

# Guinea Bissau: Unlocking diversification to unleash agriculture growth

**June 2019**

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## ACKNOWLEDGEMENTS

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The team would like to thank the Ministry of Agriculture and the Ministry of Finance for their support throughout the preparation of this Report. The team recognizes the valuable insights gained from interviews with several in-country development partners and their project teams; these discussions helped in “ground-truthing” the Report’s analytics and eventual recommendations.

The team thanks the Report’s peer reviewers for their guidance – Chakib Jenane (Lead Agriculture Economist), Christopher Brett (Lead Agribusiness Specialist) and Maurizio Guadagni (Senior Agricultural Development Specialist) – and several World Bank Group colleagues for their useful inputs, including: Eric Lancelot (Program Leader, AFCF1), Fiseha Haile Gebregziabher (Economist, GMTA2), Francisco Moraes Leitao Campos (Senior Economist, GFCAS), Giovanni Ruta (Senior Environmental Economist, GEN04), Holger Kray (Lead Agriculture Economist, Head of African Agriculture Policy Unit, GFA13), Aifa Fatimata Ndoye Niane (Senior Agriculture Economist, GFA01), Juvenal Nzambimana (Senior Operations Officer, GFA01), Nabil Chaherli (Lead Agriculture Economist, GFA01), Kristina Svensson (AFRVP), Sonia Sanchez Moreno (Operations Officer, AFMGW) and Zenaida Hernandez Uriz (Senior Private Sector Specialist, GFCAC). Volana Farantsa Andriamasinoro (Program Assistant, GFA01) and Ramatulay Heloysa Barbosa (Program Assistant, AMFGW) provided administrative support throughout.

Sincere thanks to senior management for their guidance and support during this process, including Louise Cord (Country Director, AFCF1), Juergen Voegele (Senior Director, GFADR), Simeon K. Ehui (Director, GFADR), and Martien van Nieuwkoop (Director, GFADR).

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## List of Acronyms

AOI	Agriculture Orientation Index
CAADP	Comprehensive African Agriculture Development Program
CNC	<i>Conselho Nacional do Cajú</i>
CNRA	<i>Centre National de Recherche Agricole</i> – National Center for Agronomic Research Côte d’Ivoire
CNSL	Cashew Nut Shell Liquid
CPIA	Country Policy and Institutional Assessment
CRDC	Vietnam Cashew Research and Development Center
DCR	Indian Directorate of Cashew Research
ECOWAS	Economic Community of West African States
EMBRAPA	<i>Empresa Brasileira de Pesquisa Agropecuaria</i> - Brazilian Agricultural Research Corporation
EU	European Union
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
FOB	Free on Board
GDP	Gross Domestic Product
GHG	GreenHouse Gas
GNI	Gross National Income
ICT	Information and Communication Technologies
IDA	International development Association
IFAD	International Fund for Agricultural Development
INPA	<i>Instituto Nacional da Pesquisa Agraria</i> – National Agricultural Research Institute
IoT	Internet of Things
IRR	Internal rate of Return
KOR	Kernel Outturn Ratio
LULUCF	Land Use, Land Use Change and Forestry
MUSD	Million United States Dollar
NAIP	National Agricultural Investment Plan
NARI	Naliendeleg Agricultural Research Institute - Tanzania
NGO	Non-Governmental Organizations
NPV	Net Present Value
OECD	Organization for Economic Cooperation and Development
OHADA	Organization for Harmonization of Business Law in Africa
PFIA	Policy Framework for investment in Agriculture
PRSPDA	<i>Projeto de Reabilitação do Setor Privado e de Desenvolvimento do Agribusiness</i> - Private Sector Rehabilitation and Agribusiness Development Project
R&D	Research and Development
RBP	Ration Balancing Program
RBC	Responsible Business Conduct
RCN	Raw Cashew Nuts
ROPFA	<i>Réseau des Organisations Paysannes et des Producteurs Agricoles de l’Afrique de l’Ouest</i> - West African Farmers’ Organization
SCD	Systematic Country Dialogue

SME	Small and Medium Enterprise
SRI	System of Rice Intensification
SSA	Sub Saharan Africa
TFP	Total Factor Productivity
USA	United States of America
WAAPP	West Africa Agricultural Productivity Project
WAEMU	West African Economic and Monetary Union
WECARD	West and Central African Council for Agricultural Research and Development
WFTO	World Fair Trade Organization

## Executive summary

### The agri-food sector plays a central role in Guinea-Bissau's economy, but its suboptimal performance reinforces the country's fragility

1. Guinea-Bissau has rich resource endowments and an advantageous geographical location, suitable for a diversified range of agricultural production across the country. Yet both the agri-food sector and the overall economy show little diversification. Economic growth has been low and volatile for decades, while poverty remains widespread. Over time cashews have gained importance in the country's economy, in terms of fiscal revenue, exports (95 percent of total export revenue comes from Raw Cashew Nuts-RCN) and rural employment (75 percent of rural households). The economy is now concentrated in the production and sale of RCN, making both the country and farmers highly vulnerable to production and market risks.

2. Guinea-Bissau has long been caught in a vicious cycle of fragility, poor governance and weak public sector capacity. Frequent instances of political instability impose large costs on the economic and social development of the country. The country's fragility is reinforced by the high concentration in and high dependence of Guinea-Bissau's economy on a single commodity - RCN.

3. The agri-food sector plays a central role in Guinea-Bissau's economy, comprising almost half of GDP, the vast majority of the labor force and is critical to addressing both poverty and food insecurity, especially for the 120,000 small-scale farmers in the country. Global historical evidence confirms agriculture's key role in propelling the structural transformation of national economies, mostly relying on increased land and labor productivity in agriculture, which in turn opens opportunities outside of the agriculture sector. Yet, Guinea-Bissau's agriculture performance is suboptimal, with weak agricultural productivity compared to the region.

4. Given these trends, it is important to consider whether the environment in which the agri-food sector operates is conducive to sustainable and inclusive growth. Beyond RCN, the country has few alternatives in the short term for generating jobs, foreign exchange and widespread growth. Nevertheless, the agri-food sector has seen little technological advance and remains locked in a low-input, low-output equilibrium. Agricultural diversification, both horizontally (expanding the range of agricultural products) and vertically (adding-value to specific products, particularly RCN) could be transformative and strengthen economic resilience while addressing some of the key drivers of the country's fragility.

5. However, the risky environment in which stakeholders in the agri-food sector operate hampers their ability to invest and thus to generate growth or employment. To achieve the much-needed structural transformation, Guinea-Bissau needs to foster private investment in the sector by lowering its risk profile through a change in its policy framework and emphasis on key public investments.

### Setting up an enabling environment to unleash agricultural transformation

6. Experience globally has shown that total government spending on the farm sector positively impacts agriculture's performance. More importantly, the quality of public spending, specifically by increasing the share of expenditures dedicated to public goods, such as rural roads, irrigation infrastructure and agricultural research, positively impacts rural income.

7. While policy documents, including the strategic plan *Terra Ranka* and the National Agricultural Investment Plan, emphasize the importance of the agri-food sector, there has been a disconnect between policy formulation and its implementation. Guinea-Bissau's total public investment in agriculture is among the lowest in Sub-Saharan Africa, at below 1 percent of GDP and far below the Comprehensive Africa Agriculture Development Program target of 10 percent. As agriculture represents nearly 50 percent of GDP, its share of public spending relative to its share in the economy (represented by the Agriculture Orientation Index – AOI) is about 0.02, indicative of extremely low budget priority for public spending in the sector. Furthermore, more than 95 percent of total capital expenditure is foreign funded, raising the question of coordination of these efforts to ensure budget efficiency, ownership and alignment with national priorities.

8. Across all ten dimensions of the Policy Framework for Investment in Agriculture, defined by OECD (2012), Guinea-Bissau's performance is below what would be needed to facilitate private investment in the agricultural sector. The weak institutional and contract environment dampen investor confidence. Weak physical rural infrastructure (i.e. roads, access to electricity) significantly increases both transactions costs and upfront investment for any new agricultural endeavor. Public policy to address the most basic public service provision (i.e., access to electricity) is fundamental to enable the country to embark on an agenda of value addition in the cashew sector. In a country so dependent on its agri-food sector as Guinea-Bissau, there is strong justification for increasing the share of public spending allocated to the sector, particularly to public goods that can crowd-in private investment, such as rural roads and basic services, and agricultural innovation system (research, technology transfer, and farmer advisory services).

### **Fostering technological innovation that can facilitate land and labor productivity growth**

9. The current growth pattern in the agriculture sector is not sustainable. Growth in agricultural production in Guinea-Bissau has largely been driven by an increase in the area under production, rather than an increase in productivity, threatening the country's ecosystems and biodiversity. When compared to neighboring countries, the potential for increased productivity is high in Guinea-Bissau (with RCN yields of 320kg/ha, compared to 520kg/ha in Côte d'Ivoire, and rice yields of 1.7 t/ha, compared to 4t/ha in Senegal). To boost agricultural productivity and resilience in Guinea-Bissau, it is critical to support wider access to and adoption of productivity-enhancing technologies. Yet the state of the agricultural innovation system is not conducive to such dissemination and adoption. The low adoption of modern inputs, improved technologies and other innovations, results from a lack of access to financing services, the unavailability of such technologies in domestic markets combined with the lack of an adequate delivery mechanism, that are increasing the costs that these technologies bear.

10. Guinea-Bissau is one of the countries which are the most vulnerable to climate change. Recent climate scenarios portend significant changes in the climate of Guinea-Bissau. These scenarios systematically signal increased average daily temperatures of up to + 1.4°C for the period 2016-2045, potentially reaching up to + 2.2°C in the 2046-2075 period, per a low emissions assumption. Under a high-emission scenario, the changes are on the order of + 1.6°C to + 3.1°C for the period 2046 to 2075. Climate variability will remain a dominant aspect of climate in Guinea-Bissau; as such, planning for increases in temperature alongside development of resilient planning for extreme events of (a) drought, particularly in the eastern portion of the country (e.g., Bafatá); and (b) flood along the coastal zone; and (c) uncertainty

over precipitation levels<sup>1</sup> will be essential. Agricultural yields will also be negatively impacted, for instance: (a) rice, due to sea level rise and saltwater intrusion; (b) cashew, due to drought; and (c) livestock, particularly cattle, due to degraded pasture and greater water scarcity.

11. Given the stagnant and even decreasing yields observed in the country, there is an urgent need to put in place an efficient and sustainable input and technologies delivery system, fostering the participation of the private sector in their production and distribution. In the short-term, Guinea-Bissau could build on successful experiences in the sub-region such as with agro-dealers, whose implementation can make inputs and technologies available in rural areas, at the right time, in appropriate volumes and affordable prices, reducing significantly search costs faced by farmers. Fostering the organization of farmers would help reduce transactions costs for farmers, by organizing the demand and distribution of technologies. Some farmers' organizations in neighboring countries have also developed their own input supply services combined with a credit mechanism.

12. Extension services are critical to facilitate farmers' access to technology and knowledge and participation in innovation systems. Yet, in Guinea-Bissau those services are limited and mostly provided through donor- or NGO-funded projects. Globally, the private sector has increasingly been involved in the provision of extension services, either linking the provision of inputs and technologies to advice on their use or providing advice to ensure the quality of the final product in the case of processing companies. Digital technologies can also be used to foster the dissemination and large-scale adoption of Good Agricultural Practices and improved technologies. Some successful experiences of extension services are already happening on the ground, mostly financed through donor projects and operated by farmers' organizations, such as the *Programa de Extensão Rural* set in place by three cooperatives and financed through the World-Bank-funded Private Sector Rehabilitation and Agribusiness Development Project (PRSPDA).

13. Guinea-Bissau can also leverage cooperation with other countries to foster the dissemination of existing innovations. As a member of the Economic Community of West African States (ECOWAS), Guinea-Bissau could benefit from the climate-smart technologies, innovations and good-practices generated through the West and Central African Council for Agricultural Research and Development (WECARD). The country can also develop or reinforce partnerships with dedicated research institutes such as the Africa Rice Center or with the Brazilian Agricultural Research Corporation (EMBRAPA) or Cote d'Ivoire's National Cashew Research program regarding the cashew value chain.

### **The opportunities to diversify outside of cashew in Guinea-Bissau are many but require an enabling environment and capital investment**

14. Agricultural diversification is a way for farmers to manage and adapt to changing social, economic and environmental conditions and related risks. At the regional or country level, on-farm diversification and specialization are complementary. Farmers often increase their productivity and competitiveness, enhance efficiency and economies of scale through specialization, while at the landscape or national level, the diversity of agricultural products and value chains provide access to diversified food products, incomes and employment opportunities.

15. Given the existing constraints to agricultural production in Guinea-Bissau, diversifying away from cashew bears some risks for the farmers, particularly as; (a) inputs are often unavailable, (b) productive

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<sup>1</sup> Republic of Guinea-Bissau (2018b)

infrastructure such as irrigation are in a state of disrepair, (c) marketing systems for agricultural products are rudimentary at best, and (d) cashew traders are a reliable source of food supplies, particularly rice.

16. The country's climate and geographic location, as well as national and international consumption trends, present opportunities for the development of other value chains such as rice, fruit, horticulture and livestock. Guinea-Bissau has, for example, a strong comparative advantage and potential in rice production, but it is not fully exploiting it. Despite having 1.4 million hectares of land suitable for rice cultivation, the country is using less than 300,000 hectares to produce only 110,000 metric tons of husked rice per year (40 percent of national rice consumption). Most existing irrigation infrastructure is dilapidated, making production highly dependent on rainfall and productivity is far below neighboring countries with 1.7 tons per hectares.

17. To tap into these opportunities, Guinea-Bissau will have to set in place an enabling environment to foster farming systems diversification, in particular through: (a) the rehabilitation and development of irrigation infrastructure, (b) improved access to inputs, technologies, and knowledge, (c) improved access to markets, (d) availability of skilled labor, and (e) increased access to capital.

18. The level of intervention needed to promote diversification via the development of new value chains presents significant challenges for the country. In addition, the high concentration of RCN production among farmers, combined with an environment that traps farmers into the logics of RCN production, makes diversification out of cashew risky and difficult in the short to medium-term. In the short-term, the much-needed replacement of the cashew root stock presents a good opportunity to foster diversification at the farm-level, through intercropping to enable better resource use, decrease the risks of pest and disease outbreaks and allow more return. Intercropping can diversify farmer's income and increase their resilience to climatic and market shocks while keeping the advantages the cashew tree offers as an asset (providing cash and securing land tenure).

#### **Guinea-Bissau has only partially realized the potential value of its cashew sector**

19. Though Guinea-Bissau is the fourth biggest player worldwide in terms of RCN production, the country is a price-taker in the RCN global market and is only capturing a small portion of the value generated in the global cashew value chain. Given the sector's limited market power, the country must improve its competitiveness to better position itself in the traditional segment and to capture more attractive opportunities in niche markets by: (a) boosting RCN productivity, (b) eliminating the current RCN reference price policy and moving toward the dissemination of global RCN prices to farmers and traders, (c) strengthening value chain links and (d) establishing new and reshaping existing processing facilities to capture niche markets.

20. Putting in place a conducive environment to foster innovation is urgent to boost RCN productivity. Fostering technology adoption, disseminating good agricultural practices and soil and water conservation techniques, and strengthening farmers' capacities to manage the different types of certifications required to capture niche markets, will be necessary to build Guinea-Bissau's competitiveness in both traditional and niche markets.

21. Greater coordination of the different stakeholders along the cashew value chain is required if the country wants to increase its competitiveness and seize new market opportunities. A common vision and development strategy for the sector and a change in the management of the value chain -- in particular, the articulation of public and private roles -- would be of use to define and prioritize needed interventions.

The *Conselho Nacional do Cajú* (CNC) which brings together the different private and public stakeholders of the cashew value chain and is currently responsible for advising the government on the sector, could lead such a coordination effort and play a stronger role as an inter-professional entity.

