Modernising Agriculture:

Timor-Leste's Most Important Economic Sector

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Contents

Short Report

Here will be a 8-10 page shorter version in Tetun

Summary

For most Timorese adults, working on the land is their main daily activity and source of their family's livelihood (Census, 2015). This report explores some important questions about the future of agriculture in Timor-Leste.

Part A of the report explores whether **agriculture is a "lost cause".** We argue strongly that agriculture remains vital: any realistic path to economic development must include investing in agriculture. No other sector can possibly create such extensive employment opportunities for so many. But we must face the reality that progress has been slow, and learn the lessons – perhaps new approaches are needed. This report focuses on what is involved in the early steps towards a modern agricultural sector.

Part A also discusses the implications of COVID-19 for long term development, and emphasises that food security is critical, another reason for agriculture to be a key priority.

Part B focuses on the process of modernising agriculture, and how government can encourage this to happen. There are three key elements: **Inputs** (*farmers need access to quality seeds, and other inputs);* **On the Farm** (*These inputs need to be used efficiently to increase yields);* **The Market** (*Farmers need a market for their production).*

Farmers in Timor-Leste face one basic problem:

> Because of poor quality inputs, lack of tools and other resources, and difficulties accessing markets, Timorese farmers work harder, produce less output and receive a lower reward for their effort than most farmers in Asia. This drives down their incentive to produce more. This is **The Big Squeeze** on Timorese famers.

Interventions are needed that can improve the returns for farmers, to relieve The Big Squeeze.

Farmers and businesses are generally ambitious and keen to succeed, and willing to learn and adopt new practices, provide they can see the benefits and manage the risks. The problem is, The Big Squeeze means that without additional incentives, there are few attractive investment opportunities. For the agricultural industry in Timor to grow and modernise, we argue that Government needs to create **Industry Incentives** that encourage farmers and businesses to invest more time and money in growing their businesses.

The kinds of incentives discussed in the report include farmer vouchers for inputs, subsidised import or production of inputs, improved access to credit, as well as export incentives and guarantees and tax incentives. Once incentives like these are in place, investing becomes more attractive, and farmers and entrepreneurs will take the opportunities presented to them.

Alongside these incentives, that are designed to support all farmers and businesses, modernising agriculture will also need to support the emergence of **large or Nucleus Farms**. These farms provide valuable leadership in accessing inputs, introducing technology, creating employment, and improving market access, that can greatly benefit small farmers. The report proposes an incentive for establishing and growing large farms by addressing the most critical constraint: the secure access to land, alongside improved credit arrangements.

Part C of the report looks at recent data on value of exports and imports to identify crops where there is existing or potential market, either through export markets or through import substitution.

Crops with potential include Coffee and Konjac as the two largest export commodities, and import substitution in rice, chicken and eggs as well as other meat and fish products.

The report investigates some specific crops in more detail, and proposes a range of incentives that would address the most critical constraints holding back investments in these crops. To promote growth in **coffee** production and quality, we suggest a subsidy to nurseries to reduce the cost of seedlings, as well as to the supply of tools that are used for pruning and other stages of coffee production. A floor price on exports of coffee, and an export guarantee, help to reduce risk to exporters and guarantee a more stable price to farmers.

Konjac exports offer great potential, but the critical constraint here is the supply of quality seeds. Forming part of a broader plan for Konjac, the incentive proposed here is a subsidy for seeds to be provided by local nurseries, which will improve production, lower costs to farmers, as well as increase capacity of local nursery businesses.

In terms of import substitution, the report argues for an integrated approach of improved production of **meat and fish**, partially via increased reliance on local production of animal feed through **maize** production. First, giving access to more affordable fertiliser and quality seeds will increase maize productivity. Combined with subsidised imported protein, an affordable local supply of animal feed can emerge, which will lower costs of animal production.

The other main challenge faced by businesses in animal and aquaculture production is with funds for capital investment; we propose a government investment in supporting agribusiness credit. This can be achieved by providing a partial government guarantee on loans to support agribusiness activities such as expanding feed production, new aquaculture infrastructure, and other activities.

The report concludes with discussing institutional challenges affecting the process of modernising agriculture. Progress has been encouraging in some areas: good economic foundations and infrastructure are being developed, there is progress with farm-level innovation in some areas, but there remains a lot of work to develop and implement national strategies for particular commodities. A modern agriculture sector needs large volumes, consistent quality and competitive prices, and this comes from clear national strategies that give confidence and create incentives for farmers and businesses to invest.

Other institutional priorities for modernising agriculture include the provision of financial services (access to credit for farmers and businesses, as well as basic banking services), addressing inefficiencies in the import and export processes (the biggest improvements can come from improved procedures rather than facilities), and addressing ongoing concerns with land title uncertainty.

Introduction

This report is about Agriculture. Most Timorese households live in rural areas. For most Timorese adults, working on the land is their main daily activity and source of their family's livelihood (Census, 2015). But as we all know, it is a tough environment. Families live in simple housing, with often poor access to safe drinking water and toilets. Road access is difficult, schools and health services have limited facilities. On the farm, households are working small plots of land, with limited tools or inputs, and as a result, productivity is low. And even when there is surplus production, gaining access to markets is difficult and time consuming.

This report will explore some important questions about the future of agriculture in Timor-Leste. These are important questions, because they directly affect the livelihoods of the majority of Timor households. In terms of impacts on people, we are talking about the most important sector of the economy.

There are two big questions to ask at the start:

1. Is agriculture a "lost cause", or are other sectors a wiser investment?
2. Can agriculture help Timor rebound from the effects of COVID 19 and help build a long term sustainable economy?

We will explore these two big questions in the next section. In short, the answers are:

1. Agriculture is not a lost cause! It remains a vital sector: any realistic path to economic development must include investing in agriculture. But we must face the reality that progress has been slow, and learn the lessons – perhaps new approaches are needed.

2. COVID-19 has disrupted the world in ways we don't fully understand, but one thing is clear: countries will rely more on their own resources to produce essentials like food. So, agriculture will be more critical to a secure future for Timor-Leste. However, in a difficult global environment, careful planning will be needed, to selectively target import substitution and strategic export opportunities.

Once we resolve these two big questions, the report will tackle the big challenge: How. How does the agriculture sector develop? What needs to be done differently, and who are the key stakeholders? What is the role each should play? Part B of this report explores a way of thinking about agricultural development in Timor-Leste, a framework for analysis. It especially focuses on actions the governments can take to promote agricultural development.

We don't want this to be just another report, where we talk about how important agriculture is, and we conclude that "somebody needs to do something". So, the last part of the report gets specific about the "somebody" and the "something". It identifies specific actions that can be taken within agriculture. We look at areas where there is already some activity, and explore what potential there is, and what it would take to scale up and modernise production in this sector. This section gives a clear idea of the "something" that needs to be done. But of course, we also need to talk about the "somebody": who is going to drive these initiatives and activities, and how? In particular, we look briefly at the role of government and development partners.

In summary:

Part A: the big questions about the role of agriculture, given its difficult past and an uncertain future.

Part B: a framework for understanding how government can support modernising agriculture.

Part C: a deeper look at specific aspects of the sector, what needs to happen and who needs to drive it.

The Timor-Leste Government's roadmap for economic development was set in 2010 by the release of the Strategic Development Plan for 2011-2030 (Government of Timor-Leste, 2010), and then updated in the COVID-19 Economic Recovery Plan (Government of Timor-Leste, 2020). In both of these plans, agriculture features heavily as on of the small number of key sectors for investment and development. This report responds to these priorities and seeks to provide a realistic but ambitious plan for progress. As always, we write these words acknowledging that developing the agricultural sector is complex and there is much uncertainty. We seek to draw in the best of wisdom from international experience and local understanding to set a direction for a new and prosperous future for agriculture and the people of Timor-Leste.

Part A. Why?

Let's look at our two big "why" questions.

A1. How important is Agriculture to economic development?

It is sometimes argued that investing in agriculture should not be a priority for Timor-Leste. It is worth taking this view seriously, as it helps us understand some of the challenges that lie ahead for the sector. Effective progress requires investment, and investment will not happen with enough urgency if the citizens and those in positions of influence are not convinced about the importance of agriculture.

Let's imagine for a moment we wanted to make the case that investing in agriculture ought not to be a priority, and government investment ought to focus on urban areas and the "modern" sectors of services, tourism, manufacturing and natural resources. What are the main arguments that support that position? Here are a few.

1. Most farmers are currently unproductive and cannot make a decent livelihood from their land.

2. Progress towards improving this situation has been very slow over the last 20 years.

3. There are cultural and structural obstacles to progress that are difficult to overcome.

4. A sector comprised of smallholder farmers is almost impossible to modernise: the costs of investing in transformation are far too high compared to the returns.

1. Most farmers are currently unproductive and cannot make a decent livelihood from their land.

- The low level of productivity of farmers is not a limitation, more an opportunity – "quick wins" in terms of productivity and hence incomes are achievable with simple, low cost interventions.

2. Progress towards improving this situation has been very slow over the last 20 years.

- There are clearly examples of "failed programs", where investments have been made, and little improvement in productivity has been achieved. BUT there are plenty of examples of successes. There are encouraging signs of improvements in agricultural practices that improve productivity and hence livelihoods. e.g. Herbicide use has more almost tripled between 2014 (5% based on TLSLS 2014) and 2019 (13%, based on Agricultural Census 2019).
- There is evidence of declines in poverty in rural areas, driven largely by improvements in incomes from agricultural activities of smallholder farmers – rural poverty fell by 7.6 percentage points between 2007 and 2014, for example (World Bank, 2014, provides the most recent national poverty estimates).
- On balance, however, this criticism is not unreasonable. Compared to other countries, the rate of agricultural transformation has been relatively slow in Timor-Leste. For example, Cambodia was able to achieve a 33 percentage points decline in poverty over a seven year period, driven by improvements in farmer incomes (World Bank, 2013), a much larger improvement than Timor-Leste's 7 points.
- However, this slow progress is not a reason to dismiss agriculture as a priority. Instead, it is a reason to reflect on the approaches that have been taken and the obstacles to quicker progress.

3. There are cultural and structural obstacles to progress that are difficult to overcome.

- The World Bank's 2015 World Development Report explores the role of culture, beliefs and attitudes in the process of economic and social development. While acknowledging the importance of these factors, the report reminds us of the power of economic incentives to change behaviour even in the presence of such obstacles. The report also cites many examples of how governments and programs can work with existing cultural norms to produce development. The key is to see cultural attitudes as opportunities rather than obstacles, and to work with these via locally adapted approaches to development.
- The more substantial "cultural obstacles" to agricultural development are the external factors and policies that are pulling working-age people away from rural areas, making improvements in agriculture difficult. Investments in modernising agriculture can slow this trend.

4. A sector comprised of smallholder farmers is almost impossible to modernise: the costs of investing in transformation are far too high compared to the returns.

- Here it is important to place the Timor-Leste situation in a broader global context. 90% of the world's farmers are smallholders (less than 2 hectares). The challenge facing Timor-Leste is very common, and we can learn from countries that have been through similar experiences.
- In most countries, around 30-50% of smallholder farmers have typically made the transition to commercial activities (*move up*), while there is a slow (usually intergenerational) drift of others towards other employment opportunities (*move out*).

> *"Small farmers ... prosper either through a 'move up' or a 'move out' strategy. While some small farmers have the potential to undertake profitable commercial activities in the agricultural sector and expand their farm operation, others should be supported in exiting agriculture and seeking non-farm employment opportunities".*
>
> Fan and Rue (2020, p. 14)

- This global trend offers partial support to the view that not all smallholder farmers are able to modernise, the reasons being many and varied. However, it also highlights the fact that a large proportion can and have made the transition, and are enjoying improved livelihoods, better nutrition for their families, and broader opportunities for their children.

- Turning specifically to Timor-Leste, the large base of smallholder farming households offers the only realistic path for employment creation among Timor's many working-age adults. ***No other sector*** that can possibly create the level of development and employment opportunities to so many households. For example, even optimistic forecasts for Tourism suggest that it will create 15,000 ongoing jobs by 2030 (see Tourism Policy, 2017). An LNG Facility on the South Coast, costing more than $8 billion, will employ less than 500 people on an ongoing basis (ACIL Allen, 2016). In contrast, agriculture currently employs well over 200,000. Imagine the impacts of doubling the incomes even just half of these people.

- Nguyen et al. (2017) studied rural-to-urban migration rates in Timor-Leste. They note that the percentage of the population that is rural is declining but slowly, by 0.6% per year. They project that it will take until 2043 before the proportion of the population who are rural drop below 50%. Timor-Leste is a majority-rural, agricultural society, and will remain that way for several decades.

- The experience of other countries tells us that modernising agriculture is a vital stepping stone to a broader modern economy. We expand more on this point in Part B.

How do we achieve rapid progress in Agricultural development?

Based on international experience, there are a few key points to consider in framing an approach to agricultural development that accelerates progress. We will expand on these point further throughout this report.

- Growth requires sizeable investments. Small budgets and limited allocation of quality human resources into developing agriculture will make it very difficult to create momentum.
- Care is needed to define the role of government in developing agriculture. Governments are usually good at setting policy and allocating funds, but are not necessarily suited to implementing programs.
- There is a place for programs focusing on incremental improvements in primarily subsistence / local production, often with a dual aim of addressing nutritional deficits and improving livelihoods. However, these programs are usually donor funded, are often expensive to implement and often not scalable across large numbers of households.
- A critical focus needs to be on improving productivity – return to the farmer's effort. If a program does not lead to improved productivity, it relies on farmers doing more, working harder, with typically insufficient reward for this extra effort. The importance of productivity is explored in greater detail in the rest of the report.
- Related to this, changing the economic incentives for farmers and agribusinesses is the key to encouraging additional investment and productivity growth.
- In most cases, private sector businesses play a vital role in accelerating growth and building momentum.

The Potential of Agriculture

The Table below presents the summary results of a simple simulation model showing an achievable profile of the agricultural sector in 10 years, following a realistic modernisation agenda.

