sustainable. The implementation project of *Cadena de Frío* also shows an obvious absence of this driver for change. No change has been realised because the cold storage facility is only being utilized up to 20% of its potential by the final stakeholders. No incentives exist among the intended users of the cold storage facility to actually store their products.

The apple value chain provides an example of the importance of this driver. Successful joint apple agro-processing enterprises have been set up in northern India. Again, an important tool was creating transparency among all actors. Besides the central businesses of these enterprises, previously unmarketable and non-premium apples are processed and sold to their maximum value. This would not have been possible without incentives for all value chain actors to contribute.

Food for thought: The incentives for value chain actors can have many

## Fish project Lake Tana

### ● Ethiopia

This case is an example of lack of involvement of all chain actors, which caused the limited results of the project.

The Interkerkelijke Stichting Ethiopië Eritrea (ISEE), a small scale NGO from the Dutch fishery-town of Urk, has, since 1973, been providing long-term help to people around Lake Tana, Ethiopia, through supporting livelihoods by direct funding and knowledge transfer. People of the Urker community are involved in local projects, for example relating to fishing in the lakes, using their own skills. Among other things, a cold fish value chain around Lake Tana in Ethiopia has been established.

Boats have been built and fisheries cooperatives, including buildings and landing sites, have been started. The processing and marketing of fish in Addis Ababa has also been encouraged, to give the fishing families a better basis for their livelihoods. Sustainable fishing with reduced overfishing, higher fish quality and fewer losses in the chain have also been important. Through better control of the cold chain from the fishing boats up to the markets in the city, the waste of fish has been minimised thanks to better cooling. The incomes of the fishermen have also increased.

different forms. It is not just the fact that the income of the farmer is guaranteed, or that the forthcoming production volume will be entirely purchased by an exporter or retail company. It is also about fostering mutual trust, creating transparency, and offering new and

different roles for middlemen. More importantly, the cases that have been analysed show that middlemen do not in all cases play a negative or price raising role.

## Cadena de Frío, cold storage facility

### ● Panama

Initiated by the Government of Panama, this project aimed to reduce food loss in Panama City by building a cold storage facility. The facility is considered a pilot project, the first of its kind and very unique for Central America. Only approximately 20% of its capacity is being utilized at the moment, because there is not enough demand for cold storage among the local private sector. Due to the fact that the capacity is not fully utilized, there have been no significant effects related to the reduction of food loss. It is thought that a Market Hall to be built nearby might increase the use of the cold storage facility. Others believe that this will not have a significant effect, as effective infrastructure to and from the facility is lacking. A detailed study is needed, to investigate the causes of the low utilization and shed light on opportunities for improvement.

[www.cadenadefrio.com.pa](http://www.cadenadefrio.com.pa)

## Nurture/Coca-Cola

### ● Kenya

Coca-Cola sought to expand its Minute Maid Mango brand in Sub-Saharan Africa, through improving the practices of smallholder farmers and at the same time doubling smallholder incomes. The company, its local bottler Coca-Cola Sabco, and the Bill & Melinda Gates Foundation, invested \$11.5m in the project Nurture (2010-2014) for capacity development of suppliers in many ways. Experts in agronomy and extensionists helped farmers with grafting and pest control techniques. TechnoServe was responsible for farmer capacity building and had reached 54,000 farmers by the end of the project. Processors of the fruit were helped as well. This resulted in opening up new markets for locally produced juices, as well as fresh domestic and fresh export markets.

Before Coca-Cola's intervention, 60% of mangoes harvested in Kenya were not consumed. The reduction of post-harvest loss primarily occurred on-farm due to increased off-take from traders driven by improved harvesting and transport techniques, and increased demand downstream from processors, wholesalers and exporters. The production approximately doubled while the post-harvest loss percentage halved. So the actual tonnage of post-harvest loss remained unchanged, leaving a significant opportunity to further reduce the post-harvest loss within in the mango value chain.

