INNOVATIVE FINANCING MECHANISM FOR RNR SECTOR IN BHUTAN

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for RNR Sector in Bhutan

Ministry of Agriculture and Forest 2022

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Abbreviations

ADB	Asian Development Bank
AF	Adaptation Fund
AREG	Adaptation and Resilience Expert Group
AVC	Agricultural Value Chain
BFL	Bhutan for Life
BMZ	German Federal Ministry of Economic Cooperation and Development
BTFEC	Bhutan Trust Fund for Environmental Conservation
CARLEP	Commercial Agriculture and Resilient Livelihoods Enhancement Programme
CER	Certified Emission Reduction
CIF	Climate Investment Funds
CSIs	Cottage and Small Industry
DAMC	Department of Agricultural Marketing and Cooperatives
DFID	Department for International Development
DGIS	Dutch Ministry of Foreign Affairs
DPBP	Department of Planning, Budget and Performance
DoA	Department of Agriculture
DoFPS	Department of Forest and Park Services
DoL	Department of Livestock
FAO	Food Agriculture Organization
FCBL	Food Corporation of Bhutan Limited
FMCL	Farm Machinery Corporation Limited
FSAPP	Food Security and Agriculture Productivity Project
GAFSP	Global Agriculture and Food Security Program
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gases
GIIN	Global Impact Investment Network
GNH	Gross National Happiness
GNHC	Gross National Happiness Commission
GoI	Government of India
HCV	High Conservation Values
ICI	International Climate Initiative
IFAD	International Fund for Agriculture Development
IFC	International Finance Corporation

INDC	Intended Nationally Determined Contribution
IREDA	Indian Renewable Energy Development Agency
IRFC	Indian Railway Finance Corporation
LDC	Least Developed Country
LDCF	Least Developed Countries Fund
LEDS	Low Emission Development Strategy
MoAF	Ministry of Agriculture and Forests
MoF	Ministry of Finance
MYRB	Multi-Year Rolling Budget
NAMAs	Nationally Appropriate Mitigation Actions
NAPA	National Adaptation Programme of Action
NBC	National Biodiversity Programme
NDCs	Nationally Determined Contributions
NGOs	Non-Governmental Organization
NSB	National Statistics Bureau
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PPD	Policy and Planning Division
PPP	Public Private Partnership
PrSW	Private Sector Window
RBF	Result-based financing
RDTC	Rural Development Training Centre
REDD+	Reducing Emissions from Deforestation and Forest Degradation, and Conservation, Sustainable Management of Forest and Enhancement of Forest Carbon Stocks
RGoB	Royal Government of Bhutan
RMA	Royal Monetary Authority
RNR	Renewable Natural Resources
RSEB	Royal Security Exchange of Bhutan
SDF	SAARC Development Fund
SDS	Sustainable Development Goals
SLMP	Sustainable Land Management Project
SPV	Special purpose vehicle
TSFP	Trade Support Facilitation Program
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

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1. Background

1.1 Introduction

Bhutan has a total geographical area of 38,394 square kilometers of which 70.46% is under forest cover with only 2.93% of the total area available for cultivation[1]. Farming in Bhutan is a challenge because of small land holding and rugged topography, making mechanization difficult and labor intensive[2]. The livelihood of more than 57% of population is dependent on Renewable Natural Resources (RNR) sector which comprises of agriculture, livestock and forestry[3]. Farmers in Bhutan continue to depend substantially on the RNR sector. In 2019, the contribution of RNR sector to Gross Domestic Product was 15.82%[4]. It is also the single largest sector that provides employment to over 49.20% of the population as per Labor Force Survey 2021[5].

Majority of Bhutanese farmers practice a self-sustaining, integrated and subsistence agricultural production system in a small and marginal land. The average holding sizes of Bhutanese farms is 3.7 acres[6]. Rice, maize, wheat, buckwheat and millet are the staple cereals cultivated by farmers. In Bhutan, rice self-sufficiency is only 45% and the rest is imported from India and neighboring countries[7]. However, over the years agricultural practices have shifted from subsistence to semi commercial farming. With improved access to market and market information, farmers' household income is supplemented by sales of dairy, poultry and agriculture products. Horticulture crops such as mandarin, apple, potato, vegetables and spices like ginger are main cash crops[8].

The Constitution of Bhutan mandates that the recurrent expenditures of the Government are financed from domestic resources. This means, it is not possible to use funds from external sources to finance recurrent costs, which also implies that any Government expenditure of recurrent nature, be it in biodiversity or any other sector, has to be managed internally. On the other hand, the available domestic resources are still too small to finance capital or development expenditures fully. Hence, Bhutan

[1] National Soil Service Centre, 2010
[2] Tobgay, 2005, Agriculture Diversification in Bhutan
[3] Ministry of Agriculture and Forests [MoAF], 2018
[4] National Accounts Report 2020
[5] Labour Force Survey, National Statistics Bureau, 2021
[6] RNR census, National Statistics Bureau, 2019
[7] Enhancing Climate Resilient Agriculture and Food Security in Bhutan, UNDP, 2017
[8] Enhancing Climate Resilient Agriculture and Food Security in Bhutan, UNDP, 2017

depends substantially on donor assistance for development expenditures. In the renewable natural resources sector, which includes agriculture and environment, there is substantial support from the Government of India (which continues to be Bhutan's largest donor), the European Union, the UNDP, World Bank, and IFAD.

In order to boost agriculture in the pursuit of food and nutrition security and to reduce the high import dependency, the provision of subsidy on agriculture inputs was initiated as early as 1961 with support ranging from input supplies to fertilizers to irrigation facilities. However, the gradual phasing out of subsidies started in the 7th Five-year plan with the removal of input support on land terracing. Further, in the 8th Five Year Plan, the Government removed the support on agriculture inputs such as fertilizers, seeds and plant protection chemicals except partial support for transportation. Presently, the different forms of direct incentives covered in the agriculture and livestock sector include free supply of seeds and seedlings of promotional crops and fodder, supply of improved breeds of livestock and poultry, veterinary drugs, farm machinery, plant protection chemicals, and inorganic fertilizers at subsidized rate. Farm roads and irrigation are the other two key production incentives. In the forestry sector, the incentives include provision of subsidized timber for rural household construction, traditional harvesting rights for non-wood forest products and compensation for livestock lost to predation. Subsidized timber is also allocated for community infrastructure and construction of Dzongs and monasteries.

Bhutan's global commitment to the Sustainable Development Goals and other international conventions related to the RNR sector are challenging from the financing point of view. As the country graduates to a middle-income country by 2023, the pressure to fund the development activities will escalate. Based on the concept of development finance, it is important to diversify financing of the RNR sector development. In view of the RNR strategic initiatives such as securing food self-reliance, accelerating agri-business, efficient service delivery, innovation in the sector, ensuring resilient production system and suitable resource management, the sector will have to secure/generate commensurate funding through an innovative RNR sector investment plan.

1.2 Objectives

The main objective of the assignment is to explore a comprehensive, vibrant, viable, Innovative Financing Mechanism for the RNR Sector in Bhutan. Specific objectives are:

a) To explore possible sources of sustainable and innovative financing mechanism for the RNR Sector and provide recommendations.
b) To develop financial model and provide financial viability analysis for innovative financing areas for the RNR Sector and provide recommendations.
c) To review policy and regulatory instruments, identify gaps and provide recommendations on RNR Sector financing.

1.3 Rationale

The Ministry of Agriculture and Forests known as the RNR sector continues to be a predominant player in improving the country's economy, livelihood, and environment. It contributes about 15.82% to the national GDP and provides employment to around half the population of the country[9]. The sector also manages 60% of country's geographical area maintained under forest cover[10]. For the 12th Five Year Plan, the RNR has been allocated with only 2.63% share of the national capital outlay. Considering the challenges posed by the COVID-19 pandemic, global disruption of supply and demand of food, soaring world food price, the adverse effect of climate change on agriculture productivity coupled with limited budgetary resources, it is critical for the sector to find solutions and explore innovative financing mechanism for investment in RNR sector. The concept of innovative financing mechanism is relatively new to Bhutan, and capacity to formulate and implement appropriate policies and regulations needs to be strengthened.

Therefore, a Joint Programme titled "Building a Bhutan Integrated National Financing Framework (INFF) for the Sustainable Development Goals (SDGs) and Gross National Happiness (GNH)", was initiated by UNDP, UNICEF, DPBP (MoF) and GNHC. The programme intends to support the government in articulating how the resource gap can be financed to advance the SDGs through a comprehensive assessment of the financing landscape and establishing the building blocks of the INFF, a transformative contribution to the way Bhutan finances its development priorities. This includes supporting financing solutions aligned with longer-term investments with sustainable financing.

[9] National Accounts Report (2020)
[10] Patrick and Derek (2016), Forest cover changes in Bhutan: Revisiting the forest transition.

1.4 Defining innovative financing

At a global level, among a range of global development financing bodies there is no common, clear definition of innovative financing for development, and the language involved remains 'opaque and imprecise[11]'. The concept of innovations now extends to diverse forms such as thematic global trust funds, public guarantees and insurance mechanisms, equity investments, growth-indexed bonds, counter cyclical loans, distribution schemes for global environmental services, microfinance and mesofinance, and so on[12].

OECD describes innovative financing as comprising of: 'mechanisms of raising funds or stimulating actions in support of international development that go beyond traditional spending approaches by either the official or private sectors, such as: 1) new approaches for pooling private and public revenue streams to scale up or develop activities for the benefit of partner countries; 2) new revenue streams (e.g. a new tax, charge, fee, bond raising, sale proceed or voluntary contribution scheme) earmarked to developmental activities on a multi-year basis; [or] 3) new incentives (financial guarantees, corporate social responsibility or other rewards or recognition) to address market failures or scale up ongoing developmental activities[13]'.

[11] World Bank 2009, cited in Lampert(2014

[12] UN Secretary-General's 2009 progress report

[13] OECD 2009, cited in Lampert (2014)

2. Situational Analysis

2.1 Assessment of current financing landscape

The RNR Sector plays an important role in securing food sufficiency by increasing domestic production. The major activities included were land development and construction of cold storages, installation of input supply infrastructure facilities, RNR Enterprise development program, and promotion of climate smart agriculture in the six eastern Dzongkhags[14], conservation and protection of environment, promotion and development of livestock sector and rural development and climate change response program[15]. In addition to that the Government has been implementing food security project to boost agriculture and livestock production under the Economic Contingency Plan as a response to Covid situation.

As per the 12th FYP, the total estimated cost required for the MoAF to successfully implement several programmes over the next five year was Nu. 4,679.65 million whereas the capital outlay allocation was just Nu. 3,050 million (2.63% share of the national capital outlay)[16]. This is 37.24% reduction from the 11th FYP when 4.86 billion was allocated in the beginning of 11th FYP. Further, the reduction is significantly higher at 62.44% when revised allocation of Nu. 8.12 billion was made during the 11th FYP[17]. This shows that there is already reduction of fund allocation for the RNR sector which indicates the need to come up with the innovative financing mechanism.

The allocation of budget and expenditure plan amongst departments shows that DoA has the largest share accounting to 38% (Nu. 1,790 million) of the total estimated budget, closely followed by DoL at 32% (Nu. 1,504 million); and 17% (Nu. 818 million) for DoFPS, 6% (300 million) for BAFRA, 4% (Nu.184 million) for DAMC, and about 2% for the Secretariat that comprises of PPD, Directorate Services, RDTC and NBC.

In terms of programme wise allocation of budget, Food and Nutrition Security is the largest programme with involvement of multiple agencies which is allotted the largest share of Nu. 2,362.42 million equivalents to about 50% of the overall funds. This is followed by Sustainable Natural Resources Management with Nu. 706.97 million accounting for 15% of the overall fund allocation. Then to address the most pressing

[14] Mongar, Trashigang, S/jongkhar, Lhuntse, Pemagatshel and T/yangtse

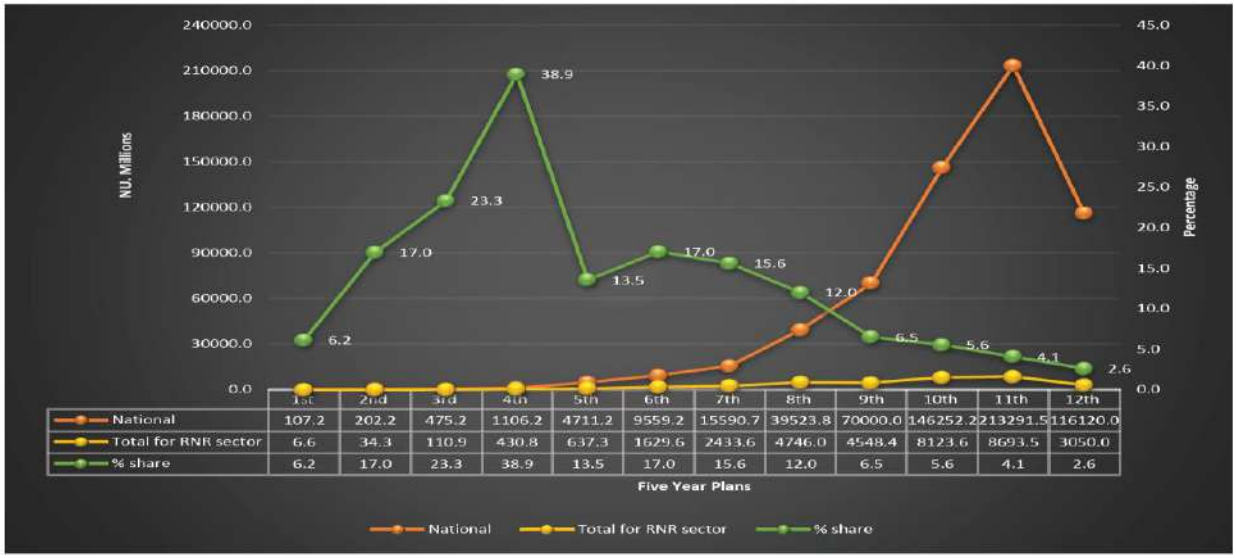
[15] 12th FYP, Royal Government of Bhutan

[16] 12th FYP document of the Royal Government of Bhutan

[17] 11th FYP document of the Royal Government of Bhutan

and urgent challenges of climate change and disasters in the sector, climate smart and disaster resilient development is allocated Nu. 655.68 million which accounts 14% of the total outlay. The other major programme is Value Chain and Enterprise Development with share of 8% accounting to Nu. 353.73 million has been allocated for commercialization, marketing and agro-enterprise development (Refer Table 1).

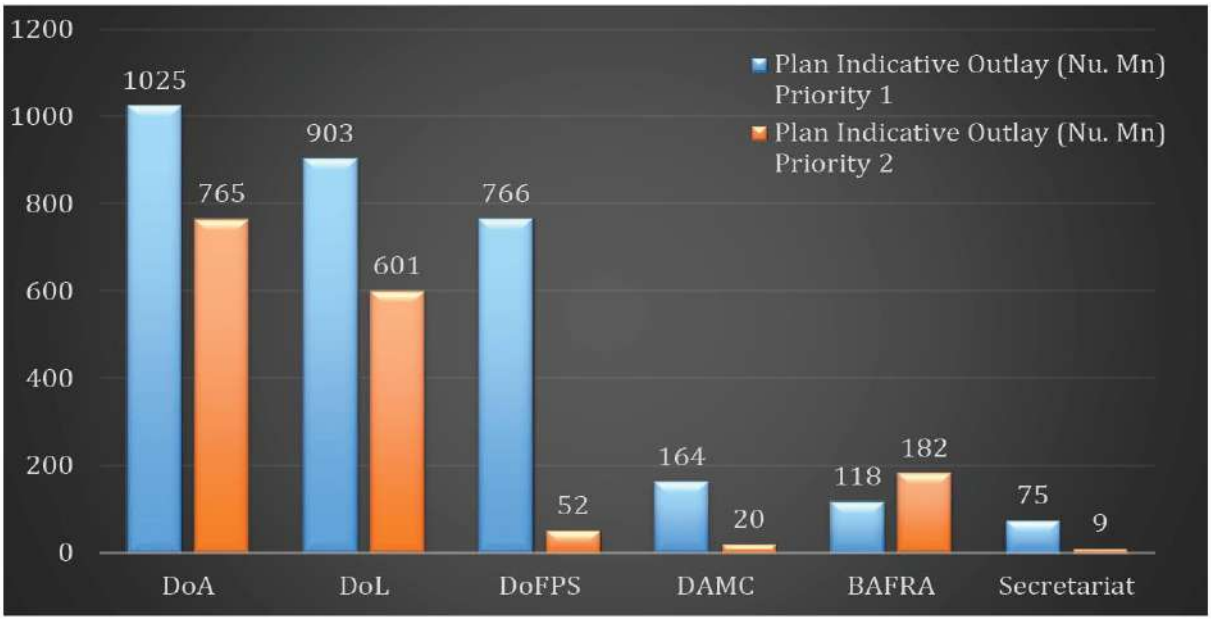
Fig 1: Share of 12th FYP Budget allocation for RNR Sector



	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
National	107.2	202.2	475.2	1106.2	4711.2	9559.2	15590.7	39523.8	70000.0	146252.2	213291.5	116120.0
Total for RNR sector	6.6	34.3	110.9	430.8	637.3	1629.6	2433.6	4746.0	4548.4	8123.6	8693.5	3050.0
% share	6.2	17.0	23.3	38.9	13.5	17.0	15.6	12.0	6.5	5.6	4.1	2.6

(Source: 12th FYP)

Fig 2: Budget allocation based on priority by agency



(Source: 12 FYP)

Table 1: Programme wise budget allocation

Programmes	Budget (million Nu.)
Food and Nutrition Security	2362.42
Value Chain and Enterprise Development	353.73
Sustainable Natural Resources Management & Utilization	706.97
Research and Extension Services	443.58
Climate Smart and Disaster Resilient Development	655.68
Highland Development	86.54
Coordination and support service	70.73
Total	4679.65

(Source: 12 FYP)

In terms of funding for major capital activities for the RNR sector, it is found that majority of them were sourced through either external borrowings or grants as shown in the table 2 below. Some of the most prominent sources of funds are from World Bank, European Union (EU), Green Climate Fund (GCF), Government of India (GoI), International Fund for Agriculture Development (IFAD) and the Royal Government of Bhutan (RGoB). They are found to be continuously supporting the Royal Government for consecutive years in the RNR sector.

Table 2: Source of funding for major capital activities for the past 5 years

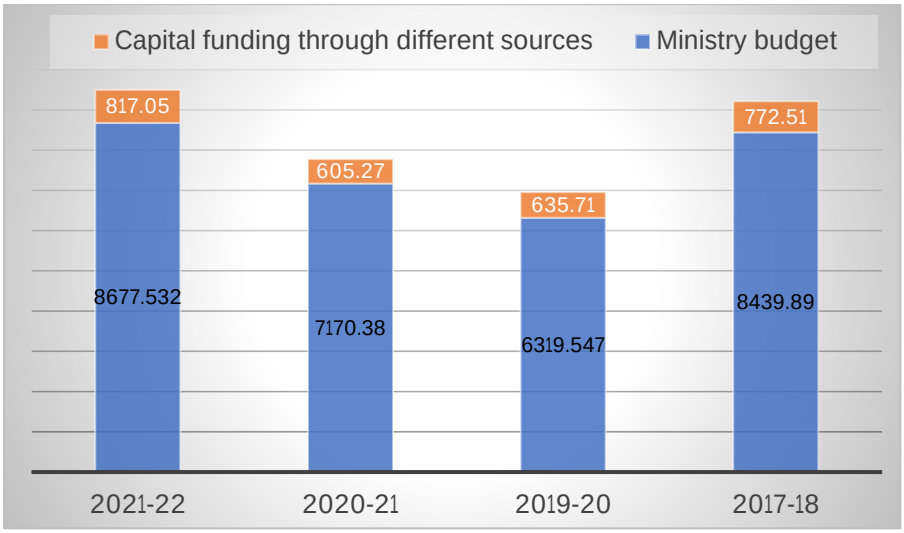
Sources of Fund	Amount (million Nu.)				
	2021-22	2020-21	2019-20	2018-19	2017-18
Trade Support Facilitation Program (TSFP)		285.90			
Royal Government of Bhutan (RGoB)	61.00	240.24	36.80	28.720	282.292
Green Climate Fund (GCF)	227.10	127.47			
Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)	70.00	52.00			
World Bank	125.82	100.61	68.317	220.948	102.93
European Union (EU-RDCCRP)	21.00	41.52	257.00	101.170	35.00
SAARC Development Fund (SDF)		11.43			
Project Grant (PG)		20.00			
International Fund for Agriculture Development (IFAD)		12.00	78.00	31.550	66.172

Government of India (GOI)	218.23		189.895		153.415
Bhutan Trust Fund for Environmental Conservation (BTFEC)	24.11			9.000	7.80
Private donors	103.76				
Global Environment Facility with UNDP (GEF-UNDP)	9.75			59.941	
Austrian Development Assistance	22.78				
UNDP	13.50				
World Wildlife Fund (WWF)			5.70		
HELVETAS					13.292
IDA					111.606
Total	897.05	891.17	635.71	451.329	772.51

Source: Budget report, MoF

The major capital activities constitute about 10% of the total budget allocation of the ministry. Some of the highest contributor in 2021-22 fiscal year are Green Climate Fund (GCF) about Nu.227.10 million, Government of India (GoI) Nu. 218.23 million and World Bank of Nu. 125.82 million.

Fig 3: Ministry budget allocation with capital funding



Source: Budget report, MoF

As per the past annual plans of the RNR sector, majority of the funds were from either grants or co-financed by the government. Some of the funding sources are as follows:

Table 3: Source of funding as par past plans

Name of project	Project duration	Funding	Fund amount
Sustainable Land Management Project (SLMP)[18]	Feb 2006 to June 2012 extended to June 2013	Global Environment Facility (GEF) through World Bank	USD 7.6 million
Bhutan for Life (BFL)[19]	10/05/2018 to 10/05/2032	Resources from a transition fund	USD 43 million
High Conservation Values (HCVs) in the programme landscape[20]	1st April 2020 to 31 March 2028	Nature Conservation and Nuclear Safety (BMU) through the International Climate Initiative	Euro 9.7 million
Food Security and Agriculture Productivity Project[21]	May 2017 to December 2022 to December 2024	FSAPP	USD 12.64 million
Enhancing sustainability and Climate Resilience of Forests and Agriculture Landscape and Community Livelihoods as NAPA III Project[22]	29th October 2017 to 30th October 2023	Grant from GEF and LDCF	USD 13.967 million
Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)[23]	10-year project (2015 to 2025)	Grant from IFAD	USD 25.64 million

2.2 Issues and challenges

Following are some of the issues and challenges in RNR sector:

a) Agricultural value chains are found to be weak and at nascent stage due to limited investment along the value chains. Proper investment to enhance value chain can improve productive capacity along the value chains to maximize the

[18] https://www.nssc.gov.bt/sustainable-land-management-project-slmp/

[19] https://www.wwfbhutan.org.bt/projects_/bhutan_for_life/

[20] https://www.wwfbhutan.org.bt/projects/living landscapes securing_high_conservation_value hcv_in_the_south_western_bhutan

[21] https://www.gafspfund.org/projects/food-security-and-agriculture-productivity-fsapp

[22] www.napa3.bt/?page_id=4190

[23] https://www.ifad.org/en/web/operations/-/project/1100001739

use of limited arable land, reduce import of food stuffs (cereals, horticulture, vegetables and dairy products) that can be easily produced, and value add for domestic and export markets, create employment opportunities, product diversification and agribusiness expansion. All these would be possible through alternative arrangement of financing.

b) Share of government budget for the RNR Sector has been found to be declining as compared to other service and industry sectors. Financing agricultural development is one of the major challenges as Bhutan prepares to graduate from LDC category by the end the 12th FYP since the RNR Sector is heavily dependent on ODAs and grants from various development partners.

c) Agriculture and its associated businesses are highly volatile and risky venture which limits most of the private investors. Financial institutions and private investors are reluctant to accept the risks prevalent in the agriculture sector, such as drought, floods, pests and diseases, or the high transportation cost of covering large geographic distances. Even with the current incentive and subsidy packages are less attractive for investors although mostly targeted to small holders and vulnerable population. More attractive incentive and subsidy packages and insurance mechanisms are pivotal for attracting FDIs and private sector investment in agriculture which would be possible only though additional financing scheme to commercialize and expand agribusinesses.

d) Agricultural Marketing is one of the hurdles that is becoming more pressing due to limited systems and infrastructure in place. Although there are opportunities for innovative financing in this area but have not been explored much which has limited product value addition to enhance agricultural marketing.

e) Most of the farmlands are located on mountain slopes and farm mechanization is generally difficult leading to high production costs which lead to not attracting the farming investors. With the innovative ways of financing to address land development along with farm mechanization would be a crucial input for productivity.

f) The funds are limited to upscale or advance the current agricultural research system along with adoption of climate resilient technologies. Moreover, there is need of more focus on human resource development before venturing into technology generation since researchers lack expertise that is demanded by the changing global demand for food production and climate change. This is also limited by inadequate access to innovative ways of financing to address the problems.

g) Bhutan has the highest annual per capita freshwater availability (109,000 m3 annually) in the region, but water is not necessarily available for irrigation due to distributional system and topography. Access to sufficient and assured irrigation and its management is a challenge due limited investment although there is opportunity to explore different financing schemes to bring about a change in irrigation systems predominantly rain-fed system into modern innovative irrigation systems.