	Current Situation	**A Realistic Vision 2030**
Productivity	Low	2-3 x current levels
Incomes	$1,000 per household	$2,500 per household
Poverty	47% of rural households	23% of rural households
Real GDP (Agriculture)	$300million	$750million

- Increased productivity will more than double household incomes and agricultural GDP.
- Further multiplier effects on other sectors of the economy will lead to even bigger GDP improvements, and a much-expanded base for Government revenues.
- Rural poverty is predicted to be less than half its current levels.

A2. How will the Post-COVID-19 global situation affect agriculture?

The short to medium term global impacts of COVID-19 are many, but the three most relevant areas are:

1. A general economic slowdown – reduced economic growth on an ongoing basis. Many changes to the world economy will increase costs to business, which in turn slows economic growth. Costs of international movement of people and goods will especially increase.

How will this affect Timor-Leste?

> **Less reliance on Oil and Gas** – international demand for oil is likely to be lower, and prices lower.
>
> **Less reliance on Labour Mobility and Remittances –** Timor-Leste will likely need to look 'inside' the nation for new employment opportunities and experience for the growing numbers of working-age young adults.
>
> **Slower progress in building Tourism –** In the midst of a big contraction in the world tourism market, the next few years will be a difficult time for tourism.

2. A reverse in the momentum for globalisation – "Security of supply" of essentials will be more important than efficiency (cost saving). Imports are likely to be more expensive.

In the past, the risk of relying on imported food was judged to be relatively small – e.g. delays were typically for a few months at most. But now we know that an interruption to the global supply chain could well last much longer.

* Countries are likely to retain a greater reserve / buffer stock of essentials (e.g. Oil reserves and supplies of essential foods like rice).

* Countries will increase their capacity to produce essential goods locally.

* These same factors will mean that exporters will face additional challenges, with higher costs and more demanding buyers.

How does this affect Timor-Leste?

> **Greater focus on food security** – there is a need for increased local production of key crops, allowing more import substitution.
>
> **Export Markets require expertise** - the global market may be tough, but not impossible. Trade will still be active. But the export sector will need to be strategic, focusing on niche products in niche markets, and focusing more on regional markets.

3. Global connectivity and the digital economy – the various "lockdowns" and closed borders have created rapid changes in how people communicate and how businesses function.

Implications For Timor-Leste?

The Digital revolution allows Timor-Leste to modernise the economy and public services at a much lower cost and to deliver better quality outcomes. This is more and more important if Timor-Leste is to engage effectively in the global economy.

To summarise:

The global pandemic creates an urgency in Timor-Leste for a renewed focus on economic diversification and on targeted development of key industries.

The urgency of the situation prompts a look at specific sectors that are currently active and have scope for relatively quick "scaling up". Focus also needs to be on key industries that have clear demand (either from domestic demand and import substitution, or through being part of a growing global market), are labour intensive, and are within the current scope and expertise of the Timorese workforce to deliver.

These parameters clearly point to the imperative to invest heavily in modernising the **agricultural sector**, in a strategic way, focusing on specific export opportunities within niche markets, and on local production for local consumption, with import substitution as a guide to which products have a clear demand.

Part B. A Framework for Modernising Agriculture

B1. How Economic Modernisation Works

Timor-Leste is emerging from a history as a subsistence economy, characterised by:

- the vast majority of the population being involved in subsistence farming and fishing as their main economic activity,
- a small non-subsistence agricultural sector, and a small non-agricultural sector.

Most countries have found themselves with a similar profile somewhere in their economic history. So how do countries typically develop from this starting point? What are the stages of transition? The table on the next page describes the typical process (see de Janvry and Sadoulet, 2009). Note this process is desriptive, not prescriptive: it is desrcibing what typically happens to countries in the process of development. We will use this typical process to reflect on some implications for Timor-Leste.

Stage 1:

Starting with Agriculture

Investment in Agriculture results in improved productivity and surplus production that can be sold.

Markets grow, there is more cash in households, local economies grow, nutrition improves.

Some investment in the non-agricultural economy sees local industries steadily emerging.

Stage 2:

Moving beyond the Agricultural household

Modernising Agriculture

Larger agricultural businesses emerge:

-farms that create employment

-other agricultural businesses such as feed mills and processing plants.

Smallholders continue to improve their productivity, as larger farms bring new technologies, facilitate supply of inputs, help with market access.

Some smallholders will explore non agricultural livelihoods, selling their land to a neighbour or larger farm.

Expanding the Non-Agricultural Sector

Opportunities in the non-agricultural sector emerge. Where from?

Pull: Once people have money, they can spend it. This creates new non-agricultural employment opportunities.

Push: More productive farmers have money to purchase tools and machinery, and need less labour. Some agricultural labour will be "pushed out" in search of non-agricultural work.

Stage 3:

The long term outcome of the transformation process

A Modern Agricultural Economy

Smaller producers are more productive, sell a higher proportion of production, involve fewer people.

Larger producers drive ongoing productivity improvements, and provide employment.

A Growing Non-Agricultural Economy

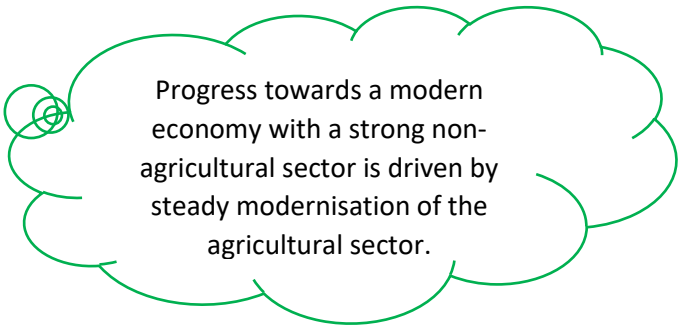
There will be increasing amount of non-farm economic activity in rural areas and smaller towns.

There will be a growing Urban economy and urban population.

Agricultural modernisation drives the process

The pattern described in the model above suggests a steady drift away from agriculture: a growing proportion of labour will be in the non-agricultural economy, and a higher proportion of the population in urban areas.

BUT: improvements in agricultural productivity are a key driver for this transformation. Countries have not achieved this transformation by simply investing in the non-agricultural urban economy (i.e. relying on the "pull" factor for people to leave agriculture). Especially in the early stages, progress in agriculture is critical, as it generates the surplus cash that drives demand for non-agriculture businesses and services.



We cannot emphasise this enough. A country at Timor-Leste's stage of development may have a vision of being a thriving modern economy that has active tourism and services sectors, vibrant cities, plenty of manufacturing employment, strong revenues from mining, oil and gas, and a minimal reliance on agriculture. Even if this is the vision that the people hold, and even if it is a realistic vision in the medium term, the lesson learned globally is that progress towards that vision is driven in its early decades by steady modernisation of the agricultural sector, as the driver of food production and generator of income and wealth from which the non-agricultural economy grows.

B2. A Model for how Agriculture Modernises

We present here a simple model for modernising an agricultural crop production chain. Each step has been shown to be an essential element in the world's most competitive smallholder agricultural economies (see Fan et al., 2013).

Inputs

Quality seeds, fertilisers and other inputs

Quality seeds and other inputs are the key to lifting productivity.

* Select the best variety of seeds / raw inputs for the climate and soils.

* A reliable supply chain of seed production and distribution to farmers.

* An efficient supply chain sourcing fertiliser and other inputs and distributing to farmers.

On Farm

Modern Techniques

These inputs need to be used efficiently to increase yields

* Small scale production continues on the household's traditional land, but with the help of quality inputs and appropriate technology and skills, productivity is improved.

* Medium and Large Farms: In each sector larger scale specialised farms will emerge. sometimes called Nucleus farms, They provide opportunities for new technologies to be tested, for improved buying power in sourcing inputs, and provide a core base of supply for aggregators and exporters. Smaller farms will often benefit from association with these large farms.

Markets

Efficient Access

Farmers are only motivated to produce more if there is a market for their production

Effective Aggregation: Buyers emerge who can assist with post-harvest storage and with giving access to centralised markets with consistent demand and better prices for farmers.

Processing of local product including feed mills, bakeries and other processing to add value to crops, and create more employment.

Reaching the consumer market: Products need buyers. Local consumers are often already buying an imported version of the product. They will switch to the locally produced good, but it needs: adequate quality, consistent supply and at a competitive price. Export markets can also be considered if appropriate.

B3. What happens when we don't modernise? The Big Squeeze

Let's compare the economics of being a farmer in Timor-Leste, compared with others in the South-East Asian region.

Timorese farmers typically:

- Pay more for inputs
- Pay more interest when they borrow money
- Hence they have fewer tools or inputs, and have to work more hours to produce their crop
- Because of all these extra costs, they expect a higher price at the farm gate.

BUT in most cases, the price cannot be set in isolation. If the product is exported (e.g. coffee), the export price depends on the international price. If there is an imported version of the product (e.g. rice), it is competing against the local production, and the price of the imported good is set by the international price of that commodity.

Since most other countries face lower production costs than Timorese farmers, the international prices often seem quite low. Timorese exporters face low export prices, and producers of goods for local consumption face competition from low cost imported goods.

Timorese farmers can respond to this situation in one of two ways:

* charge a higher price that reflects the amount of work they do. This means they can't compete with other countries' product, and they will find it difficult to get buyers;

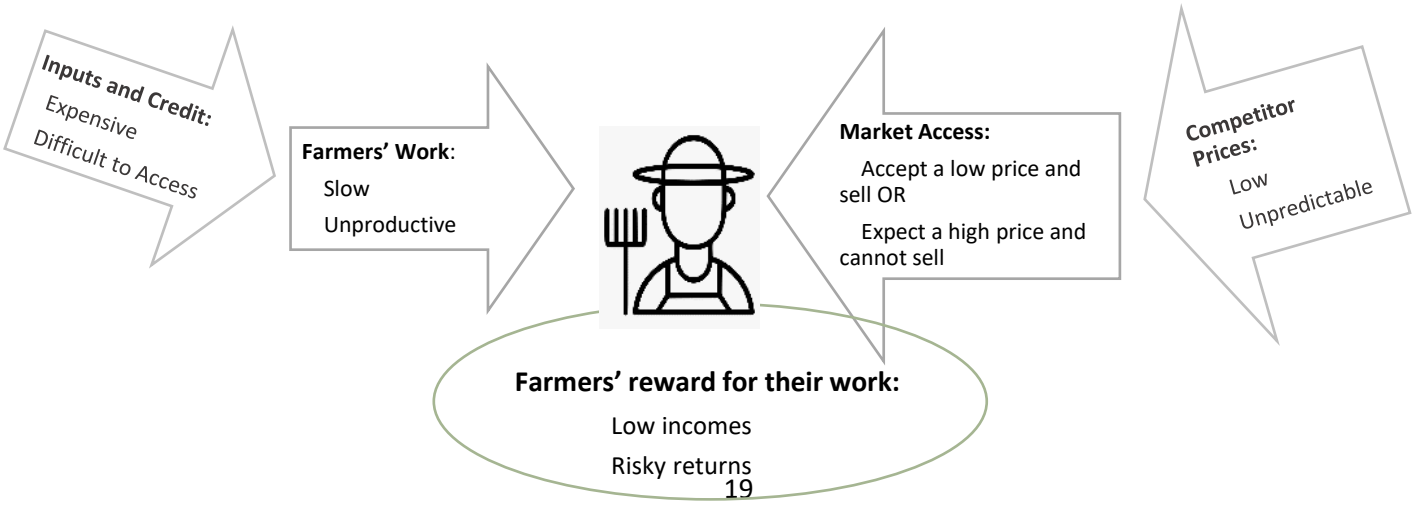
OR

* accept a really low price to match competitors, which makes all the effort of production just not worth it.

This is **The Big Squeeze** on farmers incomes. Either they accept a low price and earn little income, or try and charge a high price to cover their costs and their time, and sell little of their product, so they earn little income.

The farmer is squeezed on all sides. There is little incentive to work hard and expand production when the return to their effort is so low.

The Big Squeeze



B4. How to support the Process of Modernising Agriculture

For the agricultural industry in Timor to grow and modernise, we need investment, of both money and human resources. But who will make those investments and how does each best contribute?

B4.1 Focusing on Farmers and Businesses

Let's think briefly about the key players in the agriculture and their roles.

Government – clearly Government has a role in developing the sector. We will discuss this in more detail later, but based on international experience, it is usually unwise for government to be the primary initiator of production and distribution in agriculture (Stiglitz, 1993).

Government's role is best focused on policy and infrastructure and sector-wide iniatives like research ("public goods"), as well as finding ways to stimulating investment by farmers and businesses.

> *Notwithstanding these risks, agriculture under centrally planned systems of management has worked less well than under market conditions, for many reasons. First, under the public sector, organization and management of agriculture, and institutional surrogates for markets, tend to be poorly organized to adapt to information and incentives. Also, information tends to be poorly processed owing, in part, to the hierarchical relations which vest decision-making authority away from the scene of economic activity. Shirking becomes a central problem, individual initiative tends to be lacking, soft budget constraints replace hard budget constraints, and job and salary security inhibit quick responses to new and critical information. Thus the reduction of risks faced by farmers tends to be achieved at huge costs under the public system of management.*
>
> Stigliz (1993)

Development Partners and Non-Government organisations (NGOs) – these organisations take various important roles, including support for specific projects, building understanding of "what works in the context", helping develop community ownership of improved practices, helping stimulate new initiatives and entrepreneurs etc.

Farmers – clearly farmers are the most important stakeholders in the sector. Without investment by farmers, nothing will happen. An initiative can be assessed based on how well it promotes farmer investment in improved productivity and production. Note that not all farmers are the same: they range from smallholder farms (usually 1 Ha or less), some of whom sell some crops for market, others who do not; through to "Medium sized" farms of several hectares, relying on some inputs, technology and possibly some on-farm employment; up to "Large Farms" which are commercial operations with high levels of production and on-farm employment.

Private Businesses - Agricultural businesses such as trading, retailer, medium and large farming, transport and processing businesses are all vital to growth. They provide the link from farmer to processing and to market. Without these businesses, farmers will have limited access to the inputs that improve productivity, and to the means of processing and gaining access to high value markets. As agriculture modernises, those involved in the various agricultural businesses play an increasingly important role.

Why farmers and businesses?