22. Increasing the availability of working capital financing in the cashew sector will be fundamental to trigger the up-front investment necessary to be involved in more complex value chains. Experience has shown (i.e., the *Programa de Ligação* supported by the PRSPDA) that connecting farmers to processors (e.g., through outgrowers schemes) helps alleviate capital constraints and facilitates the development of a processing industry. The development of warehouse receipts systems or guarantee funds can facilitate access to lending from financial institutions, yet the fragility of the country’s formal institutions may reduce the short-term feasibility of such options.

23. Facilitating access to niche markets will not only require improved connectivity and market information, but also partnerships between producers and buyers, along with strong quality and standards control mechanisms to ensure the certification of RCN and the benefit of a premium price.

### Priority interventions to foster the transformation of Guinea-Bissau’s agri-food sector

24. Fostering the transformation of the agri-food sector in Guinea-Bissau will require investment – both public and private – toward key public goods, such as reducing barriers to the dissemination of new technologies and to trade with neighboring countries, fostering the development of a private sector-led input markets, increasing access to finance, the rehabilitation of irrigation infrastructures and rural roads. Given the current un-enabling environment and weak institutional framework, these interventions will require a high level of investment and will only yield results in the medium to long term. This report, however, has identified policy changes and investments which could lead to early results in the short-term and provide the initial steps towards the broader transformation of the agri-food sector.

25. Building on the challenges and opportunities identified here, three priority areas for intervention have been selected given their relevance in fostering agricultural growth and their expected high impact on expediting the transformation of the agri-food sector. They are presented in the following table. Coordination across stakeholders must increase to raise both the quality and the impact of the investments needed.

Priorities and measures	Timeframe	Impact on expediting transformation of the sector	Technical Feasibility
<b>Priority area 1: Strengthening the cashew value-chain</b>			
<b>Promote increased RCN productivity</b>			
<ul style="list-style-type: none"> <li>Promote resilient orchard rehabilitation and renovation.</li> </ul>	Short-term	High	Medium
<ul style="list-style-type: none"> <li>Foster adoption of best practices from benchmark countries through training, and extension services to increase productivity while reducing vulnerabilities to pest, diseases and climate change.</li> </ul>	Short-term	High	Medium

<ul style="list-style-type: none"> <li>Support the development of private sector-led input markets by de-risking the business environment and aggregating the demand and distribution of inputs through farmers' organizations.</li> </ul>	Medium-term	High	Medium
<b>Eliminate the current RCN reference pricing and move toward greater dissemination of global RCN prices to farmers and traders</b>	Short-term	High	Medium
<b>Strengthen the links between the cashew value chain stakeholders.</b>			
<ul style="list-style-type: none"> <li>Foster the development of vertical linkages between farmers and processors.</li> </ul>	Medium-term	High	High
<ul style="list-style-type: none"> <li>Define a common vision for the development of the value-chain.</li> </ul>	Medium-term	High	High
<ul style="list-style-type: none"> <li>Revise the role and operational model of <i>Conselho Nacional do Cajú</i>.</li> </ul>	Medium-term	High	High
<ul style="list-style-type: none"> <li>Explore alternative markets opportunities.</li> </ul>	Long-term	High	High
<b>Priority area 2: Consolidate the agricultural innovation system</b>			
<b>Strengthen farmers' organizations to scale up technology demonstration and adoption.</b>			
<ul style="list-style-type: none"> <li>Support farmers' collective action and strengthen farmers' organizational and managerial capacities.</li> </ul>	Short-term	High	Medium
<ul style="list-style-type: none"> <li>Adopt adequate legislation on farmers' organizations and cooperatives, in line with the OHADA Uniform Act on Cooperatives.</li> </ul>	Medium-term	High	Medium
<b>Increase farmers' connectivity, leveraging ICT</b>			
<ul style="list-style-type: none"> <li>Leverage existing ICT from benchmark countries for application in Guinea-Bissau to foster farmers' access to information.</li> </ul>	Medium-term	High	High
<ul style="list-style-type: none"> <li>Finalize the broadband digital infrastructure development and engage private sector investors and internet service providers.</li> </ul>	Long-term	High	High
<b>Priority area 3: Strengthening coordination, accountability and effectiveness of policies and investment in the agri-food sector</b>			
<b>Leverage NAIP II to increase coordination, accountability and effectiveness of investments in the agri-food sector.</b>			
<ul style="list-style-type: none"> <li>Establish an effective sectoral coordination mechanism with a mandate to harmonize efforts across all stakeholders to increase the effectiveness and efficiency of agricultural development projects.</li> </ul>	Short-term	High	Medium
<b>Support key public goods essential for agricultural transformation</b>	Medium-term	High	Medium

<b>Strengthen institutional and human capacities of the Ministry of Agriculture and other relevant public institutions to allow them to play their role more effectively</b>			
<ul style="list-style-type: none"> <li>Establish a Planning and Coordination Unit and strengthen the core capacities of the Ministry of Agriculture to coordinate and channel public and donors' resources more rapidly and effectively</li> </ul>	<b>Short-term</b>	<b>High</b>	<b>Medium</b>
<ul style="list-style-type: none"> <li>Strengthen the Ministry of Agriculture's expertise on the cashew value-chain both on the upstream (productivity) and downstream (marketing opportunities)</li> </ul>	<b>Short-term</b>	<b>High</b>	<b>Medium</b>

*Timeframe: Short-term (0-3 years), Medium-term (3-5 years), Long-term (more than 5 years)*

## Introduction

1. **Guinea-Bissau has a large but unrealized agricultural potential.** The country is richly endowed with good climate, fertile soils and abundant water resources, allowing a diversified range of agricultural production in the country.
2. **The agri-food sector will be key to the country's growth and development.** Agriculture is indeed the engine of Guinea-Bissau's economy and the principal source of public revenue. It comprises almost half of GDP and employs the vast majority of the labor force. Raw Cashew Nut (RCN) production is the main source of income for more than two-thirds of households. RCN exports account for more than 95 percent of the country's total export revenue. Over 75 percent of the population in Guinea-Bissau depends on the agricultural sector as a source of livelihood. In the country's strategic and operational plan for 2015-2020, "*Terra Ranka*", agriculture and agri-business have been identified among the four drivers of growth.
3. **Despite its high potential and the important role that the agri-food sector plays in the economic development of Guinea-Bissau, the country's fragility has led to its suboptimal performance.** Agriculture is primarily rain-fed, characterized by low access to inputs and technologies, and resulting in low land and labor productivity. Poor-quality rural infrastructure, unclear land rights, chronic political instability, low financial intermediation and weak market intelligence weaken the market incentives to diversify out of RCN production. The high concentration of the economy in RCN, with no significant value addition makes the country highly vulnerable to both production and market risks.
4. **Considering these trends, it is reasonable to question whether the operating environment for the country's agri-food sector is conducive to sustainable and inclusive growth.** Guinea-Bissau has few short-term alternatives to agriculture for generating needed foreign exchange, jobs and widespread growth. Yet the agri-food sector is trapped in a low-input, low-output equilibrium. Agricultural diversification, both horizontally (expanding the range of crops and livestock) and vertically (adding value to specific crops such as RCN) could bolster economic resilience for both farmers and the country. A change in the policy framework and an emphasis on key public investments in the sector can lower the country's risk profile and usher in the necessary private investment for sustainable and inclusive growth and higher farmers' incomes.
5. **Global historical evidence indicates that increased land and labor productivity in agriculture drive a country's economic development.** Technical change (through investment and technology transfer) can accelerate the much-needed structural transformation - a declining share of agriculture in GDP, a decrease in agricultural employment and rising agricultural output from total factor productivity (TFP).<sup>2</sup> Government, as it forges a pathway toward structural transformation, must be explicit about: (a) the importance of agriculture in economic transition; (b) dedicating significant public expenditure toward it; and (c) rapidly building key government institutions that foster agricultural growth to reduce (or eliminate) rural poverty.
6. **The present report explores the different policy options and priority public investments necessary to de-risk the country's agri-food sector and "crowd-in" private investment to foster agricultural diversification.** The report is structured into six parts. First, it looks at the most significant

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<sup>2</sup> OECD (2012), *Agricultural Policies for Poverty Reduction*

elements and trends confronting Guinea-Bissau's agri-food system. Second it examines the necessary public policies to set a conducive environment for agricultural growth and private sector investment. Third, it explores ways to foster agricultural innovation. Fourth, it analyzes the pathways to promote horizontal diversification, by expanding the range of agricultural production in the country. Fifth, it explores the possibilities to promote value addition in the cashew value chain through market segmentation (vertical diversification). The sixth and final section draws on the preceding sections to offer specific recommendations for investment and policy action in the agri-food sector.

## Chapter 1. Key elements and trends of Guinea-Bissau agri-food sector

### I. A country characterized by fragility

7. **Guinea-Bissau is one of the poorest and most fragile countries in the world.** The country has a history of political and institutional fragility – dating back to its independence in 1974 – and low and volatile economic growth. It is the 12<sup>th</sup> poorest country in the world, with a Gross National Income (GNI) per capita of US\$570. Growth Domestic Product (GDP) growth averaged a mere 0.4 percent between 2000 and 2014, barely keeping up with population growth. Poverty in Guinea-Bissau is high, particularly in rural areas, reaching 69 percent of the population in 2010<sup>3</sup>, the majority of whom rely on subsistence agriculture for their survival. A 2016 national survey showed high rates of food insecurity (31 percent) and acute malnutrition among children under five (10 percent)<sup>4</sup>.

8. **The economy of Guinea-Bissau is characterized by a dual vulnerability to external developments due to high concentration in and high export dependence on a single commodity (RCN) and a high susceptibility to international price shocks, given its status as an RCN price-taker.** Additionally, frequent instances of political instability, and shocks associated with adverse weather conditions, impose large costs on economic and social development in the country<sup>5</sup>. The country's weak business regulatory framework with inconsistent application of policies, regulations and fiscal incentives, significantly increases the cost of doing business and hampers the development of agricultural product markets. Segments of the cashew value chain are controlled by few stakeholders, who exercise significant market power across the distribution and export channels. Furthermore, numerous factors have contributed to the country's current fragility (Table 1).

**Table 1: Drivers of Fragility, Conflict and Violence in Guinea-Bissau (source: Risk and Resilience Assessment presentation, 2019f, World Bank)**

<b>Historical drivers</b>	Long and bloody independence war Several coups Unfinished political transformation Military legacy
<b>Political and institutional drivers</b>	Weak state institutions and dysfunctional public administration Weak justice sector and lack of effective conflict resolution Dysfunctional and politicized security sector
<b>Economic drivers</b>	Captured and poorly diversified economy (over-reliance on RCN) Lack of investment in basic infrastructure Illicit economic activities
<b>Social drivers</b>	Urban rural divide Marginalization of women Lack of investment in human development and capital (60 percent of the population under 25)

<sup>3</sup> World Bank (2016), Systematic Country Diagnostic

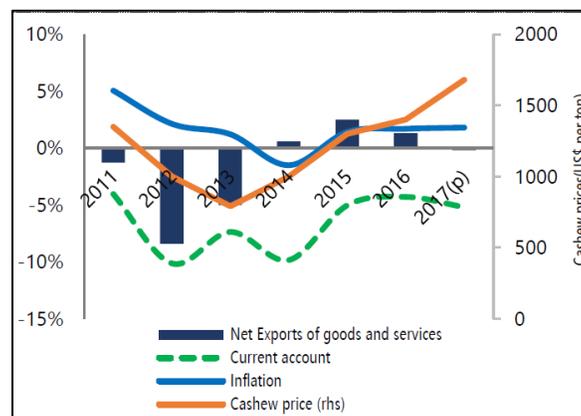
<sup>4</sup> EU (2017), Guinea Bissau country profile on malnutrition

<sup>5</sup> World Bank (2016), Systematic Country Diagnostic

## II. The centrality of Guinea-Bissau's agri-food sector

9. **The agri-food sector is the engine of Guinea-Bissau's economy and the dominant source of public revenue.** Addressing market access and productivity across agricultural value chains is critical to reduce poverty and increase food security. Agriculture comprises between 40 and 50 percent of GDP and employs 80 percent of the labor force. RCN production is the main source of income for more than two-thirds of households and for virtually all 120,000 small-scale farmers in the country. RCN receipts are a strong determinant of the current account balance and the main provider of foreign exchange, accounting for more than 95 percent of the country's total export revenue. Cashew exports are also an important source of fiscal revenue, with cashew taxes and fees generating about 10 percent of domestic revenue, exacerbating the vulnerability of the country's fiscal revenue to fluctuations in global prices<sup>6</sup>. Guinea-Bissau has the second least diversified export portfolio in Sub-Saharan Africa.

**Figure 1. Cashew prices and the external current account balance (2011-2017)**



Source: World Bank, Guinea-Bissau PER 2018

10. **Agriculture is closely linked to poverty reduction:** more than 75 percent of rural households participate in agricultural activities. In 2010, agricultural activities represented more than one-half of the total income share in Guinea-Bissau (ILAP 2010), with cashews alone accounting for nearly 33 percent of household income overall and close to 43 percent among rural households<sup>7</sup>. In 2010 for instance, about 76 percent of households outside Bissau planted cashew (see Figure 2).

11. **Women play a leading role in the agri-food sector and account for more than 77 percent of the informal sector and subsistence agriculture** (ILAP II, 2010)<sup>8</sup>. Women's agricultural productivity is constrained by their less secure access to land, as under customary practices their access to land and other assets is often dependent on their marital status and they have reduced access to inputs and farm labor. Women also do not benefit as much as men from the economic return from RCN, even though about half the cashew workforce is female. Farming and harvesting of RCN is largely done by women on land owned by their husbands or fathers during the peak cashew season of March to May. Men have control over the

<sup>6</sup> World Bank (2018), Guinea-Bissau Public Expenditures Review

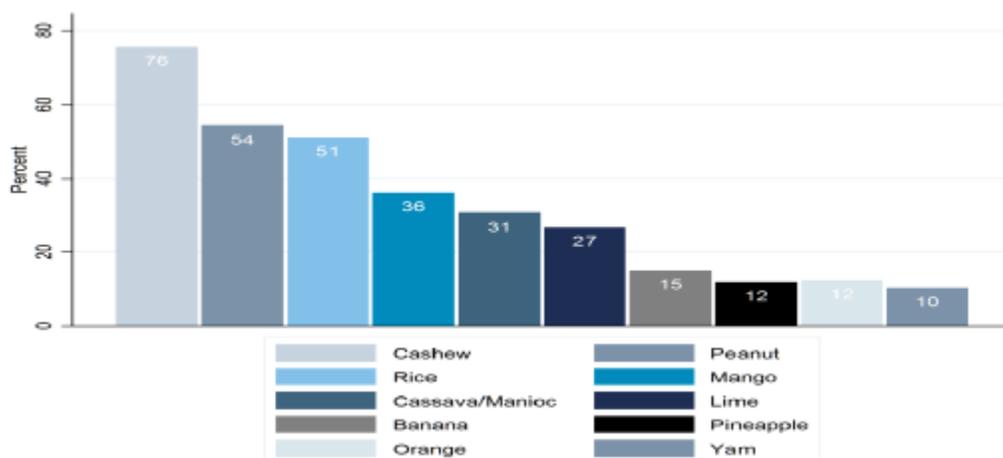
<sup>7</sup> World Bank (2015), Profiling poverty and economic opportunities in Guinea-Bissau

<sup>8</sup> World Bank (2016a), Systematic Country Diagnostic

sales and incomes generated by RCN. Women only have control over the incomes generated from the processed cashew apple (alcohol, juice, jams)<sup>9</sup>.

12. **People under 25 represent about 60 percent of the population.** The highly hierarchical relationships between adults and youth represent barriers to their full participation in rural economies (on-farm and off-farm activities). Young people are poorly represented and marginalized in decision-making entities. The harshness of traditional agriculture and subsistence farming practices coupled with the lack of mechanization pushes young people to abandon agricultural activities and rural areas to migrate to urban centers and/or abroad<sup>10</sup>.