3. Financing for what?

Bhutan is ready to move forward and graduate from the LDC status in the year 2023. The country has witnessed impressive socio-economic progress through developments taking place in every part of the country. The GNH philosophy has crossed the country's boundaries and inspired global thinking in pursuing sustainability and inclusivity beyond pure economics. Development aid, largely from the Government of India and also from the United Nations, International Financial Institutions (IFIs) and other donors sustained the process. The graduation from the LDC status, whose impact is often measured on access to aid, trade preferences and other support measures, appears unlikely to result in major fluctuations in the country's financing landscape as signaled by the ex-ante impact assessment of 201824. However, it will be the economic and social progress that the country will be witnessing in the next decade to drive a dramatic shift in the ways development will and can be financed.

The ratio of domestic revenues to total expenditures during the 11th Plan was 62% against the target of 85%. In the 12th Plan, grants covered about 20% of the Government budget, down 10% points from the previous plan, mainly due to 44% increase in overall expenditure. Still, 70% of the capital budget is dependent on foreign grants and loans. India, Bhutan's largest development partner, finances about 40% of the capital budget. Given the long-pursued goal of economic self-reliance and imminent graduation from LDC status, there is a need to fill the gap in financing through various alternatives. The country will have to shift the way it is financing current expenditures in the short term and capital expenditures in the medium and long term. Specifically, for the RNR Sector, there is still a long way to go to achieve self-sufficiency through internal production as follows.

As per the economic development policy, agriculture is included as one of the Five Jewels for growth in terms of their potential and impact to the society. It includes organic farming, agro-processing, biotechnology, forest-based products, poultry, fisheries, floriculture, nutrition food, animal feed, apiculture, horticulture and dairy. The emphasis is on improving agricultural productivity and production to achieve national food security, supply raw materials to agro based industries and for exports. A pressing priority shall be to create enabling conditions to transform from subsistence to commercial production including postharvest value addition, processing and marketing. Thus, there is a need of government intervention in providing assured

[24]UN-CDP https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/CDP-PL-2018-5a.pdf

irrigation, construction/renovation of farm roads, land development, farm mechanization, mitigating human-wildlife conflicts, strengthening marketing infrastructures and systems and providing incentives to farmers and private sectors involved in agriculture.

There is also an opportunity to intensify development of crops, livestock and forestry products for domestic consumption as well as for income generation and employment. The Ministry of Agriculture and Forests (MoAF) will be encouraging and promoting commercial scale feed plants on a regional basis along with promotion of commercial farming. Further to improve and support RNR products for marketing, there is a need to establish distribution, logistics infrastructure and systems. In terms of forestry and wood-based industry, there is a need to increase productivity through various strategies such as integrated wood industry which is under process to phase out outdated sawmilling operations along with promotion of sale and trading of timber in processed form to ensure optimal utilization.

The other areas of interest are promotion of green business and climate smart technology agriculture as well as application of circular economy projects. Further to enhance production, there is a need to develop comprehensive input supply systems such as for greenhouse, seeds, fertilizers, seedlings, livestock inputs etc. The other opportunity is to promote ecotourism in the communities to generate greater awareness of its offerings within the local areas.

On the other hand, marketing plays a pivotal role in stimulating higher production, income generation, creating employment opportunities, linking domestic and export markets and enhancing food security and economic development. Thus, in order to create efficient and effective marketing system, there is a need to support RNR market development, trade facilitation, promote ease of doing business, empower producers, buyers and traders with market information and enhance supply chain management[25].

Ensuring biosecurity is important for the country with a good surveillance system in place for early detection of hazards. Proper surveillance system can also facilitate exports with free from trade-sensitive pests and diseases. Thus, there is a need of investment for effective prevention and preparedness for biosecurity, adoption of evidence-based solutions and best practices, enhancing partnership, collaboration and engagement for food regulatory systems[26].

[25] RNR Marketing Strategy 2021, DAMC

[26] Bhutan biosecurity and Food safety strategy and action plan (2021-2028), BAFRA

Private sector participation needs to be promoted in the RNR sector to augment the efforts of the Royal Government towards the sustainable development such as in marketing, production, value chain development through commodity exchange mechanisms, strengthening of supply chain management and for private sector/community participation in the development and maintenance of irrigation and water management systems.

4. Regulatory Framework

4.1 Acts and policies

Constitution of the Kingdom of Bhutan 2017

a) Taxes, fees and other forms of levies shall not be imposed or altered except by law.
b) The Government, in the public interest, may raise loans, make grants or guarantee loans in accordance with the law.
c) The Government shall ensure that the cost of recurrent expenditures is met from internal resources of the country.
d) A minimum foreign currency reserve that is adequate to meet the cost of not less than one year's essential import must be maintained.

Public Finance Act of Bhutan, 2007

a) Raising of revenues through taxes and appropriate money requirements for the state shall be authorised by the Parliament.
b) Minister of Finance shall propose taxation measures to the Parliament and raising other revenues and resources for the Government.
c) Minister of Finance shall approve borrowings and issuance of public securities subject to concurrence of the Lhengye Zhungtshog.
d) Minister of Finance may raise a loan from any person, organization, or Government, either within or outside Bhutan.
e) Ministry of Finance shall mobilize resources, including external assistance, and integrating those funds into the budgeting, reporting and accountability processes prescribed by this Act.
f) All money of revenue nature to be deposited to the Government Revenue Account; all money received as grants, borrowings, recoveries of loan principals and other receipts to be deposited in the Government Budget Fund Account and all money received by any budgetary body as advance or reimbursement from other budgetary bodies to be deposited in the Government Non-revenue Receipts and Deposits Account.
g) The approval of the Minister of Finance shall be obtained unless otherwise authorized by other provisions of this Act, to fix the fees and charges made by budgetary bodies, for services provided to the public.

Local Government Act 2018

a) Gewog Tshogde can mobilize, spend, and invest money for the support of its functions in accordance with the Royal Government's policies and rules and regulations.
b) Gewog Tshogdes shall levy taxes such as land, building, cattle, grazing, entertainment, advertisement and other taxes.
c) Thromde Tshogde can levy rates as may be approved by Parliament such as land tax, property tax, property transfer tax and other taxes including various fees and charges.
d) Thromdees can raise, borrow, spend, and invest money for the support of its functions in accordance with laws, Royal Government's policies and rules and regulations.

Public Private Partnership Policy 2016

a) The policy covers all infrastructure and services where the private sector is able to provide public infrastructure and services that results into cost effectiveness and efficient delivery for the public good.
b) Decisions on appropriate revenue sources to be based on the findings of the Feasibility Study and recommendation of the Public Private Partnership Agency. Revenue sources for the private party could include tariffs and/or annuity payments.
c) If the PPP Steering Committee determines that a project is economically viable but not financially viable without Financial Assistance, it will seek approval of the Lhengye Zhuntshog for assistance.
d) The Royal Government will provide subsidies or viability gap funding for PPP projects that are economically and socially justified but fall short of financial viability.

4.2 Financial rules and regulations

Public Private Partnership Rules and Regulations 2017

a) The Implementing Institution shall collate information including the project concept, scope of the project, roles and responsibilities of parties, the estimated project cost Identification for the Public Private Partnership Project.
b) The Ministry of Finance shall establish a Project Development Fund under administrative control of Public Private Partnership Unit as a central fund for financing the transaction advisory services for the Project.
c) The Implementing Institution may adopt an Expression of Interest process, before the initiation of tendering stage to list out the project basis and inviting

potential bidders to express their interest in respect of Public Private Partnership Projects.

Rules on the income tax Act of the Kingdom of Bhutan 2001

a) All unincorporated businesses issued with a license by the issuing Authority shall pay Business Income Tax (BIT) at the rate of 30% of the Net profit.
b) 30% of the Gross Income from cash crop shall be allowed as deduction. Income from cash crop means income from apple, orange, and cardamom orchards.

Rules on the Fiscal Incentives Act of Bhutan 2017

a) Tax rebate of up to 15% of the up-gradation expenses is applicable for adopting modern environmentally friendly technologies.
b) Income tax holiday of 10 years applicable to CSIs and Co-operatives but the business should have commenced commercial operation between 8th May 2017 and 31st December 2020.
c) Income tax holiday of 10 years applicable to business engaged in agriculture and RNR activities but the entity should have commenced commercial operation between 8th May 2017 and 31st December 2020.

5. Assessment of potential financing opportunities

Majority of the RNR sector interventions have been pro-poor and welfare oriented where it does not generate revenue as a plough back to sponsor sector development. So far, the sector has been receiving funding from national exchequer and more abundantly from the development partners. For instance, in last 30 years (7th to the 12th plan) RNR sector's public investment increased by 29%[27]. However, over the years, input and infrastructure related services have been progressively withdrawn from subsidy program, resulting in clients sharing the cost of development. While the proportions of cost sharing may not be substantial, it has helped in enhancing the sustainability of development initiatives through increase participation and ownership.

There are numerous innovative financing mechanisms and some of the potential innovative financing sources for RNR sector are the following:

a) Securities and derivatives include bonds and notes, guarantees, loans, microfinance investment funds and other derivatives.
b) Establishing a new Climate Fund and reforming the tax collection system.
c) Cost sharing of RNR services between the RNR sector and the beneficiaries like ecotourism, agriculture infrastructure and irrigation systems.
d) Collection of fees for certain services such as laboratory analysis, surveys, issue of clearances etc.
e) Carbon trading being a carbon negative country has opportunity to earn revenue such as through clean development mechanism from Co2 emissions from agriculture or livestock and the forestry.
f) Fintech is about the innovative use of technology in the design and delivery of financial services and products. This includes digital banking and financial literacy, block chain applications, diaspora finance, crowdfunding, e-lottery and financial product diversification.
g) Voluntary donations which include carbon auctions and consumer donations.
h) Public-private partnerships, a long-term contractually based mutual cooperation between public and private sector aimed at the provision of public services.
i) Project finance, which mainly targets large-scale and long-term projects, and it protects the undertaking company in case of failure.
j) Blended finance, a mechanism that uses public and philanthropic funds to leverage private capital in order to meet the financing needs of an inclusive business.

[27] 12th FYP, Royal Government of Bhutan

k) Result-based financing is used by developing country governments, or states or donor agencies, in cooperation with the private sector, to incentivise the provision of goods or services to create or expand markets, or to stimulate innovation. This includes advanced market commitments, awards and prizes, development impact bonds, performance-based contracts, debt swaps and buy-downs as well as payments for ecosystem services (PES).

l) Thematic bonds, a sustainable investment option that is beginning to attract a new generation of investors.

m) Agricultural value-chain finance is financing provided to actors in the chain by a financing source outside of the value chain or by another actor in the value chain.

n) Crowd funding brings together multiple private investors to fund a project for a specific cause, usually start-ups with the desired impact as main reason why investors choose one project over another.

o) Impact investment funds, curate a selection of carefully vetted businesses, which seek funding towards an impact area or around a regional focus.

p) Financing through savings with the introduction of new technologies in the RNR sector mainly through green business and climate smart technology.

q) Financing through corporate social responsibility (contributions from the companies as part of the social responsibility).

The United Nations Framework Convention on Climate Change (UNFCCC) has created more sources of funding windows for combating climate change and enhancing developing countries capacity to build resilience to climate change impacts. The UNFCCC funding sources include Green Climate Fund (GCF), Adaptation Fund (AF) and Least Developed Countries Fund (LDCF) for NAPAs. Multinational institutions like GEF, World Bank and Asian Development Bank (ADB) also provide support for MEA related projects. Similarly, BIOFIN seeks to address the biodiversity finance challenge in a comprehensive manner - to define biodiversity finance needs and gaps with greater precision through detailed national-level assessments, to determine challenges and opportunities for resource mobilization, and to build a sound business case for increased biodiversity investments. Through all these developments, synergies with other national and international initiatives on financing and funding streams are explored, including exploring revenue streams, coordination with bilateral and multilateral donors, engagement with private sector and local funding partners.

6. Most used innovative financing options

Innovative financing mechanisms are diverse, and they respond to different needs. Following are some of the proposed best internationally practiced innovative financing models which are relevant options to the RNR sector. Each model provides financing mechanisms in terms of their structure and their application in the RNR sector followed by a case example to show how the mechanism works in practice.

6.1 Public Private Partnership (PPP)

A PPP is a long-term contractual based mutual cooperation between public and private sector for provision of public services. The resources of both the private and the public partners are combined, and the different risks are allocated in the most efficient way to generate a successful project[28]. A study carried out by FAO on 70 cases from 15 developing countries highlights that the public-private partnerships in agriculture are mainly established around four issues[29]:

a) to develop agricultural value chains.
b) to run joint agricultural research, innovation and technology transfer.
c) to build and upgrade market infrastructure, including cold storage, washing and packaging services, vehicle and machinery servicing, etc.
d) to deliver business development services to farmers and small enterprises (BDS).

The pooling of public and private funds through PPP projects may range from small initiatives to bigger projects for the construction and management of market infrastructure, feeder roads in rural areas, processing plants, circular economy projects, among others. Financing through PPPs may include co-equity investments, in-kind contributions, matching grants and concessions for the private sector.

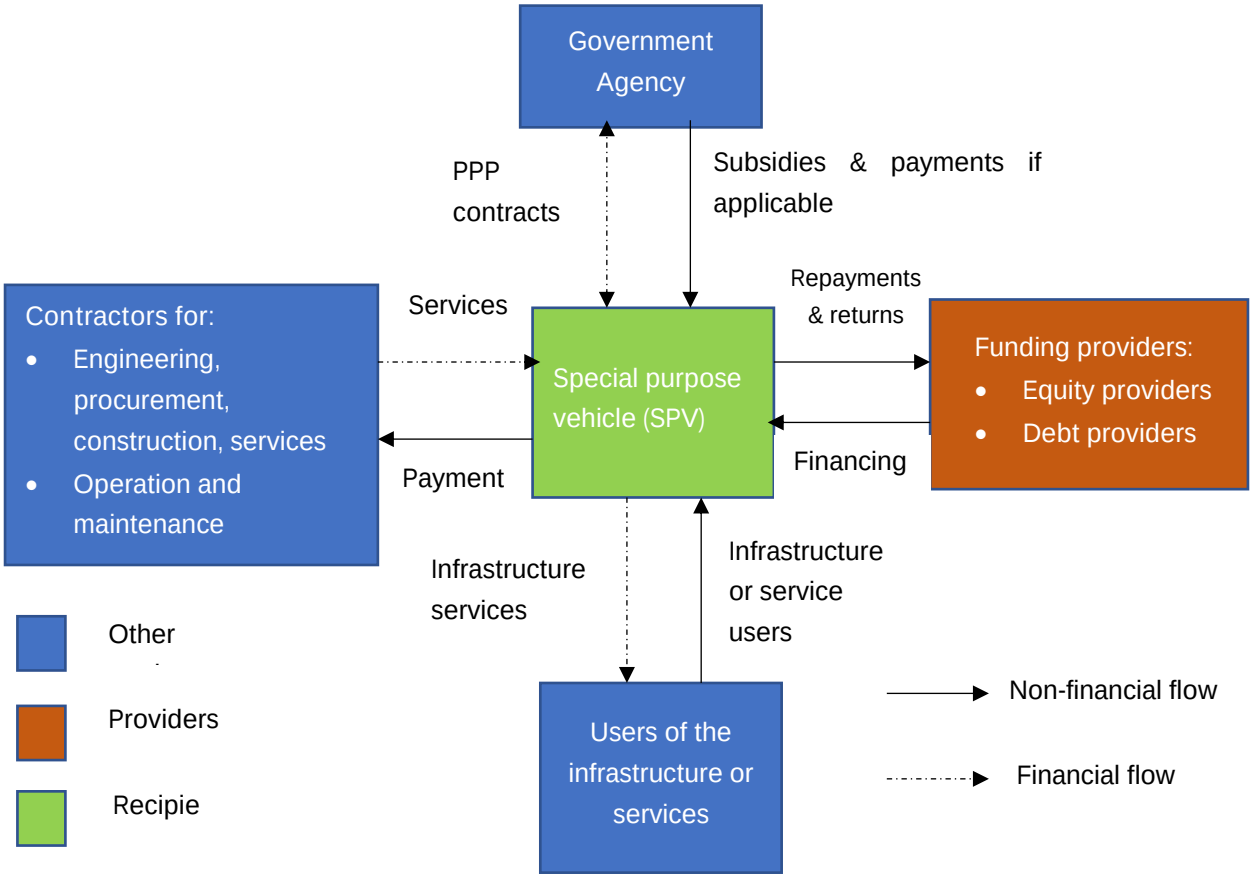
Formation of PPP will be open to anyone although competitive bidding process is encouraged for the selection of private parties. This means that potential partners will be provided with detailed terms of the proposed partnership (e.g., the scope, timelines, expected contributions and risk distribution). However, in practice, PPPs are often

[28] GIZ, PPPs in the context of development cooperation — an overview and approach, 2011 http://www2.giz.de/dokumente/bib-2011/giz2011-0183en-ppp.pdf

[29] Rankin, et. al., "Public–private partnerships for agribusiness development", FAO, 2016, pg.34

formed through “limited competitive bidding,” the government selects the private party from the few eligible entities[30].

Fig 4: Actors and relationships in PPPs.



(Reference: GIZ, Finance Guide 2018, page 59)

PPP Case: Psaltry International Limited and 2SCALE

In a PPP established in 2014, 2SCALE brought together Nigerian Breweries (a subsidiary of Heineken) with Psaltry International Limited (PIL) – a medium scale cassava starch producer in Nigeria. Nigerian Breweries offered offtake contracts in the initial years and provided financial support to purchase a second processing line[31]. In addition to bringing the PPP together, 2SCALE played a major part by providing technical support to Psaltry. Recently, they focused on reducing the cost of producing the cassava[32].

[30] Rankin, et. al., “Public–private partnerships for agribusiness development”, FAO, 2016 pg. 109

[31] 2SCALE, Business as Unusual: Highlights 2014 https://www.2scale.org/upload/42c148_Highlights-2014.pdf

[32] 2SCALE, Cassava, https://www.2scale.org/updates/cassava May 2018

2SCALE also supports the initiative through training of the extension staff, and by developing local and regional networks to strengthen access to and relations with transporters, financial institutes, input suppliers, and research centres, which are developing new higher yielding, and higher quality cassava varieties. By focusing on farmer mobilization and training, as of October 2018, PIL's supply chain has expanded to 3,000 out grower farmers, of which 1,300 are committed farmers cultivating about 3,000 hectares of farmland. About half of the committed farmers receive inputs, including stem cuttings, fertilizers, pesticides and other services (tractor, spraying) on credit[33].

In the context of the RNR sector, potential private sector (an SPV) can set up the projects like in the case of integrated wood-based industry, commercial production of organic fertilizer etc. in consortium with the regional or international company can execute the potential project. The investment can be mobilized through the private sector investment for the proposed project.

Advantages:

Increased funding for infrastructure: Since the private sector finances the construction of the project and is reimbursed by the project's cash flows, PPPs reduce the financing burden for the government, and increase the overall universe of funding available for infrastructure financing.

Risk shared with private sector: PPPs transfer a part of the project's risk to the private-sector companies involved, and directly result in improved public-sector control of the overall project cost, delivery time frame and end-product quality. The risks pertaining to these factors are passed on to the private sector participants, which may be better equipped to manage them.

Increased efficiency through private-sector participation: Public-sector authorities often lack in-house capabilities related to the construction, operation and maintenance of infrastructure projects. Specialized infrastructure companies can introduce the management and technical expertise needed to innovate and carry out complex projects.

[33] Discussions with Ms. Yemisi Iranloye, Managing Director, Psaltry International, September -October 2018.

Development of local private-sector capabilities: By engaging in joint or cooperative ventures and serving as subcontractors for larger and more technologically advanced international players, local private-sector companies can develop capabilities in areas such as civil and electrical engineering, facilities management, security services or maintenance services.

Improved quality and maintenance: PPPs bundle construction, operation and maintenance tasks into one contract. This provides incentives for the private company to build the asset at a high level of quality, reducing the subsequent need for maintenance.

Disadvantages:

High level of complexity: Under traditional public-sector procurement models, the government specifies the quantity and quality of the service, while the infrastructure is constructed by private companies that have been awarded project responsibility in a tender process. Once construction is finished, the asset is transferred to and operated by the government. PPPs are substantially more complex than this traditional procurement model and require special skills and expertise on the part of the public authorities.

Bankability and risk allocation: If too much risk has been allocated to the private-sector party, lenders will reduce the amount they are prepared to lend. When this happens, more equity investment will be needed.

Larger potential for (negative) contingencies: Given the long-term nature of these projects and the complexity associated, it is difficult to identify all possible contingencies during project development. Thus, issues may arise that were not anticipated at the time the PPP contract was concluded.

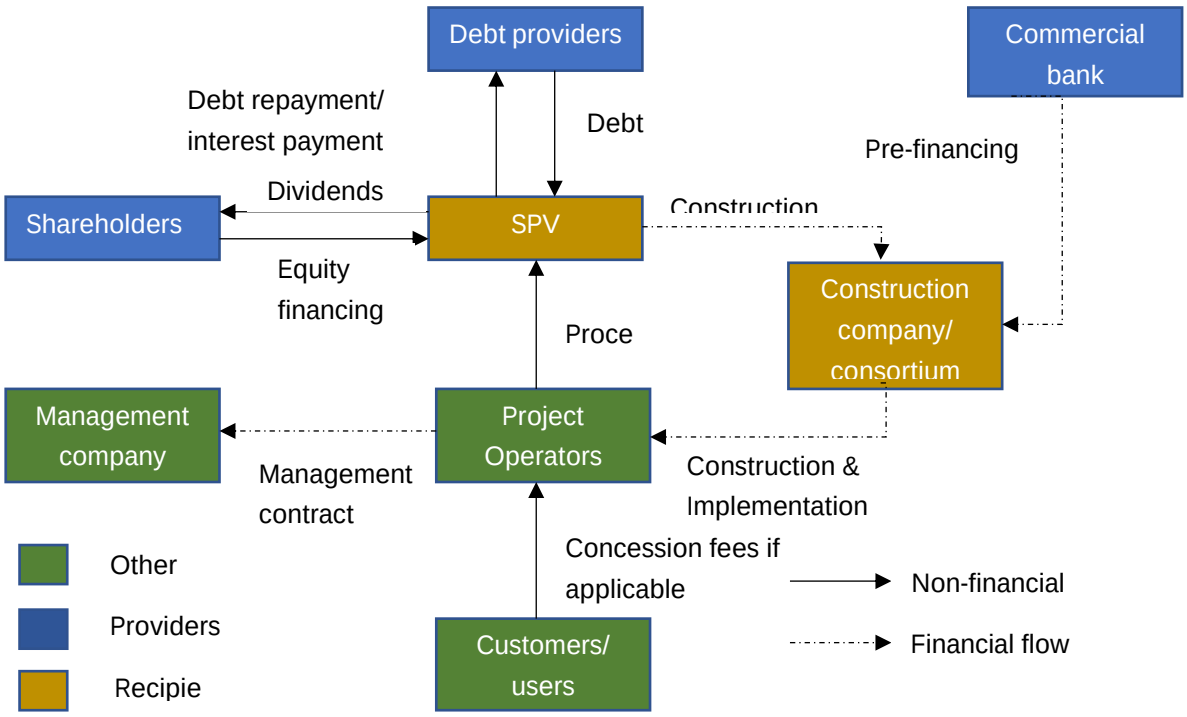
Higher cost of finance: PPPs are more expensive than traditional procurement, since the return expected by private-sector participants reflects the risks that may emerge during the operations and maintenance period.