In this report we focus on the kinds of actions that government could take to support farmers and private businesses to drive investment in the sector. There are several reasons for this focus:

- There is such latent potential at this level.
- With limited Government funding and capacity, and Development Partner budgets, the key is to find ways to support agriculture that "leverages up" the activities of existing and new farmers and businesses. With strategic investment and support, interventions have the potential to multiply their impact. Making use of limited funds to get the greatest impact is important if the sector is to grow significantly.
- Focusing on the frontline workers of the agricultural sector and responding to their expressed needs and ambitions is an effective approach to placing agency with these people. Extensive work on Agency, pioneered by Albert Bandura (e.g. Bandura, 2006), suggests that farmer motivation and effectiveness will be much higher, the greater control they have of their decisions and activities.

Take a typical extension program led by government or a development partner. It might start with design, with specific and detailed plans for implementation, then reaching out to farmers or businesses, with a range of programs they can participate in, often focused on training farmers. This approach can be a good means of pioneering new initiatives, but it is difficult to achieve scale and sector-wide impact by this means. Why?

- The approach may not create sufficient agency among farmers; for this and other reasons, it may lead to little lasting behaviour change among farmers.
- Program design is often based on the assumption that the main deficit is knowledge or commitment of farmers, and that improving knowledge will address both of these. However, often it is lack of resources that make farmers less productive, meaning high costs and risks, relative to the benefit / income they achieve. Programs that do not change the cost-benefit-risk equation will not produce lasting changes in behaviour.
- The program would typically be very expensive to implement, and a lack of ongoing funding makes it unlikely that the program would reach the scale needed to generate ongoing momentum independent of external funding.

In 2016 the Ministry of Agriculture and Fisheries launched a coffee rehabilitation program designed to rehabilitate almost 60,000 Ha of coffee growing areas. Based on project plans and progress in the first few years, the program would take ***42 years*** to reach just half of this area. Because of the design features and the reliance of government employees, the estimated cost per hectare was also very high, and the program was unlikely to survive tightening government budgets. (DNCPI, 2017)

The Agency Principle

The general principle could be stated as follows: those doing the work and taking the risks ought to have as much agency (control) as possible over what they do and how they do it.

For government, this means allowing farmers and businesses to drive the process as much as possible. It is usually unwise for Government to come in to the private sector and say: "we have decided to grow this crop in this way for this market. We want you to make this happen". If the private sector are to invest their time and money into this initiative, and to take on significant risk, they need to be convinced about what needs to be done and how. Those putting their own resources at risk are usually the best judge of whether a particular investment is worth pursuing. So, ideally, the government provides stimulus and support which is broadly applied, and allows the private sector to choose how they use that support.

> **The Agency principle:**
> *Those doing the work and taking the risks ought to have as much agency (control) as possible over what they do and how they do it.*

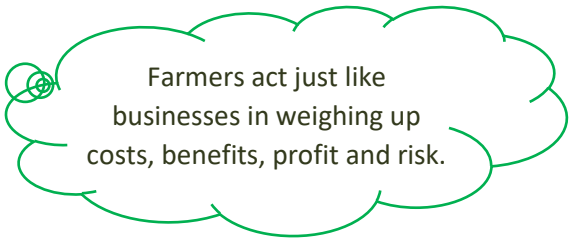
Of course, all interventions are on a continuum, and a mix is probably wise. At one extreme is very specific, targetted support, which might be appropriate for a mature crop with well established technologies and agreed pathways to modernisation and growth. An example in Timor-Leste might be with coffee, which is the largest commodity export. A specific intervention may be appropriate in this sector, such as: "to build the stock of coffee trees and hence output, we will subsidise nurseries to produce coffee seedlings at a reduced price to farmers".

At the other extreme is generic support that leaves it to farmers and businesses to do their own research about options for what to invest in. This suits sectors which are more in their infancy. For example: "Concessional loans are available for a range of types of capital expenditure in agricultural or agribusiness".

The remainder of this report explores how the government can accelerate these investments into the sector. But first, we need to understand the mindset of farmers and investors.

B4.2 What makes farmers and businesses invest in agriculture?

Businesses and farmers will consider a range of factors in deciding how to invest their money and labour, but their primary concern is the balance between returns (income / profit) and risks. Both are important, especially in agriculture. Any number of industries in Timor could generate attractive returns "on average". However, investors will consider not just the potential returns but also risks and costs.



Importantly, even a small subsistence farmer behaves like a business in weighing up options about their land. When considering planting a new crop, they will either explicitly or implicitly ask questions like: "how much work is involved in managing this crop? What kind of yield will I get? How much can I earn from selling it? What could go wrong with this crop?" Based on these questions, the farmer will decide whether planting the crop is worth it. While some may not be skilled at making such assessments with exact calculations, farmers use their experience to make these very judgements. In

that sense, the farmer is acting just like a business weighing up the potential costs and benefits (to see if it is profitable), and assessing the risk with that potential profit.

Words like costs and profit may be unfamiliar in describing the activities of a small, subsistence farmer. But it is important to recognise that they are still thinking in these terms, usually with different words but similar concepts. For a subsistence farmer, the cost is mainly their effort in working the land, and the benefit is the food they produce for their family to consume. If there is too much effort involved for producing only a small amount of food, or if the risk of crop failure is too high, they will not invest in that activity.

Larger businesses interested in investing in agriculture or in agricultural processing will also assess the costs and benefits, and consider the risks. In assessing the costs and the risks, they will consider many factors, including the broader economic environment, with issues like stability in regulation, access to skills, access to financial services, security over land tenure, ease of import and export.

Foreign investors will also weigh up how Timor-Leste compares to other investment options in neighbouring markets such as Indonesia, PNG and the Philippines.

B4.3 What can the government do to promote greater investment by businesses and farmers?

The government has access to three types of intervention which will help drive business and farmer activity:

- **Regulatory** interventions which improve the ease of doing business generally, as well as defining the rules and processes that guide specific business activities.
- Investments in **Human Capital Development** (especially education and skills) among the people – farms and businesses rely on skilled workers as the key to their success!
- Providing **Industry Incentives** that drive investors to make decisions they would not have otherwise made.

Timor-Leste is at the early stages of developing its non-oil economy, and generally measures poorly on the regulatory and skills development assessments by most foreign investors (e.g. World Bank, 2019). It is vital for medium term economic growth that efforts continue to improve the regulatory environment, and that there is increased investment in human capital. However, progress in these areas will be slow and steady.

Industry Incentive schemes have an important role to play in the shorter term, as they can change the activities of farmers and businesses relatively quickly. They can also compensate for some of the additional obstacles that businesses will encounter while these institutions are still in early stages of development.

It is also worth noting that effective regulation and institutions are very difficult to build in a vacuum, they are normally built in partnership with industry. This creates a further reason to focus now on building the level of economic activity in the sector as a priority. The more successful businesses and farmers there are, the greater the impetus for reform of institutions and improved regulation, and the more the experiences of these businesses can guide effective institutional reform.

Part C of this report will look more at regulatory and human capital investments that can be prioritised in Timor-Leste, in order to give the best impact in terms of economic and social development. A climate of poor regulation and low skills can undo many of the possible benefits of other more direct investments, and there are some priority reforms that can deliver progress quite quickly. Overall, though, there is no shortcut to development, just steady work to build the people and the institutions that support a thriving economy.

In the short term at least, a strategic way forward is for the Timor-Leste government is to target programs that provide incentives for early investors, and work responsively with these early stage investors to build the sector.

There are many steps in the agricultural process where the returns are very low for long periods, or the risks are too high, so business or farmers will not invest without some encouragement. They need an incentive to invest; without additional incentive, farmers and businesses judge that "the numbers don't add up" – the activities may not be profitable, or the return on their labour is just not worth the effort. Interventions that support certain activities can change the balance for businesses and farmers, so that they see a positive / attractive return on investment, and one where the risks are not too great.

Case Study: Incentives change behaviour!

A coffee farmer has been advised to prune their trees regularly, as this improves yield. But when you prune, there is a loss of income for a few years while the tree regenerates. The farmer is worried: maybe the tree will not grow back, it is uncertain how much extra yield they will get. They cannot necessarily afford to take the risk – they may prefer to leave the coffee tree untouched and continue to get a low (but more certain) yield.

Can a well-designed intervention change the farmer's decision?

B5. Relieving the Big Squeeze: Types of Government-funded Incentives

It is common to talk about a first-mover advantage, that businesses who invest early in a new industry or country have an advantage over later arrivals. However, this is almost always not going to be the case for agriculture in Timor-Leste: early investors experience a disadvantage today. The current environment of expensive inputs, high transactions costs for imports and exports, high labour costs, low skills and weak institutions are felt disproportionately by early stage investors.

The role of targeted industry incentives is to draw in these early stage investors, to pave the way for longer term investment and growth.

First mover disadvantage (examples):	* Farmers need to invest in skills, tools, seeds, fencing, other inputs. They invariably don't have the capital or knowledge to do these things, so need support. The private sector are unlikely to offer adequate support without some encouragement – they will not get sufficient return on their investment, especially when dealing with low productivity farmers, where risks are high. * Businesses considering activities such as buying from farmers, processing and marketing can find the prospect unviable early in the development of an industry. The volumes are low, risks are too high, and the profit margins too low.

B5.1 What principles should guide Government-funded Incentives?

The Basic goal: We are looking for financial interventions that:

- increase benefits or reduce costs, making activities for farmers or businesses more profitable, OR
- reduce risk.

Each intervention should aim to create an **incentive** for farmers to adopt new practices, or for private sector to invest in improving the production process, reducing costs and increasing incomes (See the FAO program on Incentives for Ecosystem Services as an example, fao.org/in-action/incentives-for-ecosystem-services/es/).

Industry incentives can take many forms, and need to be carefully considered. Even a well-intentioned, but poorly designed intervention can make the situation worse. Where possible, we would propose incentives based on the following principles. These principles are based on learnings in the literature on "Smart Subsidies" (e.g. Morris et al., 2007).

1. Short term	Any incentive should last only a few years. The goal of any incentive is to stimulate the development of viable businesses, not lock the government into supporting non-viable businesses into the longer term. Any support must be designed to be short term, and *communicated* as being short term. The timeframe should be clear to investors from the outset. Short term incentives are also an important learning opportunity for the government. Some incentives will work better than others, and short timeframes allow for learning and adapting.

2. Results-based	Incentives should, where possible, be directly related to the *outcomes / results* which the government want. For example, contributing 20% of the capital costs of a coffee nursery is an *input*-based subsidy. The money is provided even if the nursery doesn't produce any seedlings. An *results*-based subsidy would instead subsidise each seedling produced. Generally, a results-based subsidy will cost more (the government will need to offer more in order to stimulate the same investment). However, with an input-based subsidy the business receives upfront support at no risk, while the government takes the risk that the desired output may not eventuate. An outcome / results-based subsidy passes the risk over to the investor, not the government. This is generally wiser, as the investor is in a better position to consider the risk, and there is greater incentive for them to deliver the desired outcome.

3. Fair	Any subsidy should be available to all businesses that meet relevant criteria. This avoids both the potential for, and any appearance of bias or corruption in the allocation of the industry incentives. Continuing the above example, any output-based coffee seedling subsidy should be available to *all* eligible coffee nurseries.

4. Simple and Affordable	Some interventions are costly to manage and administer. Good schemes are designed to minimise the number of actors that the government needs to deal with. e.g. A subsidy paid directly to every farmer is very expensive to administer, hence ought to be used sparingly. A subsidy to input suppliers that benefits farmers will be much simpler and more affordable to implement.

5. Prioritise reducing risk	Interventions that reduce risk for business and farmers can provide greater incentives at lower cost, compared to those which reduce costs on average. e.g. where possible it is more effective to provide guarantees than subsidies.

6. Giving Choice	Investments that give businesses or farmers choice about their investments are preferred, as farmers and businesses know better how to weigh up the various options. e.g. An ideal example is supporting access to inputs that can be used with a range of crops, allowing farmers to choose what they grow.

7. A Diversified Approach	It might seem simpler from an administrative point of view to focus on one area, such as inputs, for example. However, a large subsidy in just one area can have a distorting effect and may not resolve other key blockages. For example, an intervention that eases the availability of inputs could lead to increased production, but not address other challenges such as giving producers access to market. A diversified pool of incentives reduces risk and also provides the opportunity to observe and respond to those which work best over time.

Case Study: Government Investment in Agriculture in India

India has undergone a rapid growth in agricultural productivity since 1967, described often as a "Green Revolution". Agricultural production grew almost exclusively via improvements in productivity - the agricultural work force was fairly constant up until 1999, even as real production more than doubled. Rural poverty also declined substantially over the same period, driven by these productivity improvements.

How was this rapid improvement in productivity achieved? Two basic steps were taken.

1. The Government adopted a New Agricultural Strategy, built on one basic principle: "the application of science and technology for increasing yield per hectare".

2. A massive increase in Public Investment and Subsidies in agriculture, which became the drivers of the improved productivity.

Up to 1967, government investment in agriculture was very small (Rs 3billion in 1966 in real terms), and agricultural growth had been slow, built in large part around expanding area cultivated rather than productivity (Tripathi and Prasad, 2009). A period of rapid growth in investment followed, leading to rapid productivity growth and increased output. Real public investment in agriculture peaked at Rs271 billion in 1999, a 90-fold increase in investment since 1966.

The effectiveness of these interventions has been studied extensively. India offers an excellent opportunity to assess what works, as the interventions took place over several decades, and differed across the different States. By studying differences in outcomes across States and across time, we can learn a lot about "what worked" and what didn't work. An important contribution is found in the work of IFPRI (International Food Policy Research Institute), and we discuss some of the findings here, based on work led by Shenggen Fan (Fan et al., 2008).

First, a classification of the types of investments from Government.

Public Investments

1. Agricultural Research – The public research budget quadrupled (in real terms) between 1964 and 1990 (Fan et al, 2008).

2. Irrigation and Water management – mainly the growth has been in wells, including tubewells, rather than large scale channel irrigation. Use of irrigation pumps grew from 26,000 in the 1950s to more than 9 million by 1990 (Tripathi and Prasad, 2009),

3. Rural Roads – development of rural roads that link small farmers to local suppliers and markets was an important priority.

4. Rural Education – This is included as an agricultural investment, as better education can produce higher human capital, with the capacity to improve productivity.