**Figure 2: Share of households growing different crops**



Source: World Bank, Profiling poverty and Economic opportunities in GB, 2015 (based on ILAP 2010)

13. **The government of Guinea-Bissau identifies agriculture and agri-business among the four drivers of economic growth in its strategic and operational plan for 2015-2020, “Terra Ranka”.** The strategy focuses on the development of the cashew and rice sectors. For cashew, the goal is to achieve a four-fold increase in the revenue generated by the sector by 2025, through: (a) increased RCN yield and quality; (b) local processing of at least 30 percent of RCN production; and (c) penetrating the best paying markets. In the rice value chain, Guinea-Bissau intends to achieve self-sufficiency by 2020 by: (a) expanding rain-fed production in lowlands and mangroves; and (b) improving management practices in rice cultivation.

14. **In the context of the Comprehensive African Agriculture Development Program (CAADP), Guinea-Bissau is designing its second generation National Agricultural Investment Plan (NAIP II).** The first generation NAIP aimed at intensifying the agricultural production, strengthening private investments and value-chain coordination and deepening Guinea-Bissau’s integration into regional and international agricultural markets. The total investments planned in NAIP I were estimated at 167,430 million FCFA (334,86 MUS\$), of which 33 percent were financed during 2012-2017, mostly dedicated to hydro-agricultural infrastructures, the provision of small agricultural equipment and plant and animal health protection products. Globally, the achievements are very far from what was planned. The NAIP II (2018-

<sup>9</sup> AFDB (2015b), Country Gender Profile: Guinea-Bissau

<sup>10</sup> IFAD (2019)

2030), still pending validation, is currently organized around 7 programs<sup>11</sup> for an estimated budget of 341 billion FCFA (approx. 683 MUSD). A credible financing plan still needs to be elaborated.

15. **Guinea-Bissau has many factors that make the agri-food sector one of the levers of economic growth, poverty reduction and food security.** The country’s unique geographic position, as a coastal country lying in the transition zone between the Sub-Saharan arid savannah in the North and East, and the humid tropical forest ecosystems in the South, gives it rich and diversified ecosystems and a favorable climate, benefitting from substantial rainfall and rivers (Table 2). Guinea-Bissau has: (a) abundant water resources (45 million m<sup>3</sup> of rainwater and a dense network of small river basins); and (b) 1.4 million ha of arable land (about 30 percent of the country’s land area), of which 200,000 ha are lowlands, 100,000 ha are mangroves and 1.1 million ha are highlands. Only 15 percent of the lowlands and 50 percent of mangroves are currently exploited<sup>12</sup>. Thanks to these favorable characteristics, Guinea-Bissau can diversify and expand the range of cultivated crops. A diversified range of cereals (e.g., rice, millet, sorghum), cash crops (e.g., RCN, groundnuts and cotton), fruit (e.g., mangoes, citrus fruit, papayas), and tubers (e.g., cassava and sweet potatoes) can be grown across the country.

**Table 2: Three main agro-ecological zones in Guinea-Bissau (Eastern, Northern and Southern)<sup>13</sup>.**

Agro-ecological zone	Climate	Average rainfall	Average number of rainy days	Average evaporate transpiration	Average temperature
East (Bafata, Gabú)	Sudan climate	1200-1500 mm	107	2500mm	26.9°C
South (Tombali, Quinara, Bolama/Bijagos)	Humid sub-tropical climate	2000-2500 mm	125	1458mm	26.9°C
North West (Oio, Cacheu, Biombo)	Guinean maritime climate	1500-1900	122	1837mm	26.6°C

16. **Cooperation with regional partners can provide critical support to Guinea-Bissau.** Regional agri-food markets have grown in recent years due to rapid urbanization and a growing middle class. In 2010, food demand in West Africa was valued at US\$178 billion, two-thirds of which was captured by imports<sup>14</sup>. The Economic Community of West African States (ECOWAS) holds considerable potential for Guinea-Bissau, through increased regional trade, yet the country’s exports to ECOWAS are the lowest in the regional group, accounting for less than one percent of the total share of the country’s exports<sup>15</sup>. Regional integration has the potential to increase the country’s trade, allowing it to achieve greater competitiveness and stronger, more robust growth. Guinea-Bissau can also benefit from regional integration by using regional agricultural policies<sup>16</sup> and trade agreements to strengthen its bargaining position vis-à-vis other countries and to increase its technological capacity.

<sup>11</sup> Promotion of agricultural value-chains, Promotion of livestock and animal products, Development of Fisheries, Sustainable natural resources management (water, soils, forest), Research, Development and extension services, Sector coordination and institutional strengthening, Adaptation of the agricultural sector to climate change

<sup>12</sup> IFAD (2015)

<sup>13</sup> Kyle S (2015), Rice sector policy options for Guinea Bissau

<sup>14</sup> F. Hollinger and J. Staatz (2015), Agricultural growth in West Africa: Market and policy drivers

<sup>15</sup> World Bank (2015), Country Economic Memorandum

<sup>16</sup> ECOWAP, the ECOWAS Regional Agricultural Policy and the West Africa Economic and Monetary Union (WAEMU) Agricultural Policy

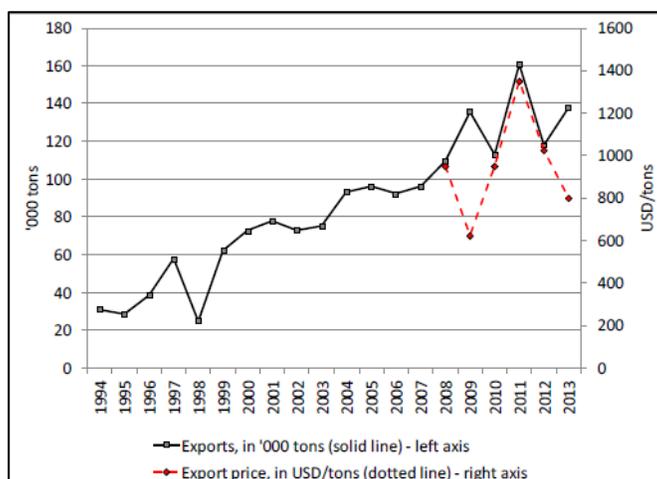
### III. The vulnerability of Guinea-Bissau's agri-food system

17. **RCN receipts drive domestic consumption, terms of trade and current account performance.** Although inflation reduces purchasing power, there is a clear link between RCN receipts per worker and domestic private consumption, which comprises 86 percent of GDP. Global RCN exports have increased substantially over the past decade. RCN prices have a strong effect on the current account—and on domestic savings. Higher RCN prices tend to improve the terms of trade, particularly with respect to rice, Guinea-Bissau's main import after fuel.

18. **Access to transport and markets is crucial for rural households that depend heavily on RCN income.** However, most households that get most of their income from RCN and other cash crops have limited access to transport and markets. The distant location of households increases the transaction costs and widens the gap between farm-gate price and export price. Changes in the farm gate RCN price have a greater impact on the incomes of the poorest than any other variable in the economy. One study (Cont and Porto, 2014<sup>17</sup>) concluded that a 15 percent increase in the farm gate RCN price could result in a 9.5 and 3.3 percent increase in the consumption among the extreme poor and the poor households respectively<sup>18</sup>.

19. **Over time, the importance of RCN in the country's economy has grown, in terms of public revenue, the composition of the agricultural frontier, exports and rural employment** (cf. Figure 3). In the Northwest, cashew orchards cover almost all arable land, with a tendency to expand into more vulnerable areas such as forests and even protected areas. Incentives to shift into cashew are strengthened by high international prices, and customary land tenure norms, which tend to protect investments in land. Since planting of cashew trees is seen as an improvement to the land (similar to investments in infrastructure), customary practice requires that the individual/household that planted them retain the land as long as the trees remain on it. Households, therefore, have a strong incentive to plant perennial cashew trees rather than annual crops, since it helps guarantee longer security of land tenure.

**Figure 3. Evolution of total RCN exports and export price** (Source: Cont and Porto, 2014)



<sup>17</sup> Cont and Porto (2014), Measuring the impact of a change in the price of cashew received by exporters on farm-gate prices, and on poverty, in Guinea Bissau

<sup>18</sup> Extreme poverty is measured by the USD 1.25/day (PPP) line and poverty by the USD 2/day line. Extreme poverty rate in Guinea-Bissau was 44.4 percent and poverty rate was 69.4 percent in 2014

20. **In terms of tax incidence, Guinea -Bissau's reliance on taxes from RCN exports means that the poor bear a considerable share of the tax burden.** RCN taxes are set at about 11 percent of the government's reference price for RCN exports. Simulation analysis indicates that cashew farmers, mostly poor, absorb about 80 percent of this tax, while exporters absorb 13 percent and traders the remaining 7 percent<sup>19</sup>.

21. **This high dependence on the cashew sector leaves the economy highly vulnerable to external, political, and natural shocks.** The 2018 cashew harvest provides a good illustration of this fragility (cf. Box 1).

**Box 1: Guinea- Bissau 2018 cashew campaign**

Global RCN production reached 3.3 million MT in 2015, with about 45 percent produced in Asia, 45 percent in West Africa (Cote d'Ivoire 702,000 MT and Guinea-Bissau 220,000 MT), 6 percent in East Africa and 4 percent in Latin America (Brazil). Globally, RCN production has increased at an average annual rate of 5.7 percent between 2000 and 2015 and continues to grow, mostly driven by increased production in West Africa<sup>20</sup>. Guinea-Bissau accounts for only 6 percent of world RCN production. Guinea-Bissau's RCN campaign comes at the end of the world harvest (after the harvest in East Africa and Asia). Although Guinea-Bissau has a comparative advantage in terms of quality, the volume of RCN production and its sequence in the global campaign mean that the country has little influence on international RCN prices. Upon reaching Guinea-Bissau, international buyers are already aware of the volumes needed and the margins that the global market will permit.

In 2018, Asian RCN production reached higher volumes than the previous year. The international RCN market price at the beginning of the campaign in West Africa (February - March) was below 2017 prices, between USD 2000 - 2200 per MT. Given its high internal RCN production, Vietnam decided in March 2018 to suspend RCN imports from West Africa, which had the effect of reducing the global RCN price to USD 1800 per MT<sup>21</sup>.

Furthermore, Guinea-Bissau suffered this year from a wind anomaly (longest period of *Harmattan*) at the time of flowering of the cashew trees, bringing dust - which may have a negative impact on production. Due to the lack of national data, it is difficult to assess precisely the level of RCN production, but it is estimated that the 2018 production fell by 10-20 percent compared to 2017.

At the beginning of the 2018 marketing year, the Government of Guinea-Bissau enforced a reference price of CFA 1000 per kg for RCN, which was perceived by stakeholders as a de facto "minimum price". Due to reduced RCN demand worldwide, this benchmark price was significantly above the world RCN price and hampered Guinea-Bissau's competitiveness vis-à-vis its neighboring countries (i.e. 500 CFA per kg in Côte d'Ivoire and 650 CFA per kg in Benin).

The 2018 RCN reference price also delayed the arrival of international RCN buyers. Until mid-May 2018, the intermediaries did not receive the necessary cash flow to purchase RCN. It is estimated that up to 20 percent of domestic RCN production was smuggled (i.e., sold via the border with Senegal where RCN are sold for 750-800 CFA per kg). RCN sales began to take off in the country at the end of May 2018 after Government statements clarified that the reference RCN price was not mandatory. At the end of November 2018, 147,000 MT of RCN had been exported with an average purchase price of 500 FCFA per kg.

This delay in 2018 RCN campaign had several consequences:

- ◆ Decrease in farmers' income. Most RCN had already been harvested by end-May 2018, but farmers decided to store them, waiting for an improvement in the price (with exceptions, as small quantities were sold to meet basic

<sup>19</sup> World Bank (2016), Systematic Country Diagnostic,

<sup>20</sup> The African cashew sector in 2015 General trends and country profiles, Rongead for the African Cashew Initiative

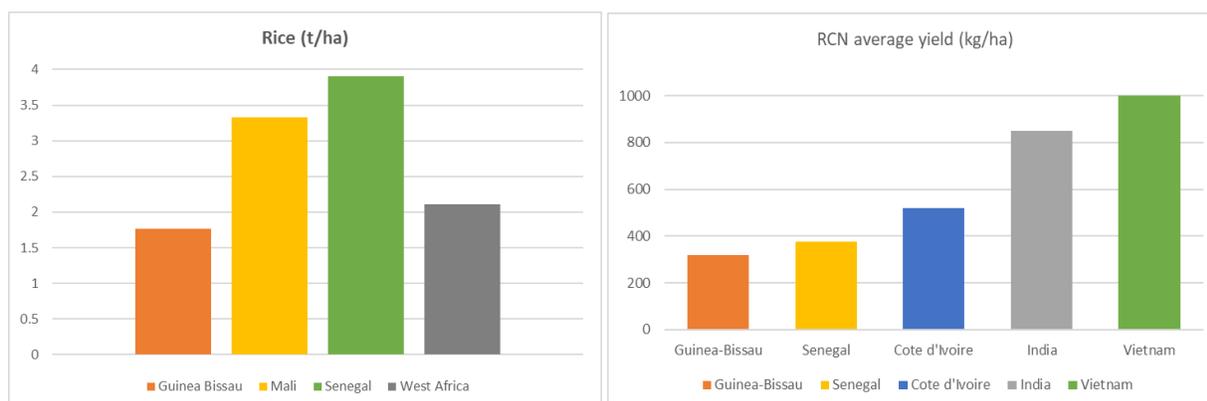
<sup>21</sup> <http://www.commodafrica.com/16-03-2018-la-concurrence-semble-reprendre-sur-le-marche-de-la-noix-de-cajou>

expenses and repay the debts). However, such a strategy cannot be maintained, particularly for farmers in the most remote areas, as the arrival of the rainy season make transport more difficult. Moreover, increased RCN moisture, due to inadequate storage and insufficient packaging material (e.g. shortage of jute bags), may also reduce the RCN quality and the purchase price. As RCN sales and rice purchase are closely linked (and done with the same traders), this delay and possible decrease in farmers' incomes has impacted their chances of maintaining family food security.

- ♦ Decrease in tax revenues. Lower international RCN demand and smuggling at the border with Senegal may have had a negative impact on RCN exports and foreign exchange, hampering imports and fiscal revenues in the country. All this has impacted on the economic growth of the country.
- ♦ The late start of the RCN campaign also limited imports of rice and oil (as traders that export RCN are also rice and oil importers), thereby increasing the price of these products, as well as the decreasing employment opportunities in the rural population.

22. **The agri-food sector in Guinea -Bissau is trapped in a low-input, low-output equilibrium that stunts both productivity and production.** Agricultural sector productivity remains low with yields comparing poorly to those in neighboring countries (cf. Figure 4). Though the Kernel Outturn Ratio (KOR) of RCN from Guinea-Bissau is high (52-54)<sup>22</sup>, bringing more value to the crop, there is potential for RCN yields gains, currently at an average of 320kg/ha in Guinea-Bissau, when compared to neighboring countries (Côte d'Ivoire, 520kg/ha) and the world's biggest producers (India and Vietnam at 800 – 1000kg/ha)<sup>23</sup>. The potential for RCN yield gains in Guinea-Bissau is high and can be achieved through more intensive production systems enabled by improved water management, better access to inputs (including improved varieties and fertilizer), and the use of good agricultural practices, proven technologies, and other knowledge and innovations generated and disseminated by well-functioning agricultural research and advisory services.

**Figure 4: Comparison of RCN and rice yields in Guinea-Bissau and neighboring countries**



Source: FAOSTAT (2016), Rongead and WB (2017)

23. **Food processing is very limited in Guinea – Bissau, mainly associated with minimal RCN processing.** There is a small installed RCN processing capacity (some 25,000 MT of RCN) but only a small

<sup>22</sup> Kernel outturn ratio (KOR) is measured as the weight of kernels in lbs. per bag of RCN (80 kg or 176 lbs.). For example, a KOR of 54 means that there are 54 lbs. of useable cashew nut kernels in 176 lbs. bag of RCN, which corresponds to an outturn of 31%, which is good.

<sup>23</sup> Rongead and World Bank 2018

part is operational<sup>24</sup>. The agri-food sector is constrained by several bottlenecks, including: (a) unclear land rights and poor land management system; (b) lack of hydro-agricultural developments; (c) limited access to inputs and technologies to support production; (d) inadequate investment in agricultural research and development and extension, (e) poor infrastructure (e.g., logistics, energy, storage) limiting the development of agribusiness value chains, (f) a lack of finance for agriculture; and (g) the unpredictable policy environment and the dearth of market information.