6.2 Project Finance

Project finance mainly targets to large-scale and long-term projects. It differs from other financing options that are at equal scale, as it protects the undertaking company in case of a failure. This is done by creating a different company, called as Special Purpose Vehicle (SPV) in order to carry out the project. The financing is placed into the SPV and it relies solely on the revenue from the SPV for repayment and on the SPV's assets for collateral purposes. The revenue is only expected once the project is put into operation, therefore it may take a long time for the lenders to be repaid. This increases the importance of due diligence and project structuring.

Financing instruments may include equity, loans or bonds, or subsidies that come from public and private sources. The shareholders provide the equity, while others provide debt financing. If the shareholders are public and private entities, the SPV may even be a PPP. Depending on how much return each investor seeks and how much risk it is willing to take, project financing can be structured in different ways.

Fig 5: Actors and relationships in Project Finance



(Reference: GIZ, Finance Guide 2018, page 70)

The scale of an average project finance deal differs, but the nature of this type of financing and the complexity that comes with it, makes it only relevant for larger size projects. The example case below (raising an SPV starting with $59 million) is on the lower end of the spectrum of project finance, and it would be safer to say that an average project finance deal is $100 million and upwards.

Project finance is a complex form of financing, given the size and the necessity of setting up an SPV. A company that wishes to set up project finance would often seek potential partners through their relationship network, most importantly public financiers such as development banks and sometimes government entities. Partnerships are tailor-made and relationship intensive. As is also described below, the presence of a more independent broker (in this case the Clinton Health Access Initiative) could greatly benefit the partners, especially when the SPV is set up for the purpose of advancing a public good, and also when the group of actors participating in the SPV is diverse.

Project Finance Case: Africa Improved Foods To counter malnutrition in Rwanda, the private Dutch company DSM agreed to work with Government of Rwanda, World Food Program, CDC (the investment arm of the DFID), the International Finance Corporation (the World Bank Group) and FMO (a Dutch development bank), to create a sustainable solution to scale-up the creation and delivery of nutritious, supplementary food for the first 1,000 days of life.
Clinton Health Access Initiative brought development funders and private investors together in a joint venture that raised $59 million[34]. As a result, Africa Improved Foods was created in Rwanda as a Holding Company- a Special Purpose Vehicle. The main shareholders of AIF are DSM (47%), IFC (20%), the CDC Group (20%) and FMO (13%)[35]. The Government of Rwanda owns an eight percent equity stake of the operating company in Rwanda, with the remainder held by the AIF holding. The Government of Rwanda and World Food Program are the main purchasers of AIF products.
In the context of RNR sector in Bhutan, a separate company can be created (Special Purpose Vehicle) in order to carry out the project such as agriculture product processing plant, electricity generation plant through the use of organic waste, integrated wood-based industry, packaging and grading plant etc. The funding can be sourced from the commercial banks as loan with the asset of the company as collateral.

[34] OECD, "Partnership Models in Blended Finance: An Overview", January 2018
[35] FMO, "Addressing Child Malnutrition at Scale", 2015

Advantages:

Long-term financing enabled: Project finance enables long-term financing to be raised for projects that entail huge capital expenditures. Thus, companies whose financial position is not strong enough to raise the necessary finance to invest in a project on their own can potentially acquire sufficient financing on a project-finance basis.

New sources of capital mobilized: Projects can be structured so as to attract a wide range of finance providers, thus supplementing or even substituting for banks. Project finance helps in accessing a large spectrum of providers with different risk-return profiles, particularly given the globalization of financial markets. For instance, private-equity investors, who tend to take a long-term view of their investments and are often willing to take on more risk than banks in anticipation of higher returns, are increasingly taking an interest in project finance.

Risk allocated efficiently: By properly allocating risk among a group of actors, project finance allows a project developer to undertake a project with more risk than the sponsor is independently capable of assuming (or willing to assume).

Ringfencing protections created: The risks of the new project are separated from the project developer's existing business. This means that if the project fails, the project-finance structure insulates the developer from having to use existing assets to repay either the project debt or any liabilities incurred through the failure of the project.

Disadvantages:

Complex structure: Given the complex nature of project finance, considerable time and effort must be invested in structuring and creating a detailed appraisal of the project, for instance with the help of financial and legal advisers and other experts. This adds to the cost of setting up the project and may delay its implementation.

Unforeseen risks: Given the long-term nature of project finance, this model contains several inherent risk factors. Since the viability of the project-finance structure depends on the strength of the project itself, the project's technical, financial, environmental and economic viability are of paramount concern. Any risk factors that weaken the project are also likely to weaken the financial returns received by investors and creditors. Therefore, an essential early-stage task is to identify and analyze the project's risks, then to allocate and mitigate them.

High cost of capital: Project finance usually involves a high proportion of debt. The non-recourse (or limited recourse) nature of this debt increases the cost at which it is provided.

6.3 Blended Finance

Blended finance is an innovative approach to financing sustainable development that aims to attract commercial capital towards projects that benefit society while also providing financial returns to investors[36]. Blended finance is a mechanism that uses public and philanthropic funds (in the form of financing or in guarantees, technical advice, capacity building, etc.) to leverage private capital in order to meet the financing needs of an inclusive business. It is similar to a PPP in that the public and philanthropic (development) funds serve as a de-risking tool in order to bring in private funds. However, it doesn't require an SPV to operate.

Blended finance is increasingly an important source of funding. As per the State of Blended Finance Report 2021 from Blending Global Finance, a total of 680 blended finance transactions were captured with aggregated financing of over $160 billion. For the blended projects, the blended structure with the largest median transaction size have grown in size in recent years (median size of $130 million between 2018-20, up from ~$107 million between 2015-17). When it comes to blended finance, mature investment options were more likely to access funding and at larger amounts, compared to start-up projects.

Blended finance combines public and private capital in order to deliver along three pillars: Impact, Leverage, and Returns.[37]
Impact: Investments that deliver measurable social, environmental and economic impact.

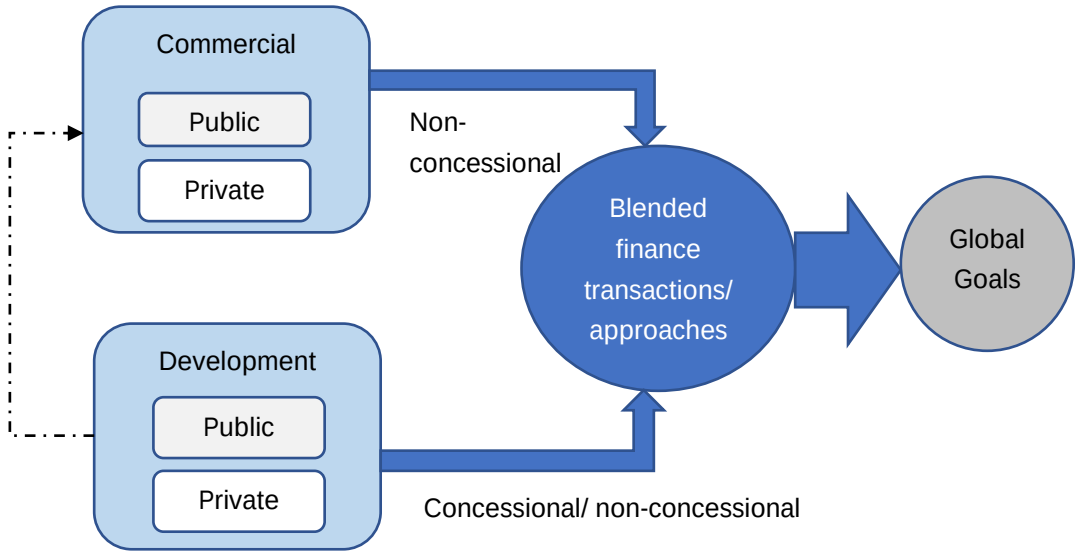
Leverage: The systematic and strategic use of development finance and philanthropic funds to mobilise and engage private capital at scale

[36] The OECD DAC Blended Finance Guidance | Best Practices in Development Co-operation | OECD iLibrary (oecd-ilibrary.org)

[37] OECD and WEF, Insights from Blended Finance Investment Vehicles & Facilities, 2016, pg7 http://www3.weforum.org/docs/WEF_Blended_Finance_Insights_Investments_Vehicles_Facilities_report_2016.pdf

Returns: Market-based risk-adjusted returns for private investors that meets business goals and fiduciary duties.

Fig 6: Dynamics of Blended Finance



Additionality[38]: The concept of additionality is an important element in the blended finance discourse. It refers to the added value of a specific form of finance, whether financially and/or socially, and plays an important role in demonstrating the rationale behind blending.

Additionality	Financial implications	Development implications	Risks involved
Financial only	Subsidy is required for project to commence	The development results/impact of the project can be attributed to the grant element. No changes in project design	It is difficult to calculate additionality
Development only	Subsidy is not required from a financial point of view	Development results improve as a result of blended operations better design	Quantifying the development impact can be difficult. How much improvement is required?

[38] Blended Finance: What it is, how it works, and how it is used, Oxfam, Research report. Pereira, J. (2017)

Development & Financial	Subsidy is required for project to commence	The development results/impact of the project can be attributed to the grant element and development results improve as a result of blended operations (better design)	Same as above
None	Unnecessary subsidy to the project	No improvement in development results	Waste of ODA resources

At the initial stages of the projects, the role of public and development funders is especially important until its commercial value is proven. Their financial support, through grants or similar financing instruments, is key in the start-up phase of the project. While blended finance appeals to development funders as it leverages private resources and potentially also their expertise, it also appeals to private investors because it allows them to explore new markets and high-return sectors at reduced risk, with the technical support from development funders. Hence, the benefits exceed financing for all partners. Examples of funding instruments they have created, are the Global Agriculture and Food Security Program (GAFSP) or the Dutch Good Growth Fund, and often they are open to companies to apply[39].

Blended Finance Case: Global Agriculture and Food Security Program

Funded by the governments of Australia, Canada, Japan, Netherlands, UK, and US, the Global Agriculture and Food Security Program (GAFSP) is housed at IFC. The program invests alongside IFC in projects that private investors have avoided in the past. By blending public and development funds, GAFSP and IFC are able to invest in early-stage or high-risk projects. The fund aims at correcting market failures in the entire food supply chain, from farm inputs to logistics and storage, to processing and financing.

In 2016, GAFSP's Private Sector Window (PrSW) funding, together with IFC, supported 42 investment projects in agribusiness with a total project size of $1.3 million. In addition to investments, IFC also brings in technical advice and training in order to help grow production, strengthen farming standards, reduce risks andmitigate climate change effects. GAFSP invests in inclusive businesses in agriculture. In 2016, the investments benefited 3.3 million farmers.

[39] Convergence report: The State of Blended Finance (2018)

Blended Finance is the provision of debt, equity or grants to a project or company at various stages. Supporting mechanisms are a set of indirect mechanisms that attract private capital by mitigating risk to address investor barriers across the entire life cycle of a project or enterprise. These include:

Technical assistance: Advisory services that support the investee project or enterprise to function more effectively and efficiently, creating the potential for long-term commercial sustainability and ultimately improving the investment viability.

Risk underwriting: Unfunded risk underwriting tools that improve the credit rating by offering better terms and/or additional assurance that investors will be repaid amid unforeseen credit events, effectively shifting the risk-return profile of an investment opportunity enough to enable private investors to commit capital.

Market incentives: Risk management tools that can reduce investor risks from excessive market volatility while seeking to deliver positive returns and limit the downside risk of investing in emerging and frontier markets; these include local currency swaps, interest rate swaps and credit default swaps.

Blended Finance Market segment is the stage of a project or company in the investment life cycle when specific barriers are encountered in raising private capital. The five stages are:

a) Preparing, when significant initial costs are encountered, coupled with uncertain viability and visibility into whether a project will be approved.
b) Pioneering, when entrepreneurs are experimenting with new ideas, products and business models in early-stage investments, and it is difficult for private investors to justify the time and funds to support innovation.
c) Facilitating, when ongoing projects and enterprises requiring capital to fund expansion and/or existing operations may offer strong development returns, but the risk-adjusted returns for private investors may be below commercial thresholds.
d) Anchoring, when mature or credible enterprises/projects seek capital for scaling or replicating in critical areas of development, but capital providers may be hesitant to invest because of real and perceived macro risks (such as political and sectoral risks, as well as currency risks and uncertainty around exits).
e) Transitioning, when projects and enterprises are at a very mature stage, suited for commercial viability and access to commercial markets, but many private

investors lack access to a pipeline of deals that are sufficiently sizeable and scalable to fit within investor mandates.

Advantages:

Private-sector capital mobilized for development purposes: Blended-finance vehicles increase the reach of limited public development-finance and philanthropic funds, as they are used strategically to encourage the participation of larger volumes of private capital. Through the provision of investment opportunities for a variety of investors with different risk, return and impact profiles, private capital is channeled into investments with high development impact.

Combined public and private-sector expertise: Bringing together the complementary skill sets, knowledge and other resources held by public, philanthropic and private investors can increase the scope, range and effectiveness of development-related investments.

Increased private-sector investment in socially and environmentally beneficial projects: The provision of incentives encourages private-sector capital to enter sectors and markets that might otherwise be avoided by traditionally commercial investors. This is achieved by de-risking investments and by demonstrating financial viability and technical feasibility.

Improved financial discipline: The involvement of private-sector capital can have a positive effect on financial discipline within projects.

Expanded ability to reuse development funds: The entry of private-sector capital enables donors to realize financial returns and thus recycle scarce development funding for other development purposes.

Disadvantages:

Risk of crowding out private investments: Public-sector engagement in blended finance – particularly if a concessional finance model is used – can crowd out other local or international commercial finance providers that would only be able to provide finance at higher rates.

Risk of market distortions: Providing access to support and/or finance to selected investors or companies gives these recipients a competitive advantage relative to other investors or companies, thus potentially distorting the market.

Risk of wasting scarce public resources: Any time public-sector aid is provided, there is a risk of supporting an activity that would have happened anyway, or of providing much more support than required to mobilize the private sector.

Difficulty of proving, measuring additionality: As of today, no guidelines for assessing additionality when working with private financial sectors exist. Measuring and comparing financial and developmental additionality presents numerous methodological challenges, and it is not a common practice to assess additionality on both an ex-ante and ex post basis. This also makes it challenging to understand the cost-effectiveness of blended-finance initiatives as compared to alternatives.

Difficulty of balancing private, public interests: A fine balance must be struck between ensuring the confidentiality required by private investors and ensuring transparency in the use of public funds.

Mission drift: There is a danger that public and philanthropic sectors may seek to bring in purely commercially oriented investors at any cost, and/ or focus too heavily on easily attained goals in order to make the project or vehicle more financially attractive.

6.4 Result Based Financing

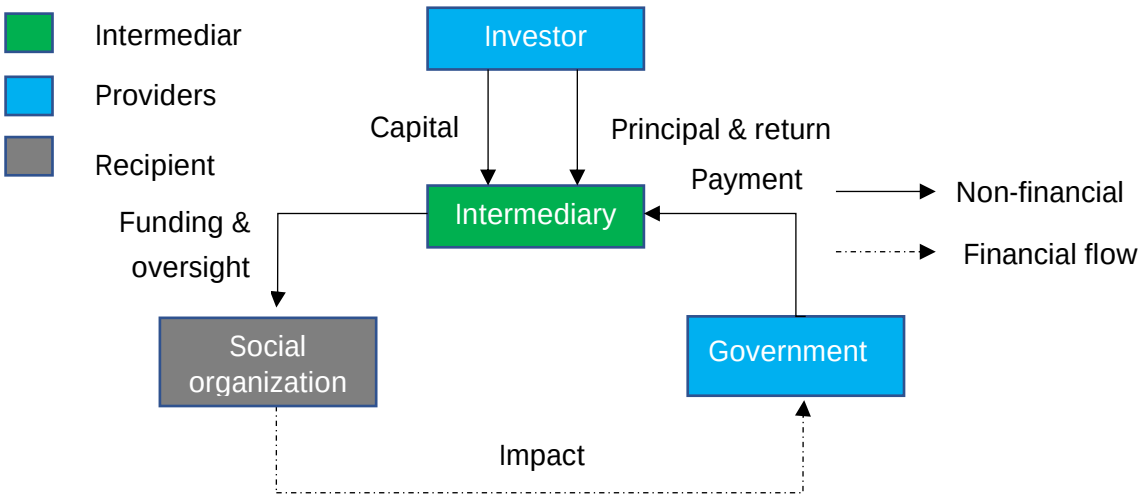
Result-based financing (RBF) is used by developing country governments (national or local), state agencies, or donor agencies, in cooperation with the private sector, to incentivise the provision of goods or services, to create or expand markets, or to stimulate innovation[40]. The differentiating aspect from conventional financing structures is that activities, results, or end-goals are pre-defined, and the payment is tied to their achievement.

In linking funds to results different options include output-based aid (OBA), Cash Transfers, Advance Market Commitments (buyer's guarantees), Development Impact Bonds, and Social Impact Incentives. The World Bank has been an active RBF investor,

[40] DANIDA, Private Capital for Sustainable Development (2016)

with 77 active Program for Results investments totalling $19.9 billion (January 2018). However, only 1% of this amount goes to agriculture[41].

Fig 7: Actors and relationships in Result Based Financing



(Reference: GIZ, Finance Guide 2018, pg 73)

Key outcome indicators might include changes in total production levels (crop, livestock, fish); yields as a ratio of production to area cultivated or smallholder income from agricultural production; total yield; gross margins and smallholder incomes; smallholder crop areas; production and crop value; number of landless rural households; and the number of micro-enterprises and chronically poor households[42].

In RBF, payments are linked to specific results or achievements. Depending on the results defined, the scale of payments varies greatly. For example, in Nigeria, an RBF project which aims to increase the adoption of Aflasafe, a new biocontrol technology among maize farmers, offered $18.75 for every metric ton of high-Aflasafe maize delivered. In a Kenyan project which aims to develop storage facilities for farmers, the first five service providers to reach a 21,000 MT threshold of storage devices sold to smallholder farmers are eligible for a $750,000 grant[43].

[41] https://ieg.worldbankgroup.org/evaluations/program-for-results

[42] Janus, Heiner and Sarah Holzapfel, "Results-based approaches in agriculture: what is the potential?", German Development Institute, 2016, pg 5-6.

[43] Instiglio: Reults-based Financing in Agriculture and Land (2017)

RBF may come in the form of performance-based contracts, grants, loans or prize-based challenges. RBF programs are mostly implemented by governments or large non-profits. Private sector companies are able to access results-based financing if they can propose to the respective program how they can contribute to, or realise, the results that are set for the RBF program. Companies can then engage in contracts with the RBF program and will be paid for their activities if and when they can demonstrate that results are achieved[44].

RBF can be one of the solutions for the RNR sector to increase production of selected commodities in the agriculture sector in Bhutan. Some of the organizations like IFC is willing to partner in RBF if there is a good proposal from the Government where the funding will be released based on the results such as increase in production, percentage of unproductive land brought underutilization, increase in export of selected commodities etc.

RBF Case: Transformation of Agriculture Sector Programme

In an effort to move 3 million rural residents out of poverty, the Government of Rwanda (GoR) and the World Bank are undertaking this program with the aim of "raising farmers' income through diversification of crops, better use of input to combat land erosion, improved irrigation, and increased private sector investments[45]." The total costs of the program add up to $1.2 billion, and the program is implemented by the Ministry of Agriculture and Animal Resources.
Results will be measured against, and payments will be made based on the following Disbursement-linked Indicators:

a) Increased Agricultural growth rate
b) Decreased percentage of rural population under national poverty line
c) Increased agricultural land under "modernised" agricultural use
d) Increased agriculture export.

[44] https://endev.info/images/b/b6/Factsheet_EnDev_RBF_EN.pdf
[45] http://documents.worldbank.org/curated/en/200501483524577743/pdf/PIDA0101994-PID-P161000- P148927-PUBLIC-RwandaAgPRAFAppraisalPID.pdf

Advantages:

Focus on prevention created: By design, impact bonds are focused on early-intervention programs that are preventive in nature. This reduces the need for subsequent and more expensive remedial measures in the future.
Outcome orientation established: Success is measured by outcomes, not by outputs as in the case of a performance contract, or by financial performance as is true of a typical investment. This helps to orient the intervention toward the results that ultimately matter for beneficiaries and the government.

Risk capital harnessed: Impact bonds are expected to raise capital for innovative programs involving risks that governments (or development agencies) are not able (or unwilling due to political reasons) to assume and are often unable to budget for.

Innovation enabled: Government agencies do not specify required inputs, thus leaving room for innovation and creativity in addressing social challenges.

Up-front working capital provided: Service-delivery organizations are provided with up-front working capital.

Long-term predictability established: Funding levels are predictable and sustained over a comparatively long period of time, reducing the need for costly fundraising.

Disadvantages:

Target-group definition: The target group has to be well defined, and data on their preferences and needs has to be available.

Need to measure outcomes: Outcomes have to be measurable and have to translate into government savings substantial enough to pay for the work of the social organization and intermediary, as well as the original investors' return.

Range of capacities needed: Social organizations must have the capacity both to attract investors and to deliver the promised outcomes.

Potentially high-risk level: Investors need to be ready to face uncertainty and assume a high level of risk, as the process will largely unfold outside of their control once the service provider begins offering services. Critics have warned that investors may push

for the use of conventional rather than innovative approaches in order to reduce implementation risk.

6.5 Thematic Bonds

As sustainable investment options begin to attract a new generation of investors, thematic bonds are expected to become the largest private source of development financing. Based on their area of impact, thematic bonds are further classified as green bonds, impact bonds, social bonds and sustainability bonds. For example, it is estimated that green bonds reached US$250 billion in 2018[46] and Sustainable Bond issuance reached € 26.7 billion in 2017[47]. In October 2014, IFC launched its Inclusive Business Bond Program to support businesses which include Base of the Economic Pyramid (below $8.44/day (PPP) income threshold) into their value chains as suppliers, distributors, or customers. Under the Inclusive Business Bond Program, five bonds were issued, raising $296.1 million from institutional and retail investors. The bond will finance businesses in different sectors, including in agribusiness that buy products from and/or selling to small-scale farmers. IFC outlines its selection criteria for projects that are funded by this fund as follows[48]:

a) Project committed by investment team, meeting all of IFC's established environmental, social and governance standards.
b) Independent team within IFC reviews all committed projects to identify those that could qualify as having an inclusive business model.
c) Team reviews projects against an established set of inclusive business criteria for each sector. Team engages investment teams/companies for additional information as needed.
d) Loan projects qualifying as "Inclusive Business" are eligible for IFC's Social Bond Program.