Subsidies

1. Minimum Farmgate prices – Various policies were adopted for setting a minimum farmgate price of grain, to support producers. Cost of implementing this policy increased five-fold through the 1990s and 2000s, and led to huge oversupply of grains. Its benefits are not included in the assessment, as this approach is not advocated in general.

2. Fertiliser – The Retention Pricing Scheme worked as follows: The Government sets a (low) price at which fertiliser must be sold to farmers. There is an agreed Retention Price, close to the import price or cost of production. Importers or producers of fertiliser receive a subsidy equal to the difference between the Retention price (plus distribution costs) and the Price to Farmers. Fertiliser use grew from 0.5kg per hectare in 1951 to 74kg per hectare in 1996, although still well below averages in most developed countries (Tripathi and Prasad, 2009).

3. Credit – these are simply interest rate subsidies, usually working through commercial financial institutions. The value of the subsidy grew was more than 60 times higher in 1999 than in 1960.

4. Irrigation - Farmers pay less for irrigated water than the operations and maintenance costs of the irrigation system. The value of this subsidy grew at a rate of 7.6%pa over the 40-year period.

5. Electricity – In 1999, the Agricultural sector (farmers and their households, plus agribusinesses) in India consumed 29% of the power in India, but contributed only 3.4% of cost. The cost of this subsidy grew very rapidly from 1966 to 1999.

Fan et al (2008) have used the historical data and state-level data to undertake complex statistical modelling of the impacts of the various government expenditures. The table below shows the estimated benefits of the different investments.

	Income increase per $1 invested*				**Rural poverty Reduction**		
	1960s & 1970s	1980s	1990s		1960s & 1970s	1980s	1990s
Agriculture Research	$8.7	$7.9	$9.5		643	409	436
Irrigation Infrastructure	$8.0	$4.7	$4.4		630	267	193
Rural Roads	$20.0	$8.9	$7.7		4124	1311	881
Rural Education	$14.7	$7.6	$5.5		1956	651	336
Fertiliser Subsidy	$2.8	$1.9	$0.9		90	110	37
Credit Subsidy	$18.8	$3.0	$4.3		1449	156	196
Irrigation Operations Subsidy	$5.2	$2.3	$2.5		394	116	113
Electricity Subsidy	$12.1	$2.3	$1.2		998	126	59

* Annual Increase in Agricultural GDP per $1 increase in Government investment
** Number of people moved out of poverty for every $100,000 invested

The first panel of data show the estimated increase in Agricultural GDP for every $1 of each of the government investments. For example, each $1 spent in Agricultural research in the 1960s and 1970s, led to an extra $8.70 in GDP. Any number larger than $1 indicates a positive return, but the bigger values indicate an even greater return on investment.

The second panel shows the reduction in rural poverty that resulted from the different investments. For example, $100,000 spent in Agricultural research led, on average, to 643 less people in poverty in the 1960s and 1970s.

What do we learn from the Indian experience?

Overall:

* Investments have great returns, almost universally, with each $1 invested producing $2 or more, even up to $20 in increased national income.

* Investments in agriculture have a very good impact on poverty reduction, bearing in mind these impacts are long term – the one-off $100,000 investment in irrigation infrastructure (for example) takes 630 people out of poverty on an ongoing basis.

* To give an idea of scale, suppose there was a $10million investment across a range of these initiatives in Timor-Leste, and they produced similar returns. Based on broad averages, this would add $50million to Agricultural GDP per year, a 25% increase on current agricultural income. We would also see more than 50,000 people move out of poverty; almost 20% of the rural poor in Timor-Leste would graduate to being "non-poor".

* Returns were generally better in India in the 1960s and 1970s. Prior to this period, government agricultural investment was virtually zero, and growth in the sector was very slow. The early decades of investment were able to achieve the best returns. This early-investment period is probably the best guide to how returns would look in Timor-Leste, given the current productivity base is also relatively low in Timor-Leste.

Specific Investments and Subsidies

Looking at specific investments and subsidies, the story is complex, and likely to be different for Timor-Leste compared to India's experience, so we ought not to generalise too much, but some comments are relevant:

* Rural roads have provided enormous benefit, through linking farmers to suppliers, to buyers, to markets, and many other benefits.

* Increased investment in rural education was also very beneficial to agricultural growth. A more educated population are better able to learn and adopt new technologies and approaches.

* Access to affordable credit has had enormous benefits. Imagine an investment of $1 that produces $18.80 in return, simply by providing a means for farmers and businesses to access loans at an affordable interest rate, and with reasonable protection for risk.

* Support for building and running irrigation infrastructure has very strong returns, mainly in the early decades where the most profitable areas were developed. Important lessons can be learned about the most appropriate types of irrigation infrastructure, though: indications are that smaller scale irrigation projects had greater ongoing success.

* Notably, returns on subsidies like fertiliser are relatively low. However, the cost of such a subsidy is low compared, say to roads, education and irrigation. And the benefits are more short term and direct – they affect productivity within one season. Fan et al. point out that fertiliser subsidies (and other material input subsidies like basic tools or seeds) produce the most tangible and direct benefit to farmers, so they are well received.

* The large returns on an electricity subsidy in India in the early years is an interesting finding. Whether this would translate well to a Timor-Leste context is unclear – the benefits will only be large if farm-level agriculture depends on it, and if there is significant growth in a modern agricultural processing / food technology sector.

* As noted earlier, output subsidies (such as guaranteed farmgate prices) have been very unsuccessful in India, and not recommended by the authors. Equivalent benefits to farmers can be achieved by other means, whilst avoiding the pitfalls of price guarantees.

B5.2 Who would these incentives be aimed at?

There are several categories of market actors who play important roles in a market-focused agricultural sector. While currently the vast majority of the agricultural sector are small farmers, there are many other market participants, and an effective strategy would want to target several of these with incentives. These include:

- Small farms
- Large farms
- Input suppliers
- Aggregators & processors
- Exporters
- Lenders

Let's consider each of these market participants in more detail.

Small (household-level) Farms

Clearly, it is important that interventions bring benefit to small farms, as they represent the most vulnerable participants in the sector. However, the overhead costs of providing services directly to many thousands of small farmers will often mean this is not the best way of delivering the benefits. It will usually be fairer and more efficient to subsidise activities that bring indirect benefit to these farmers, such as credit, input, labour and other production incentives, compared to an intervention that requires dealing with each individual farmer.

As financial services improve and digital options emerge for cash transfer and other information sharing, this will open up affordable options of direct support for farmers.

Large / Nucleus Farms

Timor-Leste has comparatively few large farms. In the context of Timor-Leste, we will refer to a "large farm" as any farm that uses more than a few hectares, and / or which relies on more than just the immediate household labour. They could range in size from (for example) a small commercial chicken operation with a few hundred chickens, to a large commercial farm. Large farms have a range of important roles in the agricultural mix:

- They provide training and experience for workers, who then apply these skills on their own farms.
- They have political and economic influence to highlight unhelpful regulations, such as import and export rules, and influence changes that reduce costs for all farmers.
- They attract input suppliers with their higher volumes, creating supply chains that smaller farmers benefit from.
- They can help aggregate output, provide storage and give access to centralised markets.

Large farms located among a large network of small farms are sometimes referred to as nucleus farms. These farms take a role become a hub for improving productivity of small farms that surround them.

Investment incentives that support the establishment and expansion of large and nucleus farms offers an effective and economical way of achieving broad reach into the sector.

Timor-Leste Case Study: MAECOM Network of Chicken Farms

The production of broiler chickens – chickens for meat consumption – is a growing and successful industry in Timor-Leste. While chicken products are the largest imported food commodity after rice. It is estimated that local chicken production represents 20-30% of local consumption. This share is growing.

How is it working? There appear to be two key components:

- A national-level "nucleus farm" based near Dili, where chicken broiler production takes place, there is a processing facility for preparing chickens for distribution to retail outlets. This facility also provides a base for import of feed and other inputs, with distribution to chicken farms across the country.
- A network of medium-sized commercial chicken farms, that are managed by a collective of community members, and that rely on the national level farm for supplies, and as a buyer of their final product.

This provides an excellent example of the Nucleus farm model, in this case operating at a national level. It also gives insight into a very successful model for mobilising local people to modernise their agricultural practices through an innovative "community ownership" model, alongside excellent national-level support for establishing and running their operations.

Nucleus Farms Case Study: Sri Lanka's Tea Industry

Sri Lanka is famous for its Ceylon tea. During colonial times in the 19th century, the British set up "large farms" – tea plantations which offered housing for farm workers onsite. Currently these plantations make up around 30% of the total tea production: the rest is smallholder farmers (less than 3Ha), with farms scattered throughout the country, usually in the same local area as the larger plantations. The two types of farms benefit each other:

- The road and rail infrastructure that opened up access to the tea-growing areas was built largely in response to pressure from larger, politically influential tea plantations. All the community, including small farmers, have benefited from this infrastructure.
- Smallholders transport their tea crop to the nearest tea plantation for storage, initial processing and transportation to the capital city markets. This gives affordable access to markets for smallholders, and increases processing volumes for plantations, increasing their efficiency.
- There is sharing of expertise and technical advice about tea varieties and trends in market demand, that flows between the two farm types as they trade together and share labour.

Input Suppliers

Inputs such as seeds, fertilizer and crop protection products are like fuel to the agricultural industry. Along with appropriate tools, they give farmers the essentials that drive improvements in productivity. Efficiency in the import / production of inputs, and then their distribution to farmers, is vital in building the industry. Subsidising the activities of input suppliers is an efficient means of driving rapid growth across the whole sector, utilised widely in the developing world (e.g. Chirwa and Dorward, 2013).

Aggregators and Processors

Depending on the crop, there are a range of businesses who buy from farmers, aggregate production, process and distribute to market. They fill an important role as intermediary between the farmer and the final market. Targeted incentives to aggregators and processors could drastically improve market access for small farmers.

Exporters

Where a commodity has an export market, the businesses that manage the export process face several additional challenges. Targeted support to promote growth in export markets can benefit all participants in the supply chain.

Lenders

Access to credit is a critical component of expanding farms and building new businesses. A state-subsidized agricultural lender is often the cornerstone of agricultural development even in developed countries. A mechanism for lending funds to farms and agricultural businesses at concessional rates would reduce the cost of credit, and make it easier to access.

B5.3 Specific Types of Government-Funded Incentives

Governments use a range of investments incentives. Some of these are sector-wide investments – roads, irrigation schemes, etc. These are vital to development and continued investment is needed in these areas in Timor-Leste.

The other investments used by Governments are incentives targeted at specific market actors. We introduce below three possible results-based subsidies, and 3 risk-based guarantees. These illustrate in broad terms the kinds of incentives that the government might consider offering. Section C of this report considers particular crops and incentives that would be most useful and relevant to Timor-Leste in the short to medium term.

1. Result: Improved use of Inputs

There are three points in the process where incentives can be introduced to improve the use of inputs by farmers. Incentives can be introduced at one or more of these levels, depending on the specific input and structure of the supply chain for the inputs.

- **Farmers:** vouchers are given to farmers at the start of each cropping season. These can be used to buy seeds, fertilisers or other essential inputs.
- **Input Suppliers / Retailers:** A payment is made to input providers every time they sell seeds, fertilisers or other essential farm inputs to a farmer. This payment can be conditional on a pre-set maximum price that the farmer is asked to pay for the input.
- **Input Producers / Importers:** A payment is made to input importers or producers each time they sell / distribute to a retailer. This cost reduction can then be passed on to the farmer via a lower price paid for the inputs.

2. Result: Improved access to credit

The simplest mechanism for providing easier access to credit is a payment to lenders each time they lend money to a farmer or agribusiness. A well-designed incentive scheme will increase the willingness of financial institutions to lend, increasing the supply of loans, and also reduce to cost to borrowers.

3. Result: Increased Farm Employment

One effective means of lowering the cost of providing on-farm employment on medium-sized and large farms is via a tax concession. For example, for large farms that employs local workers, the Government could pay 80% of the employee social security contributions.

4. Reducing Credit Risk

One big disincentive for financial institutions to lend to farmers or agribusinesses is that these are high-risk businesses. They are vulnerable to diseases, weather shocks and many other things that can disrupt their production. The government can reduce this risk to lenders by insuring lenders against the risk of unsecured loans to a farmer or agribusiness. This can take the form of a first loss guarantee which pays out every time a loan defaults, or a last loss guarantee, which is paid after a certain portion of the lender's portfolio is in default.

5. Reducing Price Risk

We consider two types of price risk schemes, one focused on exported commodities, and one for locally produced goods that are competing with imports. Note these are designed to provide protection against fluctuations in the world prices of commodities, not an ongoing price subsidy for producers.

Export price floor: A payment is made to exporters when they export agricultural produce during periods where the world price is very low. For example, when an exporter ships coffee at a time when the world price is below some pre-set floor price, the government pays the exporter 50% of the difference between the market price and the floor price. This in turn transmits to some price security at the farm gate.

Import parity pricing: A payment is made to aggregators when the world price of their commodity is very low. When the world price is lower, importers can access the commodity at a lower price. Local producers need a means of reducing their price to consumers in order to be able to compete with the imported product, but without penalising farmers. This scheme could be designed in a similar way to the export price floor, to protect farmers during a period of very low world prices.

6. Reducing Export Risk

It is common for countries to provide an Export Credit Guarantee for exporters in emerging markets. Essentially, the government insures a Timorese exporter against the risk of their buyer refusing to pay for the shipment. This reduces a major export risk.

We will go into greater detail about most of these various types of incentive schemes in Part C as we explore the specifics ways they are relevant in the Timor-Leste economy over the near future.

B5.4 Other Comments

- The idea of targeted investment by government in industries in the form of subsidies or guarantees is not some radical proposal by those opposed to the free market. Governments in "neoliberal" economies across the world invest heavily in agriculture and other industries with the kinds of incentive arrangements described here. Even in rich economies with much larger and more productive agricultural and industrial sectors, significant strategic government investment is needed to build strength in a particular industry or sector. Consider (on the next page) the example from Australia in 2020, where the Government is investing $1.5 billion in grants to kick-start targeted industries.

- Similarly, in the Developing country context, investment and incentives are seen as a valuable stimulus to development. For example, the 2008 World Development report on *Agriculture for Development*, argues for input subsidies that reflect "smart approaches to jumpstarting agricultural input markets....and underwriting risks of early adoption of new technologies to help achieve economies of scale...to reduce input prices...as part of a comprehensive strategy to improve productivity" (World Bank, 2007, p.23).