<http://www.technoserve.org>







## Driver 2

# Government creates an enabling environment

The government should establish an enabling environment for value chain development through policies, regulations and supporting institutions. Part of this is setting tax rates, tariffs and standards, and regulating the flow of goods across borders in a way that gives incentives to reduce food loss.

Governments are often largely responsible for infrastructure, including transport, water and energy. Governments should also facilitate good start-up conditions for new value chain projects in developing countries. Information should be made available, regulations put in place and training made accessible.

Governments should also control and sanction those who are not living up to the rules and regulations. Coherent and consistent government policy is of crucial importance to making sustainable changes to the farming system in developing countries. Political stability is important as well, as it fosters a healthy investment climate for foreign investors enabling economic growth.

## The impacts of reducing food loss

### ● Ghana

Wageningen Economic Research undertook a study on the impacts of reducing food loss in Ghana. The study investigated the impacts of reducing food loss in five commodity categories (paddy rice, maize, fruit and vegetables, oilseeds and fish) at the production, processing and distribution stages in the supply chain. While producers in all sectors obtained lower product prices, revenues for paddy rice increased due to substantial increase in output.

Research such as this does not have a direct impact on food loss. It does, however, provide insight into the drivers for change towards reduction in food loss. The study provided a medium and long-term macro-economic impact model for Ghana in the case of a 50% reduction in food loss by 2025. This was based on a scenario study using the global economic simulation model MAGNET.

The model demonstrated that when Ghana reduces food loss in future, the impacts for producers vary across sectors at all stages of supply chains for paddy rice, fruit, vegetables and nuts, maize, fish and oilseeds. Consumers gain from food price reduction, but if they are wage labourers, they might lose income. A more efficient food production system in Ghana will also result in an additional 0.8% increase in its Gross Domestic Product in 2025, a welfare increase equivalent of USD 19 per capita, and a slightly higher (29 Kcal per capita) calorie intake. Reducing food loss can, however, be negative for farmers. The study shows that reducing food loss can lower the incomes of the farmers, depending on the market price elasticity.

The Dutch Ministry of Economic Affairs commissioned the study to investigate the medium- to long-term macroeconomic impacts of tackling food loss, with Ghana serving as an informative case.

[The impact of reducing food loss in Ghana - For the economy, producers and consumers](#)

In the case of the fish project near Lake Tana, Ethiopia, the government is not yet much involved in enforcement of regulations. Overfishing is an important issue. Without government regulation, it is doubted whether the private sector is willing to reduce the catch of small (immature) fish with illegal gear (small mesh size nets). Although the Dutch project partners have been providing the fishermen with proper gear, it is not used by local parties who replace the nets with others with very small mesh that catch more as soon as the project team has left. This does not take the long-term sustainable development of the total fish population into account.

### Active governments

The governments of Kenya and Uganda have been engaged in project Nurture, where Coca-Cola works with mango growers through production of new passion fruit varieties, training of extension officers and strategic input via the project's steering committee. Yet project partners believe that a deeper relationship between the

partnership and the government would have been advantageous. This could have included involvement in the project design and early implementation stages, to enable the partners to understand national priorities for the fruit sector, to identify how the partnership could help in achieving those priorities, and to determine what role the government could take in the process.

The government of Ghana has made the reduction of post-harvest losses one of their priorities and wishes to develop a national investment plan towards this goal, as indicated in the Malabo Declaration (African Union, 2014). This is an example of a government that is very active in this field.

Research can contribute to improvement in policy making for investments in natural resources, as is shown in the *Follow the Food* case, where researchers study the impact of foreign investments on land governance.

### Private standards

The results of the lychee project in Madagascar contradict the idea that

## Follow the Food - Dutch agribusiness and local food security

### ●●● Ethiopia, Ghana and Kenya

The overall objective of this newly started research project at Utrecht University, funded by the NWO-WOTRO Global Challenges Programme, is to assess the effects of private Dutch agribusiness investments in African agriculture on local food security. The aim is to enhance food security in Ghana, Ethiopia and Kenya through targeted advice for Dutch agribusiness investors, policy makers and other stakeholders, on the possible impact of global agribusiness investments on local food security, and the risks and opportunities involved. The research is part of the larger research agenda of professor Annelies Zoomers' Social Geography and Planning group, on land governance.