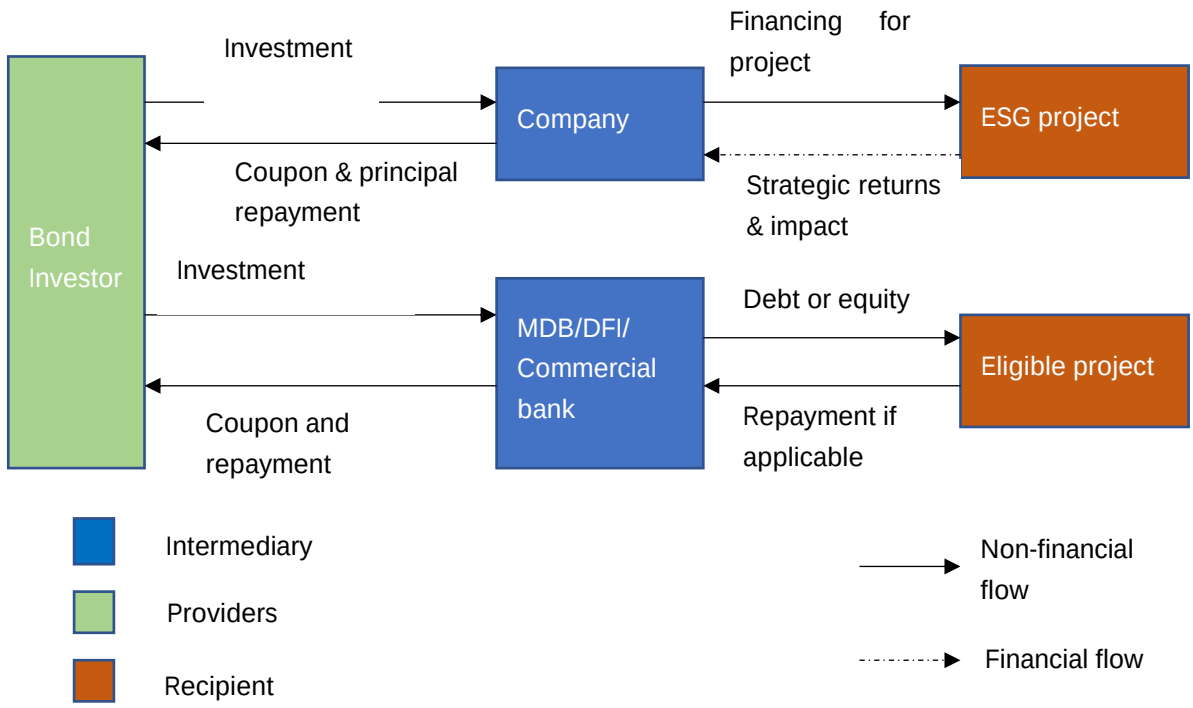
The Social Bond Principles outline a set of voluntary guidelines that recommend transparency, disclosure and integrity in the development of the social bond market[49]. The SBP are intended for broad use by the market: they provide issuers with guidance on the key components involved in launching a credible social bond; they aid investors

[46] https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/a+catalyst+for+green+financing+in+indonesia
[47] Quarterly Report, ICMA Group, April 2018
[48] IFC Social Program, https://www.ifc.org/wps/wcm/connect/54dd263d-1097-42f0-8ce0-16e13b762c22/IFC+Social+Bond+Program+Presentation+final_Oct2016.pdf?MOD=AJPERE
[49] https://www.icmagroup.org/green-social-and-sustainability-bonds/social-bond-principles-sbp/

by promoting availability of information necessary to evaluate the positive impact of their social bond investments; and they assist underwriters by moving the market towards expected disclosures that will facilitate transactions.

As a reference, the size of loans committed to projects by IFC through its social bonds varies from $3 million to $100 million. The average commitment was $20.7 million in 2017. Beneficiaries include multinational food companies such as Friesland Campina, as well as bigger African companies such as Tropical Heat (Kenya)[50].

Fig 8: Actors and relationships in Thematic Bonds



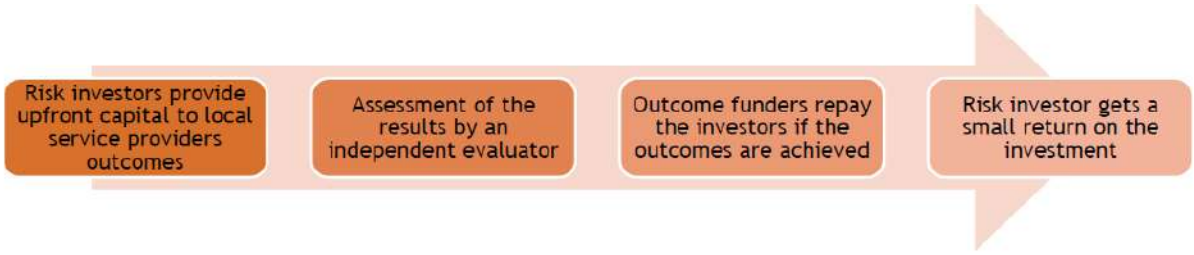
(Reference: GIZ, Finance Guide 2018, pg 76)

India has the second largest emerging green bond market, with a total of US$7.2 billion issued to date. A number of Government agencies have contributed significantly to issuance, among them the Indian Renewable Energy Development Agency (IREDA) and the Indian Railway Finance Corporation (IRFC). In 2018, the State Bank of India entered the market with a US$650 million Certified Climate Bond, the first of a US$3 billion issuance programme. The proceeds of these bonds are allocated to renewable energy

[50] IFC Social Bond Report2018

projects, low carbon transportation, and to energy efficient projects and green buildings[51].

One possible avenue to increase green bond issuances would be backing the bond issue using the cash flow generated from climate resilient initiatives (asset-backed securities). For example, water infrastructure improvements and climate-smart agriculture initiatives may allow for greater revenue streams to be generated from water sales and increased agricultural productivity, respectively. Notably, the World Bank was involved in issuance of green bond for proceeding a loan of US$100 million (45% of the project cost) for the Bengbu Integrated Environment Improvement project in China. The rest of the fund was provided by the Government of China.



Impact bonds are an outcome-based financing instrument targeting social investors and philanthropic funds in India. These outcome-based investments are set to attract new and strategic funds in the social impact space. Studies show that impact investment in India has reached US$5.2 billion between 2010-2016 period whereas annual investments touched US$1.1 billion in 2017, with a 20-25% growth potential. With climate change adaptation also adversely impacting the rural sector, impact bonds could play an important role in attracting funds for implementing cross-cutting projects.

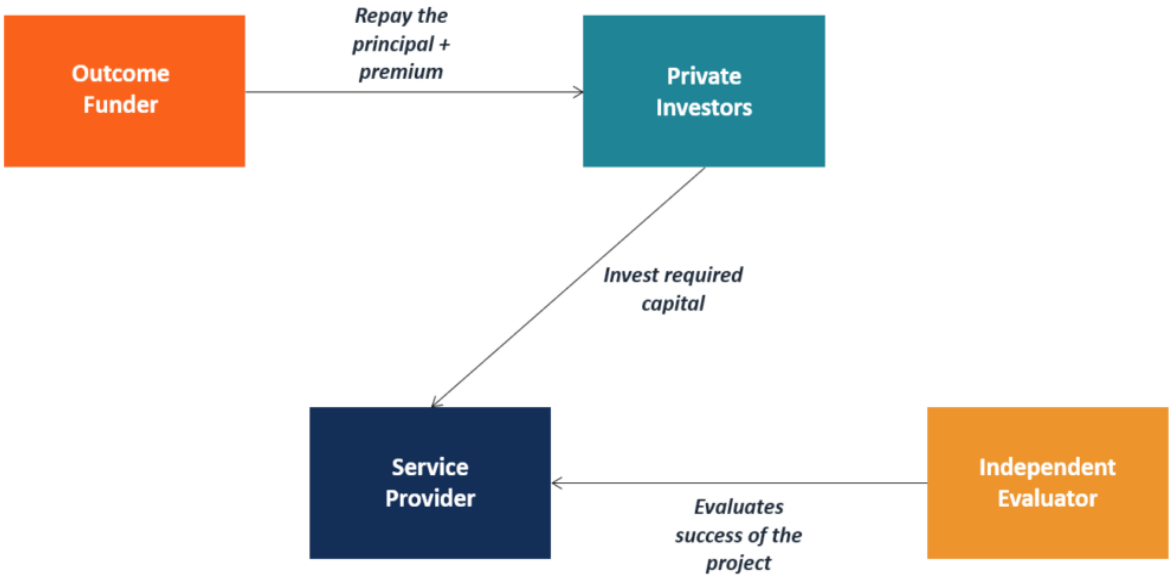
Development Impact Bond

A development impact bond is a type of financial security that is used to finance development programs in low-resource countries by attracting private investors. Development impact bonds are considered a sub-type of social impact bonds. Similar to other social impact bonds, development impact bonds are new financial instruments that were introduced only in 2012.

The main purpose of development impact bonds is to attract private investors to subsidize development projects in poor countries. Although the security is called a bond, it lacks most of the features of conventional bonds. The bonds come with a fixed term, but they do not offer a fixed rate of return to the investors. Instead, the repayment

[51] Climate Bonds Initiative, 2018

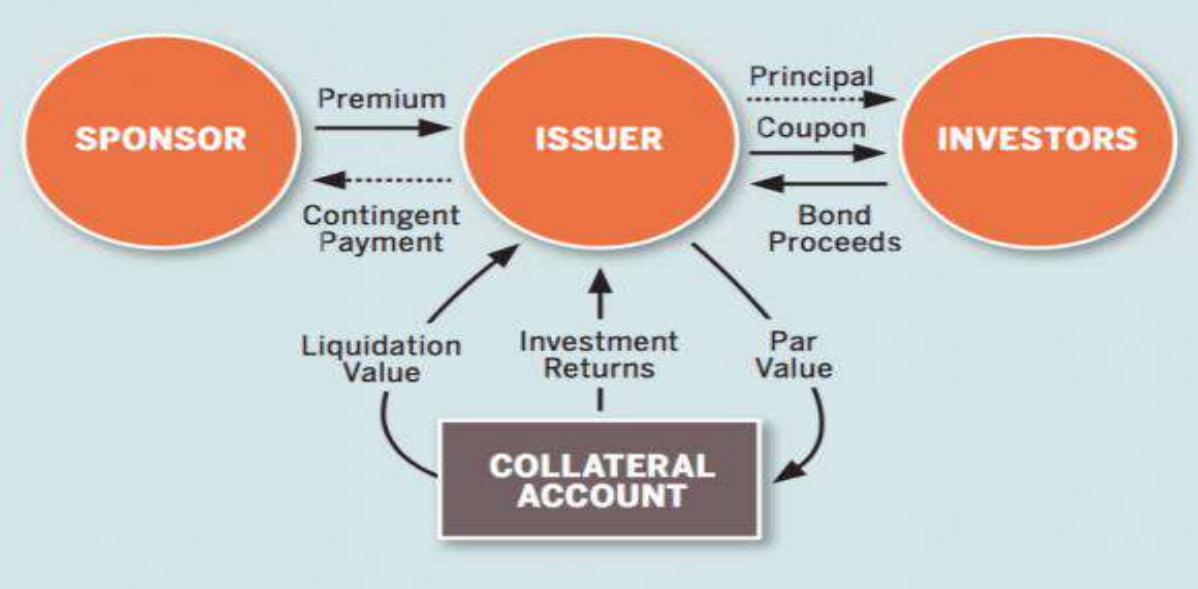
of the bonds primarily depends on the success of a project that's been subsidized using the proceeds from the sale of the bonds. If a project is successful, the investors are repaid by the outcome funder (a philanthropic organization or an aid agency). However, if the project fails, the investors do not receive anything. Therefore, development impact bonds are high-risk instruments for investors[52].



A Resilience Bond is a new insurance instrument designed to help cash-strapped Governments to increase both physical protection and financial insurance against disasters. These bonds link insurance coverage that public sector entities can already purchase (including parametric insurance policies and catastrophe bonds) with capital investments in resilience projects (such as, flood barriers) that reduce expected losses from disasters. These bonds are more like insurance policies than traditional municipal bonds and are designed to reduce the financial risks associated with very low-probability, high-consequence natural disasters. For example, if a hurricane strikes, the aim of a catastrophe bond is not to limit the damages on the ground, but instead to reduce the resulting economic disruption[53].

[52] https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/development-impact-bond/

[53] RE bound Programme: A guide for public sector – Resilience Bond Sponsorship



Green Bonds

Green bonds enable capital-raising and investment for new and existing projects with environmental benefits. The Green Bond Principles (GBP) seek to support issuers in financing environmentally sound and sustainable projects that foster a net-zero emissions economy and protect the environment. GBP-aligned issuance should provide transparent green credentials alongside an investment opportunity. By recommending that issuers report on the use of Green Bond proceeds, the GBP promote a step change in transparency that facilitates the tracking of funds to environmental projects, while simultaneously aiming to improve insight into their estimated impact. The GBP, updated as of June 2021, are voluntary process guidelines that recommend transparency and disclosure and promote integrity in the development of the Green Bond market by clarifying the approach for issuance of a Green Bond. The GBP recommend a clear process and disclosure for issuers, which investors, banks, underwriters, arrangers, placement agents and others may use to understand the characteristics of any given Green Bond. The GBP emphasise the required transparency, accuracy and integrity of the information that will be disclosed and reported by issuers to stakeholders through core components and key recommendations.

The Climate Bonds Initiative has also convened an Adaptation and Resilience Expert Group (AREG) to discuss and develop the adaptation and resilience (A&R) Principles, which will provide high-level guidance for determining when projects and assets are compatible with a climate resilient economy, and therefore should be certified under the Climate Bonds Standard. The A&R Principles will provide the framework under which sector-specific A&R Criteria will be subsequently developed, following review by

the AREG. For the sectors that already include A&R Criteria, the AREG will evaluate their fit with the framework and provide recommendations on alignment. For the new sector criteria under development, the AREG will provide guidance to ensure alignment with the framework. Potential projects include water-efficient technology, drip irrigation, wind, flood and heat-resilient building materials, new financial and insurance products, early warning systems, drought-resistant seeds, and new health products, among many others[54].

Large institutions use their extended local networks in developing countries to identify potential financing opportunities. Similarly, IFC selects Social Bond Eligible Projects from their scrutinised loan portfolio. Companies and projects which are potentially eligible to benefit from these financing opportunities need to go through due diligence, which may include on-the-ground research by the financing party, and which require professional documentation of the company's processes.

Advantages:

Additional sources of financing mobilized: Institutional investors (such as pension funds, insurance companies and sovereign-wealth funds), who manage a very substantial share of the available global capital, are among the largest investors in bonds. These investors have a preference for low-risk financial instruments. Thematic bonds help to mobilize these institutional investors for development-oriented purposes.

Investor demands met: Many investors globally are increasingly incorporating ESG factors into their investment decisions. From an investor's point of view, thematic bonds provide an opportunity to meet these demands.

Financing provided that is cheaper and longer-term than bank loans: Banks are inevitably subject to regulatory compliance costs. They also need to take into account the duration of their liabilities (i.e., their customers' savings), which are rather short term. Bonds, by contrast, do not have such costs (or at least have lower costs), resulting in lower interest rates, and are by design preferred by investors with longer-term horizons.

Large amounts of funding raised: The amount of financing provided by a single bank can be limited by the degree of risk exposure that bank is willing and allowed to accept.

[54] Climate Bonds Initiative, undated, Adaptation and Resilience, https://www.climatebonds.net/adaptation-and resilience

By contrast, by involving a larger investor base, bonds can help to raise much larger amounts.

Projects that will benefit from the proceeds of the social bonds include:

a) Research & innovation for advanced medical nutrition: 40%
b) Social inclusiveness: 25%
c) Responsible farming and agriculture: 20%
d) Entrepreneurship financing: 10%
e) Quality healthcare and parental support: 5%

Thematic Bonds Case: Danone Social Bonds

In March 2018, Danone issued its first social bond with a 7-year maturity and a 1.00% coupon, raising 300 million euros, listed on Euronext Paris[55]. This marked the first issuance of a social bond by a multinational corporation. It is based on the company's Social Bond Framework, following the Social Bond Principles. Crédit Agricole manages the bond. The Notes were rated by Moody's (Baa1) and S& P (BBB+).

With this first bond, Danone aims to finance sustainable, non-GMO food and agriculture projects; support farmers and dairy producers; assist communities affected by undernutrition; fund medical research on nutrition; support employees with enhanced healthcare coverage; and finance entrepreneurship in health and nutrition.

Disadvantages:

Additional costs of issuing thematic bonds: Bond issuers have to bear the additional costs entailed in the issue of a thematic bond, while still providing returns comparable to a normal bond. These additional costs derive from defining the criteria, monitoring and evaluating, and transparently communicating performance to investors over the lifetime of the bonds.

Lack of universally accepted frameworks: The proliferation of different standards, frameworks and guidelines, along with the diversity of market practices in terms of definitions and requirement can create confusion among issuers and investors.

[55] Danone Social Bond Framework, March 9, 2018

Nascent market: The market for thematic bonds (for example green bonds), albeit growing, is still small. This limits liquidity and the ease with which investors can trade bonds among themselves.

6.6 Value Chain Finance

A value chain is defined as the sequence of value-adding entities and activities that stretches from the point of production to the point of consumption. The flows of funds to and among the various links in a value chain comprise what is known as value-chain finance.

Value-chain finance can be internal or external to the chain itself[56]:

1. Internal value-chain finance: These are financing arrangements taking place within a value chain, directly between two value-chain actors. These arrangements do not require the participation of an external financial institution. An example would be a credit provided by an input supplier to a smallholder farmer.

2. External value-chain finance: These are arrangements where financing is provided by an external third party based upon the recipient's value-chain relationships and activities. For example, a bank may provide a loan to a farmer to buy inputs based on the farmer's sales contract with a trusted buyer. This buyer may pay the farmer through the bank, which would then deduct the scheduled loan payments before releasing the net proceeds to the farmer.

Value-chain finance does not include conventional agriculture-sector financing, which predominantly takes the form of collateral-based bank loans, unless there is a direct relation to the value chain.

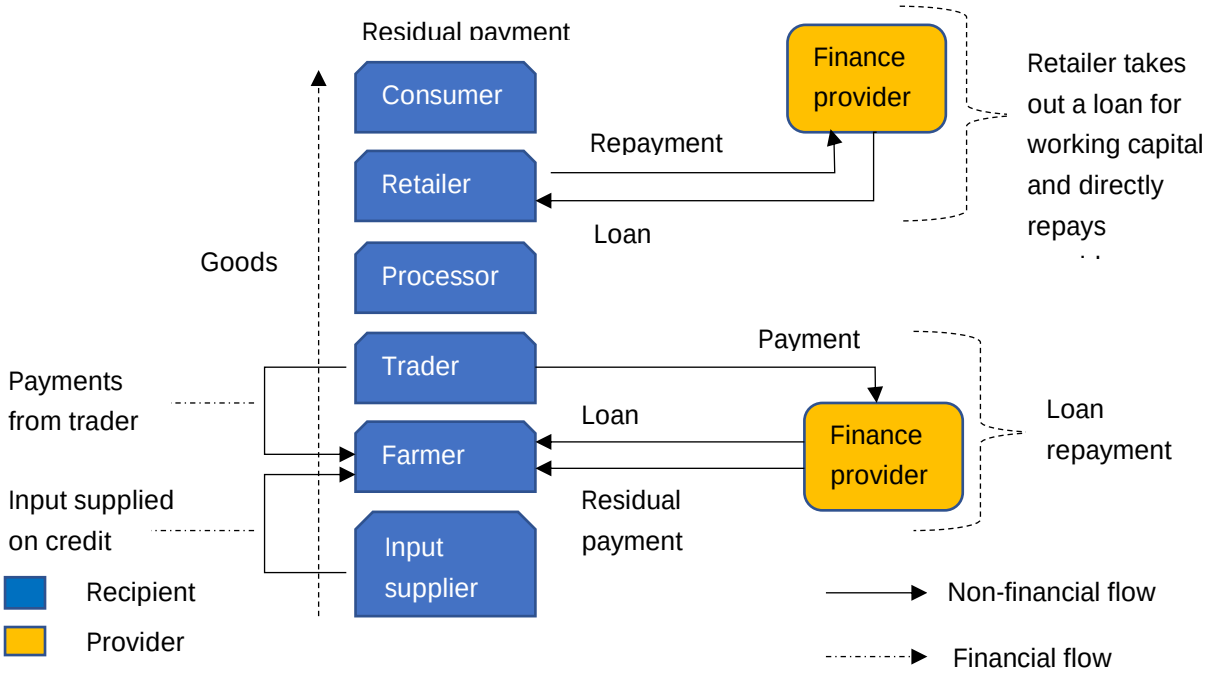
Flow of funds: While goods always flow in one direction through a value chain, the direction of the flow of financing varies. Actors within the chain can be both recipients and providers of finance, depending on the nature of the chain. Figure 9 presents a generalized version of agricultural value-chain financial flows. The exact nature of and role played by actors will depend on the agricultural commodity in question.

[56] https://endeva.org/wp-content/uploads/2020/09/giz_financeguide.pdf

Internal financing within the AVC is usually in-kind. It can be in the form of pre-financing; for example, when the input supplier sells seeds and fertilizer on credit to the farmer, who pays during the harvest season; or advanced purchase financing, as in the case of the trader paying in advance for the produce. Quite often, with these more internally oriented forms of value chain financing, external financiers are involved. One example of this is a bank that provides a guarantee to the financing that is provided by one of the value chain actors. In that sense, all forms of AVC involve some sort of external financing.

Most external financing instruments are credit based, including short-term and seasonal loans; long term loans; lines of credit; overdrafts; letters of credit based on trade receivables; other collateral (such as warehouse receipts, repurchase agreements); or guarantees by third parties.

Fig 9: Actors and relationships in AVC



(Reference: GIZ, Finance Guide 2018, pg 62)

Credit analysis is often based on existing contracts and information about ongoing transactions between different links of the chain. However, the overall functioning of the AVC is also an important consideration for the lender because failure at any stage will impact the repayment. Credit risk assessment will need to incorporate the whole chain as well as external factors.

AVC financing can take different forms, ranging from guarantees to loans and other products and funding amounts can also differ. The financing to any “lead firms” in the value chain can range from small to larger amounts whereas the onward lending or financing from these lead firms to aggregators or individual farmers is more likely to be in the smaller amounts.

As a starting point for AVC finance, larger development banks such as IFC or EIB can provide capital, alongside more purpose-driven social investors. These institutions channel the funding for AVC, often through local banks such as Bhutan Development Bank (BDB) which are usually looking for “lead firms,” who are dominant players in a particular value chain of a certain market, and who are the main entry point for the financial institution to reach other actors throughout the value chain. These lead firms are quite often off-takers, for instance larger dairy firms that sources milk directly from farmers or through aggregators. More and more banks like Equity are open to providing forms of AVC finance, and this makes them the right entry point for firms to discuss options. Increasingly, NGOs implementing agricultural or food security projects embrace opportunities for AVC financing and broker opportunities between banks and agribusiness firms.

Advantages:

Expanded financing opportunities: Conventional bank loans are usually out of reach for farmers and other MSMEs in agricultural value chains due to factors such as the finance recipient’s small size, the lack of banking services in rural areas and inadequate recipient collateral; however, value-chain finance can overcome these issues.

Better-suited financial products: Value-chain finance promotes the development of financial products tailored to fit the needs of participants in the chain, since finance providers look beyond the direct recipient and take the sector as a whole into account when crafting suitable products.

Strengthened value chains: By focusing on the value-chain linkages and offering tailored products, value chain financing helps strengthen the linkages further, thereby creating a virtuous cycle.

Reduced information asymmetries: Information asymmetries are substantially reduced, because finance providers are able to utilize partnerships or contracts with

value-chain actors to acquire information that would be unavailable or expensive to obtain for parties outside the value chain.

Lower costs: Finance providers can pass on the benefits from reduced information asymmetries, transaction costs and lower risk assessments to recipients in form of lower interest rates and fees.

Agricultural Value Chain Financing Case: Starbucks Global Farmer program

In order to ensure the production of 100 percent ethically sourced, high-quality coffee from over 300,000 coffee farmers in 25 countries, Starbucks has provided financing to farmers through its Global Farmer Fund program since 2008.