- The focus and design of the incentive matters – it is unwise to subsidise local production in a commodity that is unlikely to ever be competitive with imported products. The aim is to invest in areas that help protect against risk, or that overcome shortfalls in current institutions or infrastructure, with a view to growing independence over time.

- Part C of this report looks in more detail at specific options for Timor-Leste that try to follow these features of 'smart' approaches.

Ten features of smart subsidies:

- promoting fertiliser as part of a wider strategy
- favouring market based solutions
- promoting competition in input supply
- paying attention to demand
- insisting on economic efficiency
- empowering farmers
- involving an exit strategy
- pursuing regional integration
- ensuring sustainability
- promoting pro-poor economic growth

(Morris et al., 2007, p. 103–4).

- In NONE of the Government-funded incentives described here is Government involved in "doing the work" – running farms, training farmers, buying produce, providing inputs, exporting crops, etc. That is almost always best left to the individual farmer or private sector businesses.

Example: Governments Investment in supporting Business[1]

NEWS THURSDAY, OCTOBER 1, 2020 THE AGE 9

Manufacturers in key areas set for $1.5b funding boost

Focused on increasing local production, "sovereign capability"

David Crowe
Chief political correspondent

Industry will be promised $1.5 billion to sustain local manufacturing as part of a budget plan that aims to secure a "sovereign capability" in six priority areas ranging from food to medicine and clean energy.

Prime Minister Scott Morrison will name the target industries in a major speech today that sets out ambitions to build global scale in each sector, with the promise of public funding to lure big investors.

"We make things in Australia. We do it well. We need to keep making things in Australia. And with this strategy, we will," Mr Morrison says in a draft of the speech.

Five days out from the federal budget, the Prime Minister will use the speech to signal flagship measures to cut tax, build new infrastructure, fund more skills development and "rebuild the economy" from the recession.

Mining giant BHP| Billiton will back the government message by announcing an $800 million outlay on skills, engineering and technology today, saying this will include at least 2500 more apprentices and trainees.

The government estimates its manufacturing plan could create 80,000 direct jobs and about 300,000 more indirect jobs by helping companies modernise their factories and ramp up exports.

Jobs Jobs Jobs

The six priority sectors will be resources technology and critical minerals processing; food and beverage manufacturing; medical products; clean energy and recycling; defence; and space.

"The reality is we cannot and should not seek to reach global scale in a large number of sectors," Mr Morrison says in a draft of the speech to the National Press Club.

"Don't try to do everything. It's all about alignment, across different levels of government, with industry and with the research and education sectors."

Government supports business do the work, not doing it themselves!

Industry Minister Karen Andrews has talked of expanding food exports, for instance, so Australia adds value to its farm produce, and producing batteries that add value to the country's rare earths and other raw materials.

Choosing a few areas to invest in deeply

The $1.5 billion is new money to be spent over four years on three components including a Manufacturing Modernisation Fund, which will offer $52.8 million in grants to local companies within three months.

The grants will be offered only to companies in the six priority areas and will be conditional on industry committing $3 for every $1 in public funds, with the new money adding to an initial round of funding last April.

Expect business to show commitment

The government estimated the last funding round would create 2600 jobs and the next round could do the same. Companies can apply for amounts between $100,000 and $1 million.

The second component will be a $107.2 million Supply Chain Resilience Initiative to identify areas where Australia needs a domestic capability for emergencies, a problem exposed in medical products during the pandemic.

The third and largest component will be a $1.3 billion Modern Manufacturing Initiative, which will open in the first half of next year to offer grants for major projects.

The fund is meant to attract big investors from overseas and build "economies of scale" in local production.

Labor industry spokesman Brendan O'Connor has dismissed the government's talk so far of a new plan for manufacturing, pointing to the closure of car-making as one of the Coalition's failures.

Prime Minister Scott Morrison.

"They've spent seven years attacking and undermining Australian manufacturing and now they want Australians to believe they support manufacturing – what a waste of years of economic growth and taxpayers' money," Mr O'Connor said on Monday.

The government estimates manufacturing employed 860,000 workers and generated about $50 billion in exports before the pandemic.

One day after Labor leader Anthony Albanese accused the Prime Minister of dodging responsibility for the "Morrison recession" and being too slow to help those in need, Mr Morrison will promise a budget that can "cushion the blow" of the pandemic.

Under the BHP plan to be announced today, the mining giant will spend $300 million over five years on 2500 new apprenticeships, and $450 million to source more local products and services in Australian mining and technology businesses.

"Providing apprenticeships, skills and training opportunities for Australians of all ages and all walks of life, particularly in our regional communities, is a commitment we can make to help Australia bounce back," BHP chief executive Mike Henry said.

[1] Source: The Age newspaper (Melbourne, Australia) October 1st, 2020

B6. A Shift in Approach to Agricultural Development

The proposed focus here is a significant shift from most current approaches to agricultural development in Timor-Leste. This is not the place for extensive discussion of these other approaches, but some brief comments are warranted.

The main rationale for the approach advocated in this report is two assumptions about the attitudes of farmers and businesses. The key attitudes are:

- **Ambitious:** Farmers and businesses want to succeed, they want to increase their incomes.
- **Willing to Learn:** Farmers and businesses are keen to learn new skills as needed.

While these attitudes will not be adopted by all farmers and businesses in Timor-Leste, they are the essential attitudes and mindset for any business wanting to modernise or grow. A focus on modernising agriculture will adopt strategies that respond to the farmers and businesses who show these attitudes.

If other farmers do not take the opportunities on offer, they will simply not be the first-movers in this modernisation process. That is not a major obstacle: creating a movement of modernising agriculture does not depend on all stakeholders participating with equal enthusiasm. We just need a "significant minority" to get on board, and that will create momentum that many others will follow in time.

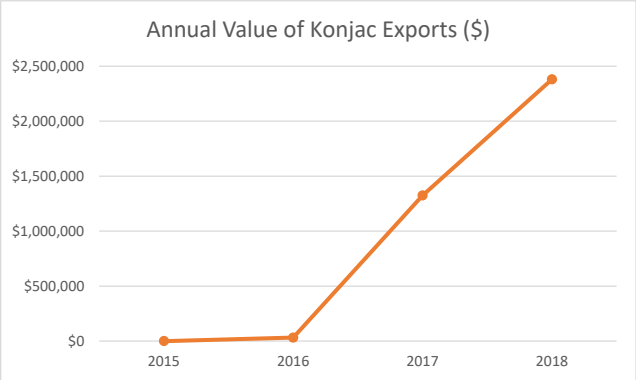
We argue that the key blockage to agricultural modernisation is not farmer motivations, or their ability to acquire skills. So what is the blockage?

> *Farmers and businesses encounter significant obstacles to success, primarily centred on access to the required resources to make their businesses viable.*

This leads to the strategy advocated in this report: provide access to "resources" – inputs, tools, appropriate technologies, better price / return on labour, access to credit for larger scale investment, etc etc – for farmers and businesses who are keen to succeed and to apply new and improved practices. Then watch these entrepreneurs take the opportunities presented to them.

Konjac: A case study in farmer opportunism

Global demand for konjac is strong and growing, with highest demand coming from China and Japan. Timor-Leste's exports of dried konjac chips grew from 20 tonnes in 2016 to 1,669 tonnes in 2018, and by 2018 konjac was the second largest non-oil export after coffee.



The economics of konjac is quite healthy. A farmer can plant konjac on land also used for coffee trees, to get additional value from that land, and earn at least $2,000 per hectare in addition to their coffee income (typically coffee earns less than $1,000 per hectare).

This case study highlights one essential point: when presented with an opportunity to increase their incomes, farmers quickly adopted this new crop, developed the required skills and substantially increased volumes of production over a very short time period.

This is a perfect example of the premise of our recommended interventions: farmers want to succeed, they know how to learn and adopt new skills, they are simply constrained by opportunity and resources.

There is another part to this story of Konjac – a big drop in production followed in 2019. The reasons illustrate some of the remaining challenges even in what appears to be a growing commodity. First, a lack of supply of productive seeds meant that the peak in production had been reached by 2018, until there could be an improvement in seed supply. Secondly, there were issues with relationships with overseas buyers, that illustrate the risks inherent in global trade. The discussion in Part C of this report is designed to t least partly address these constraints.

Part C. The Specifics of what and who

In this section we outline the range of crops and activities that could be the focus of government-funded incentive programs. These have been chosen to cover an extensive range of farmers, and with a focus on crops where some progress has already been made. There is great potential for further progress. The areas covered are not meant to be exhaustive, but they reflect areas of obvious priority and are good place to start.

C1. Target Crops

Fast growing agricultural economies specialise. Industry leaders and government work together to decide in which crops the country has a comparative advantage, and to grow this advantage. A clear signal of commitment from government allows businesses to invest in building the market and supply chain with confidence that support will remain in place for at least 10 years.

A key criterion for scaling up of investments is the need for a market – there has to be demand for a product, and potential for access to that final demand. For that reason, we look in two directions:

* Exports – finding demand from consumers in the international market.

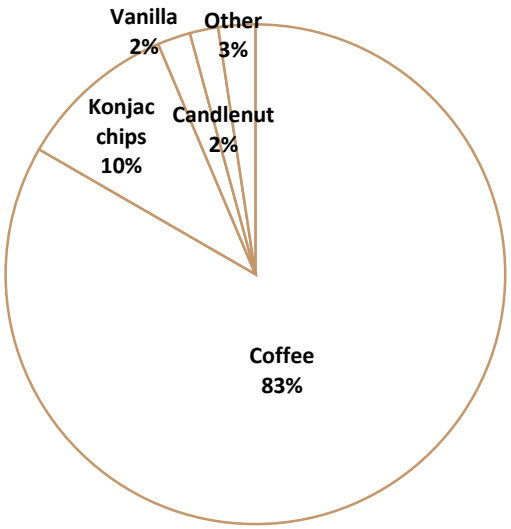
* Import substitution - information about current levels of imports helps us identify products where there is clearly a local demand. While that demand may currently be met by imported goods, in many cases consumers would welcome the opportunity to shift to a locally produced alternative of equivalent quality and price.

C1.1 Expanding Exports

The list of current exports provides one perspective on which crops have potential. Table 1 shows the value of exports of non-oil commodities for Timor-Leste in 2018.

Table 1: Value of Non-Oil Exports 2018

Category	Value of Exports	%
Coffee	$19,243,641	83.33%
Konjac chips	$2,380,666	10.31%
Vanilla	$492,427	2.13%
Candlenut	$425,049	1.84%
Copra	$231,554	1.00%
Scrap Metal	$99,867	0.43%
Fish	$68,215	0.30%
Areca Nuts	$40,814	0.18%
Dried Sea Cucumber	$25,404	0.11%
Other	$84,751	0.37%
Total	**$23,092,387**	**100%**



Source: Timor-Leste Statistics

The value of exports fluctuates from one year to the next, but this table tells the main story:

- Coffee is the dominant export commodity.
- Konjac chips have emerged as a relatively high value export commodity in recent years, second only to coffee.
- After that is a range of low volume, niche exports such as vanilla and candlenut.
- Note the very low value of earning from fisheries / seafood. There is obvious potential for growth here, but the data suggests the export component of this industry is very small at this stage.
- Similarly, there is no evidence of exports of timber products, despite the fact that there is great potential for expanding activity in the forestry sector (Inder, 2020). Evidence suggests that in fact there is a large illegal export trade in sandalwood (Raynor et al, 2019).

What does this suggest as a possible focus of investments in export-oriented agriculture over the next 5-10 years?

- There is an obvious case to continue investing in the "bigger" commodities – coffee and konjac – taking advantage of the existing, well established supply chain and market players and international market access, and to build up the volumes in these areas.
- The other area to consider is support for the nascent niche products – vanilla, candlenut, coconut oil, etc, with a view to scaling up of a select few in the longer term. Without going into details of specific crops, the best approach to a market at these early, low-volume stages is for Government to provide support that is 'generic', not targeted at a particular crop, and allow market participants to choose where to invest, as they pursue markets and improved supply chain. Over time, some products will emerge as growing markets, and warrant more targeted support.
- Commercial fisheries and forestry both represent industries that offer great potential for Timor-Leste. We do not consider them directly in this report; in each case, building an export industry will require significant industry-wide investment, based on a long term strategic plan. The focus of this report is on farm and business level interventions that can produce significant increases in production in a relatively short time frame.

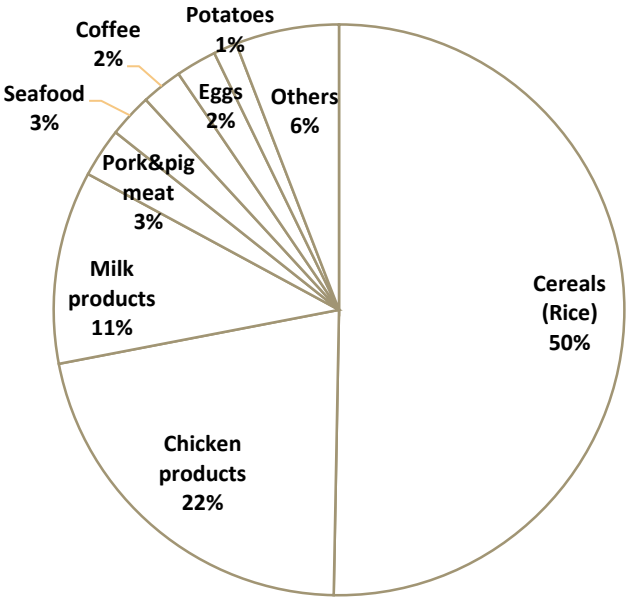
C1.2 Import Substitution

Timor-Leste relies heavily on imported foods and agricultural commodities. In some cases, this is because the imported good can be produced very efficiently overseas, and local production could not compete in cost. But in several cases, local production could eventually compete in cost and quality. This can be achieved by investing in building a reliable supply of locally produced goods that is consistent in quality and competitive in price.

Table 2 shows the 2018 data on selected imported food items that might be relevant to consider for import substitution. These are relatively broad categories – for example, "chicken products" covers a wide range of chicken and poultry products such as whole frozen chickens (the largest component by far), and other processed chicken products.