Investments in land or water can have negative consequences when external agribusiness displaces local smallholders without providing alternative income sources. The research will generate knowledge on the global-local nexus of different foreign-induced business models, their level of inclusiveness and how and to what extent they can contribute to local food security. This will be done by comparing a variety of Dutch investment cases in Ethiopia, Kenya and Ghana.

[www.knowledge4food.net](http://www.knowledge4food.net)

although the certification process is difficult and costly, it is an opportunity for smallholders. This project showed that private standards have only a limited effect on producers when they are instrumentalised by value chains with the sole aim of improving their competitiveness. This shows that government should have a role here as well.





*Governments should control and sanction those who are not living up to the rules and regulations.*



## Driver 3

# Private sector involvement



*The private sector has a critical role to play in addressing development related challenges and reducing food loss.*

In recent times, the role of the private sector has received an increasingly prominent place in government development policy, both at the Dutch and the EU level. The analysed cases provide a number of examples of the importance of the private sector, giving strong anecdotal evidence that it does indeed have a critical role to play in addressing development related challenges and reducing food loss.

One example of involvement by the Dutch private sector in a developing country is the apple value chain project. A Dutch partner has successfully modified and sold their technology to new Himalaya Indian companies, leading to a win-win for all partners in which all stakeholders benefit financially from reducing food loss.

The private company *PT Ollop* is the driving force behind the organic nutmeg project in Indonesia. The importance of the private sector lies in the fact that the company must remain financially viable, which depends on a sound business plan

and on production of top quality spices that meet the requirements of the international market. Versteegen Spices & Sauces pays a slightly higher price than the market rate, and in exchange, investments are made which improve working conditions and increase quality. Versteegen employees regularly travel to Ambon to discuss progress, provide support and share knowledge.

The project team of the EU-funded project *GRATITUDE* relied heavily on local private sector partners for the development of business plans and the implementation of project activities. The project leader, Prof. Keith Tomlins from the Natural Research Institute at the University of Greenwich, stressed the important role that the private sector plays in projects of this nature,

### PT Ollop-Organic nutmeg

#### ● Indonesia

This case is an example of the important role private sector can play. PT Ollop is a Dutch-Indonesian family firm established in 2006 with around 90 employees in the coastal village of Hila on the island of Ambon, Indonesia. It is a major exporter of nutmeg, mace and cloves to, for example, the Dutch company Versteegen Spices & Sauces. It is a participant in the Living Lab Logistics Indonesia-NL, and as part of that, is seeking opportunities for improving the nutmeg supply chain from Indonesia to the Netherlands. The overall goal is to help Ambon farmers to improve yields – through agricultural training – to provide top quality spices on the international market and to improve the quality of the supply chain as a whole, among other things, in order to reduce food loss.

PT Ollop is in the process of getting nutmeg cropping and production organically certified. It is also improving the supply chain and logistics by reducing the logistics cycle time, resulting in a 20% reduction in handling time, including quality controls, in the port.

[Living Lab Logistics Indonesia-Netherlands](#)

particularly in terms of their knowledge of local government requirements and assessing the financial viability of a business case.

In the *Ugandan cashew nut case*, the contribution from the local private sector was an important factor in ensuring that a value chain approach was adopted with a focus not only on increasing the supply of cashew nuts, but also on ensuring that the supply matches the demand from international markets.

The Cadena de Frío case is an example of what can happen when the private sector is not involved in a development project. While the objective of the project was the construction of a cold storage facility for farmers supplying Panama City, it has become apparent that only the government had the incentive to participate in the project.