Today, with a $50 million fund, Starbucks finances farmers through institutions including Root Capital and the Fairtrade Access Fund. So far, 40,000 farmers have benefitted from financing through more than 62 cooperatives in eight western and African countries. By selling their coffee through cooperatives, the farmers ensure they reach global markets at premium prices.

Using Starbucks sales contracts as collateral, Root Capital provides pre-financing to coffee cooperatives and other rural businesses. The pre-financing comes in the form of short-term loans to finance seasonal inputs. Recently, they have also introduced medium and long-term loans to finance infrastructure investments. Instead of paying the cooperatives for the full value of coffee, Starbucks deducts the amounts for loan repayments and pays them directly to Root Capital[57].

Disadvantages:

Informal and trust-based relationships: Agricultural value-chain linkages may depend on informal and trust-based relationships that may be difficult for external finance providers to incorporate into their assessments of potential finance recipients.

Correlated risks in agriculture: Agriculture faces a high degree of correlated risk (i.e., a high probability that a single negative event will affect multiple actors in a value chain or sector) stemming from the sector's price volatility as well as from weather risks that can affect whole regions at a time. These issues can affect the entire value chain at

[57] https://news.starbucks.com/news/starbucks-more-than-doubles-global-farmer-loan-commitment

once and be perceived as a substantial threat by a finance provider that is highly exposed to the sector (concentration risk). This risk may thus be reflected in the cost of borrowing.

Lack of financial education: Farmers and other value-chain actors may not understand exactly how the financing mechanism works, and thus be unaware of its costs and implications.

Allocation of capital: Agribusinesses such as traders and processors may need to allocate significant resources to financing suppliers rather than to their core business.

6.7 Crowd Funding

Crowdfunding brings together multiple private investors to fund a project for a specific cause. The projects are usually start-ups or early-stage companies, and their mission or desired impact is the main reason why investors choose one project over another. The projects are selected, vetted and advertised by platforms, which also manage the relationship and flow of financing between funders and recipients.

Impact and innovation are at the core of crowdfunding. What innovative and untried solution will the project offer? The ability to raise funds partly depends on the project owner's pitch to many small funders. By opening investment venues to the common person and allowing them to pool funding for innovative projects, crowdfunding democratises impact investment. Increasingly, crowdfunding also targets institutional investors, government agencies and multilateral banks. For instance, Google invested $125 million in person-to-person lending through Lending Club in 2013[58].

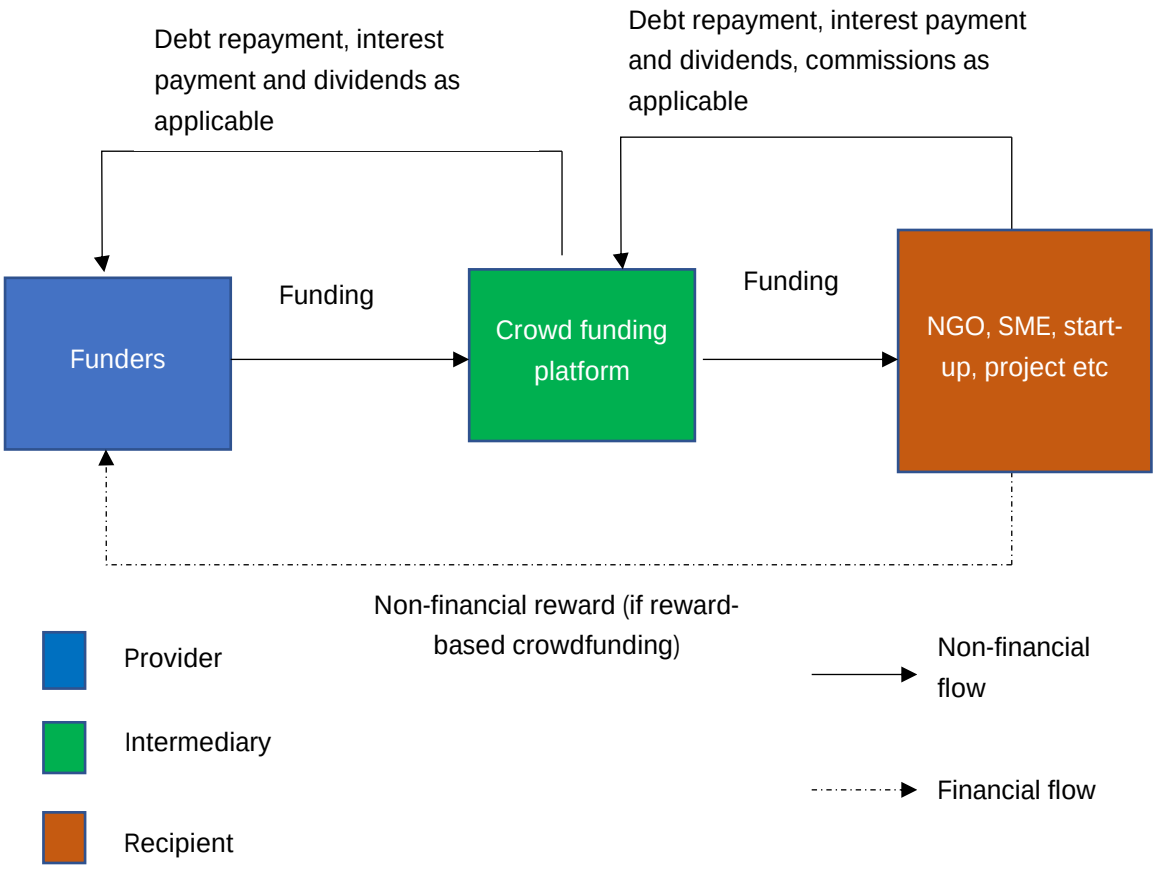
Originally based in developed markets, crowdfunding is increasingly targeting developing markets. Lack of regulation and availability of platforms targeting developing countries make it difficult to gather a large number of investors around potential projects. However, projects in developing countries can be listed on the platforms that are registered in developed countries- directly or through partner financial institutions. Some examples of platforms with an agricultural focus that are active in developing countries include Lendahand (based out the Netherlands, focus on developing countries), Agfunder (based out the US, focused on global ag-tech) and

[58] Freedman, David M. and Matthew R. Nutting, A Brief History of Crowdfunding, 2014-2015, Pg. 5 http://www.freedman-chicago.com/ec4i/History-of-Crowdfunding.pdf

Lelapa Fund (targeting African diaspora investors), but increasingly more local platforms are now also being established such as Crowd Funding through Royal Security Exchange of Bhutan (RSEB) in collaboration with Royal Monetary Authority (RMA) in Bhutan. So far, RSEB was able to register 16 firms, of which 8 were successful and was able to raise Nu.31.89 million till date[59].

Globally, transaction value in the Crowdfunding segment is projected to reach US$1.02 billion in 2022 and is expected to show an annual growth rate of 2.33% resulting in a projected total amount of US$1.15bn by 2027[60]. The platforms also offer different financing options, including donations, rewards, debt and equity. This allows for projects to be structured to appeal to a certain group of investors, based on their risk and return appetite.

Fig 10: Actors and relationships in Crowd Funding



(Reference: GIZ, Finance Guide 2018)

[59] https://bhutancrowdfunding.rsebl.org.bt/

[60] https://www.statista.com/outlook/dmo/fintech/alternative-financing/crowdfunding/worldwide

Donation and reward-based models: These models do not offer a financial return to their funders. While donations usually go to charitable causes, reward-based projects offer non-financial returns, such as a sample of products that were created through the project. The amount of financing per project remains small, usually below $10,000 as per international practice.

Debt-based (Person-to-person lending): Investors lend to a project at a fixed interest rate and a fixed return. They might expect a return of 3-6% per annum over the duration of the loan. Loan maturities vary between 6-48 months. Debt based projects might raise up to $150,000. This is as per the experience of developed and developing countries. Debts might be secured by the business assets.

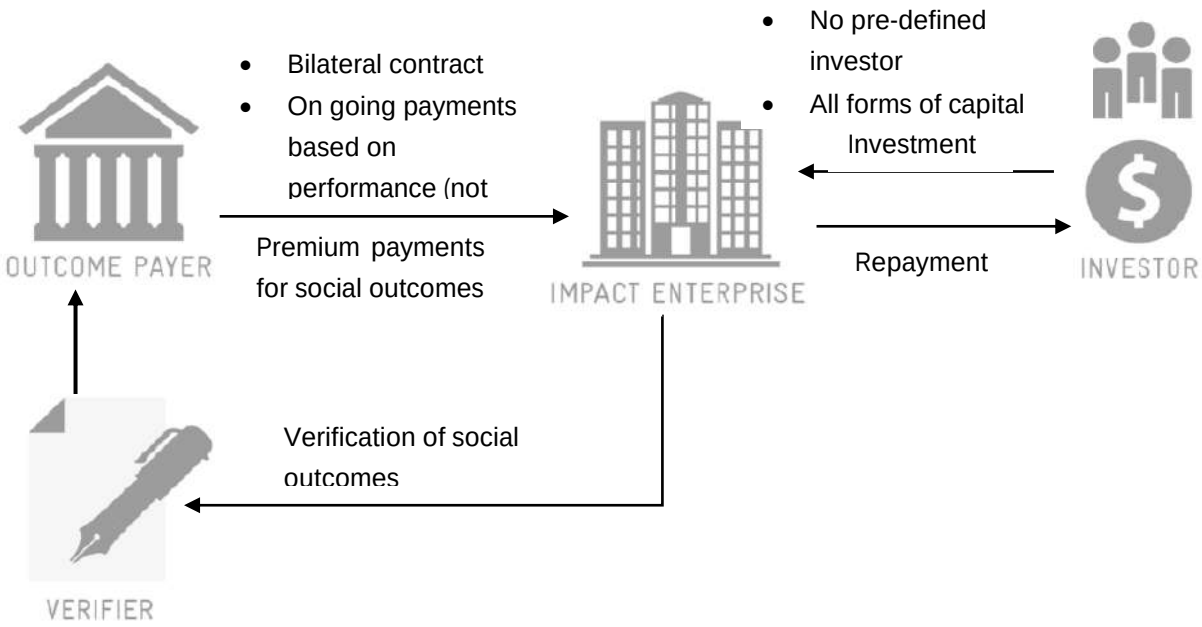
Equity-based: Direct investment into start-up or early-stage businesses by investors, also known as Angel Investors, who receive shares of the company. The return for the investor is the dividend that the business pays, or profit gained when the shares are sold. While it might take between two to three months to complete equity crowdfunding, it might raise up to $10 million as per the international experience.

Crowd Funding Case: Crowd Credit and Facts

Crowd Credit is a Japanese crowdfunding platform that mobilises individual funding from Japanese citizens. Crowd Credit was established with the idea of connecting countries with funding gaps and countries with lending gaps on a global basis. At the end of 2017, it had mobilised a cumulative amount of around US$45 million from over 8000 individual users. The company invests the funds in a diverse range of investment opportunities, not only in Japan but around the world. In their investments in other countries, Crowd Credit closely collaborates with financial institutions in the target countries.

For African agriculture, Crowd Credit collaborates with Ovamba, a fintech company that provides short-term capital to agribusiness SMEs in different African countries. Through Ovamba, the crowd funders of Crowd Credit are provided, together with two other investors, a loan of US$30 million to Cameroon cocoa trading company Producam, to fund 10,000 tonnes of cocoa aggregation and export.

Fig 11: Nudging the investment ecosystem by incentivizing impact



6.8 Impact Investment Funds

Impact investment funds curate a selection of carefully vetted businesses, which seek funding towards an impact area or around a regional focus. The funds offer a wide array of investors opportunities to become part of businesses that have a measurable social and/or environmental impact, while getting positive financial returns, which may be below-market rates. These funds invest in various impact areas, including agriculture, job creation, energy access, affordable healthcare, housing, financial services, and education. Different types of impact investment products include equity and venture capital, quasi-equity, guarantees, convertibles, and debt – including concessional loans.

Impact investment funds are generally quite open to considering new investment opportunities from firms. In general, there is still a tendency for fund managers to report a gap in quality investment proposals to fund, when compared to the capital they have available to invest. When an agribusiness firm applies for an investment with a fund, typical steps will be taken by fund manager to vet the opportunity, going from pre-screening the deal to doing due diligence on the firm, meeting the management and structuring the deal. Final investment could take the form of (quasi) equity, (convertible) debt or any form of mezzanine[61] finance. In general, impact investors are very keen (as

[61] Unsecured, higher-yielding loans that are subordinate to bank loans and secured loans but rank above equity

are their institutional investors) to report on the impact generated by their investments. A common framework to measure this is IRIS39, managed by Global Impact Investment Network (GIIN). These metrics are used to measure social, environmental, and financial success, evaluate deals, and grow the sector's credibility.

6.9 Carbon Payments

Bhutan is a signatory to the Kyoto Protocol to the United Nations Framework Convention on *Climate* Change, which aims to combat global warming by developing annual inventories on emissions and removals of greenhouse gases (GHG). Bhutan submitted its Intended Nationally Determined Contribution (INDC) to the Paris Agreement on 30 September 2015. On ratification of the Paris Agreement on 19 September 2017 the INDC became Bhutan's first NDC. The NDC reaffirmed Bhutan's pledge to remain carbon neutral first made in 2009 and laid out the priorities for low GHG emission development across nine areas. The NDC also contained ten areas of priority needs for adaptation and called on the international community to support Bhutan's efforts to mitigate and adapt to climate change and that "the successful implementation of our intended actions to mitigate will depend on the level of financial and technical support received[62]".

The Third National GHG Inventory[63] shows that Bhutan's greenhouse gas emissions (including forest emissions) in 2015 amounts to just 3.8 million tons of CO2e, which is negligible on a global scale. In the same year, Bhutan's forests sequestered 9.4 million tons of CO2 resulting in net negative emissions of 5.6 million tons of CO2. In this regard, Bhutan continues to remain carbon neutral.

Bhutan's target is to maintain the status as a carbon neutral country where total GHG emissions do not exceed total removals by sinks including forests. In order to maintain this carbon neutral status, sectoral targets, programs and plans have been prepared as part of sectoral LEDS and National REDD+ Strategy and Action Plan. The implementation and achievement of this target will depend on the level of support available for implementation and is therefore conditional on support received.

There is opportunity for carbon trading through agriculture emissions reductions or livestock emission reductions. For example, Dagachhu Hydropower is the first cross

[62] INDC of the Kingdom of Bhutan, 2015

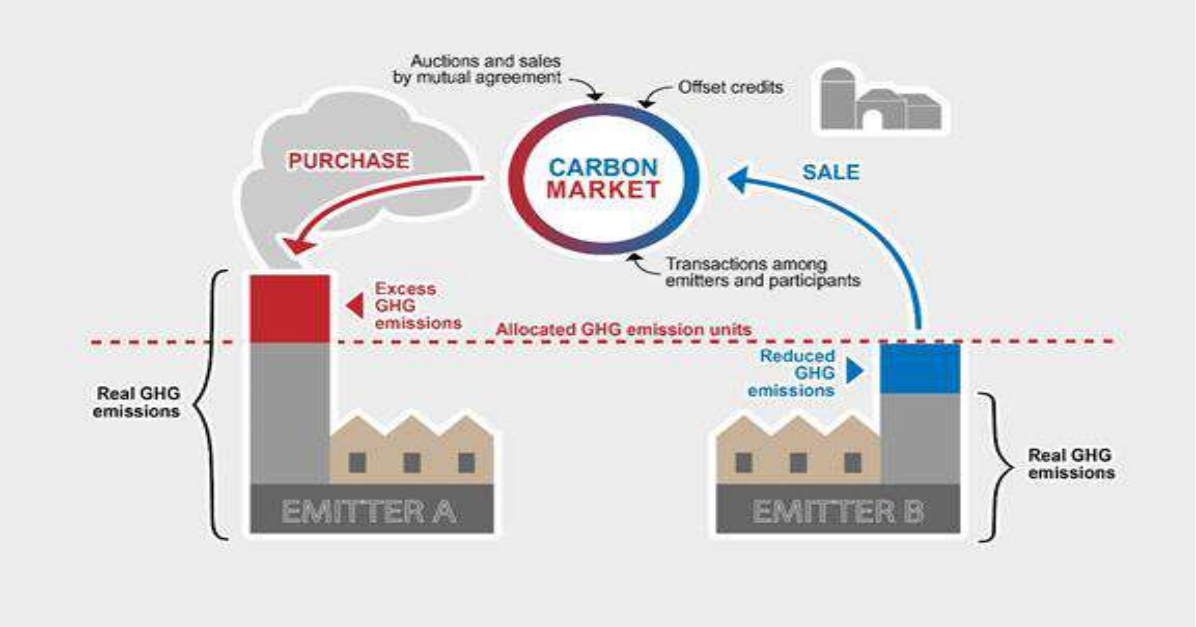
[63] Third National Communication from the Kingdom of Bhutan to the UNFCCC, 2020

border project with Clean Development Mechanism with the yearly Certified Emission Reduction (CER) of 500,000.

Globally, 11% of 2020 greenhouse gas emissions are from agriculture coming from livestock such as cows, agricultural soils, and rice production. Further, 13% of 2020 green house has emissions are coming from land use and forestry, which act as a sink (absorbing CO2 from the atmosphere) or a source of greenhouse gas emissions[64].

In the case of green climate financing, government is already working to facilitate the flow of financing for implementation of the NDC and adaptation priorities from the Green Climate Fund (GCF). Direct access modalities for climate finance are also being pursued with the accreditation of the Bhutan Trust Fund for Environmental Conservation (BTFEC) as National Implementing Entity to both the GCF and the Adaptation Fund. In addition, Bhutan is pursuing access for the private sector with three financial institutions (Bhutan Development Bank Ltd, Bank of Bhutan Ltd and the Bhutan National Bank Ltd) undergoing the accreditation process for access to the Private Sector Facility of the GCF.

Fig 12: Carbon trading



The other opportunities available for the short-term financing are from those of preparing project proposals and submission to various climate financing entities like the International Climate Initiative (IKI), NAMA Facility which is a strong agent against

[64] https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

climate change and empowerment. The successful mitigation tool based on the idea of NAMAs (Nationally Appropriate Mitigation Actions) is helping developing countries worldwide to fulfil Nationally Determined Contributions (NDCs) to the Paris Agreement. The other one is the Adaptation Fund supports population groups and regions that are particularly affected by the consequences of climate change. Among other things, it finances early warning systems against flooding and heavy rainfall, measures to secure the water supply and the conversion to drought-resistant cultivation methods in agriculture.

6.10 Offset Mechanisms

Biodiversity offsets are conservation actions designed to compensate for the unavoidable impact on biodiversity to ensure "no net loss" and, preferably, a net gain of biodiversity. Offset mechanisms are potentially powerful tool for internalising traditionally externalized costs and compensating good practices regarding biodiversity and ecosystem services. For instance, if a private enterprise has to pay to mitigate its residual impact on river basins, it either has to bear the cost of mitigation or develop elsewhere to avoid this cost. Conversely, if businesses can be financially compensated for protecting or enhancing a rare species or habitat, there will be an economic incentive to protect that habitat[65].

Natural biodiversity supports the ecosystem services upon which many communities depend. Where regulation for biodiversity and offshore development is strong, offset mechanisms such as species banking and biodiversity offsets could become an important mechanism for conservation.

As the vast forest sink of Bhutan will form the cornerstone of commitment to remain carbon neutral, measures to manage and conserve the forests will need to be supported by a robust forest monitoring system. The forest monitoring and inventory system being developed in conjunction with a national forest monitoring system for REDD+ will enable monitoring and assessment of forest cover over time. Presently, Bhutan offsets 4.4 million tons of CO2e through exports of hydroelectricity. In addition, Bhutan can offset up to 22.4 million tons of CO2e per year by 2025 in the region through the export of electricity from our clean hydropower projects[66].

[65] Bann & Başak (2013)

[66] https://policy.asiapacificenergy.org/sites/default/files/Bhutan-INDC-20150930.pdf

6.11 Cost saving schemes

In addition to standard international practices on innovative financing options, there is another scheme which can be a part of the innovative financing scheme, the cost saving. With the use of technology, there is opportunity to save government budget and bring about improvement in the operations of the agriculture, forest and livestock products, mainly in terms of utilizing the waste. The cost saved can be utilized for other development aspects and at the same time, there is opportunity for import substitution, employment generation and internal production.

For example, take the case of wood-based industries in Bhutan which consists of about 441 industries as per the records maintained by DoFPS, which include 231 furniture units. Private individuals/enterprises mostly operate the wood-based industries in the country. At the same time, timber resources are limited, and the forest is depleting fast unless the country mechanizes itself to have a sustainable harvest. One way is to address the timber wastage in sawmills by opening integrated wood-based industries with latest technologies to reduce the wastage of timbers as low as 3% where the timber wastage in the country is as high as 37%. Similarly for the other sectors like livestock, there is opportunity to adopt biogas technology to make use of cow dung and to agriculture to use organic waste to generate other products.

7. Selection of financing options

The selection of suitable financing options to the RNR sector were analysed based on the priority of the sectors, resource generation potential, socio-economic impact, employment generation, rural livelihood enhancement, self-sufficiency (import substitution), scalability, feasibility and sustainability.

Priority of the sectors:

The following are the priorities of the RNR sector:

a) Following the government's plan to rebuild the economy from Covid-19 losses by exploring measures to export wood-based products, the MoAF expects to save Nu. 3 billion from imports. It includes export potential for semi-finished and finished wood products, end-to-end supply chain of wood-based industries, and possible import substitution for wood-based products. The proposal is to upgrade the standalone sawmills to integrated wood-based industries to address the issues of huge timber wastage through enhanced value addition as well as to help in creating employment opportunities. The integrated wood-based industries are found to minimise wastage using advanced technologies or machinery such as finger jointing machine, panelling machine, planning machine, CNC-Router, and seasoning kiln. The proposal was well received by the Association of Wood-Based Industries (AWBI) since most of the sawmills in the country focused on producing sawed timber without value addition, while the market is flooded with imported wood-based products. The integrated wood-based industry would help to minimise wastage of scarce resources and reduce imports of wood products.

b) In 2011, the government reintroduce the concept of family-sized biogas aimed to deploy 3,600 units by the end of 2017. The program aimed to bring significant benefits to the areas of energy and agricultural production, family health and sanitation, employment generation, and environmental protection. The units that have already been installed are collectively producing around 5,000 m3 of biogas/ day (the equivalent of nearly 60,000 cylinders of LPG/year). The savings from fuel replacement was recently estimated at Nu. 31.4 million/year (roughly $500,000 USD). The systems have also reduced firewood use by around 10,000 tons per year. Since Bhutan has no known fossil fuel reserves, so every unit avoided is also one that does not have to be imported, further reducing fossil fuel use and mitigating the related climate change effects[67].