Table: Food Imports 2018

Category	Value of Imports	%
Cereals (Rice)	$38,525,000	50.30%
Chicken products	$16,601,270	21.67%
Milk products	$8,366,866	10.92%
Pork and pig meat	$2,138,435	2.79%
Seafood	$1,899,513	2.48%
Coffee	$1,782,153	2.33%
Eggs	$1,770,166	2.31%
Potatoes	$1,016,391	1.33%
Apples	$783,711	1.02%
Garlic	$580,468	0.76%
Onion	$488,679	0.64%
Beef	$450,236	0.59%
Tea	$290,026	0.38%
Oranges	$281,225	0.37%
Cheeses	$268,093	0.35%
Butter	$266,673	0.35%
Grapes	$120,937	0.16%
Spices	$120,335	0.16%
Mandarin	$106,174	0.14%
Pears	$90,929	0.12%
Mushrooms	$63,349	0.08%
Preserved Vegetables	$60,552	0.08%
Condiments	$53,659	0.07%
Lamb	$50,457	0.07%
Carrots	$38,191	0.05%
Nuts	$22,737	0.03%
Dried Fruit	$19,482	0.03%
Melon	$17,806	0.02%
Coconut	$13,231	0.02%
Preserved Fruits	$12,357	0.02%
Other Vegetables	$143,397	0.19%
Other Fruits	$90,974	0.12%
Other	$61,745	0.08%
Total	**$76,595,216**	**100.00%**



Source: Timor-Leste Statistics

The Table shows there are a few areas where there is a relatively large demand currently being fulfilled with imported product, that could be moved to greater domestic production. Areas that could be considered include:

- Rice, the biggest import by far.
- Meat and meat products: Chicken, Eggs, Other Meat (especially beef and pork), seafood
- Selected vegetables: especially potato, garlic and onion
- Selected Fruits: Apples, Oranges.

- Milk products.

Rice is a complex product to consider, a big and competitive global market, and some domestic issues to be addressed with production, infrastructure and government policy. We will not go into specific recommendations for expansion in this report, due to these complexities.

After rice, it makes sense to focus initially on Chicken and eggs especially, but also on other meats and fish.

Clearly there is scope in other areas (eg potato, onions, garlic), which suit local conditions, are relatively easy to grow. But the volume imported is not high, so there is not clear evidence of potential for sizeable market growth. Several interventions and incentives advocated in this report are quite generic to any crop (e.g. improving access to inputs and credit), hence can lend support to expansion in these areas, as farmers and businesses seek out market opportunities.

There are other categories that show the existence of a relatively large local market, such as milk products. However, milk products do not represent such an obvious choice. Current domestic production is virtually non-existent, and these would be difficult products to develop, as processing is capital intensive. Hence, they are probably not the best priorities at first.

C2. Specific Crops and Proposed Government-funded Incentives

C2.1 Coffee

Coffee farming is widespread in Timor-Leste; about 38,000 households grow the crop to earn cash (Census 2015). Coffee is Timor's largest agricultural export, netting over $20m annually. Based on the 2014 Timor Survey of Living Standards, the average coffee-selling household earns just $500 each year from coffee sales, less than 30 cents per household member per day.

The number of families who depend on the crop necessitate that coffee is central to our proposed industry package. Incentives which support even a modest improvement in production and prices will lead to significant reductions in poverty.

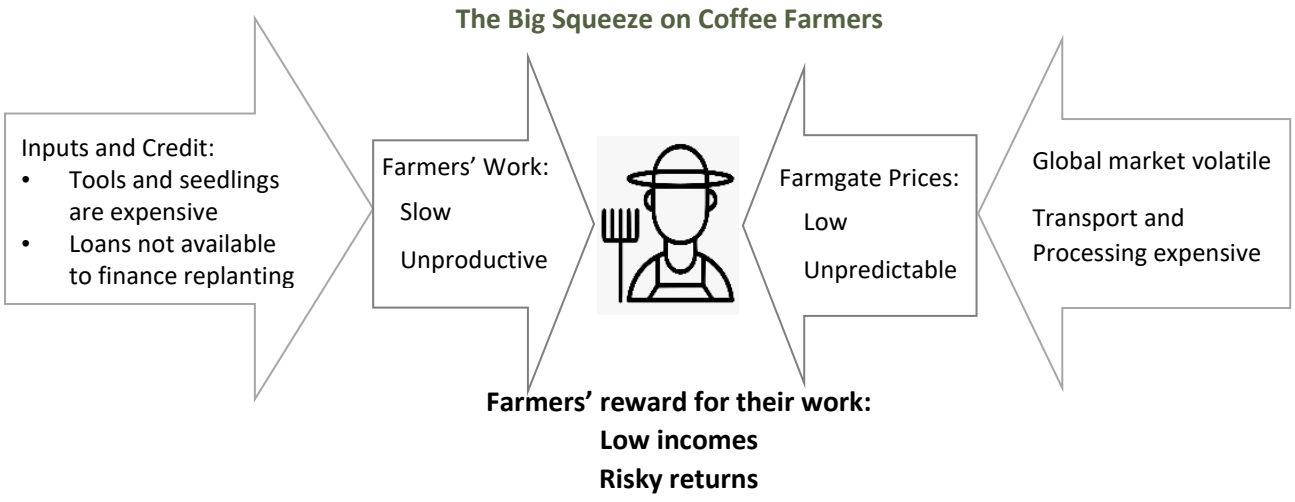
Current yields are very low when compared to neighbouring countries, so there is significant potential to lift productivity and incomes. Our focus is on industry incentives that encourage increased investment in the coffee sector; we do include some brief comments about institutional and regulatory changes.

C2.1.1 The Big Squeeze on Coffee Farmers

Coffee farmers face challenges on all three of the input, credit and price sides of their businesses. Confronted with these pressures, farmers typically choose to invest little time and money into their farm, which gives rise to the low yields.

On the input side, farmers lack the most basic of tools to farm effectively, including pruning to improve the yields of existing trees. In addition, farmers are not investing in new trees. The existing tree stock is old and its genetic quality is low.

The incentives proposed here focus on fundamentally shifting farmer returns to the point where it becomes viable to invest time in their farm to lift yields and increase productivity of their land and labour (time).



C2.1.2 Proposed Coffee Incentives

Section B of this report provides a general list of possible industry incentives. Here we propose a few specific interventions that would work particularly well for coffee. As with the other crops and specific proposals in this report, these are initial ideas that we believe will make the biggest impact on modernising the sector. Before these proposals can be implemented, there needs to be wider consultation, and more detailed work on design to ensure they give maximum effectiveness.

1. Encourage Investment in Increased Production

One of the biggest challenges facing commercial exporters of coffee is the relatively low volumes of production. Working from a low production base limits the kinds of export markets that can be targetted. In addition, farmer incomes from coffee are very low, and there is potential to increase these substantially by renewal of the coffee growing areas, pruning and stumping, and planting new trees. Existing programs (e.g. The NZ Aid / CCT program, reviewed in: RDSM Consulting, 2018) have shown significant benefits to farmers of increased production volumes.

We suggest three incentives can be put in place to stimulate this increased volumes in an affordable way. The first two address the costs to the farmer of increasing production via: increased supply of new trees by making seedlings more affordable; and increased productivity from existing trees via more effective pruning and stumping with the help of labour-saving tools. The third incentive focuses on improving farmer motivation to invest in coffee, by better farmgate price stability.

a. Increased Production via Reducing the Cost of Seedlings

The intervention here would be to provide an incentive to nurseries to provide high quality coffee seedlings to farmers. Reducing the cost of seedlings will change the investment calculation for farmers, and lead to a much-needed expansion of fresh plantings.

> Seedlings take a few years to produce income, and farmers have limited resources to invest over such a long timeframe, yet each seedling offers a very high return on investment. The estimated return is over $13 in its lifetime of a tree on a $1.50 seedling, even allowing for not all seedlings to survive. The multiplier effect of this government incentive is significant.
>
> This incentive would need to be coupled with a regulatory change (proposed below) which would see nurseries licensed and inspected to ensure the quality of their seedlings. There would also be a requirement for providing basic information to the farmer on care of seedlings, at the point of sale. See below for more discussion of this point.
>
> **Why this approach?**
>
> This action is attractive because:
>
> - The high return on investment, in terms of future coffee production per seedling.
> - Most of the benefit is passed on to farmers, with a low administrative cost of making payments to just a few licensed nurseries.
> - The requirement of the nurseries in order to receive funds (selling trees) is easy for the government to check.

- The incentive requires a co-commitment from farmers to pay some portion of the cost of the trees, ensuring only farmers who are committed to care for the seedlings will take up the opportunity.
- This incentive would support not just farmers, but provide significant employment and skills development in nursery management, which would assist with expansion into other crops.

How much will it cost?

To get an indication of the approximate cost of such a program, assume 25% of farmers would take up subsidised seedlings, and each buys about 300 trees. Based on a $1 subsidy per tree this would cost $2.8m, likely to be spread over 3 years.

The cost of running the scheme including disbursing payments, and inspecting nurseries will be an estimated 20% of the outlay, around $600,000.

The lead farmers who take up the trees within the first three-year period will provide an example to other farmers.

What is the Return on Investment (ROI)?

Each subsidised tree will cost the government around $1.20, and after the tree reaches a productive stage (around 4 years), provide an estimated 1.2kg or $2 worth of coffee income to farmers each year. The return on the government's investment of this subsidy is exceptionally high – costs are covered after the first year the tree produces a harvest, even allowing for some loss of seedlings. The returns would only multiply as yields are produced in future years.

b. Increased production via Reducing the cost of tools

Tools such as secateurs, chainsaws and coffee processing equipment support critical activities, including removing old trees and pruning existing trees. However, they cost too much, and farmers are typically unable to buy what they need. An incentive targeted at reducing the price of imported secateurs, chainsaws, watering cans and pruning saws, and possibly other inputs required for coffee processing, would drive greater investment.

There are two high impact means of distributing subsidised tools. Firstly, they could be sold together with seedlings in a kit that includes the seedlings as well as basic seedling care tools and information. A second option is to distribute tools through the coffee companies who are typically the buyers and exporters, and who often have strong incentive to help their farmer suppliers achieve higher yields.

Why is it recommended?

This action is recommended because:

- Most of the benefit is passed on to farmers, as there is a minimal administrative cost to paying the small number of importers.
- The requirement documentation for importers to receive funds (proof of purchase of imported tools) is easy to validate.

- While the tree seedling subsidy (above) will only be used by some farmers, basic tools could be available to all farmers.

How much will it cost?

As with the tree seedlings, only some farmers will choose to take up the option of purchasing subsidised tools. If 25% of coffee farmers were to buy $200 worth of tools (at a 50% price subsidy) the total of cost of this initiative would be $1 million, spent over 2-3 years.

What is the ROI?

Tools provide high returns on investment, although it is difficult to quantify. Tools such as wheelbarrows, secateurs and pruning saws substantially increase the amount of work a farmer can do each hour. This not only incentivises better crop care, but improves the farmers effective hourly wage.

c. Increased production via more Stable Farmgate Prices

Low coffee prices and the risk of price variability drive low production on farms. There is a strong link between price and production, because higher prices encourage farmers to invest more effort in production. During periods of low prices, farmers are not incentivised to prune or care for their crop, which then has a negative effect not just in that year but into the future.

To support greater production, we propose that the government set a "floor export price" of between $1.20 to $1.40/lb (the world coffee markets quote prices in lbs), and make a payment to exporters during periods in which the international price drops below this amount. We propose that the government pay 50% of the difference between the international market price and Timor's floor price.

This will drive up farm gate prices and reduce volatility. Certain of strong pricing, farmers will have the confidence to invest back into their farms.

Why is it recommended?

This action is recommended because:

- Most of the benefit is passed on to farmers, as there is a minimal administrative cost to paying a small number of exporters. Based on past patterns of international coffee prices, payments would be required on average once every three years.
- The requirements that exporters must fulfil in order to receive funds (proof of export volumes) are easy to validate.
- Addressing uncertainty in price will be a key driver of behavioural change for farmers.
- The international price is published by the International Coffee Organisation (ICO), so there is no need for the government to value each shipment in order to calculate payments to exporters.
- While the tree subsidy (above) will be used by some farmers, price stability affects all farmers.

How much will it cost?

Over the last five years, the global coffee price has moved between about 90 and 180 cents per pound. If a price floor was set at 120 cents per pound and the government paid exporters 50% of the price difference between the market and floor price, this would cost an average of $1million per year, based on historical prices and volumes. Clearly, this cost will change from year to year,

but hedging the government's risk on the coffee futures market could cap the cost at $1million per annum.

What is the ROI?

Of the $1million paid by the government in a given year, the majority will be passed on to farmers in increased farm gate prices, with others in the supply chain benefiting from slightly improved margins. In addition, guaranteed high prices will also lift yields, delivering more than the full value of subsidy back to farmers and their families.

2. Reduce Risk for Exporters via an Export Credit Guarantee

One of the greatest risks facing exporters is that after all the expense of purchase, processing and exporting their product, the international buyer refuses to pay for the shipment. This happens rarely, but it does happen, and for a small or medium sized exporter it can lead to sizeable losses that they may not be able to bear. An export credit guarantee could provide security to traders and in turn lifting farm gate prices. The guarantee would also support medium sized traders to compete with larger businesses for export markets, thus improving competition in the export sector.

Summary

Across these four incentives, the total recommended investment in Coffee over 3 years (average) is $4.5million, or $1.5million per year. For an industry currently exporting around $20m worth of coffee annually, this is a reasonable investment, and ought to give significant momentum to the industry.

C2.1.3 Institutional and regulatory changes

As the country's largest export commodity, the coffee Industry is well developed, with a several businesses of various sizes, and a vast network of almost 40,000 farms. In addition to the Government-funded initiatives described above, a few institutional and regulatory changes would be strategic in supporting the effectiveness of these interventions. Specifically, we recommend:

1. Ongoing Support for the Coffee Association (ACT) and their activities, including coffee festival and competitions. This Association strengthens the learnings between the various members of the industry, and supports the building of industry-wide momentum.