## GRATITUDE

### ●● Africa and Asia

GRATITUDE (Gains from Losses of Root and Tuber Crops) was a large-scale EU-funded (FP7) project led by the Natural Resources Institute (NRI), University of Greenwich UK, in collaboration with 15 organisations from Ghana, the Netherlands, Nigeria, Portugal, Thailand, the UK and Vietnam that ran from 2012 until the end of 2014. It aimed to improve the post-harvest management of cassava and yams by addressing physical losses, investing in value-added processing and improving the utilization of wastes (peels, liquid waste, spent brewery waste) for the manufacture of consumer products. Food loss after harvesting and during processing can be as high as 60% (yam) and 30% (cassava). This is not only detrimental to food security and the environment, but also means that value-adding opportunities are lost.

The project included a value chain assessment that compared waste handling in cassava value chains in Africa and Asia. It was found that economic losses in the cassava value chain tend to be underestimated. GRATITUDE estimated these to be USD 20 million in Vietnam and USD 500 million in Ghana. The project assisted in the development of innovative uses for High Quality Cassava Flour and business plans were developed.

[www.fp7-gratitude.eu](http://www.fp7-gratitude.eu)

## GUTS Agro Industries

### ● Ethiopia

GUTS Agro Industry PLC is an Ethiopian nutritious food processing company founded in 2005 by two Ethiopian entrepreneurs. Their vision is to be the leading nutrition food processing company in Ethiopia, competing with the multinational companies. GUTS offers product lines such as baby cereals and snacks for the Ethiopian market, based on Ethiopian crops such as maize, chick peas or soya beans. The company takes into account the whole chain and organises farmers' cooperatives as well. The 2Scale programme and organisations such as BoPInc and ACDIVOCA provide help in investments and expertise, for example on technology and organisation. Because the whole value chain from farm to consumer product is being developed in relation to local needs and opportunities, there is potential that losses in the chain will be minimised.

The company has manufacturing facilities in industrial zones in Bishoftu town and Hawassa city. The company currently has 92 permanent employees and 30 employees on a contract basis. The profit and knowledge remains in Ethiopia and by giving special attention to the food chain in Ethiopia, fewer losses are made in production, processing and marketing.

[www.gutsagroindustry.com](http://www.gutsagroindustry.com)

## Cashew nuts for farmers' incomes

### ● Uganda

The 'Introduction of cashew nuts for income security for poor farmers in Northern Uganda' project is a three year project funded by the Food & Business Applied Research Fund that started in February 2014. The goal of the project is to integrate the cashew nut tree as a perennial cash crop in Northern and Eastern Uganda with a view to contributing to food, nutrition and farmer income security.

The project set out to achieve these objectives through participatory research with farmers, a value chain analysis to help identify market opportunities, and through knowledge generation and dissemination. By the end of 2015, the project had established six nurseries, 22 demonstration centres and two multiplication and learning centres. In total, the project has produced 112,162 seedlings planted by 2,781 farmers. Reduction of food loss is not a direct goal of the project. It is, however, expected that setting up an effective Cashew Supply Chain will lead to minimisation of food loss.

[www.knowledge4food.net](http://www.knowledge4food.net)





## Driver 4

# A champion is personally involved

A champion is a person who voluntarily takes an extraordinary interest in the adoption, implementation and success of a cause, policy, programme, project or product. He or she will typically try to force the idea through entrenched internal resistance to change and will evangelise it throughout the organisation or system. Champions will put long-lasting energy into a project. Because these champions give their trust to others, investments and networks will be more easily created. The personal belief in the final goal makes the champion's resilience and perseverance stronger and others become involved in the developments as well, creating a long lasting result.

Dr. Bertha Mjawa is called the '*crop-saving champion of Tanzania*'. She is a small woman, but has a commanding presence. In 1994 she visited a coconut programme in the Philippines. The visit inspired Dr. Mjawa to dedicate her career to solving Tanzania's post-harvest food loss problem. She returned home with a sense of mission. She started her own business,

processing commodity crops and training entrepreneurs in food-processing skills. She managed to convince the government to create an office dedicated to post-harvest crop losses in 2002. Her office first started training agricultural extension agents on post-harvest practices and then handed the supervision responsibility for the extension network over to local governments.