[67] Green growth initiative in Bhutan, case study, Bhutan biogas project

c) Irrigation development in Bhutan was the result of farmers' own initiative known as community managed irrigation systems (CMIS). The Government's involvement in irrigation sector started with the second five-year plan in late 1960s. Since then, a couple of large irrigation systems were built by the government, which are now being managed by the community. However, the sector is largely dependent on rainfall for irrigation, and it has been found to be most vulnerable to climate change with unpredictable changes on the rainfall pattern. While Bhutan has many north-south flowing rivers and streams, they are not tapped for irrigation purposes due to the hilly and mountainous terrain with water at the bottom of the valley and agricultural land on side slopes and at the top. The current system of community managed irrigation systems is highly susceptible to climate change, and schemes are impacted by changes in seasonal water availability, flooding, and landslide events. As per the National Irrigation Master Plan[68], the total investment required was about US$140 million from 2017-2032. There are two main types of benefits (direct and indirect), direct benefits relate to an increase in crop production while the indirect benefits are: (a) enhancing food security, (b) creating rural employment opportunities, and (c) contributing to further development of the livestock subsector and micro agro-industries. So, the use of Hydraulic Ram Pumps (Hydram) is found to be useful in Bhutan as piloted in Rubesa and Phobjikha, Wangdue, by the Bhutan Water Partnership in collaboration with the Center for Rural Technology (CRT), Nepal. The technology addresses water scarcity problems in the hilly areas to pump water from the lower levels without the use of electricity and rather using water pressure.

d) Securing a sufficient food supply has long been a top priority of the government and in the process, food loss in the post-harvest system is a perennial issue, even in today's highly scientific and technological world. To close the gap between demand and supply, food must be conserved to meet growing and existing food demands, especially for fruits and vegetables, which are more perishable. By introducing new technologies and methods of food storage, developed countries have significantly reduced food loss such as development and adoption of better harvesting equipment and development of commercial storage plants/cold storages. In 2020, Bhutan has imported approximately Nu. 470 million worth of fruits and vegetables[69]. Due to the climatic conditions, the short growing season as well as the technology advancement in Bhutan, the country is unable to preserve the excess produce from

[68]National Irrigation Masterplan 2016. National Environment Commission & Department of Agriculture, RGoB

[69]Bhutan Trade Statistics 2020, DRC, MoF, RGOB

the peak season for the lean season. This has led to low export prices in the peak season followed by disproportionally high import prices in the lean season[70]. Cold storage units can help to reduce the loss incurred from the wastage of fruits and vegetables. It would also help in getting a better value for the fruits and vegetables particularly in the export market. It would also discourage, to some extent, the import of fruits and vegetables in the lean season.

Resource generation potential:

The National Forest Inventory survey found that 60% of the trees are less than 16m in height and have a diameter of less than 31cm, suggesting having relatively fewer large-sized trees suitable for timber. A cost-benefit analysis by the DoFPS estimated that 11.27% of the total geographical area (16% of forests outside protected areas) has the potential for sustainable forest management. Only 5.8% is suitable for sustainable commercial harvesting. Expanding beyond this area will require massive investment and compromises, which include safety and environmental health[71]. Thus, with the integrated wood-based industry, there is potential for resource generation with value addition and less wastage. Similarly for the biogas, there is resource generation in terms of biogas, slurry which is excellent for manure in the vegetable gardens and even generation of compost for sale. In addition to that the cold storage will be save wastage in terms of post-harvest processes which ultimately result into more returns for the farmers as well as products in the market.

Socio-economic impact:

About 77% of the country has more than 35-degree slopes making the landscape highly vulnerable to landslides, further worsened by slope disturbances such as logging, road, and other forest conversions. It is also limited by poor and old equipment (that frequently breaks down), frequent changes in weather conditions, lack of skilled labor, and rugged terrain. As a result, the World Bank notes that it is not possible to harvest even the Annual Allowable Cut from most Forest Management Units (FMUs) which are the designated commercial timber production sites[72]. Thus, applying the principles of sustainable forest management and modernizing the sector such as through integrated wood based industry could significantly increase productivity and improve ecological resilience.

[70] https://thebhutanese.bt/nu-127-mn-for-the-construction-of-three-cold-storages-in-the-country/

[71] https://kuenselonline.com/clearing-the-air-over-bhutans-forest-resources/

[72] https://kuenselonline.com/clearing-the-air-over-bhutans-forest-resources/

The direct socio-economic impact of biogas is fuel in place of firewood and coal as well as LPG for cooking which reduces fuel expenses. Compared with kerosene lamps, biogas lamps not only reduce the cost of fuel, but also increase light level and improve living quality. Once biogas is established within the household, there is no additional cost on lighting, cooking gas, firewood and even to manure. So, there is larger economic and social benefit not only in monetary terms but for environment and health.

Although the principal cost of ram pump is nearly equal to diesel pump, its operational cost is nil. Therefore, ram pump returns its investment cost much quicker than ordinary diesel pumps[73]. Its benefit will be making water available for irrigation in the hilly areas which can create opportunity to cultivate in barren lands to enhance production which will lead to enhancement of living standards of people living in those areas.

Similarly, through the adoption of cold storage, post-harvest wastage can be reduced and can benefit the producers to earn additional income mainly during off seasons. Further, it will also fetch better retail price during the off-season when particular products are not available in the market.

Employment generation:

There is opportunity for employment generation with the introduction of new technology in the integrated wood-based industries along with value addition process taking place within the same location. More people will be engaged for biogas during the initial establishment such as for construction, operation and maintenance although it will not require more after the establishment. However, if biogas can be translated into bottling of gas as well as manure production and also spare part fabrication, then there will be creation of jobs in the market. Similarly, for the cold storage facilities, it directly creates job opportunities in processing, transportation, loading and unloading of the products and services. So overall, there will be employment generation in every aspect of the activities since it will create enterprises and move to a market-based approach for trading products and services.

Rural livelihood enhancement:

All the financing option proposals like integrated wood-based industry, biogas, hydram pump and cold chain will enhance rural livelihood through various activities. It will create alternative employment opportunities to earn their living in addition to

[73] Low-cost water pumping for sustainable irrigation using renewable energy-based ram pump, National Institute of Urban Infrastructure Planning, University of Engineering & Technology, Peshawar, Pakistan

production enhancement which in turn can improve product sells. Specially through adoption of biogas, there will be clean environment and healthy life compared to using firewood or other fossil fuels like kerosene oil with no smoke or fumes through burning of fuels for cooking and lighting. Further, when there is increase of production in agriculture or less expenditure for fuels through the use of biogas, the livelihood will be enhanced with better standards of living.

Self-sufficiency (import substitution):

With the introduction of integrated wood-based industry, wastage will be minimized and there will be value addition to the wood-based products. Definitely, it will contribute towards substitution of wood related product imports such as timber, furniture or other finished products. Biogas can contribute towards substitution of LPG since more people will be dependent on biogas rather than LPG and to some extent on fertilizers/manure. With more production of fruits, vegetables and other food products due to availability of water for irrigation as well as storage facility, there will be more sufficiency of food products in the country and minimize waste. In that way, there will be lesser quantity of food products being imported into the country from outside.

Scalability:

Almost all proposed financing projects have the potential for scalability. Take the case of integrated wood-based industry which can be set up in all potential areas where there is plenty of opportunity in terms of resources and market including availability of easy access to road. Biogas can be established is any household where there is availability of livestock farming. While in the case of hydram pump irrigation system, it will be mainly to those areas where there is need of irrigation for farming specially at higher elevation to reach water. Then for cold storage, it can in the areas, where farmers or producers usually make a point for distribution to wholesalers and where they have to store their products for longer duration.

Feasibility:

The integrated wood-based industry has been already piloted by the DoFPS like the case of Gelepbhu and the proposal is also accepted by the Association of Wood Based Industries. It was learnt from the owner of an integrated wood-based industry in Gelephu that the upgradation of sawmill to integrated wood based has more potential to earn profits, but investment has to be made to upgrade machineries. However, it may not be feasible in all parts of the country since resources are spread across the nation

but to certain locations wherever there are ample facilities to operate the integrated wood-based industry such as in the west or south.

Biogas at the household level has been under operation for the past years and there was overwhelming response from the rural homes about its benefits and success. In addition to that there are number of national level studies being conducted on its feasibility. Similarly, for the hydram pump system of irrigation, it has been piloted in Wangdue and found to be feasible. In Nepal, it was found to be adopted in many areas as one way of irrigation source to the farmers mainly in the highlands. On the other hand, cold storage was mostly handled by government in certain locations but quite recently, private cold chain has been operational in Paro which has demand from the general public.

Sustainability:

As long as timber, furniture and wood-based activities prevail in the country, integrated wood based will be sustainable in the country. Currently, there are around 136 sawmills including 16 mobile sawmills and 6 integrated wood processing units, most of which are located in the western part of the country. Besides, there are about 441 wood-based industries which include 231 furniture units. In the case of biogas, the ones which were installed 5-6 years ago are still functioning with support from the government. It is sustainable as long as there are livestock rearing in the community and further it gives certainty with the commercialization of livestock products in the country.

For the hydram pump irrigation system, it will be sustainable if undertaken routine operation and maintenance along with training of the beneficiaries. While for the cold storage, it will be sustainable as long as farmers keep on producing their products and there is demand of those products in the market.

Accordingly, based on these analysis, the most suitable innovative financing schemes selected are cost saving schemes in terms of integrated wood based industry for the Department of Forest and Park Services and Biogas for Department of Livestock, result based financing for hydram pump irrigation system and value chain finance for cold storage were selected.

8. Viability analysis of selected financing options

Selected financing options are analysed as follows.

8.1 Cost saving mechanism

In the traditional method of wood works mainly in the sawmills which are the main area of wood processing, it was found that there is loss of 32,600 tons of wastage[74] which directly impacts more degradation of forest due to felling of trees for timber. With the adoption of new technology, the cost of investment saved can be utilized for other developmental activities. Similarly, in the case of livestock, biogas has multiple benefits of saving government money in fertilizer as well as in cooking gas. The biogas manages to save kerosene, cooking gas, firewood and CO2 emission.

a) Financing for technology in sawmills

There are about 228 furniture units and 136 sawmills in the country where sawmills are the primary wood-based industry which produces sawn timber and for subsequently processing other purposes such as furniture and other wood products by the secondary wood-based industries (furniture houses, joinery units, etc.). So, the objective is to improve the sawmilling technology for production of sawn timber from same quantity of log input which in turn will help to increase sawn timber availability. With improved production of timber coupled with efficient utilization of sawing waste will further increase income generation of the sawmill owners.

The minimum criteria required for establishment of an Integrated Wood Based Industry comprises of sawmilling unit (minimum of 70% efficiency and 75% timber recovery[75]), joinery unit Finger Jointing Unit/assembly and Seasoning kiln.
Assuming the following as per the experience of the DoFPS from the existing practice:

a) Sawn timber Recovery rate for existing sawmills: 65% (average of 70% for conifer and 60% for broadleaf)
b) Sawn timber recovery rate for improved technology: 72.5% (80% for conifer and 65% for broadleaf)
c) Average monthly timber allotment per wood-based industry: 10,000 cft. log volume
d) Percentage of waste timber utilized post sawing for existing sawmill: 0%
e) % of waste timber utilized post sawing with improved technology: 50%

[74] Study on circular economy and recycling of waste, EU-TACS report, 2021
[75] Based on the experience of DoFPS, MoAF

Table 4: Case of Sawmilling

	Avg vol. of log utilized (cft) monthly	Sawn timber recovery (%)	Avg Vol. of sawn timber recovered (cft)	Average NRPC Rate[76]	Revenue earned (million Nu)
Existing Technology	10,000	65	6500	350.17	2.3
Improved sawmilling technology	10,000	72.5	7250	350.17	2.5
	Saving of 750 cft.		Additional revenue (monthly)		0.2
			Additional revenue (Annually)		2.4

Table 5: Case of finger Jointing

	Vol. of waste sawn timber recovery (cft)	% of waste timber utilized /value added (cft)	Avg Vol of waste timber utilized (cft)	Avg Market Rate/cft[77] (Nu)	Revenue earned (million Nu)
Existing Technology	3500	0	0	1375	0.00
Integrated technology	2750	50%	1375	1375	1.9
				Additional revenue (monthly)	1.9
				Additional revenue (Annually)	22.7

Table 6: Revenue Earned by sawmill with existing and integrated technology

	Monthly revenue (million Nu)	Annual revenue (million Nu)
Existing Technology	2.3	(2.3 * 12) = 27.6
Integrated technology	4.4	(4.4 * 12) = 52.8
Additional revenue	2.1	(2.1 * 12) = 25.2

[76] As per the rates provided by DoFPS, MoAF

[77] As per the calculation from DoFPS, MoAF

Table 7: Establishment Cost of an Integrated Wood Based Industry

Sl. No.	Minimum machinery required	Cost estimate (Nu)
1	Sawmill	32,85,000.00
2	Vertical band saw	3,87,000.00
3	Surface Planer	6,88,000.00
4	Thicknesser/Thickness planer	9,46,000.00
5	Panel saw	11,39,500.00
6	Spindle moulder	9,67,500.00
7	Mortising machine	2,24,000.00
8	Tenon maker	3,85,000.00
9	Finger joining machine set	2500000.00
10	Seasoning kiln	48,91,000.00
	TOTAL	1,54,13, 000.00

With the use of improved technology in sawmill and furniture making, the cost of saving will be:

a) Saw milling = 2.4*136=326.4 million
b) Furniture making =22.7*228=5,175.6 million

Total saving= Nu. 5,502 million considering 136 sawmills and 228 furniture houses in the country through efficiency improvement.

Considering the 70:30 model of financing with 30% from government, the cost will be Nu. 69.35 million to be injected from the government for 5 integrated sawmills in the country while the saving would be Nu.125.5 million annually. If considered for 5 years, the saving will be about Nu. 627.5million.

b) Financing for biogas technology

The installation of biogas costs between Nu. 36,000 to Nu. 48,500 to set up a biogas plant depending on the size of the plant ranging from 4, 6, 8 and 10 cubic metres in the country[78]. In order to ease the burden for the cost of installation of the biogas plant as well as to encourage adoption of biogas by the rural homes, farmers can avail a subsidy amount of Nu 11,700 for all types of plant irrespective of the size of the biogas plants.

[78] National Biogas Implementation Guideline, Department of Renewable Energy, MoEA

A household with biogas can save 2,000 kgs of firewood, 2,555.5 litres of kerosene, 164.25 kgs of liquefied petroleum gas, 1,460 kilowatt of electricity and 5,000 kgs of carbon dioxide in a year[79]. The biogas is also beneficial for human health, environment and agriculture farming. At the moment, biogas in Bhutan is mainly used for cooking. In other countries, it is used for lighting and fuel engines as well. Accordingly, biogas not only benefits the rural communities but also helps in GHG emission reduction, maintaining carbon neutral and minimizing usage of imported LPG gas and chemical fertilizers.

The potential for biogas production in Bhutan can be based on numerous factors such as number of cattle or quantity of dung that could be available for biogas and the micro-climatic conditions in different parts of the country. The daily dung production from cattle or related animal alone is about 3,622 tons which has theoretically a potential to produce 130,398 m3 of biogas. Practically, only 75% of the potential (i.e., 97,799 m3) would be available since the number of animals also include households with only one cattle or related animal and hence do not have enough dung volume to feed the smallest size biogas plant (4 m3) which requires 20 kg of dung per day. These calculations do not take account of the dung available from poultry and other domestic animals such as pigs and goats (van Nes, 1991). The potential for biogas generation based on the number of cattle or related animals is presented in Table 8 below.

Table 8: Gas production potential

Animal	Number	Dung available per animal/day (kg)	Total dung available/day (kg)	Biogas yield /kg of dung (m^3)	Gas volume (m^3)
Cattle	298,601	10	2,986,010	0.036	107,496
Mithun/yak/buffalo	42,412	15	636,180	0.036	22,902
Total	341,013		3,622,190		130,398

Source NSB statistics 2018

Considering of all parameters like availability of cattle and dung, biogas yield and volume of gas production, the technical potential of biogas plants in Bhutan is calculated as per the table below:

Table 9: Potential for biogas

[79] National domestic biogas implementation guideline, Department of Renewable Energy

Particulars	No of households
Total households in Bhutan [80]	163,001
Households in rural areas[81]	102,607
Households with favorable temperature (less than 2000m altitude)[82]	55,408
Households with more than 5 cattle in favorable temperature areas [83]	23,271
Biogas potential households	23,271

Out of the total 163,001 households in Bhutan, 102,607 households are in rural areas. About 69% of the households use LPG for cooking purposes. It is assumed that most of the urban households have no cattle, or less than 5 cattle are not feasible for biogas. Out of the 102,607 rural households, on average about 54% (55,408 households) are considered potential housed based on relatively favorable temperature. These households generally get temperature between 15◦C to 32◦C are located below 1800m altitude. Assuming 46% of households with sufficient cattle are in cold areas and are not suitable for biogas. Further, out of the 55,408 households, only 42% (23,271 households) are estimated to have more than 5 cattle thus are considered technically feasible for biogas.

Table 10: Financial analysis (at cost of installation)

Cost and benefits		Year of operation				
	0	1	2	3	4	5
4m3 plant without subsidy						
Benefits						
Saving of fuel		135750	135750	135750	135750	135750
Saving of chemical fertilizer		13800	13800	13800	13800	13800
	0	149550	149550	149550	149550	149550
Costs						
Installation	41588	0	0	0	0	0
Operation		2160	2160	2160	2160	2160
Maintenance		0	1250	1250	1250	1250
	41588	2160	3410	3410	3410	3410
Total	-41588	147390	146140	146140	146140	146140
	B/C Ratio=1.02		FIRR=35%			

[80] Results of Population & Housing Census of Bhutan 2017, NSB

[81] Results of Population & Housing Census of Bhutan 2017, NSB

[82] Directory of cities and regions in Bhutan, www.fallingrain.com/world/BT

[83] Department of livestock

6m3 plant without subsidy						
Benefits						
Saving of fuel		190050	190050	190050	190050	190050
Saving of chemical fertilizer		13800	13800	13800	13800	13800
	0	203850	203850	203850	203850	203850
Costs						
Installation	46745	0	0	0	0	0
Operation		2160	2160	2160	2160	2160
Maintenance		0	1250	1250	1250	1250
	46745	2160	3410	3410	3410	3410
Total	-41588	201690	200440	200440	200440	200440
	B/C Ratio=1.01		FIRR=48%			
8m3 plant without subsidy						
Benefits						
Saving of fuel		203625	203625	203625	203625	203625
Saving of chemical fertilizer		13800	13800	13800	13800	13800
	0	217425	217425	217425	217425	217425
Costs						
Installation	53923	0	0	0	0	0
Operation		2160	2160	2160	2160	2160
Maintenance		0	1250	1250	1250	1250
	53923	2160	3410	3410	3410	3410
Total	-41588	215265	214015	214015	214015	214015
	B/C Ratio=1.01		FIRR=51%			
10m3 plant without subsidy						
Benefits						
Saving of fuel		217200	217200	217200	217200	217200
Saving of chemical fertilizer		13800	13800	13800	13800	13800
	0	231000	231000	231000	231000	231000
Costs						
Installation	60064	0	0	0	0	0
Operation		2160	2160	2160	2160	2160
Maintenance		0	1250	1250	1250	1250
	60064	2160	3410	3410	3410	3410
Total	-41588	228840	227590	227590	227590	227590
	B/C Ratio=1.01		FIRR=55%			

Considering savings from each household with 2,000 kgs of firewood, 2,555.5 litres of kerosene, 164.25 kgs of liquefied petroleum gas, 1,460 kilowatt of electricity and 5,000 kgs of carbon dioxide after the installation of biogas per year.

Table 11: Savings by biogas per household per year

Particulars	Qty saved	Unit cost	Amount (Nu.)
Firewood	2000kgs	1000/tonne	2,000.00
Kerosene	2555.5litres	58.8/litre	150,263.40
LPG	164.25kgs	1100/16.5kg	10,950.00
Electricity	1460kW	3.6/unit	5,256.00
		Total	168,469.40

Considering saving of Nu. 0.169 million per household in a year, if taken for 23,271 households which is found to be technically feasible as per the studies conducted in the past, the total saving of government budget will be Nu. 3932.799 million. This does not include those commercial livestock farms which are available across the country. Even if the government provides subsidy of Nu.11,700 per household, the total subsidy will amount to Nu. 272.27 million and the saving will still be Nu. 3660.529 million in a year.

8.2 Result based financing

Description:

In the case of result-based financing, some of the international funding agencies like IFC are ready to make the finance if they are assured of result or outcome of the funding. The objective is to make sure each dollar spent produces the maximum benefit at the least possible cost. These approaches, the introduction of which in most cases represent a process or product innovation, allow governments and development partners to better link funding decisions with results. They strive to align the goals of a principal-agent (e.g., the Ministry of Finance) with those of the implementing agents (e.g., Ministry of Agriculture and Forests), for example by setting an incentive for the agent to pursue the goal of the principal as its own goal. Among the most innovative mechanisms, social and development impact bonds feature an incentive system for which social outcomes are paid by the agent (e.g., the Government) only when results are achieved.

Development partners have applied many strategies to enhance transparency and accountability to development aid. For example, the World Bank has released facilities for education and health based on payments for results. Moreover, Governments have looked at efficiency gains in the way public services are delivered and sometimes outsourced. The solutions can include public service delivery, public-private partnerships, asset maintenance fund, accessing new forms of aid, debt for-nature swaps, carbon markets and payments for ecosystem services.

Business case:

The result-based financing through public private partnership is considered for the case of hydram pumps. About 60% of the population in Bhutan depends on agriculture, but the sector is largely dependent on rainfall for irrigation, and it has been found to be most vulnerable to climate change with unpredictable changes on the rainfall pattern. While Bhutan has many north-south flowing rivers and streams, they are not tapped for irrigation purposes due to the hilly and mountainous terrain with water at the bottom of the valley and agricultural land on side slopes and at the top. The National Irrigation Master Plan[84] recognizes the current widely used community managed irrigation systems (CMIS) as highly susceptible to climate change, and schemes are impacted on by changes in seasonal water availability, flooding, and landslide events – all can have negative impacts on these CMIS. Therefore, in addition to rainfed agriculture, irrigated agriculture is also seen as being under the threat of climate change.

Hydraulic Ram Pumps (Hydram) are innovative technologies which can address the water scarcity issues in most parts of Bhutan. In this technology, using the principles of physics, a high-volume low-head is used to deliver water at a low-volume and high-head. As the water flows from the drive tank to the pump, a pressure surge is formed as the waste vale is forced to shut. The pressure surge causes the check value to open and allows high pressure water to enter the air chamber. The pressurised air in the air chamber then helps smooth out the pressure surges from the ram pump and allows a continuous flow through the delivery pipe. Due to the above physics, these pumps do not require any external source of energy like fuel or an electric generator. These technologies have been successfully adopted in countries like Nepal where the geography as well as the risk from climate change are very similar to Bhutan. In Bhutan, it has been piloted successfully in Rubesa and Phobjikha, Wangdue, by the Bhutan Water Partnership in collaboration with the Center for Rural Technology (CRT), Nepal.

[84]National Irrigation Masterplan 2016. National Environment Commission & Department of Agriculture, RGoB

The CST proposed here is establishing a local firm in Bhutan that can provide specialised services in design and installation of hydram systems that are tailored to individual needs. Services can include design, equipment procurement, installation, testing, commissioning, operation and management of hydram systems in the initial stages. After about 2 years the firm should be in position to reverse engineer and locally produce the pumps. The firm can also work with farmers to determine water needs for their landscape, how to apply irrigation by following water conservation principles, and appropriate system selection.

Cost Benefit Analysis:

The Cost Benefit Analysis was carried out taking discount rate of 8%[85] over a lifetime of 10 years. The cost benefit analysis has been carried out based on the assumption that approximately 5 hydram systems are installed annually. The annual fixed cost includes the charges for manpower while annual variable cost is inclusive of raw materials, utility bills, marketing, taxes and other miscellaneous costs.

The social benefit of the project includes improved access to water for consumption and irrigation; enhances water security; support livelihoods - small-scale agriculture practices, livestock farming, fisheries; improved health and sanitation; improved livelihood for women and children – reduced drudgery for collecting water; time saving which can be used for other economic activities and education for children.

On the other hand, there is also environmental benefits such as zero emission technology for sustainable water resource management, zero use of fossil fuels in operation and reduced pressure on water resources. The detail of analysis is shown in the table below and further reference can be found in annex 15.3.

Table 12: Cost Benefit Analysis of a hydram pump

Cost Particulars	Amount (Nu.)
Establishment cost (land, warehouse construction, equipment, miscellaneous)	1,500,000.00
Annual Fixed overhead cost	250,000.00
Annual variable cost	655,000.00

[85] The discount rate of 8% has been applied rather than 10% because of uncertainty for future market conditions, profitability of the investment, and inflation levels. So, the discount rate is adjusted for risk based on the projected liquidity which comes to 8%.