2. Work with ACT to establish a national quality grading system which allows differential pricing and improved marketing internationally. There is great potential for future growth in specialty coffee in Timor-Leste, with significant growth in international markets. Developing a means of measuring and rewarding quality is an important first step.

3. Establish a Coffee Marketing Board, to design a strategy for building and promoting the Timor Coffee Brand in a few targeted countries.

4. Establish a regulatory framework for licencing nurseries and monitoring quality.

C2.2 Konjac

One of the most promising means of assisting coffee farmers and other farmers to achieve higher and more stable incomes is to encourage intercropping: growing a second crop between their existing coffee trees. A range of different crops could be considered, but one particularly promising option is the use of high value root crops including turmeric, ginger, konjac and ginseng. Of these, konjac has already established a strong foothold in Timor-Leste.

Global demand for konjac is strong and growing, with the highest demand coming from China and Japan. Exports of konjac have grown significantly in recently years, largely to China. In 2018, almost $2.4m worth of Konjac was exported, making the crop the second largest export after coffee. Remarkably, this grew from almost nothing in 2016 ($32,000). About 1,200 families grow the crop.

The industry is both relatively new, and in its early years was growing quickly. As a result, standards and processes around seed farming, processing and export are still in development.

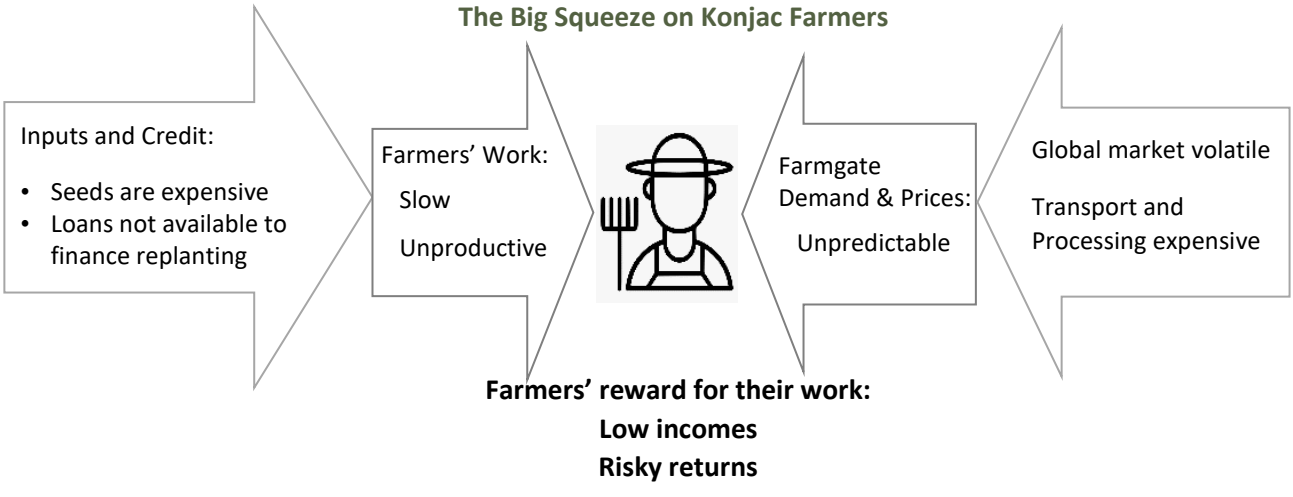
Farm gate price for dried konjac chips vary from less than $2 per kg to more than $4. At these prices, and planting over 5,000 konjac seeds per farm, incomes of over $1,000 per year can be achieved. This is twice the average family income from coffee, and explains the existing uptake of this new crop by farmers (proof again, that farmers' supply responds to good prices and a guaranteed buyer). The return to farmers is also much faster than with coffee, as it takes less time for the plant to mature.

C2.2.1 The Triple Squeeze

Konjac farmers face challenges on all three of the input, credit and price sides of their businesses.

On the input side the availability of quality seeds is perhaps the most significant constraint. In the first few years, konjac production was mostly a result of harvesting wild plants, but this supply is limited and needs to be replaced with a reliable and affordable supply of seeds. Seeds can be imported from Indonesia at a significant cost, while local production is limited.

There is very little credit available to invest in seeds. Prices are also highly variable and depend on the Chinese market demand. During periods of high supply, Chinese importers are known to cancel shipments, citing quality issues.



C2.2.2 Incentives

We propose one intervention at the critical bottleneck for growth in konjac production.

Increase Production by Reducing the Cost of Seeds

The proposal is that government provide an incentive to nurseries to provide high quality konjac seed corms. Reducing the cost of seeds and improving their quality will fundamentally change the investment calculation for farmers, and lead to a significant expansion of fresh plantings.

This incentive is coupled with a regulatory change which would see nurseries licenced and inspected to ensure the quality of their seedlings.

It is important that the subsidy is limited in scope: too many subsidised seeds could overstimulate supply and depress prices going forward. One method to reduce this risk is by also encouraging the production of turmeric, ginger and ginseng in the seed nurseries.

Why is this recommended?

This action is recommended because:

- A regulated seed supply will dissuade farmers from replanting seeds from their own harvest, which has a detrimental effect on quality and yield.
- Most of the benefit is passed onto farmers, as there is a minimal administrative cost to making payments to just a few licensed nurseries.
- The requirement of the nurseries to receive funds (selling corms) is easy to validate.
- The incentive requires a co-commitment from farmers to pay for the seeds, ensuring only the farmers who are committed to care for the seeds have access.
- This incentive would support not just farmers, but provide significant employment and skills development in nursery management.

How much will it cost?

Based on internal analysis by Market Development Facility Timor-Leste, currently about 1,200 families grow konjac. Expanding production to 4,000 families over 3 years would require each family to have access to 100kg of seed, with a value of $250. A 50% seed subsidy would cost the government $500,000 over 3 years.

What is the ROI?

The subsidy will cost the government $125 per farmer, who will produce over $1,500 worth of konjac. This represents a very high return on investment.

What about existing Konjac seed suppliers?

We are aware of existing seed supply chains, both through private business and a government nursery. Our proposal here is not ignoring these existing stakeholders, more arguing for a shift in their roles. The government does not need to get into “the business” of seed production and distribution. There are sufficient businesses already working in this space, and able to expand their operations, typically more efficiently than a government-provided service. Government’s best role is in providing an incentive for these seed producers, to expand supply at a lower price to farmers.

Other Interventions?

The team explored a range of options on the market side to support this industry including export credit guarantees, export payments and floor prices. However, given the high variability in prices and multiple export channels we believe it is better to focus on the production side. In addition, incentives associated with availability of credit (described below) will offer some benefit to this industry, as will other reforms to the administrative processes around managing exports.

C2.2.3 Institutional and Regulatory Changes

In addition to this stimulus to supply by reduced cost and improved reliability of seed supplies, some other reforms will improve the supply chain for konjac and other related products. These include:

- Establishing a regulatory framework for Licencing seed production and monitoring quality.

- Continued progress to improve efficiencies with processing exports.

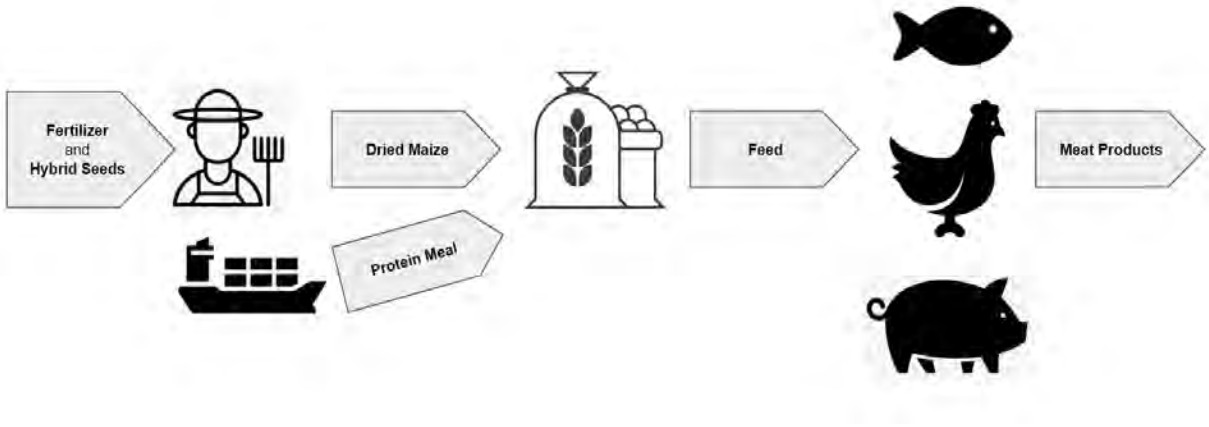
C2.3 Livestock and Maize

A modern agricultural system produces crops for human consumption, but also as feed for livestock. The livestock sector is an important driver of a thriving agriculture sector. Livestock adds a great deal of value to crops such as maize and soy. The sector also creates off-farms jobs, improves access to protein for low income families and reduces the need to import products such as chicken and beef.

The current situation:

- A network of chicken, egg and broiler operations have been established in Timor, paving the way for further growth. An estimated 20-30% of local production of chicken meat and eggs is from medium sized domestic producers.
- A small industry is growing for beef production, along with abattoir and retail facilities.
- Pig and pigmeat production is currently small but there are signs of growth.
- A growing network of fishponds are being established on small farms across the country, with an established supply chain of inputs (feed and fingerlings), and local markets for fish that can compete well with imported products
- In 2018, maize is estimated to have been cultivated on about 37,000 ha and produced 80,000 tonnes, at a very low yield of less than 3 tonnes per ha.

The maize market will not grow without the livestock market growing, and the livestock market cannot grow without maize, so they are addressed together.



In most Asian livestock systems maize is grown locally, while some of the protein portion of animal feeds (such as soy and fish meal) is often imported.

C2.3.1 The Triple Squeeze

Both livestock producers and crop farmers face a number of pressures which limit growth.

Livestock producers face challenges on all three of the input, credit and price sides of their businesses.

On the input side, the availability of locally grown maize is limited and there are no commercial feed mills. Credit is also of critical importance to building chicken, fish and pork operations, and remains limited. On the market side, cheap imports from Brazil and Indonesia put continued pressure on pricing.

For the *farmers* most of their challenges are on the input side, with hybrid seed and fertiliser largely unattainable. On the market side, the limitation of mill capacity drives down demand.

The challenges of farmers and of livestock producers are closely linked.

The Big Squeeze: Livestock

Farmers' reward for their work:
Low incomes
Risky returns

The Big Squeeze: Maize

Farmers' reward for their work:
Low incomes
Risky returns

C2.3.2 Industry Incentives

We propose three industry incentives that ought to provide a sizeable stimulus to the maize and livestock industry.

1. Expanding Local Feed Production by Reducing the cost of Protein

The sector must move away from importing full feeds (protein and grain combined) from overseas in order to create an opportunity for maize farmers, *and* to reduce the cost of feed. This move from fully imported feeds to locally produced may take some years, but it is an important step. A key to enabling this growth is subsidising protein imports, which will reduce the price of locally produced feed and encourage local livestock operations to buy locally sourced maize.

N.B. This incentive design is based on the assumption that commercial volumes of protein required as feed inputs will initially rely on imported supplies. This incentive needs to be designed to include support for local commercial protein producers to emerge over time.

Why is this recommended?

This action is recommended because:

- Over a period of several years this initiative should drive strong demand for commercially produced local maize, which should then drive the growth of the feed mill sector. Feed mills are capital intensive, and will remain in place after the subsidy window.
- Subsidised proteins and locally produced feed will reduce costs and allow local livestock producers to compete in price with imported meats and fish.
- Most of the benefit is passed on to farmers, as the administrative cost of making payments to just two or three protein importers is minimal.
- The requirement of the importers to receive funds (importing protein) is easy to validate.
- This incentive would support not just farmers, but provide significant employment and skills development in the livestock industry.

What will it cost?

At present, Timor is importing $16m worth of chicken products. To replace $2m worth of this chicken would require the import of an estimated $500,000 worth of protein supplement each year. A 20% subsidy on these imports will cost $100,000 per year, or $500,000 over five years.

What is the ROI?

This subsidy will cost $100,000pa but (together with the interventions below) will generate $2m pa worth of additional economic activity in Timor-Leste. These benefits will flow to farmers, mill operators and chicken producers.

2. Improve Maize productivity by Reducing the cost of fertilizers and hybrid seeds

Modern, high yielding maize production is driven by strong seed genetics (hybrid seeds) and by good crop nutrition from fertilisers. Subsidising both seeds and fertilizers will unlock significant expansion of maize production which can be taken up by the expanding livestock sector (above).

Why is this recommended?

This action is recommended because:

- Subsidised fertiliser and hybrid seeds will drive a behavioural change in farmers, which is likely to outlive the support period.
- Most of the benefit is passed on to farmers, due to the minimal administrative cost of making payments to just two or three importers.
- The requirement of the importers to receive funds (importing fertilizers and seeds) is easy to validate.
- The fertilizer will be taken up outside of the maize industry, supporting other crops.

What will it cost?

Maize is grown on 37,000 ha in Timor. A 25% uptake of modern farming practices would require 20kg/ha for seed and 350kg/ha of fertiliser across more than 9,000 ha. Costs of a 50% subsidy on the use of fertiliser can be derived using market prices of these inputs.

3. Expanding Livestock Processing Facilities and Farm-based Aquaculture by Supporting Loans to the Livestock and Aquaculture Sector

The construction of both feed mills and livestock operations is capital intensive. While higher maize production and the feed subsidy will improve the economics of the sector, faster growth will be aided by support for capital expenditures.

Similarly, small or medium-sized-farm based aquaculture is proving to be a promising means of diversifying incomes for farmers, producing protein in a managed environment and close to market for consumers, offering sizeable nutritional benefits. A key constraint to expansion is the cost of building the fishponds and acquiring the associated equipment. A subsidised loan will see a rapid expansion of the industry, where there is substantial unmet demand, and clear nutritional benefits through increased supply of a locally produced and affordable source of protein.

We explore a suitable design for a loan scheme in the next section (C2.4).

C2.4 Agribusiness Credit

Credit is a reality in any situation where a business or farm needs to spend money first, before producing income in the future. The only way to avoid the need for "cash up front" is to run an essentially subsistence activity where there is no investment in equipment or inputs. This is the best way to guarantee that farmers remain poor, productivity and incomes low, and the sector stagnates.