Lesson learned: change doesn't happen overnight. Developed countries still keep on believing that bringing in the experience, technology and money will do the job. These are important, but cannot operate by themselves. In most cases it works much better if a champion is involved. Such a figurehead can open doors at all levels and is acknowledged and recognised by their own community. They also have a much stronger involvement due to the fact that they are present around the clock. The long-term involvement of the champion means that time after time, hurdles are cleared, new budgets found and the project can continue.

## The crop-saving champion

### ● Tanzania

Dr. Bertha John Mjawa is known in Tanzania as the crop-saving champion. In 1994, she was working as an agricultural field officer for the Tanzanian Ministry of Agriculture. She started her own business, processing commodity crops and training entrepreneurs in food-processing skills. Nowadays, she is an agricultural extension specialist, working with the government on a major value addition and market improvement project called Market Infrastructure, Value Addition and Rural Finance. Mjawa's goal is to reduce post-harvest food loss throughout Tanzania by creating awareness and training programmes. She has brought her own resources and training to the people who are now doing the work. Mjawa's work has been professionally supported by the Postharvest Education Foundation (Oregon, USA), which has enabled support by USAID-funded projects.

As a result, the pilot Postharvest Training and Services Centre was launched in October 2012, training young horticultural professionals from seven countries (Benin, Ethiopia, Ghana, Kenya, Rwanda, Tanzania, and Uganda) as 'post-harvest specialists'. Simultaneously, during 2012–2015, three years of mentoring were provided by the Postharvest Education Foundation for more than a dozen Tanzanian extension workers and post-harvest trainers who are currently working within the local communities in and around Arusha to improve post-harvest handling practices and reduce losses in horticultural crops.

[The crop-saving champion of Tanzania: Bertha Mjawa](#)

## Driver 5

# Local context is taken into account



*Understanding the context is critical not only to its design, but also its successful implementation.*

Every project has a unique context. The setting and scope, decision processes, project partners and stakeholders can vary enormously, along with a project's budget. Understanding the context is critical not only to its design, but also its successful implementation. In the analysed cases, knowledge of the local context was identified as a key driver for change, both in terms of identifying the core problem and the most feasible solution. Ensuring that the local context is considered during the inception phase of the project will also help to ensure that it is run as efficiently and effectively as possible.

Dr. Bertha Mjawa and her Tanzanian Ministry of Agriculture and Food Security post-harvest team understood how important the local context was. They translated a manual on post-harvest handling into Swahili and made it available online for free. Delegating resources to local control appeared to be crucial for matching services appropriately with local needs, since approaches that work in north-eastern

## Flexible cold chains for fresh vegetables

### ● Vietnam

Understanding local context formed the basis for the case in Vietnam. The company Fresh Studio, started by Dutch entrepreneurs, worked with the Fruit Republic, BoPInc and local partners to develop a low cost and innovative cold storage solution for smallholders, together with a cold chain and distribution system for fresh vegetables from Moc Chau, in the highlands of northern Vietnam to the high value urban markets of Hanoi. The pilot project was part of the 'Three Pilots for Pro-Poor innovation' (3P4PPI) programme that ran from 2011-2013, supported through co-funding from the Directorate-General for International Cooperation (DGIS) of the Dutch Ministry of Foreign Affairs.

The pilot was linked to an existing project that Fresh Studio was implementing with supermarket Metro Cash & Carry and the Royal Netherlands Embassy in Hanoi. As part of that larger project, six farmers' groups were developed, representing a total of 113 farmers across 3 sourcing areas.

[www.freshstudio.vn](http://www.freshstudio.vn)

Tanzania may not do so in the south-west. The *Fruiteq* case highlighted the importance of conducting thorough analyses of the actors in the value chain and the way in which contracts between them are shaped, and of local technical requirements such as packing facilities and refrigeration logistics equipment. Collecting as much information as possible on such topics helps to avoid applying a strictly 'Western way of working', which is something that many

'knowledge transfer projects' need to take into account.

Right at the start of the apple value chain project, a decision was made concerning the technology to be deployed, which needed to be designed with local context taken into account. The project was implemented by creating Indian enterprises with Indian staff that set up Indian requirements for the necessary technology.