Total cost	2,405,000.00
Benefits	
Total revenue per year	1,100,000.00
Simulation Result	
Initial investment cost	1,500,000.00
Total Fixed Overhead cost	2,750,000.00
Total Variable Cost	6,605,000.00
Total benefit	12,100,000.00
Net present value	603,466.00
IRR	25%
Payback period	2.5 years

The total cost of installation of hydram pump is Nu. 2.41 million and the benefit of the project will be Nu. 12.1 million per hydram pump for irrigation. If assumed 50 numbers of hydram pumps are installed, then the cost will be Nu. 120.5 million which will be the funding required through result-based financing from the funding agencies.

8.3 Value chain financing

Description:

Value chain finance offers an opportunity to expand financing for agriculture, improve efficiency and repayments in financing, and strengthen or consolidate linkages among participants in value chains. It can improve quality and efficiency in financing agricultural chains by:

a) Identifying the financing needed to strengthen the chain.
b) Tailoring financial products to suit the needs of the participants in the chain.
c) Reducing financial transaction costs through the direct discounting of loan payments at the time of product sale; and
d) Using value chain linkages and knowledge of the chain to mitigate risks to the chain and its partners.

There are number of value chain studies being conducted within the MoAF and some of the issues and constraints highlighted are as follows:

a) There are weak institutional linkages for spillover effect for exchange and sharing of knowledge on best practices. The market linkages are not well established wherein it is the buyers usually visiting the producers to buy

products. The other thing is locational disadvantage owing to producers being in various Dzongkhags and high transportation cost to bring to the processing units[86].

b) Lack of working capital is one of the major constraints that have hampered the farming business, particularly for the farmers' marketing groups. Some of them are unaware about the credit schemes provided by some of the financial institutions[87].

c) There is no backup for setting up of cold storage due to which during the off-season months, the weekend and retail markets in Bhutan have to depend on imported products from India. There is also lack of group enterprise, pest and disease problems, inappropriate handling during transportation and only a small portion of internal production goes to processing in Bhutan[88].

d) There are inherent systematic issues like lack of budget for training and awareness creation, trading and marketing challenges, challenges related to access to finance, poor market information, very few processing units and weak private sector participation in the chain. There are other external challenges such as lack of lateral coordination within supporting agencies, lack of collaboration amongst each other and low capacity of extension personnel[89].

Business case:

Along the value chain, transportation of agricultural produce is always a challenge specially for fruits and vegetables, which are more perishable. In comparison to the developed world, the issue of food loss is more prominent in the developing world. By introducing new technologies and methods of food storage, developed countries have significantly reduced food loss. Development and adoption of better harvesting equipment; establishment of collection centres at strategic points in major crop-producing areas; remodelling of containers to improve produce protection; and, most significantly, the development of commercial storage plants/cold storages are examples of such steps.

Storage facilities play an important role in balancing supply and demand in the market. Storing certain number of apples during peak season could reduce glut in the market where farmers may be forced to sell their produce at a lower price. Apple as a seasonal

[86] Buckweat value chain analysis, 2019, DAMC, MOAF, Thimphu

[87] Citrus in Bhutan: Value Chain analysis, 2019, MoAF

[88] Potato value chain analysis, 2018, Technical Cooperation Project in support of the Renewable Natural Resources Sector in Bhutan

[89] Apple value chain analysis, 2018, TCP in support of the RNR Sector in Bhutan

fruit can flood the market, immediately after the harvesting phase and may be short in supply during the other times, resulting in import dependence to fulfil the demand. Therefore, storage facilities have important role to play[90]. Due to the climatic conditions, the short growing season as well as the technology advancement in Bhutan, the country is unable to preserve the excess produce from the peak season for the lean season. This has led to low export prices in the peak season followed by disproportionally high import prices in the lean season. Post-harvest losses have been accounted to be as high as 30% of total production and is same for Bhutan which accounts to 25%-30% losses[91]. Cold storage units can help to reduce the loss incurred from the wastage of fruits and vegetables. It would also help in getting a better value for the fruits and vegetables particularly in the export market. It would also discourage, to some extent, the import of fruits and vegetables in the lean season.

The Cold storage proposed here is a commercial cold storage facility which can be adopted in various parts of the country. Such facilities can store and extend the shelf life of the excess vegetables and fruits during peak season. These produces can then be exported or used for domestic consumption during the off season. There are small solar powered cold storage units available on the market that are suitable for individual farmers, farmers' groups, women's groups and local traders, coming in many different sizes.

A large proportion of the Bhutanese population are farmers and almost all Dzongkhags in Bhutan produce a variety of fruits and vegetables over the year, and they are all potential customers for cold storage facilities. The common challenge faced by many farmers in the different Dzongkhags was the lack of market or the lack of easy access to market for perishable goods and cold storage facilities would help these farmers extend the shelf-lives of their excess produce. Additionally, fruit export houses are also potential clients for such facilities. Therefore, there is market for at least one large cold storage facility or several smaller facilities in each Dzongkhag.

Cost Benefit Analysis:

The Cost Benefit Analysis was carried out taking discount rate of 8% over a lifetime of 20 years. The cost benefit analysis in the table below has been carried out based on the unit at the National Post-Harvest Centre. The storage capacity is 120 MT. Investment

[90] Apple value chain analysis, TCP in support of the RNR Sector in Bhutan, April 2018

[91] Coulomb, D. 2008. Refrigeration and the cold chain serving the global food industry and creating a better future: Two key IIR challenges for improving health and environment. Trends in Food Science & Technology, 19, 413–417.

and operation/ maintenance cost has been collected from the National Post Harvest Centre while some assumptions have been made such as duration of storage for 6 months for apple along with the cost of storage per day for calculating the benefits. The annual fixed cost includes the charges for manpower while annual variable cost is inclusive of utility bills, marketing, taxes and other miscellaneous costs.

It is assumed that apples are stored in the cold storage for 6 months with number of apple boxes stored – 9231 and the cost of Storage/box/day – Nu. 3.

The social benefits of the proposal includes improvement in food and nutrition security; improved health with increased access to high quality, nutritious and preservative free vegetables and fruits; reduced dependence on imported vegetables and fruits; incentive for farmers to grow vegetables and fruits on a large scale; increased employment opportunities as people take up farming; increased income for farmers; cost savings for consumers who would otherwise have to pay higher price for imported vegetables and fruits.

Table 13: Cost Benefit Analysis of cold storage facility

Cost Particulars	Amount (Nu.)
Establishment cost (land, warehouse construction, equipment, miscellaneous)	12,000,000.00
Annual Fixed overhead cost	180,000.00
Annual variable cost	7,350,000.00
Total cost	19,530,000.00
Benefits	
Total revenue per year	4,454,615.00
Simulation Result	
Initial investment cost	12,000,000.00
Total Fixed Overhead cost	3,780,000.00
Total Variable Cost	7,350,000.00
Total benefit	99,692,300.00
Net present value	31,206,067.00
IRR	35%
Payback period	2.6 years

On the other hand, there is also environmental benefits such as reduced carbon footprint of food, efficient use of valuable raw materials/resources and reduced pollution due to decomposition of excess vegetables and fruits. The detail of analysis is shown in the table above and further reference can be made in annex 12.4.

The total cost of installation of cold storage is Nu. 19.53 million and the benefit of the project will be Nu. 99.69 million per cold storage establishment along the value chain. If considered for 20 numbers of cold storage installation in selected feasible areas across the country, the cost will be Nu. 390.6 million which will be the funding required in this case through value chain financing from the funding agencies.

9. Estimated Fund Requirements

There are various strategies, plans and programmes developed by the sectors which indicates fund projected fund requirements in the next 5 to 10 years as follows:

a) The Low Emission Development Strategy (LEDS) for Food Security 2021 covers agriculture and livestock sector which has identified six mitigation actions aimed at reducing emissions and increasing carbon sequestration[92]. The prioritised mitigation measures targets until 2030 with the cumulative mitigation potential of up to 710 Gg CO2e. The cost of implementing the interventions will require an estimated investment of USD 61.65 million.

b) Under the National REDD+ Strategy, Bhutan will continue to strengthen the conservation of existing forests and increase the adaptive capacity to climate change impacts without compromising opportunities for future economic development and prosperity. This requires strengthening of forest management practices, climate smart primary productions, integrated land use planning and improved rural livelihoods with the estimated amount of USD 54.5 million.

c) In terms of marketing, there is a need to promote enabling policy with multisectoral support mechanism, promotion of market led commercial production, infrastructure and logistic supply chain management, enhancement of domestic and export market, information management system on marketing including RNR enterprise development.

d) According to the RNR Strategy 2040, the sector is looking forward for a sustainable natural resources and self-reliant food systems contributing to the socio-economic well-being of the country. The various strategies proposed for different subsectors and agencies requires about Nu. 21,641 million. The details of the financing requirement are provided below in Table 14.

   The fund projection in Table 14 is mainly for the capital budget but if both current and capital expenses are taken into consideration for the next 10 years. It is found that there is need of about Nu. 58,125 million based on the past 10 years trend with the average growth rate is 12% annually for the RNR sector.

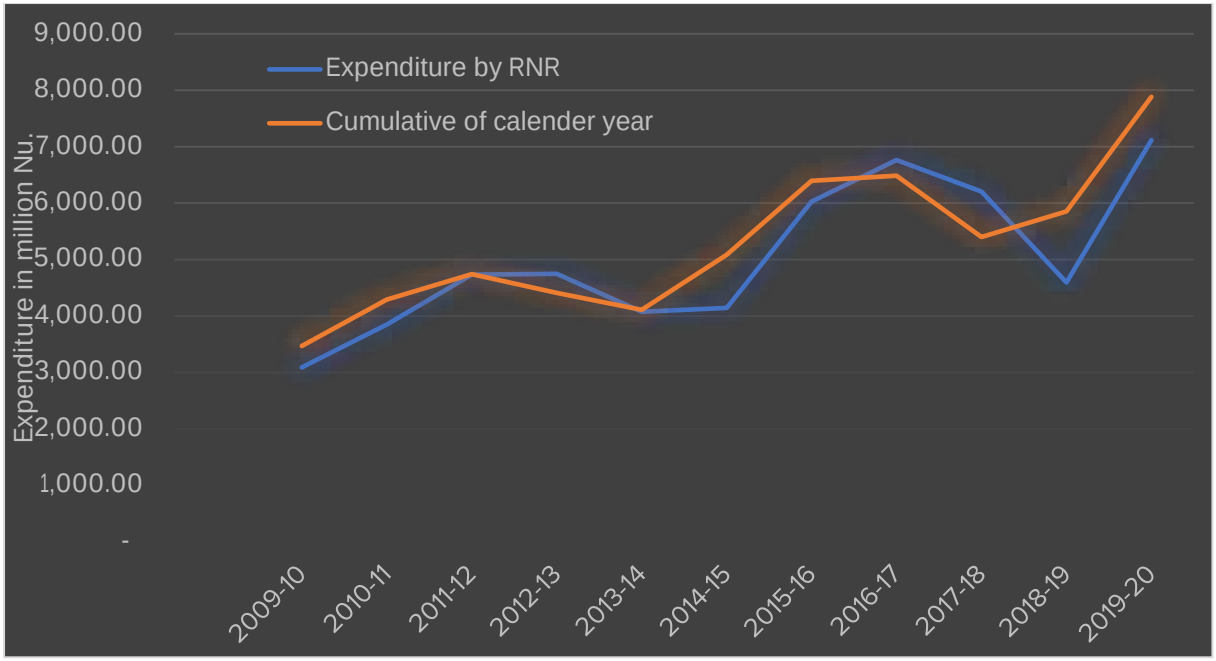
[92] Low Emission Development Strategy for Food Security 2021, Ministry of Agriculture and Forests, Royal Government of Bhutan

Table 14: Financing requirement by 2030

Strategies	Amount
Enhance production and quality of RNR commodities	6,124.00
Enhance contribution of RNR sector to National economy	2,069.00
Accelerate agri-business development and expansion	1,322.00
Develop enabling policies for RNR sector	25.00
Strengthen research, innovation and dissemination	2,057.00
Institute efficient RNR service delivery	122.00
Enhance production efficiency of RNR commodities	796.00
Promote Research and Innovation	2,721.00
Diversify sustainable financing for RNR sector development	1.50
Mainstream sustainable management (conservation and utilization) of natural resources	5,008.00
Enhance and promote resilience to climate change impacts and low emission development	1,395.00
Total (in million Nu.)	21,641.00

Source: RNR Strategy

Fig 13: RNR Expenditure in the past 10 years



(Source: Annual Financial Statistics, MoF)

10. Governance and management

The overall operation and management of the innovative financing involves the following agencies.

10.1 Role of MoAF

Since financing for RNR is a crosscutting issue and there are various actors to be coordinated for effective implementation, the overall coordination will be vested with the PPD, MoAF. The ministry will play a lead role toward supporting policy directives, project implementations through proper coordination and support services as per the priorities of the government. Other responsibilities shall include exploring of innovative financing schemes, providing assistance to the agencies or departments in terms of coordination and to liaise with partner funding agencies. It will be also the role of PPD to lead discussion forums, formation of committee and networking with different stakeholders to undertake the financing schemes.

10.2 Roles of sectors/agencies

The concerned agencies or sectors will take their own initiatives to sourced various innovative financing opportunities as per the rules and regulations of the ministry. However, they will have to involve MoAF and MoF for final negotiation and implementation. They will be monitoring and reporting the progress to the ministries. The concerned agencies collaborate with the relevant partners for the potential innovative financing and take up the proposal to the ministries concerned for approval and implementation.

10.3 Role of MoF

The Ministry of Finance (MoF) shall be the central agency where all investors will have to route through for probable innovative financing mechanisms. Even if in some cases, the concerned ministry or department takes a lead role during the initial discussions or planning, the MoF will be always involved for decisions and facilitation support. In the case of involvement of funding sources from international agencies, the MoF will act as the executing agency on behalf of the government and sign necessary agreements. It will act as a link between different parties involved for the financing sourcing.

10.4 Role of Financial institutions

The primary role of financial institutions is to provide liquidity to the economy and permit a higher level of economic activity than would otherwise be possible. Banks accomplish this in three main ways: offering credit, managing markets, and pooling risk among consumers. The principal function of financial institutions is to collect funds from the investors and direct the funds to various financial service providers. Their role will involve across any of the innovative financing mechanisms in terms of either acting as investor or as banking channel for the financing schemes.

10.5 Role of international agencies

International agencies or partners will play an important role in any types of innovative financing mechanisms. Their presence and partnership will be necessary for almost all the financing activities such as ADB, IFC, IFAD etc. Most of the international funding operations are primarily financed by member contributions, loan repayments, investment income and special contributions from non-member states. Other sources of financing include sovereign borrowing, concessional loans and borrowing in international capital markets. The role of international agencies will be critical in terms of partnering with probable agencies for the proposed financing options and taking equal responsibility for promotion and implementation of the proposed financing plans.

10.6 Role of private sector

Private will be playing a major role in the RNR sector even more than what is being practiced at the moment mainly in terms of providing innovative financing and their participation. Whether in terms of PPP projects, participation in the agriculture value chain or integrated wood-based industries, there is need of support from the private sector. The presence of private sector will be crucial in any of the financing models since it is the private sector which will have to take major role to execute the projects.

11. Monitoring and Evaluation

Monitoring and evaluation will be important to oversee the performance and results of the interventions. The implementing entities of central Departments and Agencies within the Ministry shall be responsible for collecting and recording data on implementation status of their programs and projects in coordination with the Ministry of Finance. The data shall include physical and financial data of completed activities and results and other related information. The PPD and the Finance Division/Section shall monitor/verify the accuracy of data and ensure that the implementing agencies enter the data in the system regularly.

The implementing entities or agencies under the Ministry shall prepare detailed progress report of their respective sectors annually. The 1st Semi-Annual Progress Report for the period July-December shall be completed by 31st January and the 2nd Semi-Annual Progress Report for the period January-June shall be completed by 31st July. The inter-ministerial committee shall review the status of plan implementation at the entities or agencies under the Ministry on a semi-annual basis. However, the entities or agencies within the Ministry shall organize internal reviews more frequently (monthly or quarterly) to facilitate efficient decisions making.

Evaluations can be conducted for lessons regarding replications or sustainability, identifying what methods and strategies work best over time as well as to ensure accountability. Evaluations may be conducted to account for the use of resources by the implementing entities to the government and funding agencies.

12. Recommendations

Below are the recommendations derived from the study.

a) Short-term

Capacity-building and training needs

In order to operationalize the innovative financing into the RNR sectors, there is a clear need to develop the capacities of concerned agencies under the Ministry. The following are some of the training needs.

1. The key concepts and principles underlying the innovative financing, the methods used, the standards followed, and the practices applied in other countries. This training should be directed at MoAF, DoL, DoFPS and DoA officials, plus relevant stakeholders.
2. Training on the various financing opportunities available in connection with the usage of RNR waste-flows and their improved utilization through technology interventions. Training that demonstrates savings using newer technologies from the conventional methods of processing in the RNR sector which will have major impact on overall financing.
3. Training on preparing coherent business development plans for proposed fundings and the opportunities offered by various funding agencies based on RNR products, services and economic models. The trainees must acquire a sufficient set of skills in all aspects of the business planning to enable them to comply with the requirements of the financing institutions.
4. Training on the various business opportunities available along the value chains of RNR sectors for inputs and services providers, support services, and market agents. The participants must be acquainted into various funding opportunities available through financial institutes in terms of loans, cost-sharing mechanisms, public private partnerships or result based financing mechanism.

Collaboration and networking

1. The RNR sector requires involvement of numerous stakeholders and agencies to work together in the handling, management and operation of RNR sector activities. The various agencies and stakeholders involved should collaborate and network in order to work out possible innovative financing options for respective sectors, from piloting to out-scaling.
2. Collaboration is also required between potential business entrepreneurs, suppliers, investors, and experts in RNR sector. Networking for training, consultation, and information sharing can take place in workshops and

brainstorming sessions. Longer-term and targeted networking between potential institutional partners can be implemented, via institutional inter-institutional partnerships and collaborations.

b) Long term

Development of plans and frameworks

1. The existing policies, rules and regulations do address some form of financial management, budgeting and progress reporting but it does not allow agencies to explore and carry out fund management. Since the innovative financing is a new concept, there is a need to either integrate within the existing policies, regulations or rules; or else to come up with separate policy instruments. As a result, there is a need to conduct a series of consultations with stakeholders to discuss what regulations, plans, manuals, and guidelines are required to implement innovative financing mechanisms effectively.

Establishment of innovative financing governance

1. The overall planning and management of innovative financing require the formation of a new MoAF or inter-ministerial committee whose members will take suitable decisions, monitor progress, and ensure the successful implementation of the projects.
2. This position is based on the fact that the various agencies or departments under MoAF have their respective functions and mandates, and it may not be feasible to add additional functions. The current analysis indicates that to carry out innovative financing functions, a separate committee with unit in MoF is required to conduct the necessary coordination, collaboration, support, and regulation of innovative financing activities.

Awareness, education and advocacy

1. Awareness on innovative financing mechanism is vital for ensuring the continued stewardship of Bhutan's rich natural and cultural heritage since every Bhutanese is a trustee of the Kingdom's natural resources, and every citizen must contribute to environmental protection as per the Constitution of the Kingdom of Bhutan. There is a need to create advocacy among the agencies within the RNR sector as well as to private sectors about the innovative financing so that there is contribution from everyone towards financing schemes. The

advocacy can be created through pamphlets, brochures and advertisement through both printed and media (such as TV, social platforms etc.)

2. As Bhutan develops its policy frameworks and determines long-term plans for each RNR sector, conducting awareness efforts around specific areas of the innovative financing mechanism will be essential for their effective implementation. Thus, RNR communications should be directed to potential interested participants mainly the private sector including all those participating along the value chain.
3. Efforts to ensure knowledge and understanding of innovative financing mechanisms can increase opportunities for financing by various stakeholders. They will enhance their participation during the planning and implementation stages of various financing options. Creating awareness and advocacy directed at all stakeholders, from Government officials to business entrepreneurs, farmers, and individuals, will catalyze innovative financing mechanism implementation in the country.

13. Conclusions

It is important to recognize the different trends in RNR sector practices including its financing, often in response to changes in technologies and approaches. There is increasing research activities carried out worldwide for innovative financing in the agricultural sector with more focus on stronger value chain relationship due to increasing qualitative and quantitative demands for food products and food self-sufficiency. Alternative financing has become important with decreasing development assistance and donor funds while on the other hand, there is need of increasing fund requirements to improve agriculture production, land use management, forestry management, livestock management, efficiency improvement in marketing, supply chain development and other aspects in the RNR sector.

The success of innovative financing initiatives rests on technology, governance, policies and regulations, institutions, infrastructure, human capital, knowledge and data as well as mindsets and capability of actors and various organizations. For smooth implementation of innovative financing from various sources, there is a need of active participation from all the relevant entities and agencies within the ministry. The organizational operation has to shift from an implementing agency to financial management, operation and implementation of the plans and programmes.

The impacts of these dynamics on the structure of agricultural markets have to be understood by all actors in the RNR sector, especially financial service providers. The participation of private sector, financial institutions, international partners and all entities will be necessary to work in coordination to lead the way for agricultural financial services. Production, marketing and finance will be more intertwined and linking partners with financial services will be part of the business model for the coming years.

Further, the study prescribes policy reforms and other interventions that will enable the sector to continue to improve its services with a more robust eco-system and diverse innovative financial sources. The RNR sector will strive to cope and respond to the new business operation through accelerated agriculture, livestock and forestry production in tandem with marketing, value additions and enhanced functions.

14. Implementation strategy and action plan

Based on the above assessment on innovative financing for the RNR sector and considering the findings from the study, Action Plan is being proposed to support development of innovative financing planning and implementation for the RNR sector (forestry, livestock and agriculture).

Sl. No	Strategic area	Measures	Lead	Partners
1.1	Strategy 1: Strengthen the Policy and regulatory Environment	Conduct stakeholder consultations to review the possibility for integration of innovative financing component within existing policy and regulations	MoAF, MoF, DoA, DoL and DoFPS	GNHC, PPD
1.2		Propose amendments to existing policies or regulations or develop separate regulations to be applied for innovative financing	MOAF, MoF	GNHC
2.1	Strategy 2: Governance and institutionalization of the organizational setting and procedures for innovative financing	Develop terms of reference for the innovative financing Working Group, its functions, and roles	MoAF, PPD, MoF	Depts
2.2		Conduct meetings to discuss plans to develop innovative financing activities, to review their progress and to propose measures to accelerate innovative financing activities	MoAF, MoF Working Group	Stakeholders
2.3		Steered by the Working Group, design and adopt innovative financing schemes and plans	MoAF, GNHC, MoF	Depts
2.4		Establish inter-ministerial committee along with their functions and roles	PPD, MoAF, MoF	Depts
3.1	Strategy 3: Conduct stakeholder consultations and	Design a Communications Strategy that explains to stakeholders about the innovative financing approaches	MoAF, MoF	DoA, DoL, DoFPS,

3.2	awareness creation	Create awareness amongst stakeholders and investors about the innovative financing options	MoAF, MoF	Depts
3.3		Strengthen stakeholders' awareness on the opportunities for innovative financing options for RNR sector by holding information sharing sessions.	MoAF, MoF	Depts
4.1	Strategy 4: Establish institutional linkages, pursue significant international partnerships	Carry out dialogues with financial institutions and organizations with the potential for innovative financing	MOAF, MoF	Depts
4.2		Establish MOUs with Bhutanese financial institutions or organizations to establish financing mechanisms	MOAF, MoF	Stakeholders, banks
4.3		Establish linkages with international agencies, to provide both financial and technical support for investments	MOAF, MoF	Stakeholders.
4.4		Build collaborations between MoAF, MoF and other institutions	MOAF, MoF	Partners
5.1	Strategy 5: Skills development and technology	Design a Training Program for the promotion of innovative financing opportunities	MOAF, MoF	Stakeholders
5.2		MoAF and MoF to develop innovative financing Guidelines that provide details of innovative financing procedures and options	MOAF, MoF	Stakeholders
5.3		Provide training on innovative financing mechanism and methods to raise funds to officials and other stakeholders	MoAF, MoF	Depts
6.1	Strategy 6: Cooperation and coordination.	Conduct coordination meetings with relevant stakeholders within the ministry, inter ministries, financial institutions and other investors interested in innovative financing for RNR sector.	MoAF	Depts

6.2		Facilitate interested parties or agencies both domestic and international to process innovative financing mechanisms	MOAF, MoF	Depts
7.1	Strategy 7: Monitoring and evaluation	Conduct bi-annual Progress Review Meetings on the progress of innovative financing mechanisms adopted for RNR sector through the Working Group	MOAF, MoF, agencies and PPD	Stakeholders
7.2		Submit progress reports annually to the relevant authorities including the inter-ministerial committee members	MOAF, MoF, agencies and PPD	Stakeholders

15. Annexure

15.1 Methodology

The process of assessment for innovative financing has been explored from different perspectives based on the theory and models of innovative financing like result-based finance, impact investment, debt for development swap, climate finance among others. Based on these models and principles, following procedures were adopted in this study.