24. **Deteriorated rural roads and insufficient electrical supply and distribution raises costs for farmers and agribusiness, which in turn lowers their productivity and competitiveness.** Only 28 percent of roads are paved and secondary and tertiary roads, that connect rural populations to markets are in particularly poor condition. Nationally, the electricity access rate is below 10 percent, one of the lowest in Africa. Another key infrastructure constraint is the port of Bissau, which is in a dilapidated state and imposes high transaction costs on RCN exports as well as imports (such as rice). Tariffs are up to ten times higher than neighboring competitors such as Banjul and Dakar.<sup>25</sup>

25. **There is already evidence that Guinea-Bissau's climate is changing in several ways.** These changes range from greater rainfall variability and late onset of the rainy season, to increased temperatures and rising sea level and tidal surges. For instance, average yearly temperature has increased about 1°C over the past decades. Observations suggest a shortening of the cool season during the months of December-February. Trends show increased irregularity in precipitation, together with an overall trend of decreased mean annual precipitation and seasonal precipitation. Changes in rainfall patterns are leading to longer, hotter dry seasons, particularly in the northeastern interior, resulting in seasonal water shortages which directly affect access to water for the population's needs, as well as for agriculture and livestock. Flooding events occur frequently in inland and coastal areas, causing severe impact on infrastructure and agriculture. Projections suggest that these trends are likely to be exacerbated in the future, since Guinea-Bissau, while a low-emission country, is highly vulnerable to the impact of global climate change, particularly of rising sea levels and salinization of water, ranking second only to Bangladesh on the 2014 Climate Change Vulnerability Index<sup>26</sup>.

26. **Agriculture is today the biggest source of wealth in Guinea-Bissau but is also the cause of major environmental problems.** Although it is hard to establish a conclusive correlation between agricultural expansion and deforestation, data show that the country's tree cover was reduced by almost 80,000 ha between 2001 and 2014. In turn, the area cultivated in cashew increased by 35,000 ha (2002-2013) and the area cultivated in rice increased by 52,000 ha in the same period<sup>27</sup>. Some agricultural practices, such as slash and burn techniques and overgrazing of livestock, are also threatening local ecosystems. It is therefore crucial to develop an agricultural strategy that goes hand-in-hand with efforts to conserve critical ecosystems, with the goal to achieve a triple win through increased productivity and resilience while decreasing the sector's carbon foot-print.

27. **Guinea-Bissau's governance framework is extremely fragile.** The Country Policy and Institutional Assessment (CPIA) score of Guinea-Bissau in 2017 was 2.5, below the average Sub-Saharan Africa IDA

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<sup>24</sup> World Bank (2014), Private Sector Rehabilitation and Agribusiness Development Project

<sup>25</sup> World Bank (2016), Systematic Country Diagnostic

<sup>26</sup> World Bank (2016), Systematic Country Diagnostic

<sup>27</sup> WRI, Global Forest Watch, <http://www.globalforestwatch.org/country/GNB>

countries<sup>28</sup>. The country is known to have relatively weak institutions, with low technical capacity and high staff turnover. Guinea-Bissau's civil service exhibits high capacity gaps and skills mismatches across line ministries<sup>29</sup>. Lack of government presence outside of Bissau is a defining feature of fragility. Access to public services and possibilities to participate in public administration have been limited to the urban center.

**28. Aid coordination among multi- and bi-lateral donors and between them and the government of Guinea-Bissau remains a challenge.** There have been little aid monitoring and coordination in Guinea-Bissau, which results in unnecessary waste of scarce resources due to duplication and overlapping implementation mechanisms<sup>30</sup>. At the government level, no clear institutional framework for aid coordination exists and discussion with donors are primarily bilateral. An effective donor coordination system, led by the government, is key to maximize results on the ground, given the relatively small size of the public administration. This platform for dialogue should also be extended to other stakeholders of the sector (e.g., farmers organizations, agribusiness, research centers) to share knowledge and experiences and improve synergies and complementarities.

**29. Following independence, a rural associative movement emerged in the southern and eastern regions and extended to the whole country.** Unfortunately, this movement has not been accompanied and until now, there is no legislative incentive for organizing farmers. Farmers' concertation frameworks exist, mostly driven from the West Africa sub-region (i.e. the West African Farmers' Organization – ROPPA), but the structuring of farmers remains weak. Even for the cashew value-chain there is not yet a strong organization. The absence of farmers' organizations leads to a high fragmentation of agricultural production, reducing farmers' bargaining power within the value-chain, and higher costs of purchasing inputs.

**30. The information and data available on Guinea-Bissau's agricultural sector are few and often inaccurate.** Agricultural statistics are highly tentative and must be used with caution. Reliable statistics exist for legal RCN exports, but information on total RCN production is based on estimates using diverse methods. This further complicates the analysis of the state of the sector. The dominance of agriculture in the economy demands that policy formulation, planning and implementation, monitoring and evaluation in the sector is based on sound evidence. In the long term the government of Guinea-Bissau should invest in the development of robust and high-quality agricultural statistics taking advantage of new opportunities brought by digital technologies. This would allow all stakeholders from the sector to: (a) make informed and more effective investment decisions; and (b) put in place a transparent and reliable results framework for monitoring and evaluating policy and program implementation.

**31. The private sector in Guinea-Bissau is underdeveloped and faces several challenges.** These include a difficult business environment – characterized by a complex regulatory environment and weak enforcement – as well as poor infrastructure, constraints in accessing finance and low productivity<sup>31</sup>. In the agricultural sector more particularly, there are few input suppliers in rural areas. Farmers have mostly access to improved seeds through Non-Governmental Organizations (NGOs) or donors' projects or by

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<sup>28</sup> The CPIA is rating countries against a set of 16 criteria grouped in four clusters: economic management, structural policies, policies for social inclusion and equity, and public sector management and institutions, from 1 (low) to 6 (high). See World Bank. 2017c.

<sup>29</sup> World Bank (2015), Country Economic Memorandum

<sup>30</sup> Ibid.

<sup>31</sup> World Bank (2016), Republic of Guinea Bissau Improving the Business Environment in GB: A reform agenda

purchasing them in neighboring countries. Access to other inputs such as fertilizers, or to small mechanization, is also scarce and mostly dependent on donors' projects.

32. **The financial sector is underdeveloped in Guinea-Bissau, with low access to formal banking services.** The banking network is very narrow with just 26 branch offices, of which only seven are in rural areas. Over the past five years, credit to the private sector reached an average of 8.2 percent of GDP, significantly below other West African Economic and Monetary Union (WAEMU) countries<sup>32</sup>. Most bank lending is short term, which carries high interest rates (14-18 percent) and substantial collateral to cover anticipated higher risk. Moreover, more than 23 percent of bank lending is concentrated in the cashew sector on pre- and post-harvest financing and includes loans to small processing plants and trading advances to exporters. Most Small and Medium Enterprises (SMEs) and poor households are effectively excluded from credit markets, since secure land tenure rights are almost nonexistent in the country, which precludes use of land as collateral. This further impairs investment in productive assets to be able to exploit economic opportunities. Furthermore, the absence of a capital market constrains the availability of risk hedging mechanisms, making businesses and households more susceptible to shocks and less efficient at managing them. Microfinance institutions represent very small volumes: only six are currently active, with 19 service points for 16,210 members and all are in the form of donor-financed cooperatives or projects with a credit component<sup>33</sup>.

#### IV. The high-risk environment hampers diversification and economic growth of the sector

33. **Guinea-Bissau has potential to develop agricultural production and bolster economic growth as well as increase resilience.** Diversifying agriculture-related income sources would reduce the risks that both the country and farmers face in relying mainly on RCN. The country has the potential to diversify both horizontally (expanding crops being grown in Guinea-Bissau) and vertically (moving-up the cashew value-chain).

34. **At the farm-level, the most often-cited exogenous driver of specialization or diversification is the access to functioning markets<sup>34</sup>.** For example, the more distant the farm is from the market, the greater are the positive impacts of diversification on a farm's resilience and nutrition. Conversely, the closer the farm is to a market – especially if it is a well-supplied and diversified market – the greater are the benefits of specialization since economies of scale will lead to higher income and thus purchasing power. Skills and knowledge of the rural workforce will also largely determine their ability to engage in productive diversification, value-chain diversification and off farm engagement. The importance of agricultural extension, as well as agricultural technical and vocational education has become apparent due to the rising demand by farmers to adapt their agriculture to a changing environment, manage agricultural land degradation and improve food security and nutrition. At the regional or country level, on-farm diversification and specialization should be seen as complementary. On the one hand, individual farms and value-chains often increase productivity and competitiveness through specialization, enhance efficiency and economies of scale, while on the other hand, at the community, landscape or national level, the heterogeneity of actors, diversity of farm production and value-chain activities provide access to diversified nutritious food products, incomes streams and employment opportunities.

35. **So far, the high concentration in RCN production in Guinea-Bissau is more the result of a lack of means and opportunities and thus, has not resulted in higher productivity.** Moving toward higher

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<sup>32</sup> <https://data.worldbank.org/indicator/FD.AST.PRVT.GD.ZS?end=2017&start=1960&view=chart>

<sup>33</sup> World Bank (2016), Systematic Country Diagnostic

<sup>34</sup> World Bank (2019), Productive diversification of African Agriculture and its Effect on Resilience and nutrition

agricultural productivity growth and toward a mix of higher-value agricultural commodities and products in the country requires changes in farming practices as well as more investments on- and off-farm. The shift toward a diversified market-oriented production system can be triggered by improved rural infrastructure and rapid technological change in agricultural production. In the longer term, encouraging investments in the upstream (research and development, access to inputs and seeds, farming systems), midstream (processing), and downstream segments of the value-chain (packaging, food safety, branding, targeted markets) of the value-chain can promote vertical diversification.

36. **The fragile environment in which agricultural sector stakeholders operate is not conducive to the generation of growth or employment.** The high level of agricultural risk (price, climatic, political), along with the high fragmentation of production and the scarce access to financing for the farmers in the country, limit the current private investment in the sector. Low productive diversification, alongside a frequent lack of assets to mitigate risks, increases the country’s economy and two-third of its population’s vulnerability to climate and market risks.

**Table 3: De-risking the business of agriculture in Guinea-Bissau: A Conceptual Framework**

Type of Risk	Challenge/Problem	Options/Solutions
Market	<ul style="list-style-type: none"> <li>• Price volatility</li> <li>• Supply shocks</li> <li>• Food safety and traceability</li> <li>• Comparative advantage</li> </ul>	<ul style="list-style-type: none"> <li>• Storage and warehousing</li> <li>• Processing</li> <li>• Certification and standards</li> <li>• Diversification (both vertical and horizontal)</li> <li>• Market segmentation</li> </ul>
Climate / Environment	<ul style="list-style-type: none"> <li>• Drought</li> <li>• Flood</li> <li>• Temperature volatility</li> <li>• Soil degradation/ erosion</li> </ul>	<ul style="list-style-type: none"> <li>• Water management (e.g. irrigation)</li> <li>• Good agricultural practices</li> <li>• Weather-indexed insurance</li> </ul>
Political	<ul style="list-style-type: none"> <li>• Expropriation</li> <li>• Profit repatriation</li> <li>• Contract enforcement</li> <li>• Government intervention in the sector (e.g. reference price or discretionary distribution of inputs)</li> </ul>	<ul style="list-style-type: none"> <li>• Guarantee instrument</li> <li>• Enabling and stable legal environment</li> <li>• Contract enforcement</li> </ul>
Firm/farm-level	<ul style="list-style-type: none"> <li>• Low input/ low output</li> <li>• Incomplete/ asymmetric information</li> <li>• Logistics</li> <li>• Pest or disease outbreak</li> <li>• Insecure land tenure</li> </ul>	<ul style="list-style-type: none"> <li>• Technological innovation</li> <li>• Commercial intelligence/ICT</li> <li>• Aggregation and organization</li> </ul>

37. **Unleashing diversification and growth from the agri-food sector in Guinea-Bissau will require leveraging investments at all levels of the value chain.** Making the “business case” to potential investors for horizontal and vertical agricultural diversification can be transformative for the country and its households who collectively depend heavily on the cashew economy. To leverage more investments in the agri-food sector in Guinea-Bissau, it will however be necessary to lower its risk profile by setting a conducive environment (see Table 3).

## Chapter 2: Public Policy to Unleash Inclusive Agricultural Transformation in Guinea-Bissau

38. **The agri-food sector plays a central role in Guinea-Bissau’s economy, being the largest contributor to GDP (almost 50 percent) and employment (80 percent of the labor force)** and is critical to addressing both poverty and food insecurity.<sup>35</sup> Global historical evidence confirms agriculture’s key role in propelling the structural transformation of national economies. With few (if any) exceptions, a country’s economic development has relied on increased land and labor productivity in agriculture, which in turn has opened opportunities outside of the agriculture sector. Typically, structural transformation occurs when the following are observed:

- a declining share of agriculture in GDP, as the economy both develops and diversifies;
- a decrease in overall employment in agriculture, driven by a combination of: (a) the “push” of labor-saving technical change in agriculture (e.g., mechanization, automation); and (b) the “pull” of growing labor demand in non-agricultural sectors; and
- rising agricultural output, chiefly through gains in productivity, particularly total factor productivity (TFP).<sup>36</sup>

39. **Mellor (2017) notes, “The rapid growth of small commercial farmer-dominated agriculture accelerates economic transformation and is essential to the rapid decline in dominantly rural poverty.”**

Historical data also demonstrate the role of technical change in accelerating the capacity of countries to achieve agricultural transformation. Kim and Lee (2003) show that many European and Western economies began the process of structural transformation in the 19th century – prior to the industrial revolution – and that the glidepath to achieving structural transformation required 90 or more years (see

Table 4). In contrast, those countries that began the process in the mid-20th century (e.g., China, India, Indonesia, Korea and Turkey) required (or will require) only one-fourth to one-half as much time to reduce agriculture’s share in both GDP and agricultural employment. This could signal that a similarly shortened trajectory could be expected for Guinea-Bissau, given the greater access to technical change and the

### Box 2. Agricultural development and economic transformation

Government must be explicit about: (a) the importance of agriculture; (b) significant expenditure to invest in it; and (c) rapidly build key government institutions to foster its growth to reduce (or eliminate) rural poverty. Agriculture is preeminently private sector—farmers are private sector as is the bulk of input and output marketing firms. However, they become more motivated in the context of clear government emphasis on their role in reaching national objectives and they require essential, constantly improving, complementary government services including rural roads, electrification, education and major government institutions, always including research and extension, and many modest services such as statistics provision and market analysis.

There are four “big problems” that Government must address:

1. Obtaining an **explicit emphasis on agriculture**;
2. Budgeting **adequate funds** for agricultural investment;
3. Developing the Government’s **own institutional capacity**; and, perhaps most importantly
4. Knowing **when and how to withdraw from some activities as the private sector grows and modernizes**.

Source: Mellor (2017)

<sup>35</sup> World Bank (2018), Public Expenditure Review, Guinea-Bissau.

<sup>36</sup> OECD (2012), Agricultural Policies for Poverty Reduction

possibility of “leapfrogging” on the accumulated experiences of countries that have already completed structural transformation.