## Fruiteq

### ● West-Africa

Fruiteq is a project aiming to open up export markets for smallholder farmers in West Africa. The focus is on mangoes from smallholder farmers with mixed farming systems in the West African countries of Burkina Faso, Mali and Côte d'Ivoire. The partners are smallholder farmers, harvesting traders, exporters, AgroFair, ICCO, and SNV. A triangular organisation model was set up including farmers, harvesting traders and exporters. The project resulted in a fully operational supply chain, including an export company with its own packing house, and efficient, refrigerated logistics services. Even though the system collapsed after some years due to an unstable political situation, the project can be considered successful. Although reducing food loss was not the explicit goal of this project, food loss was reduced significantly due to an effectively implemented supply chain.

[www.fruiteq.com](http://www.fruiteq.com)

[www.agriculturesnetwork.org](http://www.agriculturesnetwork.org)

In the *flexible cold chains for fresh vegetables project in Vietnam*, BoPInc, in partnership with Fresh Studio and the Food Republic, attempted to develop a low-cost and innovative cold chain and distribution system for fresh vegetables. Understanding the local context in which the project operates was very important. For example, the initial solution that was offered, cold storage, proved to be a solution for a problem that had been externally defined. As Sigrid Wertheim-

Heck from Fresh Studio said: 'Prolonged shelf life was a rather new concept in Vietnam, particularly for producers at the Base of the Pyramid who are used to the practice of harvesting, selling and consuming vegetables on the same day. Shelf life is generally perceived as the negative opposite of freshness'. This meant that there was a much lower interest in and demand for a cold chain that extended the shelf-life of vegetables than first thought.





## Driver 6

# New technology is available



*Mobile phone technologies present smallholder farmers with unprecedented opportunities to run their operations more productively and to increase their income levels.*

The availability and accessibility of technology proved to be a driver in some cases as well.

In the case of *apples in the Himalayas*, Dutch technology that enables apples to be stored for up to one year without significant quality reduction has been effectively deployed. This has led to significant improvements in the incomes of smallholder farmers, and impressive food loss reduction. This case demonstrates an important economic improvement in the lives of many smallholder farmers, initiated by the availability of new technology.

In the fish project at Lake Tana in Ethiopia, newly introduced technology played an important role: fishing nets with larger mesh and cold storage on board the boat. The technology was developed by Dutch fishermen and the related knowledge was transferred to fishermen around Lake Tana.

It can also be concluded that new technology was a driving force for change

## Lychees

### ● Madagascar

In this case, new technology brought in by export companies played an important role. Madagascar provides roughly 80% of European lychee imports. Alongside vanilla, cloves and pepper, lychees are one of the country's few valuable exports, and the sector provides a vital income to around 30,000 families. A food safety issue threatens the sector, however. Sulphur dusting is essential to preserve lychees during shipment to Europe. There are, however, regulations governing sulphur dioxide levels in foods. During 2010-2011, sulphur residues were detected in Madagascan lychees destined for the European Union which were not in accordance with EU standards. Due to the sulphur residues on the product, it could not be exported. As there is little local demand for the product, the harvest was lost. This prompted stakeholders in the supply chain to take steps to guarantee that their products conformed fully to regulations. Sulphur treatment plants had to make substantial investments in order to conform with the GlobalGap standard in this respect, with the cost being borne by exporters, donors and certain commercial partners.

The private GlobalGap standard was introduced in the Madagascan lychee supply chain in the mid-2000s. After an enthusiastic reception to begin with, it fell out of favour, and by 2009, only a hundred or so producers were still certified. A survey by a team from CIRAD and INRA has shown that while certification has a positive impact on the producers who are certified, it has a very limited effect on the supply chain as a whole. In short, it only affects a small, very specific group of producers who make up only a small minority of the total.

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in the Fruiteq case, in relation to the transport of mangoes. In the past, the transport of mangoes from South America, Africa and Asia to Europe was only possible by air. Sea transport was

impossible due to long transit times. Nowadays, sea transport is possible due to specific, controlled atmosphere transport systems that enable cost efficient sea transport over approxima-

tely three weeks, thereby leading to an important modal shift from air to sea and creating a larger market in Europe.