Step 1: Information gathering and document collection

Discussions were held with the relevant officials with regard study objective and availability of reference notes. The documents and information available with other stakeholders were also requested including any past studies related to innovative financing. Since the innovative financing was quite new, there was not much of references and thus the study had to rely mostly into some of the international relevant documents and see those practices in the Bhutanese context.

Step 2: Document review

Based on the available reports and documents including international best practices, detailed literature review was carried out especially on the aspects of models adopted for innovative financing and its applications. References were also made from the international conferences and workshop papers held on innovative financing.

Step 3: Conducting interviews

Since the study period came under two lockdowns, it was not possible to conduct physical interviews, thus adopted online meetings and questionnaire distribution. Pre-planned online questionnaires were distributed to all stakeholders within the three sectors (forestry, agriculture and livestock) within the departments, research centres, Dzongkhag livestock officers, Dzongkahg agriculture officers and Chief forestry officers. The other stakeholders included are international organizations and the private sector who are directly or indirectly involved in the RNR sector. In some cases, telephonic interviews were also conducted based on the convenience of the stakeholders.

Step 4: Situational Analysis

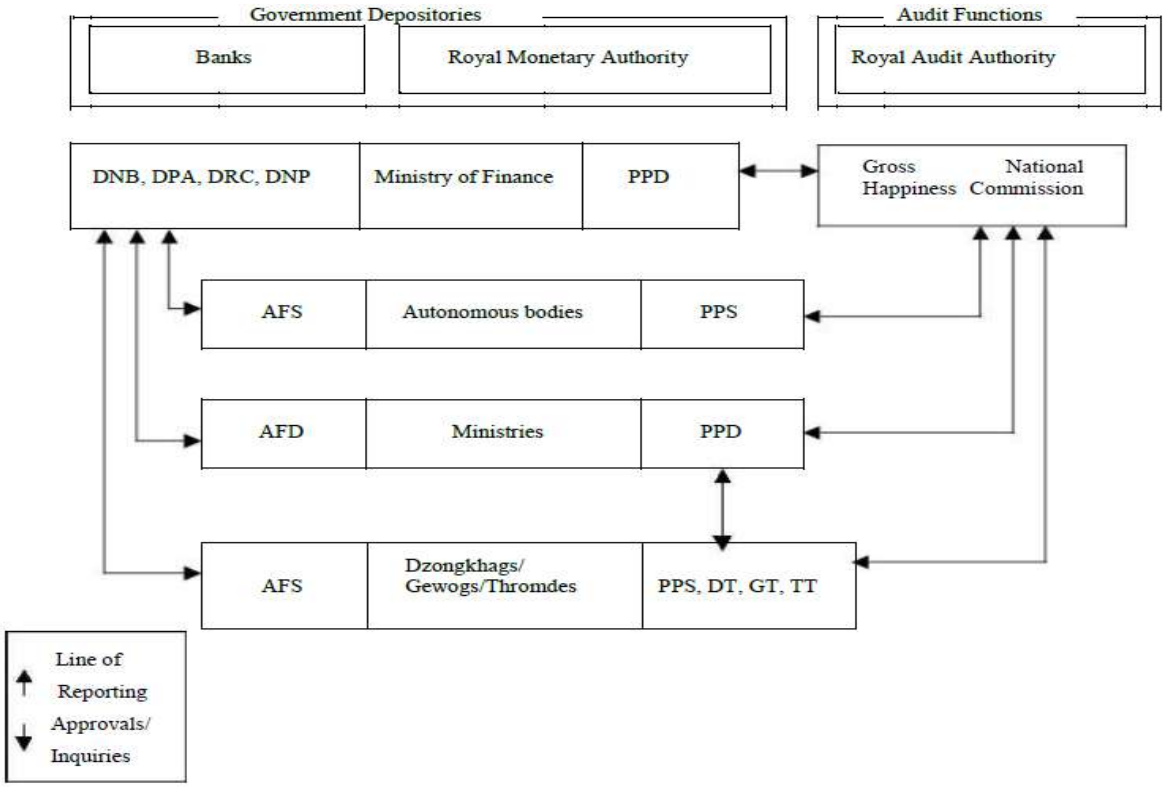
The information collected in the form of reports, workshop or seminar papers and research publications including those from consultations were analysed in terms of existing financing arrangements, sources of funds and its operation within the RNR sector. The international literatures were analysed in terms of innovative financing best practices and its relevance to Bhutan.

Step 5: Identification of gaps and recommendations

So based on the existing practices of financing in the RNR sector, international best practices and government plans and policies for the future. The analysis tried to find gaps within the sectoral operations. Accordingly, explored various innovative financing strategies applicable to RNR sector in Bhutan.

15.2 Existing structure of financial management

The Ministry of Finance is the lead agency for financial management services and economic advice to the Government. Its primary role is to determine the Government's fiscal policies, and to assess the Government's budgetary position both at macro and micro levels. The financial management services include mobilisation and judicious application of resources, management of the equity portfolio and debts of the Government, proper custody, use and maintenance of Government properties, clear and transparent accounting of all public receipts and expenditures and reporting. Specifically, there is Department of National Budget (DPBP) looking after all aspects of budget and then the Department of Public accounts (DPA) which monitors on the expenditure and accounts of all government agencies at the central level.



On the other hand, the Gross National Happiness Commission (GNHC) is the central coordinating agency which provides guidance and direction for the formulation of five-year development plans; review and endorse five-year development plans for submission to the Cabinet; and review and recommend the allocation of resources for five-year development plans. It also provides directions for mobilization of resources based on the resource envelope determined by respective agencies. Even in the case of any grants or external funding, it has to route through the GNHC to be allocated to concerned agencies.

All Gewogs, Thromdes and Dzongkhags made budget proposals as well as accounts which are submitted to the concerned departments in the Ministry of Finance through the Administration and Finance Section. Similarly, agencies under different ministries and autonomous agencies submit their budget and accounts through their respective administration and finance sections or divisions in the case of ministries to the concerned departments of the Finance Ministry. The details of working are shown in the above figure.

The Government has a system of annual budget for its receipts and payments through a Multi-Year Rolling Budget (MYRB) System introduced in 2010 from a manual to a real and virtual system connecting DPBP with Budgetary Bodies. Today, budget preparation

and management are being done through online and on real time basis and information are being shared through an integration of MYRB, PEMS, GPMS and PLaMs.

15.3 Cost Benefit analysis of Hydram Pumps

Key Assumptions							
Discount Rate	8%						
Appraisal Period	10	years					
	Year	***Capital Investment (Nu.)***	***Annual Fixed overhead cost (Nu)***	***Annual Variable Cost (Nu.)***	***Annual Benefit (Nu.)***	***Net Cash Flow (Nu.)***	***Net Present Value***
	0	(15,00,000.00)	(2,50,000.00)	(55,000.00)	11,00,000.00	-7,05,000.00	-7,05,000.00
	1		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	1,80,555.56
	2		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	1,67,181.07
	3		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	1,54,797.29
	4		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	1,43,330.82
	5		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	1,32,713.72
	6		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	1,22,883.08
	7		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	1,13,780.63
	8		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	1,05,352.43
	9		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	97,548.55
	10		(2,50,000.00)	(6,55,000.00)	11,00,000.00	1,95,000.00	90,322.73
		(15,00,000.00)	**(27,50,000.00)**	**(66,05,000.00)**	**1,21,00,000.00**	**12,45,000.00**	**6,03,465.87**
Summary of Cost Benefit Analysis							
Initial Investment Cost	BTN	15,00,000.00					
Total Fixed Overhead Cost	BTN	27,50,000.00					
Total Variable Cost	BTN	66,05,000.00					
Total Benefit	BTN	1,21,00,000.00					
NPV	BTN	6,03,465.87					
IRR		25%					
Payback		2.46	years				

15.4 Cost Benefit analysis of cold storage

Key Assumptions							
Discount Rate	8%						
Appraisal Period	20	years					
	Year	***Capital Investment (Nu.)***	***Annual Fixed overhead cost (Nu)***	***Annual Variable Cost (Nu.)***	***Annual Benefit (Nu.)***	***Net Cash Flow (Nu.)***	***Net Present Value***
	0	(1,20,00,000.00)	(1,80,000.00)	(3,50,000.00)	-	(1,25,30,000.00)	(1,25,30,000.00)
	1		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	41,24,643.52
	2		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	38,19,114.37
	3		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	35,36,217.01
	4		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	32,74,275.01
	5		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	30,31,736.12
	6		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	28,07,163.07
	7		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	25,99,225.07
	8		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	24,06,689.88
	9		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	22,28,416.55
	10		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	20,63,348.66
	11		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	19,10,508.02
	12		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	17,68,988.91
	13		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	16,37,952.69
	14		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	15,16,622.86
	15		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	14,04,280.43
	16		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	13,00,259.66
	17		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	12,03,944.13
	18		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	11,14,763.08
	19		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	10,32,188.04
	20		(1,80,000.00)	(3,50,000.00)	49,84,615.00	44,54,615.00	9,55,729.66
		(1,20,00,000.00)	**(37,80,000.00)**	**(73,50,000.00)**	**9,96,92,300.00**	**7,65,62,300.00**	**3,12,06,066.71**
Summary of Cost Benefit Analysis							
Initial Investment Cost	BTN	1,20,00,000.00					
Total Fixed Overhead Cost	BTN	37,80,000.00					
Total Variable Cost	BTN	73,50,000.00					
Total Benefit	BTN	9,96,92,300.00					
NPV	BTN	3,12,06,066.71					
IRR		35%					
Payback		2.62	years				

15.5 Criteria for selection of financing options

The following criteria was used by the consultant in order to prioritise the selection of financing options for the RNR sector. However, during the process of assessment while providing ratings for each of the criteria, it was not possible to engage either the taskforce members or the stakeholders since the study activity was impacted by lockdown due to covid-19. Thus, the criteria were replaced by the ones mentioned in the main body of the report after through discussion with the members. However, it was found that both the alternatives of criteria provided the same results.

The screening process is meant to focus analysis on the finance solutions that are most promising and realistic. From a potentially long list of existing and potential finance solutions, identify the ones that bear the highest potential for successful implementation. Each solution is being scored on a scale of 0 to 4 (0 being worst, 4 being best) against the multi-criteria. Following are the criteria used for selection of innovative financing options.

Impact: Funds deliver impact to sectors with usually no need for concessionally. A strong benefit of funds is their long-term investment horizon, typically 10-12 years. Funds can channel long-term risk capital to sectors/investees regarded as illiquid assets, like infrastructure and industrial capacity investment, where public capital market flows are not present or insufficient.

Scalability: Highly scalable in relatively low risk sectors/investments. Investors also prefer large economies where investment exit risk is lessened.

Efficiency: The fund can be highly efficient that can catalyse the model to leverage economies of scale to target multiple projects or financing deals.

Feasibility: Proven and mature: i.e., ability of a project to achieve sufficient income, credit, and cash flow to financially sustain the project over the long term.
Mobilisation: Funds should be preferred over structured funds, when possible since the financing is a more market-oriented solution. Funds can mobilise private commercial investors if they have commensurate high expected rates of return – matching or exceeding market benchmarks.

Flexibility: High flexibility to mobilise debt or equity investment to impact projects that would otherwise not receive commercial finance.

The selection of innovative financing options was carried out based on the above criteria and have included only some of the most relevant options amongst many available for the RNR sector.

Table 3: Selection of innovative financing options

Financing options	Impact	Scalability	Efficiency	Feasibility	Mobilization	Flexibility	Total
Corporate social responsibility	2	3	3	2	2	2	14
Cost sharing	3	3	3	3	2	2	16
Collection of fees for services	2	3	3	3	2	2	15
Reforming taxes	2	2	2	2	2	2	12
Cost saving schemes	4	3	4	4	3	2	20
Public Private Partnership	3	3	3	3	2	2	16
Project Finance	3	3	3	3	3	2	17
Blended finance	3	3	3	3	3	2	17
Result based financing	3	3	3	4	2	3	18
Thematic bonds	2	2	2	2	2	2	12
Value Chain finance	3	3	2	3	3	3	17
Crowd Funding	3	3	2	2	2	2	14
Impact Investment	3	2	2	3	2	2	14
Carbon payment	3	2	3	3	2	2	15

From this multi-criteria analysis, the topmost suitable innovative financing options are cost saving scheme, result based financing, value chain finance, blended finance and project finance. Accordingly, for further analysis, cost saving schemes, result based financing and value chain financing are selected as follows in the next section.

15.6 Simulation of loan portfolio

Following simulation has been carried out to see the innovative financing options through borrowing and issue of bonds for the overall financial requirements of RNR sector.

Simple Loan Calculator	Value
Loan amount	40,688.07
Annual interest rate	10.00%
Loan period in years	10
Start date of loan	1/1/2023
Monthly payment	660.01
Number of payments	120
Total interest	21,075.01
Total cost of loan	79,200.83

Calculation of loan amortization schedule

Beginning Balance	Payment	Principal	Interest	Ending Balance
58,125.82	660.01	345.16	314.85	57,780.66
57,780.66	660.01	347.03	312.98	57,433.63
57,433.63	660.01	348.91	311.1	57,084.72
57,084.72	660.01	350.8	309.21	56,733.93
56,733.93	660.01	352.7	307.31	56,381.23
56,381.23	660.01	354.61	305.4	56,026.62
56,026.62	660.01	356.53	303.48	55,670.09
55,670.09	660.01	358.46	301.55	55,311.63
55,311.63	660.01	360.4	299.6	54,951.23
54,951.23	660.01	362.35	297.65	54,588.87
54,588.87	660.01	364.32	295.69	54,224.56
54,224.56	660.01	366.29	293.72	53,858.27

53,858.27	660.01	368.27	291.73	53,489.99
53,489.99	660.01	370.27	289.74	53,119.72
53,119.72	660.01	372.28	287.73	52,747.45
52,747.45	660.01	374.29	285.72	52,373.15
52,373.15	660.01	376.32	283.69	51,996.84
51,996.84	660.01	378.36	281.65	51,618.48
51,618.48	660.01	380.41	279.6	51,238.07
51,238.07	660.01	382.47	277.54	50,855.60
50,855.60	660.01	384.54	275.47	50,471.07
50,471.07	660.01	386.62	273.38	50,084.44
50,084.44	660.01	388.72	271.29	49,695.73
49,695.73	660.01	390.82	269.19	49,304.91
49,304.91	660.01	392.94	267.07	48,911.97
48,911.97	660.01	395.07	264.94	48,516.90
48,516.90	660.01	397.21	262.8	48,119.69
48,119.69	660.01	399.36	260.65	47,720.33
47,720.33	660.01	401.52	258.49	47,318.81
47,318.81	660.01	403.7	256.31	46,915.12
46,915.12	660.01	405.88	254.12	46,509.23
46,509.23	660.01	408.08	251.93	46,101.15
46,101.15	660.01	410.29	249.71	45,690.86
45,690.86	660.01	412.51	247.49	45,278.34
45,278.34	660.01	414.75	245.26	44,863.59
44,863.59	660.01	417	243.01	44,446.60
44,446.60	660.01	419.25	240.75	44,027.34
44,027.34	660.01	421.53	238.48	43,605.82
43,605.82	660.01	423.81	236.2	43,182.01
43,182.01	660.01	426.1	233.9	42,755.90
42,755.90	660.01	428.41	231.59	42,327.49
42,327.49	660.01	430.73	229.27	41,896.76
41,896.76	660.01	433.07	226.94	41,463.69
41,463.69	660.01	435.41	224.6	41,028.28
41,028.28	660.01	437.77	222.24	40,590.51
40,590.51	660.01	440.14	219.87	40,150.37

40,150.37	660.01	442.53	217.48	39,707.84
39,707.84	660.01	444.92	215.08	39,262.92
39,262.92	660.01	447.33	212.67	38,815.59
38,815.59	660.01	449.76	210.25	38,365.83
38,365.83	660.01	452.19	207.81	37,913.64
37,913.64	660.01	454.64	205.37	37,459.00
37,459.00	660.01	457.1	202.9	37,001.89
37,001.89	660.01	459.58	200.43	36,542.31
36,542.31	660.01	462.07	197.94	36,080.24
36,080.24	660.01	464.57	195.43	35,615.67
35,615.67	660.01	467.09	192.92	35,148.58
35,148.58	660.01	469.62	190.39	34,678.97
34,678.97	660.01	472.16	187.84	34,206.80
34,206.80	660.01	474.72	185.29	33,732.08
33,732.08	660.01	477.29	182.72	33,254.79
33,254.79	660.01	479.88	180.13	32,774.91
32,774.91	660.01	482.48	177.53	32,292.44
32,292.44	660.01	485.09	174.92	31,807.35
31,807.35	660.01	487.72	172.29	31,319.63
31,319.63	660.01	490.36	169.65	30,829.27
30,829.27	660.01	493.02	166.99	30,336.26
30,336.26	660.01	495.69	164.32	29,840.57
29,840.57	660.01	498.37	161.64	29,342.20
29,342.20	660.01	501.07	158.94	28,841.13
28,841.13	660.01	503.78	156.22	28,337.35
28,337.35	660.01	506.51	153.49	27,830.83
27,830.83	660.01	509.26	150.75	27,321.58
27,321.58	660.01	512.02	147.99	26,809.56
26,809.56	660.01	514.79	145.22	26,294.77
26,294.77	660.01	517.58	142.43	25,777.20
25,777.20	660.01	520.38	139.63	25,256.82
25,256.82	660.01	523.2	136.81	24,733.62
24,733.62	660.01	526.03	133.97	24,207.58
24,207.58	660.01	528.88	131.12	23,678.70

23,678.70	660.01	531.75	128.26	23,146.95
23,146.95	660.01	534.63	125.38	22,612.33
22,612.33	660.01	537.52	122.48	22,074.80
22,074.80	660.01	540.44	119.57	21,534.37
21,534.37	660.01	543.36	116.64	20,991.01
20,991.01	660.01	546.31	113.7	20,444.70
20,444.70	660.01	549.26	110.74	19,895.44
19,895.44	660.01	552.24	107.77	19,343.20
19,343.20	660.01	555.23	104.78	18,787.96
18,787.96	660.01	558.24	101.77	18,229.73
18,229.73	660.01	561.26	98.74	17,668.46
17,668.46	660.01	564.3	95.7	17,104.16
17,104.16	660.01	567.36	92.65	16,536.80
16,536.80	660.01	570.43	89.57	15,966.37
15,966.37	660.01	573.52	86.48	15,392.85
15,392.85	660.01	576.63	83.38	14,816.22
14,816.22	660.01	579.75	80.25	14,236.46
14,236.46	660.01	582.89	77.11	13,653.57
13,653.57	660.01	586.05	73.96	13,067.52
13,067.52	660.01	589.22	70.78	12,478.30
12,478.30	660.01	592.42	67.59	11,885.88
11,885.88	660.01	595.63	64.38	11,290.26
11,290.26	660.01	598.85	61.16	10,691.40
10,691.40	660.01	602.1	57.91	10,089.31
10,089.31	660.01	605.36	54.65	9,483.95
9,483.95	660.01	608.64	51.37	8,875.32
8,875.32	660.01	611.93	48.07	8,263.39
8,263.39	660.01	615.25	44.76	7,648.14
7,648.14	660.01	618.58	41.43	7,029.56
7,029.56	660.01	621.93	38.08	6,407.63
6,407.63	660.01	625.3	34.71	5,782.33
5,782.33	660.01	628.69	31.32	5,153.64
5,153.64	660.01	632.09	27.92	4,521.55
4,521.55	660.01	635.52	24.49	3,886.04

3,886.04	660.01	638.96	21.05	3,247.08
3,247.08	660.01	642.42	17.59	2,604.66
2,604.66	660.01	645.9	14.11	1,958.76
1,958.76	660.01	649.4	10.61	1,309.37
1,309.37	660.01	652.91	7.09	656.45
656.45	660.01	656.45	3.56	0

Scenario 1: Borrowing from bank

Period	1	2	3	4	5	6
Total Output	6,401.26	6,531.06	6,672.27	6,735.86	6,910.60	7,330.04
Expenditure	3,469.18	4,291.66	4,741.04	4,410.97	4,108.67	5,085.62
Total loan repayment	-	4,267.55	4,553.36	4,858.31	5,183.68	5,530.84
Loan Interest		3,652.53	3,366.72	3,061.78	2,736.41	2,389.25
Total Expenditure	3,469.18	12,211.74	12,661.12	12,331.06	12,028.76	13,005.70
Deficit/Surplus	2,932.08	(5,680.68)	(5,988.85)	(5,595.20)	(5,118.16)	(5,675.66)
Cumulative CF	2,932.08	(2,748.60)	(8,737.45)	(14,332.65)	(19,450.80)	(25,126.47)

Period	7	8	9	10	11
Total Output	8,209.15	8,299.63	8,653.30	8,642.62	9,045.81
Expenditure	6,396.26	6,485.00	5,399.34	5,854.16	7,883.91
Total loan repayment	5,901.25	6,296.47	6,718.15	7,168.08	7,648.14
Loan Interest	2,018.83	1,623.62	1,201.93	752.00	271.94
Total Expenditure	14,316.35	14,405.08	13,319.42	13,774.25	15,804.00
Deficit/Surplus	(6,107.20)	(6,105.45)	(4,666.12)	(5,131.63)	(6,758.19)
Cumulative CF	(31,233.66)	(37,339.12)	(42,005.24)	(47,136.86)	(53,895.05)
IRR-7.10%					

Scenario 2: Issue of Bonds

Period	1	2	3	4	5
Total Output	6,401.26	6,531.06	6,672.27	6,735.86	6,910.60
Expenditure	3,469.18	4,291.66	4,741.04	4,410.97	4,108.67
Total coupon repayment	-	4,267.55	4,553.36	4,858.31	5,183.68
Coupon Interest	-	3,652.53	3,366.72	3,061.78	2,736.41

Total Expenditure	3,469.18	12,211.74	12,661.12	12,331.06	12,028.76
Deficit/Surplus	2,932.08	(5,680.68)	(5,988.85)	(5,595.20)	(5,118.16)
Cumulative CF	2,932.08	(2,748.60)	(8,737.45)	(14,332.65)	(19,450.80)

Period	6	7	8	9	10	11
Total Output	7,330.04	8,209.15	8,299.63	8,653.30	8,642.62	9,045.81
Expenditure	5,085.62	6,396.26	6,485.00	5,399.34	5,854.16	7,883.91
Total coupon repayment	5,530.84	5,901.25	6,296.47	6,718.15	7,168.08	7,648.14
Coupon Interest	2,389.25	2,018.83	1,623.62	1,201.93	752	271.94
Total Expenditure	13,005.70	14,316.35	14,405.08	13,319.42	13,774.25	15,804.00
Deficit/Surplus	-5,675.66	-6,107.20	-6,105.45	-4,666.12	-5,131.63	-6,758.19
Cumulative CF	-25,126.47	-31,233.66	-37,339.12	-42,005.24	-47,136.86	-53,895.05
IRR 7.10%						

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