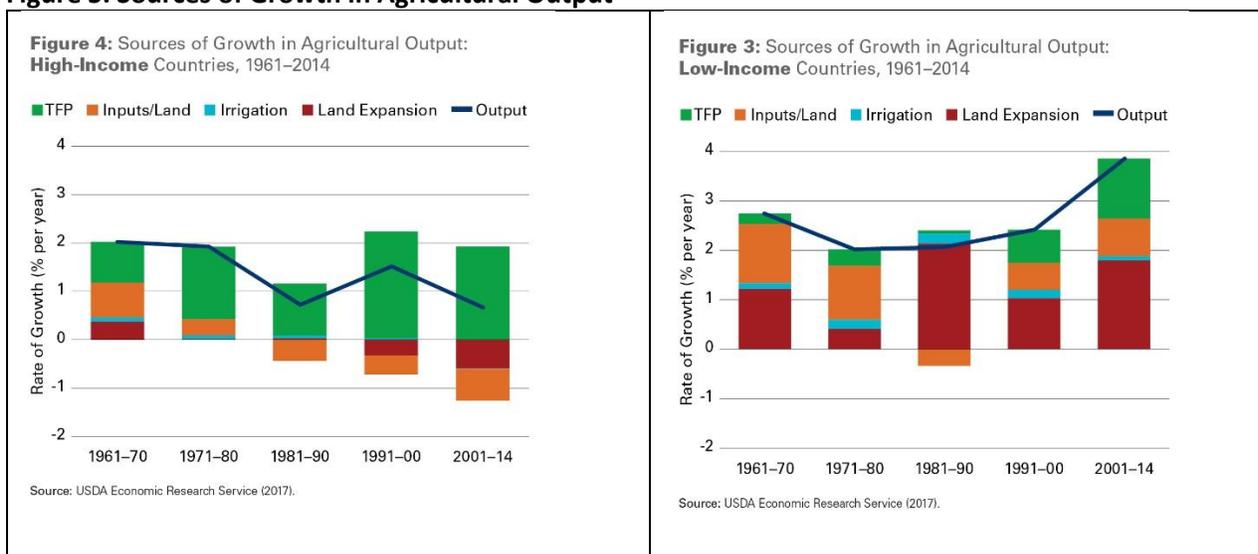
**Table 4. Agriculture share of GDP and employment**

	Agriculture share of GDP			Agriculture share of employment		
	Year of 40%	Year of 7%	Years required	Year of 40%	Year of 16%	Years required
Netherlands	1800	1965	165	1855	1957	102
Denmark	1850	1969	119	1920	1962	42
United Kingdom	1788	1901	113	1800	1868	68
Chile	1875	1980	105	1950	1993	43
Mexico	1890	1992	102	1969	2000	31
United States	1854	1950	96	1897	1950	53
France	1878	1972	94	1921	1965	44
Brazil	1910	2003	93	1960	2005 (20.5%)	> 45
Germany	1866	1958	92	1900	1942	42
Japan	1896	1969	73	1940	1971	31
Poland	1935	1991	56	1968	2006 (18.7%)	> 31
India	1962	2006 (17.5%)	> 44	2005 (58%)		–
China	1967	2006 (11.7%)	> 39	2006 (43%)		–
Turkey	1970	2007 (8.9%)	> 37	1998	2007 (28.7%)	> 9
Korea	1965	1991	26	1977	1991	14
Indonesia	1971	1997	26	2006 (42%)		–

Source: Adapted from Kim, H. and Y.K. Lee (2003).

40. **For high-income countries, TFP surpasses all other sources as a driver of agricultural output and productivity growth.** For low-income countries, the data tell a different story: TFP is growing yet expansion of the agricultural frontier continues to explain most of these countries’ agricultural output growth (Figure 5). The persistent lag in accelerating TFP in low-income countries can be attributed to low levels of technical change in agricultural production systems, which itself is symptomatic of a more generalized absence of capital investment – both domestic and foreign – in agriculture. How can public policy in Guinea-Bissau enable agricultural investment to propel structural transformation?

**Figure 5. Sources of Growth in Agricultural Output**



Source: Global Agricultural Productivity (GAP) Report (Global Harvest Initiative, 2017)

41. **While private sector investment – through both greater capitalization in agriculture and increased TFP – is pivotal to achieving structural transformation, the public sector also contributes** through policies that encourage private capital formation. The public sector can also deploy resources to promote smallholder development by: (a) derisking innovative technologies; (b) reducing screening,

search and transaction costs that constrain economic activity; and (c) addressing market failures in input and output markets.

42. **Many of the public policies required to improve farmers' opportunities are, in fact, nonagricultural.** Improvements in education and primary healthcare are key to prospects within and outside the agriculture sector. Equally important is the overall investment climate, which depends on factors such as: (a) peace and political stability; (b) sound macroeconomic management; (c) developed and robust institutions; (d) property rights and enforcement; and (e) governance. In agriculture-dependent economies like Guinea-Bissau, there is strong justification for increasing the share of public spending allocated to public goods, such as rural roads and agricultural research, and to technology transfer, farm extension and farmer advisory services<sup>37</sup>. Well-targeted public investments and public policy can foster the development of new crops and value-chains in Guinea-Bissau. What are the public policy options that:

- “de-risk” private agricultural investment;
- increase foreign direct investment (FDI);
- promote agricultural diversification; and
- accelerate structural transformation?

This Chapter focuses on the use of public policies to accelerate Guinea-Bissau’s smallholder agricultural development and the needed structural transformation, drawing on case studies of both countries and institutions to capture lessons learned.

## I. Public Agricultural Policy to Unleash Investment in Agriculture

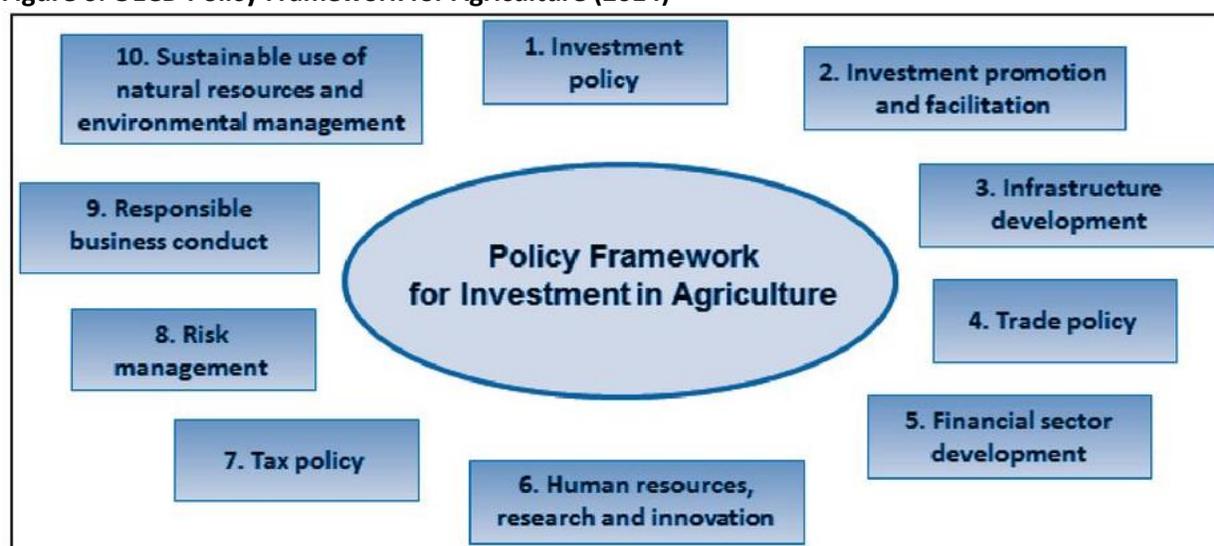
43. **Over the next four decades, global agricultural production must increase by at least 60 percent** to respond to rising food demand prompted by world population growth, higher incomes and lifestyle changes. As extending the agricultural frontier is constrained by ever-increasing urbanization, the required gains in agricultural production will primarily derive from increased productivity (i.e., land, labor, TFP). OECD (2014) sets forth a 10-point Policy Framework for Investment in Agriculture (PFIA) to kickstart capital inflows to the sector to facilitate increased agricultural productivity (Figure 6). The PFIA can contribute to achieving the CAADP objectives – by supporting the design and implementation of regional and national agricultural investment plans and investment blueprints and by strengthening cross-sector collaboration<sup>38</sup>. By promoting both policy formation and policy reforms, the PFIA can help forge an enabling environment for agricultural investment.

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<sup>37</sup> OECD (2012)

<sup>38</sup> See also the 2014 Malabo Declaration ([http://www.resakss.org/sites/default/files/Malabo%20Declaration%20on%20Agriculture 2014 11%202026-.pdf](http://www.resakss.org/sites/default/files/Malabo%20Declaration%20on%20Agriculture%202014%2011%202026-.pdf)) ; the 2018 progress update (<https://au.int/en/pressreleases/20180129/african-union-launches-africa-agriculture-transformation-scorecard-aats-%E2%80%93>)

Figure 6: OECD Policy Framework for Agriculture (2014)



44. The PFIA sets out a series of questions across ten dimensions that aid in defining a critical path toward a sound and effective policy framework conducive to agricultural development. Table 5 attempts to answer these questions in the context of Guinea-Bissau to identify those areas where action is needed.

Table 5: Policy Framework for Investment in Agriculture for Guinea-Bissau

PFIA Dimension	Critical Path	Guinea-Bissau
1. Investment policy	What is the national agricultural investment strategy?	The CAADP-inspired National Agricultural Investment Plan defines three phases for increasing agricultural growth in Guinea-Bissau: (a) intensification and diversification of agricultural production; (b) strengthening private investments and value chain coordination; and (c) deepening Guinea-Bissau’s integration in regional and international agricultural markets.
	What restricts or facilitates FDI in agriculture?	Political instability, discretionary “rules of the game” and weak contract enforcement restrict FDI in Guinea-Bissau.
	What steps have been taken to secure land tenure?	Recent promulgation of 2018 Land Law
	Is contract enforcement effective and widely accessible to all agricultural investors?	Contract enforcement is generally perceived to be low.
2. Investment promotion and facilitation	Does the government intervene in input and output markets? Are these markets competitive?	Government intervenes in outputs markets (e.g., 2018 and 2019 producer reference price for RCN). Input markets are thin and access to inputs is quite scarce. Monopsony/oligopsony prevails in the RCN trade.
	What are the investor-state dialogue mechanisms?	Ad hoc and discretionary; some farmer advocacy groups (e.g., ANAG, KAFO), sectoral advocacy (e.g.,

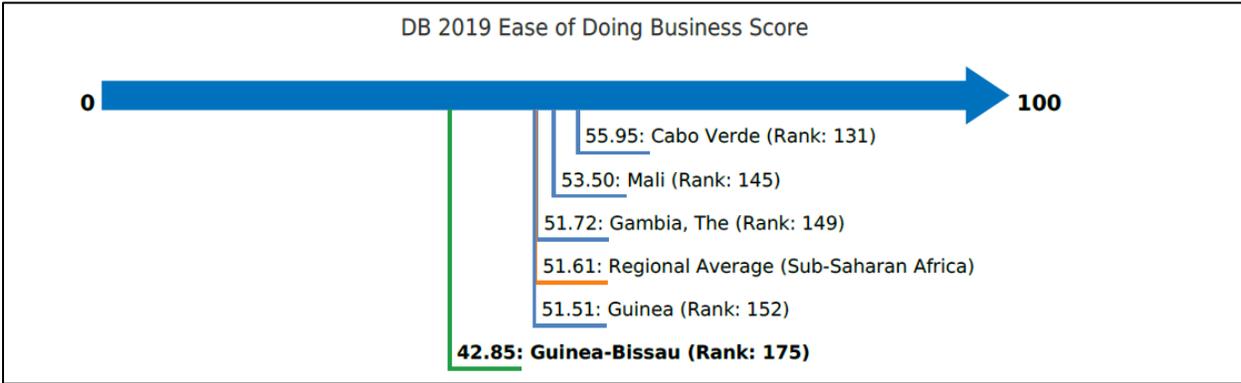
		ANCA). Some bilateral cooperation facilitates private sector linkages for their national companies.
3. Infrastructure development	Are infrastructure policies aligned with agricultural investment objectives?	No clear alignment or budget. The National Agricultural Investment Plan doesn't yet present a credible financing plan.
	How does government attract private investment in agricultural infrastructure?	Ad hoc and discretionary
	Is access to water, energy and ICT secure and consistent?	Water, electricity and ICT are sporadic/inconsistent; diesel back-up generators are a necessity for most services and industry.
4. Trade policy	Does government facilitate cross-broader trade?	RCN are >80% of exports; Guinea-Bissau is a member of CAADP, ECOWAP; low participation in R&D regional networks; Common External Tariff that influences trade tariffs in Guinea-Bissau, but little alignment of laws on seed and fertilizer to promote technological diffusion.
	What specific trade measures support agricultural export promotion?	None have been identified.
5. Financial sector development	How does government facilitate access to credit by agricultural investors? Guarantees?	No credit facilitation or guarantees.
	How do large and medium-size agricultural investors raise investment capital? Bond issues? Equity participation?	Weak banking sector; insecurity dampens investor confidence.
6. Human resources, research and innovation	How does government promote linkages between agricultural extension, R&D and farmer dissemination?	Agricultural extension and research are primarily conducted through bi- and multilateral assistance.
7. Tax policy	Are taxation policies aligned with agricultural investment objectives?	Low and unpredictable public revenues, regressive and distortionary taxation, and poor quality of public expenditure limit the effectiveness and equity of the fiscal policy (SCD 2016).
	Does the government offer tax incentives to agricultural investors?	Ad hoc and discretionary
8. Risk management	Does the government encourage diversification?	<i>Terra Ranca</i> supports the concept of diversification, yet there is minimal public budget available to support it. Multi- and bilateral cooperation emphasize the need for diversification in agriculture.
9. Responsible business conduct (RBC)	What laws/regulations govern RBC in agriculture?	None identified. Some examples of RBC as conditions in multi- and bilateral assistance (e.g., PRSPDA)

	How does the government communicate expected RBC standards to agricultural investors?	No communication identified.
10. Sustainable natural resource management	Do existing policies promote access to clean, energy-efficient and low-input technologies and encourage their adoption by large and small agricultural investors?	No

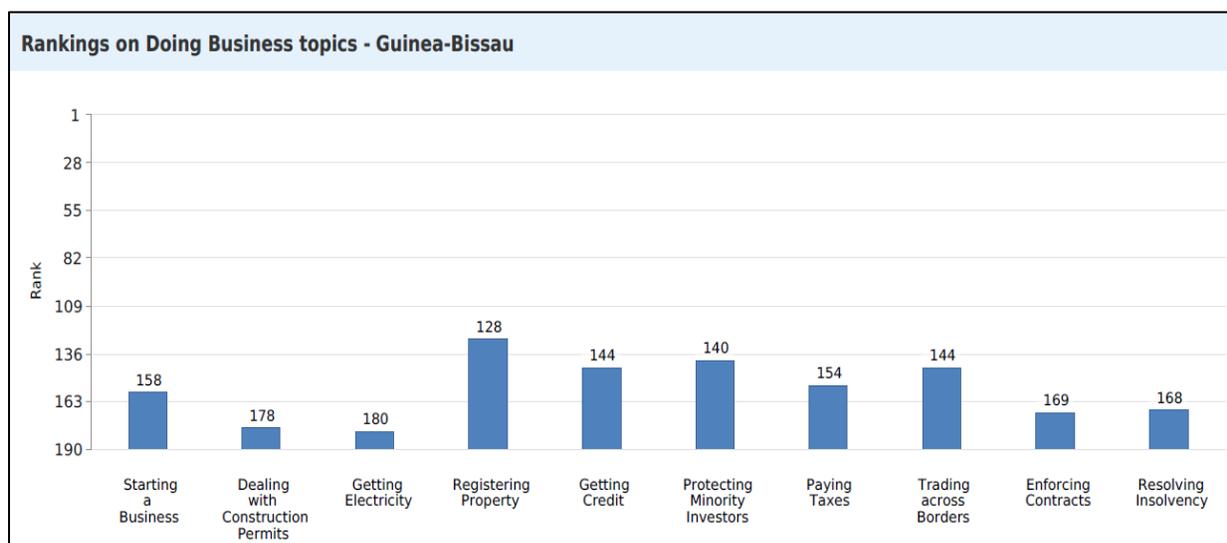
Source: Adapted from OECD 2014 and Goyal, Nash (2017)

45. **Data from Table 5 indicate that across all ten dimensions of the PFIA, Guinea-Bissau’s performance is below what would be needed to facilitate private capital inflows to the agricultural sector.** The weak institutional and contract environment (PFIA dimensions 1 and 2) dampen investor confidence, particularly considering competing options in countries with relatively stronger institutions and governance. This is particularly important for attracting Foreign Direct Investment (FDI). Here also the World Bank 2019 Ease of Doing Business Report ranks Guinea-Bissau at 175 among 190 countries – lowest among its regional peers – and notes that the country is particularly weak in electrical service and contract enforcement (see Figs. 7a and 7b). Weak physical rural infrastructure (PFIA dimension 3) significantly increases both transactions costs and upfront investment for any new agricultural endeavor.