In the case of *lychees from Madagascar*, French exporting companies have spent the past few years modernising packing and treatment facilities. This contributed to reshaping and restructuring the industry.

### Modified technology

It is noteworthy that all successful examples of new technology as a driver for change relate to existing technology which has been implemented elsewhere. New technology was first piloted in developed countries; no examples were found of new technologies that were deployed in developing countries directly after the innovation was realized. It is, however, known that modified technology is being implemented in developing countries. In most cases, these adaptations mean that the technology is adjusted to the local circumstances, which do not always demand high-end sophisticated solutions and measures

with a three-digit accuracy. This might be important for future projects that intend to implement a 'brand new' innovation in a developing country.

### Skip intermediate stages

Furthermore, in some cases developing countries are able to skip a few intermediate stages of innovation. For example, mobile phone technologies present smallholder farmers with unprecedented opportunities to run their operations more productively and to increase their income levels. This technology can facilitate farmers' access to inputs with merchants, provide information on input prices, promote market transparency, and link farmers to various financial services, without the need of a traditional physical banking system. More and more farmers have access to market data via their mobile phones. They are therefore able to postpone the harvest (if the produce allows them to do so) or decide to store (in case of e.g. potato), more produce as seed potato for the upcoming season.

## The apple value chain

### ● India

The Dutch company Fresh Food Technology has redesigned the apple supply chain in the Indian Himalaya region. Joint agro-processing enterprises have been set up in partnership with investors and farmer groups. Apples are being collected in multiple larger collection centres, stored in effective cold storage facilities and traded off-season. Apple juice processing equipment and its value chain have been implemented as well, enabling the effective use of previously unmarketable or non-premium apples. This project has led to significant reduction of food loss and improved the livelihoods of many smallholder farmers.

Expansion of the same model is being carried out by local partners purchasing Dutch technology. This project is thus one of few successful initiatives in which smallholder farmers located in developing countries are buying Dutch technology leading to structural win-win business in which all stakeholders benefit financially from reducing food loss. The International Fund for Agricultural Development (IFAD) has integrated this into their State programme and the World Bank is looking for opportunities to embed the expansion in current programmes.

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*Look before you leap.  
Significant lessons can be  
learned from past experience.*





# Conclusion

Six important drivers for change have been identified by the project team and the stakeholders of the cases. As the scope of this project is limited to fourteen project cases, it cannot be concluded that this list is all-embracing. It does, however, present valuable information to those who are involved in change processes worldwide. Organisations that focus on the reduction of food loss and the sustainability of value chains can especially benefit from the insights gained during this project.

Many individuals, companies, NGOs and governments are – or intend to be – involved in social projects. Usually, the individuals involved are very driven. However, the assumption that interventions to reduce pre- and post-harvest losses automatically contribute to food security, in particular for poor consumers, has not necessarily been found evident. It is recommended to pay explicit attention, on a case-by-case basis, to context-specific food loss interventions and their impact on local food security. It also turned out to be relevant

to take the project duration into account. In some cases, the project team found that the time to embed the project in a daily business situation was too short.

## Quantitative data

The project team has made a lot of effort to obtain information about the effects of the cases on relatively poor consumers and producers, and their effects on the social, ecological and economic aspects of their wellbeing. Relatively few interviewees were able to quantify the realised effects on profit (economically sustainable projects), planet (reduction of losses, efficient use of natural resources) and people (income, food availability, accessibility).

Also, available evaluations often did not reveal quantitative data regarding project effects on poor consumers and producers. This aspect deserves more attention. It might be challenging and confronting to do so, but this might improve the success rate of future projects as it enables practitioners to learn from experience.

Another observation during the project was whether value chain optimization has a direct link to food loss reduction. Most cases that appeared successful on e.g. improving trade or adding value to a product also resulted in significant food loss reduction. Even though relatively rare situations do exist in which value chain optimisation does not result in reduction of food loss, the question is whether new projects should be inspired by the six drivers for change to focus on food loss or value chain optimization.