Subsidized credit for agribusinesses is a mainstay of agricultural policy among all leading agricultural economies, at least during the development phase of the industry.

There is an urgent need for an effective process for supporting agribusiness lending in order to drive sectoral growth across a wide range of crops, not just those listed here.

There are two main approaches to agribusiness lending: the first is to establish a government-run agribusiness or rural bank. This brings lending firmly under the government's control. The second option is to subsidise or guarantee commercial lending.

It is generally preferred that the government should begin by subsidising or guaranteeing commercial lending, as this builds on the existing expertise in the financial sector for managing this process.

A subsidy is typically best delivered via a lower interest rate, where the government subsidises the commercial lender to lend at a rate several percentage points below the market interest rate.

A guarantee is a promise by the government to repay a loan if the agribusiness fails to do so. In a well designed scheme in which carefully considered loans are provided, the government guarantee is rarely paid out. Most of the time, guaranteeing a loan should cost the government nothing, but it can significantly enlarge the lending portfolio.

The first step in this setting up an effective scheme is to establish formal arrangements with commercial banks for the provision of loans and guarantees, including the criteria for loans and other details of the operation of the scheme. Ideally there are arrangements with more than one bank, to ensure accountability – if a bank is not delivering on the agreements, then more clients will drift to the alternative bank, and this in-built accountatilibty will improve delivery of quality service to clients.

Lender Selection

The agreement would need to establish limits on the size of the interest rate subsidy and on how guaranteed credit can be used. For example, the government might decide that guarantees only cover loans for certain activities such as coffee processing, coffee export, feed mills and nurseries. The scheme would also need to be designed to allow other lending options if a strong proposal is presented. This flexibility encourages the sector to evolve to where there is promise of commercial growth rather than being overly shaped by government priorities.

Guarantee Design

The mechanisms for credit guarantees are well established, and the government should seek expert advice on guarantee design; however, some basic principles are outlined here. A guarantee needs to pass enough risk onto the government such that it stimulates new lending. However, on the other hand the bank must take some of the risk, so that the bank does not lend money without undertaking a careful risk assessment.

The costs of the guarantee are significantly reduced if they are linked to some of the incentives and subsidies listed above. For example, a seedling subsidy delivered together with a loan guarantee for nurseries will reduce repayment risk. The same would apply in a protein subsidy partnered with a loan guarantee for feed mills.

What will it cost?

Assume that most loans will fall into the range of $300,000 to $1m for businesses such as nurseries, feed mills, warehouses, logistics operators and livestock producers. The government would need to back anywhere from 20 to 30 loans of this size to make a meaningful contribution to the sector over the next three years.

Given this scale of lending activity, if an interest rate subsidy of 5 percentage points was used, this would reduce interest costs to borrowers by around $1 million per year.

If the government were to guarantee 50% of the value of each loan, and is forced to pay out 10% of the loans, the cost would be about $1,000,000 in total, spread over the next three years.

What is the ROI?

We estimate that the $4 million outlay over three years would stimulate $20 million in new agribusiness loans. This capital would unlock significant growth in not just the sectors listed above other industries including rice, sandalwood, etc.

C2.5 Large Commercial Farms

In most developing economies, including Timor-Leste, smallholder farmers make up the bulk of employment in agriculture, and most programs focus on smallholder farmers. However, large farms have an important role to play in building a successful agricultural economy. A strategy for modernising agriculutre would include support for establishing or expanding some large farms.

In an agricultural system with only small farms, progress towards modernisation is typically very slow. No single farm has the resources to open up new markets, bring in new technologies, train staff in best practices or import quality inputs. Typically, these roles are played by larger farmers, with the benefits then flowing through to the smaller farmers in the sector.

Neighbouring countries such as Malaysia, Indonesia and Thailand have been active in promoting a mix of large or nucleus farms, alongside strengthening small farms.

Large farms are not just important in opening up opportunities for smallholders. They also add value in their own right. They create employment and pay taxes. They are also excellent policy dialogue partners for the government. Large farms have the resources to bring proposals to governments on reducing export burdens, improving skills training, etc. While it might be difficult for a smallholder to articulate what will drive industry growth, it is easier for larger farmers to see and describe this opportunity to policy makers.

The government's commercial farming strategy need not be very complex or difficult to administer. The various incentives described above will help, as will the credit guarantee initiative. However, in addition, a more proactive approach could be taken, using land as the valuable asset.

Consider allocating several land parcels of up to 50Ha for large farms and providing this land at significantly reduced rent (for the first five years) to suitable farming businesses. Of course, this would need to involve extensive community consultation, and bring direct local benefit

Once the parcels are defined, they could be opened up by tender for investors to present their plan for use of the land. If well designed and well marketed, this process would give the government a range of different options for each parcel and the most desirable investors could be selected. This open and competitive process is very important to the success of this initiative.

The support package could also include tax concessions and concessional loans in the early years of operations.

Note that following this approach the government does not have to lead the process of deciding what activities take place on the land: the businesses who are investing their own time and money in the activities are the best placed to research the options and develop the proposals. Government's role is simply to evaluate proposals using pre-set criteria (including feasibility, profitability, benefit to the community, environmental impacts, etc), and decide the tender outcomes.

A Task Force for Agricultural Incentives

The proposals in this section represent a significant shift from current approaches to supporting agriculture in Timor-Leste. Here we briefly discuss a set of "next steps" for moving in the direction of these proposals in a realistic and measured way.

The key institutional structure that can make these proposals a reality is the establishment of at "Task Force" for developing, implementing and evaluating the incentives. In some countries, a project management office structure is established to fulfil this purpose – Ethiopia's Agricultural Transformation Agency, established in 2010, provides one example (admittedly with a broader agenda).

This Task Force could be chaired by a relevant Minister, and include key representation from Government and Development Partners.

The role of the Task Force:

1. Working with the proposals in this document as a starting point, commission revelant Ministries and Directorates to develop specific proposals for the incentives outlined here. In the first year, it may be best to focus just on one commodity, such as coffee, and develop a plan for 2-3 of the recommended incentives. Technical assistance from Development Partners may be helpful at this design phase.

2. Once satisfied with the plan, secure Budget for implementing the plan, initially over 2-3 years. In some cases, regulatory changes may also be needed before implementation.

3. Receive regular progress reports, including independent monitoring and evaluation of implementation and effectiveness in terms of outcomes – improved volumes / productivity / farmer incomes.

4. As learning takes place about how things are working, build this learning into plans for investments in other incentives for other commodities. The aim could be a rapid expansion into several crops and incentives over a 3-year period.

C2.6 Other Areas for further consideration

C2.6.1 Rice

The rice industry in Timor-Leste is a complex and controversial one. It is the largest imported commodity by far, as well as representing a large proportion of the value of local agricultural production.

We do not address rice here in detail, because some complex political, cultural and other issues need to be addressed first.

Potential is there for "Timorese Rice" / red rice to grow as a niche product potentially targetting high value export markets.

White rice is a very competitive market internationally, with several large scale, highly efficient producers in other parts of Asia. Timor-Leste has some potential to compete against imported rice for a proportion of production, but the available suitable land is limited, the steps towards this are complex, and worthy of separate discussion.

C2.6.2 Community Forestry

See a recent report from Inder (2020). In that report we advocate for a Forestry Industry plan that includes extensive tree planting, better monitoring of forestry activities, tracking, carbon credit certification scheme, and some selective harvesting.

C2.6.3 Small-scale Investments

A variety of small scale activities and investments will continue with the support of development partners and NGOs or private sector participants. Whilst not necessarily investing directly in these areas, Government should encourage this work to continue, especially where it adds to food security, nutrition goals, and potentially opens up niche markets for modernisation of the agricultural sector.

These areas include:

Staple Foods: Cassava & Taro – this also provides a potential ingredient in commercial feed production alongside maize.

For domestic consumption: Fresh Vegetables, Legumes, Fruits, Nuts, …

For domestic consumption and small scale exports: Salt, Spices & Herbs, cocoa, virgin coconut oil, …

Several of the initiatives described in this document, while targetted at other crops, will deliver benefits that apply across all the products. This includes access to credit, as well as subsidies for tools and feed, etc.

C3. The Foundations: Selective Institutional Reform

As noted, the government is investing in various reforms to improve the business enabling environment and working of Government in Timor-Leste. Here we highlight just four which we consider to be high priorities to support emergence of a strong, modern agricultural sector.

C3.1. Institutional Change: Strengthening National Strategies

Taking a broad structural view of how countries modernise agriculture, there are typically three levels of structures needed: at the economy-wide level is "Foundations", in the Middle is "Strategies", and at the farm and business level is "Innovation".

1. Foundations – a strong business enabling environment, effective infrastructure and other essentials of a modern, functioning economy.

As noted, there is significant effort being put in by the government, with donor support, to build these basic economic foundations (infrastructure, legal frameworks, Government services, etc) that will benefit all sectors of the economy, including agriculture. There is still a long way to go, but the commitment is there, and things will steadily improve.

2. Strategies - clear directions and coordinated energy to build momentum with particular crops and sectors.

Strategic direction and co-ordinated activity are needed in order to scale up working models to a national level. It is here that experts who understand the sector well can produce and implement well designed incentives, help develop plans for improving market access, support basic research on crop varieties and production techniques, prompt specific government improvements to regulations and processes to improve business functioning, etc. Normally this role is overseen from the Ministry of Agriculture, although in some cases specific agencies and task forces are etablished to address some of these areas.

3. Innovation - grassroots programs that work to understand the realities "on the ground" in agriculture, and develop models for transformation.

These programs are mostly led by development partners and NGOs, and occasionally private sector businesses. Despite limited budgets and finite funding periods, they are often a good platform for innovation - seeding new agricultural activities and developing new models for agricultural development. They work best on achieving progress at farm level and other specific aspects of production and processing for particular crops and markets.

An effective national agricultural system builds on:

- Foundations: a well governed society and economy with quality infrastructure
- Innovation: learning and improving on what happens at the front lines of daily agricultural life and in the middle between these:
- Strategies: Clear Direction, coordinated energy, industry incentives.

There is a need to strengthen of expertise in the development and implementation of strategies. This is essential in order to capitalise on the many excellent innovations in agriculture nationally.

Modern agriculture sectors need scale – particular crops being produced in larger volumes. Why is scale / high volumes so important?

- Farmers and businesses can specialise.
- competition between participants can emerge.
- the sector can operate more efficiently to deliver consistent supply and quality products at prices that can compete with imported alternatives.

Scale does not come from random and isolated activities. It comes from coordinated national strategies that build momentum by giving clarity of direction, give confidence to farmers and businesses to invest, and create incentives for farmers and businesses to invest.

C3.2 Financial Services

Currently the "transactions costs" of doing business are very high, and use of financial services make up a large portion of business costs. Access to credit also represents a significant obstacle to the expansion of business activities, as has already been addressed earlier in this section. More broadly, local businesses and households have limited access to formal banking and credit facilities, which can make a big difference to emerging local businesses and markets.

For households, continued work needs to take place towards simple innovations in provision of "mobile money" services for use for the whole population and very low cost. This is vital to improved modernisation of the smallholder agricultural sector, as well as many other benefits. This can be achieved relatively quickly with a tender process, calling on experienced international providers.

C3.3 Addressing Inefficient Import and Export Processes

Businesses who trade often report great frustration with delays, time consuming and overly bureaucratic processes in dealing with customs and quarantine issues for both importers and exporters. Businesses survive on timely and reliable supply chains.

There is a need for continuous review and improvement of all Customs and Quarantine processes with a priority on digital and online interface with clients, and a "customer focus" to deliver the best outcomes as promptly as possible. A specific example would involve something as simple as standardising certificate of origin arrangements for all crops.

C3.4 Land Title Uncertainty

This would appear to be one of the most critical blockages. Virtually all businesses need access to land, especially in agriculture and agribusiness. They need security / certainty around that access so they can invest for the long term.

Focused and coordinated effort is needed to elaborate provisions noted in the Land Law, with an aim for early execution of the Law.

In addition, good progress is possible via improved access to information. Consider an intervention to support establishing a "marketplace" where businesses and individuals can learn about available land for rent and sale. This central place of providing information is the best way of ensuring sensible and consistent pricing. The intervention could involve tendering for supply of a real estate information service, with a suitable business model underwritten by Government in the first few years. A natural extension of this service might even include support in managing the legal and bureaucratic steps of transfer of land ownership and leases.

Conclusion

This report is proposing a fresh approach to modernising the agriculture sector in Timor-Leste. Many countries have benefited from a "Green Revolution" over the past 60 years, where significant gains in food production have led to declining poverty and improved livelihoods (Pingali, 2012). It is time for Timor-Leste to embark on this journey, as the driver of broader economic development that will benefit the whole population.

The global Green Revolution has not been all good news – there have been harmful effects of the over-use of land, including excessive use of chemical pesticides and mono-agricultural practices. Similarly, communities have been disrupted with the impacts of excessive debt among vulnerable farmers, and the consequences of loss of land for some small farmers. These provide a warning for Timor-Leste as the movement for modernising agriculture gains momentum: we must always have sensible safeguards around the respect for the environment, and social and cultural impacts of changes. The good news is, Timor-Leste can learn from the mistakes made in other countries, and produce the benefits without falling into the traps. Importantly, the risks of unhelpful outcomes should not deter from energetic action towards improving the livelihoods of the rural majority of the Timor-Leste population.

We conclude with the main message of this report:

- The recent history of Timor-Leste has proven the great resilience and determination of the people to build a prosperous independent nation.
- That same determination is there among farmers and business people in the agricultural sector. These citizens are eager to succeed and to build their businesses.
- They face enormous challenges, squeezed from every side to the point that without "outside" support, they are mostly unable to invest to see growth.
- Well-designed Government-led incentives can make the difference: they make it possible for farmers to break out of the Big Squeeze, and see ongoing growth in productivity and livelihoods.
- For such incentives to be designed and implemented, and other barriers to growth addressed, there needs to be investment in national agricultural planning and strategy. The focus needs to be on creating the ideal environment for farmers and businesses to flourish.

The prospects for the future of agriculture in Timor-Leste are exciting, even if the challenges are daunting.

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