**Figure 7a. Ease of Doing Business Score 2019**



**Figure 7b. Rankings on Doing Business – Guinea- Bissau**



Source: 2019 Ease of Doing Business, World Bank.

46. **The historical concentration of exports in RCN signals the importance of trade diversification** (PFIA dimensions 7 and 8) as well as the challenge of moving up the cashew value chain in the face of such weak infrastructure. Effective investment promotion (PFIA dimension 2) will depend heavily on how the government of Guinea-Bissau addresses these forgoing challenges to attract both foreign and domestic private capital to agriculture. Public policy to address the most basic public service provision (i.e., access to electricity) is fundamental to enable the country to embark on an agenda of value addition in the cashew sector.

## II. Public Expenditure in Agriculture: a mismatch between the importance of the sector in the economy and the level of agricultural spending

47. **Experience globally has shown that improving public spending in agriculture can boost productivity (Goyal and Nash, 2017).** An analysis of the influence of agricultural public expenditures on net income generation, using data for 19 Latin American and Caribbean countries from 1985–2012, found that total government spending on the farm sector positively impacts agriculture’s performance<sup>39</sup>. More importantly, and of greater practical economic significance to Guinea-Bissau, by increasing the share of expenditures committed to pure public goods, ceteris paribus, rural income significantly increases, as measured by sector value-added per capita of the rural population. The study found that privately internalized subsidies “crowd out” public goods, burden taxpayers, and lower the productivity of complementary private investments. Such subsidies could delay the timing of private investments and invite a diversion of private resources from productive projects toward rent-seeking activities in search of yet more subsidies. For example, a shift of 10 percentage points of the agricultural budget from private to public goods, maintaining total spending constant, leads to an approximately 5 percent increase in value added per capita. To achieve the same increase would require an increase of approximately 25

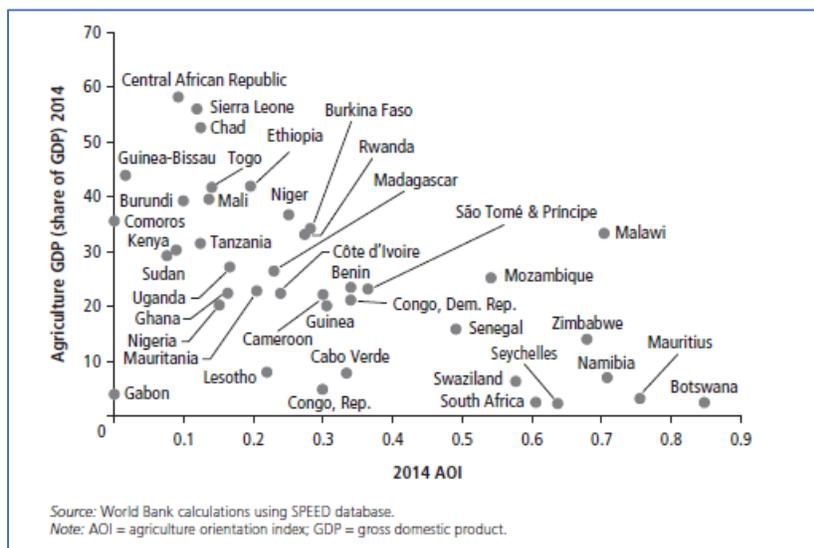
<sup>39</sup> Anríquez, G., Foster, W., Ortega, J., Falconi, C., & De Salvo, P. (2016)

percent or more in total spending, while holding the mix constant. In summary, the study confirms what economic thinking and earlier empirical studies have found: *ceteris paribus*, diverting taxpayer funds from public goods to private subsidies decreases farm sector performance. Relative to Guinea-Bissau, this would imply that the quality of public agricultural expenditure – and per-capita agricultural income – can be increased simply by a greater emphasis on public goods provision.

48. **At below 1 percent of GDP, Guinea-Bissau’s total public investment in agriculture is among the lowest in Sub-Saharan Africa.**<sup>40</sup> Furthermore, more than 95 percent of total capital expenditure is foreign funded. FDI in Guinea-Bissau reached a high of 3.1 percent of GDP in 2010 and has since declined to some 1.2 percent of GDP in 2016. This high degree of dependence on external assistance, combined with substantial fluctuation in donor support, threatens the domestic ownership of a sustainable agricultural development strategy for the country.<sup>41</sup> The virtual domination by the donor community of the country’s capital budget begs the question of just how much coordination exists among the various contributors to avoid duplication, ensure budget efficiency and align external assistance with national priorities, particularly in the agri-food sector.

49. **Assessing public spending in agriculture, relative to agriculture’s weight in GDP, can also shed light on budget priorities.** Figure 8 compares countries across Africa on two parameters: (a) Agricultural GDP (as percentage of GDP); and (b) the Agriculture Orientation Index (AOI)—is agriculture’s share of public spending relative to its share in the economy. It is striking that no country spends as much on agriculture as agriculture contributes to the economy. Specific to Guinea-Bissau, while Agriculture GDP represents some 45 percent of GDP, the AOI is about 0.02, indicative of extremely low budget priority for agricultural public spending.<sup>42</sup>

**Figure 8: Public spending in Agriculture relative to agriculture’s weight in GDP in Africa**



Source: Goyal, A., and Nash J. (2017)

<sup>40</sup> Guinea-Bissau’s total public investment in the agricultural sector was on average of 0.54 percent of GDP between 2010 and 2017 (World Bank, Public Expenditures Review, 2018).

<sup>41</sup> Agriculture expenditures represented an average of 0.73 percent of domestically funded expenditures between 2010 and 2017 (World Bank, Public Expenditures Review, 2018).

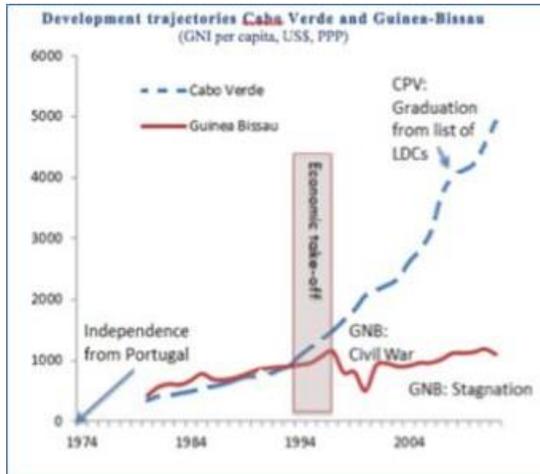
<sup>42</sup> Agricultural spending represented an average of 1.6 percent of total expenditures between 2014 and 2017 (World Bank, Public Expenditures Review, 2018).

### III. Recommendations for more and better public policy in agriculture in Guinea-Bissau

50. **The Guinea-Bissau Systematic Country Diagnostic identifies three main interconnected clusters of binding constraints to poverty reduction and shared prosperity:** (a) lack of inclusiveness and low rural productivity; (b) low and unstable growth; and (c) fragility and weak governance. A comparative analysis of Guinea-Bissau and Cabo Verde provides insights from two countries that both achieved independence in 1974, following a liberation struggle that lasted almost 20 years and subsequently pursued independent development paths (Box 3).

#### Box 3: Case Study: Economic Growth in Guinea-Bissau and Cabo Verde

Starting out at roughly equal levels of gross national income (GNI) per capita (in purchasing power parity [PPP] terms), Cabo Verde has grown rapidly, graduating from the United Nations (UN) list of Least-Developed Countries (LDCs) in 2007 and now enjoys income levels four times that of Guinea-Bissau. Guinea-Bissau remains one of the poorest countries in the world, with a GNI per capita of US\$ 590 (Atlas method).



The difference in the growth outcomes between both countries has been largely attributed to the interruptions caused by frequent coups and other political upheavals in Guinea-Bissau. Both Cabo Verde and Guinea-Bissau embarked on a process of democratic transition in the 1990s which gave birth to a period of growth. In Guinea-Bissau, however, growth came to a sudden halt in 1998 when civil war erupted. Although peace returned in 1999, economic dynamism did not, and fragility continued to mark the landscape. A period of relative calm began in 2009. Guinea-Bissau then experienced a rare period of stability and economic resurgence. But another intervention by the army during the run-off of presidential elections in April 2012 stifled optimism yet again and derailed a hopeful period of cautious progress.

Unlike Guinea-Bissau, Cabo Verde had better organized institutional and policy frameworks which made it possible for the country to capitalize on early incentives to promote FDI. Investments in human capital created a better-educated workforce, which afforded Cabo Verde a literacy rate of 62 percent at the time of its independence, the region's highest. In this context, Cabo Verde was generally better prepared than Guinea-Bissau to meet the challenges of independence, and thus enjoyed more favorable growth prospects.

Source: Systematic Country Diagnostic, Guinea-Bissau (World Bank 2016)

51. **Table 6 draws on the SCD (2016) and Goyal and Nash (2017) to link the three areas of binding constraints with prioritized public policy options** in relation to the agriculture sector to reduce poverty and generate inclusive growth in Guinea-Bissau.

**Table 6- Agriculture policy options for Guinea-Bissau**

SCD Binding Constraints	Agriculture policy options
1. Lack of inclusiveness and	Increase agricultural productivity and improve market support services by: <ul style="list-style-type: none"> <li>• Reducing the barriers to developing and disseminating new technology and improved practices;</li> </ul>

<p>low rural productivity</p>	<ul style="list-style-type: none"> <li>• Improving crop performance with extension services and access to inputs and technologies;</li> <li>• Strengthen linkages between producers and processors;</li> <li>• Supporting the development of logistics services such as warehouse facilities; and</li> <li>• Leveraging R&amp;D from regional and neighboring countries (e.g., Guinea, Senegal and the Bank-financed WAAPP).</li> </ul> <p>Reduce vulnerabilities of households to shocks by:</p> <ul style="list-style-type: none"> <li>• Supporting adaptation/ resilience strategies (e.g. water management, enhanced seeds, financial and insurance instruments).</li> </ul> <p>Reform land tenure and management systems.</p> <p>Enhance market accessibility and bargaining by strengthening connectivity, access to information and farmers associations.</p>
<p>2. Low and unstable growth</p>	<p>Improve economic resilience through agricultural diversification by:</p> <ul style="list-style-type: none"> <li>• Fostering moving up in the cashew value chain;</li> <li>• Developing value chains in rice and other agricultural crops;</li> <li>• Development of value chains in fisheries; and</li> <li>• Improving Post-Harvest Practices and Market Access.</li> </ul> <p>Improve cross-cutting economic and agriculture production support services (electricity, road infrastructure, ports, telecommunication).</p> <p>Increase financial inclusion</p> <p>Leverage regional integration of markets and infrastructure networks</p>
<p>3. Fragility and weak governance</p>	<p>Strengthen the link between the budget and policy priorities by:</p> <ul style="list-style-type: none"> <li>• Strengthening efficiency in agricultural public spending; and</li> <li>• Shifting Government Spending from private subsidies to public goods.</li> </ul> <p>Strengthen the business regulatory environment by:</p> <ul style="list-style-type: none"> <li>• Streamlining import/export practices;</li> <li>• Promoting entrepreneurship;</li> <li>• Advance the security sector reform; and</li> <li>• Strengthen contract enforcement.</li> </ul> <p>Reform the management of natural resources to preserve the country's natural wealth</p>

Source: Systematic Country Diagnostic, Guinea-Bissau (World Bank. 2016); Goyal and Nash (2017)

## IV. Conclusion

52. **Getting the policy drivers in place for the necessary agricultural transformation will require time and political will, given the fragile country context, but will be crucial for Guinea-Bissau’s economic development.** Poverty reduction and shared prosperity will be positive spillovers from such transformation. This Chapter argues for a re-engineering of public policies in Guinea-Bissau to forge a more conducive environment for private investment in agriculture.

53. **Clearly, Guinea-Bissau’s public expenditure in agriculture is well below the agreed 10 percent of total public expenditures agreed upon** at the African Union summit of Malabo in 2014 and is unlikely to increase significantly in the short- to medium term. Yet more important, a reprioritization of public expenditures is needed to achieve greater convergence with the investments that have the most potential to facilitate private investment in agriculture: rural roads, electricity and connectivity, and access to water.<sup>43</sup> While limited, Guinea-Bissau has some domestic fiscal availability, if expenditures mainly oriented towards salaries (both official wages and non-official) can be repurposed toward agricultural public investment. Rural roads and irrigation infrastructure can be geographically targeted at areas where there are concentrations of poverty. Research can be targeted at crops, livestock, and technologies that have both strong market potential and clear payoffs for rural producers. Efforts to connect farmers to markets can be focused on smallholders. Analysis indicates that such investments can have a large payoff in both economic growth and poverty reduction (see Box 4).

### Box 4

#### Impacts of Policy Options to Raise Agricultural Productivity in Sub-Saharan Africa

Recent research has quantified the potential improvement in productivity from policy reforms and several kinds of spending on agriculture or in rural areas. While comprehensive development of Africa’s agricultural sector requires investments across multiple areas, a TFP decomposition shows that productivity improvements in Africa have been led by investments in development of new technologies, wider adoption of new technologies (proxied by farmer education), and policy reforms to strengthen economic incentives to farmers (table BO.6.1).

**Table BO.6.1 Drivers of Agriculture Productivity in Sub-Saharan Africa**

	Contribution to cumulative TFP growth (%)
Agriculture research and development	51
Improvement in agriculture’s terms of trade with market and trade policy reform	20
Reduction in conflict	18
Increase in farmer education	8
HIV/AIDS therapy to adult population infected	2

Sources: Fuglie and Rada 2013.

Note: HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome; TFP = total factor productivity.

54. **Second, most investments to mitigate climate change (low-carbon growth) and adapt to it (resilience building) will need to be made by farmers and other private agents.** But proactive government policies, planning, and investments will be required to provide information, incentives, and an enabling environment to encourage communities, households, and the private sector to change their behaviors and investment choices. Many climate-resilient investments will not be very different from productive investment choices, even not taking climate change into account. Building resilience has overall benefits in any case, but their value is amplified by the changes that will occur with global warming. Table 7

proposes adaption measures to boost agricultural resilience.

55. **Third, given the significant participation of both multi- and bilateral cooperation in the public budget, more (and effective) coordination will be required to maximize the use of external support,** particularly to the benefit of agriculture – the country’s largest contributor to GDP. Many key elements in creating an enabling environment for inclusive agricultural growth involve element that are beyond the

<sup>43</sup> For example, Ethiopia’s remarkable socio-economic transformation over the last decade has been marked by: (a) a reorientation of expenditure from recurrent to capital; (b) a significant devolution of resources from Federal Government to Regions; and (c) a clear prioritization of infrastructure spending (<https://openknowledge.worldbank.org/handle/10986/24370>).

mandate of the Ministry of Agriculture and Rural Development. Policies regarding trade, transport, the financial sector, education are all critical. The government of Guinea-Bissau should also establish a coordination mechanism with a mandate to coordinate efforts across all stakeholders and sectors (relevant ministries and agencies, donors, private sector, civil society) to deliver on the goals of achieving greater agricultural diversification and increased agricultural growth. Such coordination will help to: (a) ensure that design and implementation of all agricultural development projects align with the goals and strategies of the government of Guinea-Bissau, (b) increase efficient allocation of project resources, (c) avoid duplication, and (d) increase leverage.