## Insight

Sufficient attention to an effective start of the project was lacking in some of the analysed cases. Most unsuccessful cases analysed during this project showed that insight into a lack of a driver for change at an early project stage might have contributed to positive project results. During a project, but especially at the beginning, it is advisable to look before you leap. Significant lessons can be learned from past experience.

# Approach and disclaimer

# Definitions



*The fourteen cases were analysed using a framework to identify the 'drivers for change'.*

The selection of fourteen cases was a joint exercise between the Food & Business Knowledge Platform (F&BKP), Postharvest Network (PhN) and Wageningen Food & Biobased Research (WFBR).

The selection was based on four criteria. Firstly, the selected cases needed to include projects in a variety of regions. Secondly, all of the selected cases needed to be initialised by multiple business parties, research institutes, government actors, social entrepreneurs or others. Thirdly, preference was given to those cases with a value chain approach, compared to those focused on a specific part of a value chain. Finally, cases were selected on their possible impact on food loss, even though addressing food loss may not have been their explicit goal.

## Intended and realized effects

The fourteen cases were analysed using a framework to identify the 'drivers for change'. As part of this framework, consideration was given to the intended

and realized effects, barriers and roadblocks associated with the cases, and the sustainability of implementation, identified drivers for change and the related opportunities for roll-out in other areas. The framework was used to structure the information, which was gathered from literature research and expert interviews with various stakeholders, including experts involved in most of the cases. This study was not scientifically grounded and it was adjusted in cooperation with the stakeholders of all fourteen cases during the project. The findings of the case reviews were evaluated in two sessions with the Food & Business Knowledge Platform and the Postharvest Network.

**Drivers for change:** Factors, forces or events which drive changes according to strategic choices, investments, R&D activities or foresight knowledge and strategies. Drivers are both currently accessible and future relevant.

**Food loss:** A decrease in mass (quantity) or nutrition value (quality) of food that was originally intended for human consumption. Food loss is mainly caused by inefficiencies in food supply chains, such as poor infrastructure and logistics, lack of technology, insufficient skills, knowledge and management capacity of supply chain actors, and lack of access to markets. In addition, natural disasters play a role.

**Post-harvest food loss:** Measurable qualitative and quantitative food loss along the supply chain, starting at the time of harvest until its consumption or other end uses.

**Food loss:** Any food lost by deterioration.

# Colophon

**Triple bottom line:** Aims to measure the financial, social and environmental performance of the organisation over a period of time and thus consists of three Ps: people, planet, profit, or, social (including food security), ecological and economic aspects.

**Value chain:** A mechanism that allows producers, processors, buyers, and sellers – separated by time and space – to gradually add value to products and services, as they pass from one link in the chain to the next until reaching the final consumer. The main actors in a value chain are suppliers, producers, processors, marketers and buyers. They are supported by a range of private and public technical, business and financial service providers. In a value chain, the various business activities in the different segments become connected and to some degree coordinated.

This brochure is based on an inventory study done by the Postharvest Network:  
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## Food & Business Knowledge Platform

The Food & Business Knowledge Platform is the gateway to knowledge for food and nutrition security. Connecting business, science, civil society

and policy, the Platform invites networks and organisations from local, regional and global levels to participate in its activities. The Food & Business Knowledge Platform is one of the five Knowledge Platforms initiated by the Dutch Ministry of Foreign Affairs. The Food & Business Knowledge Platform can assist you in exploring (national and international) research funds.

[www.knowledge4food.net](http://www.knowledge4food.net)

## Postharvest Network

The Postharvest Network links businesses, cooperatives and governments to Dutch expertise, knowledge and products so as to minimize food loss in the post-harvest supply chain. In some chains, around 50% of the harvest is lost before the product even reaches the consumer. Enterprises, knowledge institutes and NGOs of Dutch origin are working in food supply chains all over the world. With global experience, the Network know how to implement proven solutions to reduce post-harvest losses.

[www.postharvestnetwork.com](http://www.postharvestnetwork.com)





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