**Table 7: Key Climate Change Adaptation measures, Agriculture Sector, by Ecosystem**

Ecosystems	Climate Change Adaptation Measures of Agriculture Sector
Mangrove	<ul style="list-style-type: none"> <li>• Construct micro/small dams for water retention</li> <li>• Enhance mangrove planting</li> <li>• Implement "no take" zones for mangrove management</li> </ul>
Bas-Fonds (freshwater)	<ul style="list-style-type: none"> <li>• Construct micro/small dams for small valley water management</li> <li>• Support small-scale mechanization, particularly rice farming;</li> <li>• Promote small scale irrigation systems;</li> <li>• Support the development of irrigation infrastructures in the Geba River basin</li> </ul>
Plateau	<ul style="list-style-type: none"> <li>• Popularize new seed varieties adapted to environmental stresses</li> <li>• Improve genetic material of vegetables, cashew and palm</li> <li>• Construct micro/small dams for small valley water management</li> <li>• Promote small scale irrigation systems;</li> <li>• Improve agricultural practices to both intensify and diversify production</li> <li>• Strengthen the research and dissemination of results;</li> </ul>
Backyard Farming	<ul style="list-style-type: none"> <li>• Implement programs to increase water management and storage</li> <li>• Construct micro/small dams for small valley water management</li> <li>• Improve agricultural practices to both intensify and diversify production</li> </ul>

Source: Republic of Guinea-Bissau (2018b)

56. **Lastly, with the recent implementing regulation for the Land Law, the “rules of the game” are now in place for adequate land tenure contracts and their enforcement**, both of which are important to foster private investment in agriculture (both domestic and foreign).<sup>44</sup> Yet the overall investment climate in Guinea-Bissau for agriculture (as noted in the Doing Business 2019 Report) needs improvement to spur economic transformation.

57. Agriculture is a private endeavor, yet the public sector can and should act in such a way that farmers and investors can together bring technology, innovation and transformation to Guinea-Bissau’s economy.

<sup>44</sup> Guinea-Bissau’s Land Law of 1998 recognizes customary land use rights and the role of local communities. The 1998 Law creates Private Use Right (DUP in Portuguese), acquired either: (a) for customary use as defined by local communities, with the possibility of obtaining land title registration, which could then serve as collateral for finance; or (b) by concession granted by the central government requiring a contract between the investor, local authorities and the local community. See *Doing Business in Guinea-Bissau: Improving land governance for private investment* (World Bank, 2018).

## Chapter 3: Fostering innovation to boost productivity

58. **Innovation in agriculture is a powerful pathway toward higher productivity and increased value addition.** Higher agricultural productivity is a precondition for growth and development, and higher yields can raise incomes and reduce poverty, particularly in rural areas. Understanding how innovation takes place and developing policies and institutions that promote innovation are thus central to the process of agricultural development. This Chapter examines how Guinea-Bissau can leverage innovation to boost its agricultural productivity.

### I. The potential for productivity gains is high in Guinea-Bissau

#### a. *Guinea-Bissau's natural resources offer an enormous potential to develop its agricultural sector*

59. **The country is endowed with abundant natural resources and a favorable climate for agriculture production.** The country benefits from 1.4 million hectares of arable land (about 30 percent of the country's land area), of which 200,000 hectares of lowlands, 100,000 hectares of mangroves and 1.1 million hectares of high land. Unfortunately, these potentialities are largely underexploited. The cultivated area is estimated at 400,000 hectares, with only 15 percent of the lowlands and 50 percent of mangroves areas are being exploited<sup>45</sup>. This, if developed, offers great opportunities for agricultural diversification.

60. **Water resources in Guinea-Bissau offer an important agricultural growth opportunity.** The country benefits from abundant water resources, with 45 million m<sup>3</sup> of rainwater, surface water resources estimated at 27 billion m<sup>3</sup> and groundwater resources at 14 billion m<sup>3</sup>.<sup>46</sup> Better water management, e.g., irrigation, would allow agricultural intensification, while helping to boost resilience to climate change.

#### b. *Low adoption of technologies hampers agricultural productivity*

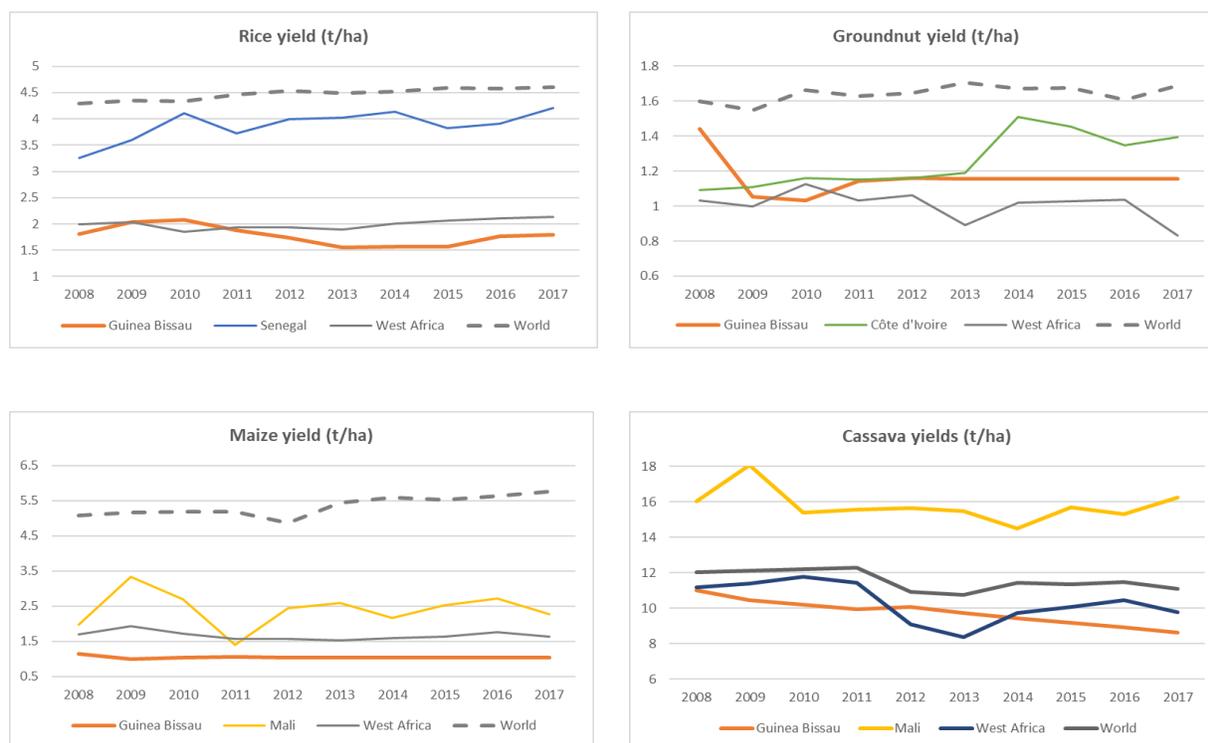
61. **Growth in agricultural production in Guinea-Bissau has largely been driven by an increase in the area under production, rather than an increase in productivity.** There has not been much change in labor productivity in agriculture. The low adoption of modern inputs, improved technologies, and other innovations hampers productivity. Poor planting techniques result in low yields per hectare. Farmers in Guinea-Bissau are trapped in a low-input, low-output equilibrium that stunts both productivity and incomes (see Box 5). Agricultural productivity remains weak, with low and stagnant yields compared to the region (cf. Figure 9).

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<sup>45</sup> IFAD (2015)

<sup>46</sup> FAO/AQUASTAT (2014)

**Figure 9: Evolution of yields in Guinea-Bissau and neighboring countries (Source: FAOStat, 2016)**



#### **Box 5: Rice systems performance in Guinea-Bissau**

There are three different rice systems in Guinea-Bissau: (i) mangrove with yields ranging from 1700 to 2600kg/ha; (ii) lowland with yields from 600 to 1200kg/ha with an average plot size of 0.25ha; and (iii) rainfed upland rice systems with yields from 400 to 600kg/ha with an average plot size of 0.8ha. The poor performance and gradual decline of the different rice systems, in terms of productivity (low yield) and quality (heterogeneous end-product in maturity and calibration) are the result of the following critical factors:

- low seed quality: the traditional varieties used are genetically degenerated, mixed with newly introduced varieties, following the widely practiced seed exchanges;
- the transplanting method of several feet per pouch is limiting tillering;
- the lack of management of soil fertility with organic and/or mineral inputs to offset the export of nutrients in a monoculture context;
- difficult weed control in the lowlands, accentuated by the ecology favorable to pasture and by the non-mechanization of weeding;
- the strong phytopathological pressure exacerbated by biotic factors and the monoculture of rice;
- the salinization of water in the mangrove rice system; and
- manual processing of paddy with inefficient techniques, resulting in losses of 15 to 25%, and the poor performance of mechanical hullers not equipped for calibration.

Source: IFAD, Projet d'appui au développement économique des régions du Sud, 2015

62. **In the case of cashew, there is potential for RCN yields gains, when compared to other producing countries where more labor and inputs are deployed (see Figure 4).** The average RCN yield in Guinea-

Bissau of 320kg/ha is achieved with relatively few inputs and traditional management practices (see Box 6). Neighboring countries like Côte d'Ivoire have been investing in fostering the adoption of good agricultural practices (e.g., pruning, thinning, weeding) and improved varieties are reaching higher RCN yields (520kg/ha currently in Côte d'Ivoire). The low level of husbandry practices of a crop developed under monoculture conditions, such as cashew in Guinea-Bissau, increases its vulnerability to pest and disease outbreaks. The absence of a functioning plant protection program and early warning system in Guinea-Bissau further exacerbate the risk that a pest or disease outbreak in the country would weigh in on the country's main production and export. Treatment for disease and insects is rare, harvesting practices leave much to be desired, and drying and storage are poorly done, leading to increased losses and decreased quality.

**63. Guinea Bissau lacks adequate delivery mechanisms to ensure the provision of good quality farm inputs such as certified seed, fertilizer, and other agricultural goods and services needed.** The low adoption of technologies and inputs also results from a lack of access to financing services, the local unavailability of such technologies and inputs on the market and their high cost.

**64. Irrigation infrastructure is very limited, leaving the country's agriculture almost entirely dependent on rainfall, despite the availability of important inland water resources.** Most agricultural production is dependent on rainfall, so it is highly vulnerable to climate change. Only eight percent of the potential irrigable land (estimated at around 281, 000 hectares) is under irrigation<sup>47</sup>. As a result, much of the agricultural land is cultivated only during the rainy season, which leaves significant production opportunities untapped for the remaining eight months of the year.

**65. Post-harvest losses are substantial and seriously affect agricultural productivity and production.** Post-harvest losses are exacerbated by the lack of adequate storage facilities, and access to processing equipment (i.e., most of the rice produced in Guinea-Bissau is transformed manually). Farmers have limited knowledge of and access to best harvest and post-harvest practices and technologies, to extend product shelf-life and reduce losses. Gains from reduced post-harvest losses could be achieved in the rice subsector by improving rice harvest through mechanization and marketing infrastructure, for example through the development of private sector-led "rice business hubs" providing improved drying, paddy storage, milling, and clean rice storage.

### *c. Current agricultural practices put pressure on natural resources*

**66. Land use change due to expansion of the agricultural frontier, often leading to human encroachment into forest areas, severely threatens the country's ecosystems and biodiversity.** The challenge for the country is to reverse long-standing land management traditions (e.g., expanding agriculture over forests, overgrazing) that are very damaging to the asset base and economically inefficient in the medium and long run. Intensifying the production process sustainably, that is, obtaining more output from the same amount of land without negative environmental impacts, will be critical for reversing the declining growth in land productivity.

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<sup>47</sup> FAO/AQUASTAT (1996)

#### **Box 6: Current cashew farming practices in Guinea-Bissau**

In Guinea-Bissau, cashew orchards are mostly wild, generally planted randomly and at less than optimal distances. Cashew trees are established by direct seeding, using random seeds and random spacing. There is little attention to the selection of seed nuts or parent plants or use of grafted seedlings. The number of cashew nurseries is low, complicating farmers' access to good quality planting material. There has been therefore no genetic improvement of planting material and productive potential. Cashew planting has mainly been realized with unselected seeds with two major downsides: (i) using seeds means that the trees mature more slowly and that there are more failures of germination and growth; and (ii) using unselected seeds to produce seedlings means that the sub-standard genome and attendant yield weaknesses currently present are perpetuated.

Investments in improved inputs or irrigation are scarce. Similarly, there is little or no tree thinning or pruning, an absence of preventive pest and disease management, and inadequate harvest and post-harvest techniques, which generate RCN losses in terms of quantity and quality.

While this low intensity approach is well suited to low income, risk adverse decision-making processes, there is clearly room for significant improvement in productivity as knowledge is shared and internal market linkages strengthen. In addition, low scale productivity at the farm gate increases aggregation costs over poor road networks. Low levels of pruning and tree maintenance reduce yield and negatively impact nut shelling outturn and quality. Furthermore, there are already some worrying signs of (localized) dying trees and experience shows that the development of a crop under monoculture conditions such as cashew in Guinea-Bissau is affected by pests and diseases that either adapt to local conditions or are inadvertently imported.

The relatively limited RCN productivity per hectare has been essentially attributed to constraints in the improvement of cashew varieties through conventional breeding, for which there is still limited understanding concerning vegetative propagation methods and other factors such as pruning and fertilization. Pests and diseases are among the factors significantly hindering cashew production. A recent study (2015) has highlighted the harmful potential of diseases affecting cashew orchards in Guinea-Bissau, allied with the lack of improvement in cashew varieties.

Source: Monteiro F., Catarino L., Batista D., Indjai B., Duarte M.C., Romeiras M., *Cashew as a high agricultural commodity in West Africa: Insights towards sustainable production in Guinea-Bissau*, Sustainability, 2017, 9, 1666

#### ***d. The state of the agricultural innovation system in Guinea-Bissau is not conducive to technology dissemination and adoption***

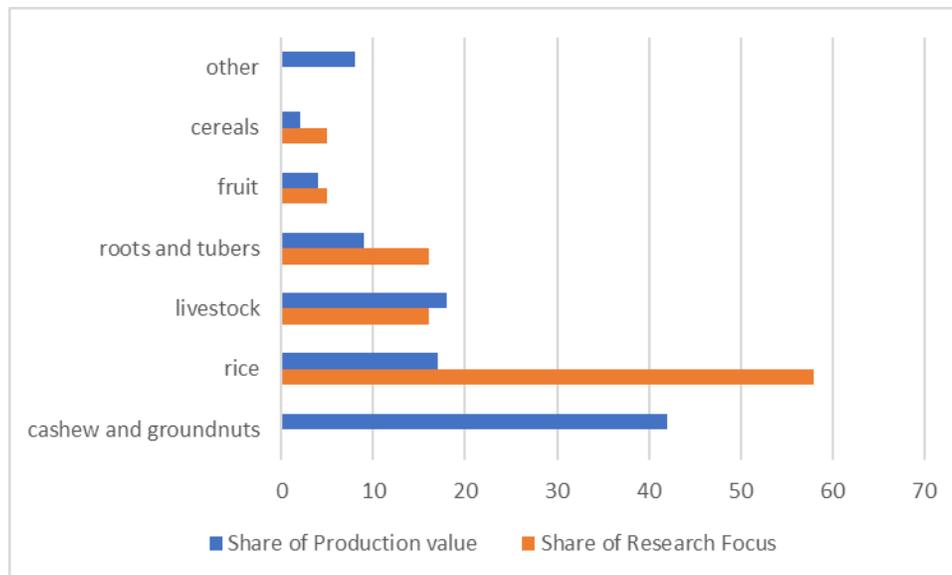
67. **The National Agricultural Research Institute (Instituto Nacional da Pesquisa Agraria – INPA) has four research centers:** (a) Center of Contuboel in Bafata, specialized in irrigated and rainfed rice production, dry cereals and pulses, (b) Center of Caboxanque, in Tombali, specialized in mangrove rice, (c) Center of Coli, in Tombali, specialized in horticulture and fruticulture and (d) Center of Bissorã, in Oio, specialized in livestock. However, these centers lack both human and financial resources. In 2011, the country had 9 Full-Time Equivalent researchers at INPA, none with more than a Bachelor of Science degree and spend just 0.02 percent of its agricultural GDP on Research and Development, by far the lowest level in Africa<sup>48</sup>. The national research system is still very weak and is not generating technologies to increase agricultural productivity, such as improved varieties. The system has little funding to implement proper

<sup>48</sup> Stads, G.J., Magne Domgho, L.V., Gomes, S (2014)

research programs and rehabilitate facilities, and it lacks human resources. What little (applied) research has taken place recently through donor-funded projects or by private sector operators.

68. **Funding for research on many priority commodities, such as cashew, is non-existent** (see Figure 10). INPA benefitted in the past from a close collaboration with the Brazilian agricultural research agency (EMBRAPA) on the cashew value-chain. Currently, INPA’s cashew research program is on hold due to a lack of resources.

**Figure 10: Congruence between agriculture R&D focus and production value, 2011**



Source: Stads, G.J., Magne Domgho, L.V., Gomes, S (2014)

69. **INPA has also been mandated by the government of Guinea-Bissau to lead the production of pre-base, base and certified first- and second-generation seeds.** Around twenty certified and trained seed producers then multiply the base seeds. INPA is currently benefitting from an FAO-supported-Africa Rice program, as well as an IFAD-supported program to increase the number of rice seed multipliers and strengthen the capacities of INPA research centers in rice seed production. A modernized system for upland rainfed rice and other dry cereals, with a package of appropriate technologies that yield close to 2.5 t/ha for rice, has also been developed and disseminated through Guinea-Bissau’s cooperation with China.

70. **There is a regional directorate from the Ministry of Agriculture and Rural Development in each region of Guinea-Bissau, in charge of providing technical advice to farmers, in particular on pest and disease management.** Nevertheless, they lack resources, both human and financial, to implement their designated activities. Budget allocations are insufficient to deliver adequate extension and advisory services to rural producers and their organizations, preventing them from taking advantage of technological progress achieved in the sector. Most of the extension services provided are made through NGOs’ or donors’ program, hence targeting a limited number of farmers. This further hampers the limited skills and knowledge of improved agricultural technologies resulting in a very slow rate of technology adoption, high post-harvest losses, and low production levels.

## II. Fostering innovation to boost productivity

### a. *Setting a conducive environment for innovation*

71. **In agriculture as in other sectors, innovation is the main driver of productivity growth.** It leads to a better allocation of resources and higher productivity, resulting in higher income. Innovation can also improve the environmental performance of the farm and help farmers deal with production and income uncertainties. Since agricultural production is a major component of Guinea-Bissau's economy, an increase in production can also directly enhance economic development prospects. Innovations in the agricultural sector can increase farmer incomes by improving the efficiency of farm operations, reducing costs, and de-risking farming considerably, through improved productivity and diversification of farming activities and optimizing the cost of applying inputs.

72. **Agricultural innovation involves a wide range of actors,** including governments, researchers, private businesses, farmers, advisors, NGOs and consumers, who guide, support, create, transfer or adopt innovation, and who advise and inform the various stakeholders about innovations. A conducive agricultural innovation system can help ensure good use of public funds, improved collaboration between public and private participants – including across national borders – and a more demand-driven system that is responsive to the needs of “innovation consumers”.

73. **Innovations can arise at any point of the agricultural value chain as the result of mediated or coordinated interactions among the different actors.** Promoting innovations in agriculture requires coordinated support to agricultural research, extension, and education, while fostering innovation partnerships and links along and beyond agricultural value chains and enabling agricultural development. The most successful experiences have occurred in agricultural subsectors where synergies between actors were created by combining market-based and knowledge-based interactions and strong links within and beyond the value chain. On the other hand, weak patterns of interaction among important actors create the most significant bottlenecks to innovation, including the ineffectual relationships between public research institutes and agribusinesses or between extension institutions and farmers<sup>49</sup>.

74. **Thus, innovation does not necessarily depend on any specific government role or action.** Nevertheless, because public policies directly influence the competitiveness of farms and agribusinesses and the functioning of value chains, the innovation system requires a comprehensive set of pro-innovation policies in agriculture, trade, science and technology, finance and education. Well-crafted and coordinated public policies may facilitate and reinforce innovation by providing incentives and structures for individuals, companies, and institutions to innovate. In the longer term, to create a functioning enabling environment for agribusiness innovation, the government of Guinea-Bissau needs to build institutional capacity, align investment priorities with wider economic strategies, and provide more financial access, particularly in rural areas. Support by the public sector of interactions, collective action, and broader public-private partnership programs can help promote innovation (see Box 7).

### b. *Fostering the development of a private sector-led input system*

75. **To boost agricultural productivity and resilience in Guinea-Bissau, it is critical to support wider access to and adoption of quality inputs and technologies.** The lack of access to productivity-enhancing innovations has hampered agricultural productivity, resulting in stagnant or even decreasing yields. Unless

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<sup>49</sup> World Bank (2009), Agribusiness and innovations systems in Africa

producers have better access to innovations to improve productivity — certified seeds of improved varieties, fertilizer and other complementary inputs, integrated pest-management practices, improved technologies, and best agricultural practices — they will not be able to increase their productivity and reduce their vulnerability to production risks.

#### **Box 7: Productive Partnerships in Papua New Guinea**

The population of Papua New Guinea (PNG) lives mostly in rural areas and largely depends on agriculture. Coffee and cocoa are the main cash crops, with half of the country's total workforce involved in their production, processing and sale. Despite its importance, the quality and productivity of these crops has been declining. The [Productive Partnerships in Agriculture Project](#) (PPAP) seeks to improve the livelihoods of smallholder cocoa and coffee producers and is supported by USD 55 m. of IDA finance, with co-financing from the IFAD (USD 36 m.), the EU (USD 6.4 m.), the Government of PNG (USD 4.5 m.) and the private sector, including smallholder growers (USD 5.8 m.).

The PPAP aims to: (a) strengthen industry coordination; (b) facilitate links between smallholder farmers and agribusiness, through productive partnerships, for easier access to markets, technologies, and services; and (c) improve critical infrastructure for market access. Coffee production is the backbone of the rural economy and accounts for 30% of the total labor force. Approximately 90% of national exports originate in the notably fragile PNG Highlands, where productivity is low, largely due to a lack of replanting, limited incentives for smallholder farmers, and poor access to markets. The cocoa industry faces similar issues, in addition to the threat of the [Cocoa Pod Borer](#), a crop disease that decimates cocoa harvests.

The PPAP supports improved quality in the coffee and cocoa industries and promotes the adoption of certified sustainability practices (e.g., organic, fair trade, Rainforest Alliance, Utz or quality certification schemes). The PPAP also funds important maintenance and upgrades to local infrastructure e.g., roads and wharfs. Partnerships are encouraged with smallholder farmers in disadvantaged areas i.e., more remote areas in the Highlands or cocoa-dependent areas affected by the Cocoa Pod Borer and partnerships which support vulnerable groups such as women. To date, more than 60,000 smallholder coffee and cocoa farmers have benefited from various activities supported under the PPAP. More than three million cocoa trees and more than seven million coffee trees have been replanted or rehabilitated across Papua New Guinea.

Source: <http://www.worldbank.org/en/results/2014/12/02/papua-new-guinea-productive-partnerships-in-agriculture-project>

**76. The input market in Guinea-Bissau is poorly developed mainly due to the risky business environment and low and fragmented demand by the farmers.** Seed production and multiplication in the country is so far limited to rice improved seeds and entirely financed through donor support. A key challenge of getting improved seeds from the research station into the hands of farmers is a chronic shortage of the foundation seeds used to produce adequate quantities of certified seeds. The limited capacity of public agencies available to produce enough foundation seed for a rapidly growing seed sector can create a crucial bottleneck in seed supply. Quality control of imported or locally produced inputs, as well as seed control and certification, is a significant problem in Guinea-Bissau. The lack of trained personnel, logistics and functional laboratories limits the control capacity of the authorities. Furthermore, those few inputs that are available in the country have a high cost to cover both the risk of not being sold and the high costs for transport and storage. This limits the possibility for farmers to adopt new technologies.

77. **Given the stagnant and even decreasing yields observed in the country, there is an urgent need to put in place an efficient and sustainable input delivery system.** It is therefore important to devise an input market strategy to encourage both the participation of the private sector in their production and distribution and their efficient use by producers. Input markets are effective when they provide farmers with timely access to appropriate inputs (i.e., at the beginning of the planting season). An efficient system also exhibits low distribution costs. This implies a local input network that responds to grouped or diffuse demands and that is competitive to limit distribution costs.

78. **Agro-dealer development is an effective strategy to foster the progressive development of a private sector-driven input and output marketing system.** Their development significantly reduces search costs faced by farmers, making much needed production inputs available in rural areas at the right time and in appropriate volumes, sizes, and affordable prices. Over the past ten years, AGRA (<https://agra.org/>) has facilitated training and certification of over 25,000 agro-dealers across 18 countries in Africa. These investments have not only enhanced the service orientation of the agro-dealers to smallholder, they have helped them to improve business relations with input suppliers. Some key lessons emerging from AGRA's investments in the agro-dealer space include<sup>50</sup>:

- Small packaging improves effective demand, especially among women farmers and very poor farm families. Selling seeds and fertilizers in small affordable packs expands the use of improved technologies and reduces the risk to farmers of experimentation;
- Demand and awareness creation through demonstrations, field days, and input exhibitions encourage agro-dealers to establish new outlets to harness business potentials in remote locations;
- Use of “hub” agro-dealers enhances service orientation and builds a strong foundation for input market development. Given the training and previous exposure of hub-agro-dealers to new technologies, they can readily provide value to smaller agro-dealers and help reduce cost of training other agro-dealers given that public resources to meet these needs are limited;
- Deployment of Information and Communication Technologies (ICT) platforms can dramatically boost strategic business partnerships between agro-dealers and other value chain actors;
- Financing for agro-dealers is critical for broadening the volumes and range of inputs agro-dealers provide to farmers. The use of credit guarantees has demonstrated the value of risk sharing with financial institutions to relax the high capital constraints faced by rural agro-dealers;
- Agro-dealers can be effective aggregators of harvested grain when linked to strong value chains, thus increasing the returns to their farmers and clients;
- Policy reforms and supporting investments that can make agricultural input production and distribution more profitable and attractive are required to induce greater investment among agro-dealers.

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<sup>50</sup> Gerstenmier A. (2015), AGRA, Agricultural Input Supply, Background Paper, prepared for Feeding Africa: an Action Plan for African Agricultural Transformation

### **Box 8: Establishing an agro-input supply chain in Liberia**

The Liberia Smallholder Agriculture Productivity Enhancement and Commercialization (SAPEC) Project -- a US\$ 54.4 million project co-financed by the Government of Liberia, African Development Bank and GAFSP -- seeks to reduce rural poverty and household food insecurity by increasing incomes for smallholder farmers and rural entrepreneurs, particularly women, young people, and the physically challenged. SAPEC promotes sustainable intensification of crop production through the adoption of productivity-enhancing technologies for rice, cassava and vegetables, including fertilizer, improved seed, and improved planting material.

During the 2016/17 cropping season, SAPEC provided a full package of agro-inputs (e.g., fertilizer, rice seed, and cassava sticks) to 43,100 farmers across Liberia. SAPEC took several steps to make this process efficient. It began by developing a national e-registration platform for farmers, agro-input dealers and financial institutions, through another program —the Liberia Agriculture Transformation Agenda (LATA) Program. Nearly 322,000 farmers across Liberia registered, providing telephone numbers, photo IDs, and their unique ID numbers to create the country's first E-platform for farmers. Once registration was complete, SAPEC could establish an agro-input supply chain and agro-dealer network involving 3 suppliers and 10 agro-dealers. The suppliers and agro-dealers were linked to smallholders' locations so that suppliers could efficiently stock agro-dealerships near those farmers. The E-platform was integrated with a mobile wallet program that delivered vouchers to eligible farmers to purchase the subsidized inputs from the agro-dealers. An impact evaluation of SAPEC remains to be done, but monitoring data indicate that some participating farmers achieved significant increases in rice yields.

Aside from lessons on structuring the input subsidy program to reach the intended beneficiaries and strengthen the private input supply network in Liberia, SAPEC offers other lessons that may be useful for similar programs to consider:

- The supply chain is only as efficient as rural infrastructure and weather will allow. Poor roads and heavy rainfall made it challenging for suppliers of inputs and services to reach farmers.
- Close collaboration with other development partners is important for programs to be effective, particularly in fragile countries such as Liberia. SAPEC benefited from collaboration with AfricaRice and the International Institute of Tropical Agriculture, which provided advisory services and capacity building.
- To overcome weaknesses in local agricultural advisory services, SAPEC recruited 76 extension workers to support participating smallholders. These extension workers will reconstitute the Liberia agricultural extension department.

Especially in fragile countries with limited resources, government counterpart funding should not be part of the critical funding path for the project; otherwise implementation could suffer. At the same time, political support and ownership at all levels, from the central government to county authorities, is critical for success.

Source: World Bank. 2019f. "Liberia: Analysis of public expenditures in agriculture".

79. **Digital solutions can aid in capturing farmers' effective demand for farm inputs and forging a service provider network, thereby reducing transactions costs across the value chain.** The Liberia Smallholder Agriculture Productivity Enhancement and Commercialization (SAPEC) Project leveraged a national e-registration platform for farmers, agro-input dealers and financial institutions to establish an agro-input supply chain and agro-dealer network now serving over 40,000 farmers (see Box 8).

#### *c. Role of extension services in fostering the adoption of innovation*

80. **In Guinea-Bissau, public extension services lack sufficient resources to provide adequate training and advice to farmers,** further limiting their knowledge and adoption of good agricultural practices and technologies. Most of the extension and training is done through donor-funded projects or NGOs, thus focusing on a limited number of beneficiaries and crops. In the case of RCN production, a

better organized approach to extending advice to farmers on production practices would not only improve yields but also the RCN quality.

81. **The potential benefits of innovations are only realized if they are effectively disseminated and implemented.** Attention should be paid to training, extension and advisory services that can facilitate the transfer and successful adoption of innovation. Extension services are critical to facilitate farmers' access to technology and knowledge and contribute to facilitate farmers' effective participation in innovation networks and ability to formulate their specific demands. Improving the extension system should entail enhancing the linkages between farmers' demands, agricultural research and advisory services, which to date have constrained the development and provision of technologies tailored to farmers' needs. Private-led extension can also be bundled with input purchases in an overall input marketing strategy to boost innovation.

82. **The provision of extension services involves a diverse set of actors: public sector, private companies, farmers' organizations and NGO.** The PRSPDA experience provides an interesting example of extension services led by NGO and Farmers' organizations with the involvement of national institutions such as INPA (see Box 9). The private sector has increasingly and effectively been involved in the provision of extension services either by private companies linking the provision of inputs to advice on their use or processing companies providing advice as part of their outgrower schemes, to ensure the quality of the product purchased. In such cases, the government can play a complementary role in identifying gaps in the provision of extension services, for examples on extension services related to climate change adaptation or mitigation and ensure the delivery of these services to farmers either directly or through contracting with private service providers.

**Box 9: Rural Extension Program in Guinea-Bissau (Private Sector Rehabilitation and Agribusiness Development Project)**

With support from the Private Sector rehabilitation and Agribusiness development Project (financed by the World Bank), three producers' organizations (KAFO, COAJQ and Associação Mers-Bodjar) are implementing extension services targeting cashew producers to improve cashew tree productivity. The first part of the program, implemented in partnership with INPA, aims at improving local cashew tree varieties, through the establishment of three cashew tree nurseries that annually produce some 75.000 seedlings and by training farmers in identifying and selecting the best RCN.

The second part of the program consists of assisting 1,000 farmers on 1 or 2 hectares each in the rehabilitation or renovation of their cashew orchards, eliminating old and infested trees and allowing greater interspacing between trees. Farmers are also trained on Good Agricultural Practices such as thinning, pruning or the use of organic fertilizer through farmer field schools, support from lead farmers and regular radio broadcasts. The Program has also started the georeferencing of the renewed orchards to facilitate on-going technical support and follow-up of the orchards.

83. **Digital technologies can be used to foster the dissemination of agricultural advice** and promote large-scale adoption of improved technologies and best agricultural practices. While rural physical infrastructure will continue to be a challenge for Guinea-Bissau in the short to medium term, cellular technology can help to bridge this gap with greater access to smart phones and other forms of connectivity. Yet significant obstacles remain, namely: (a) Mobile subscribers spend 27 percent of their monthly income on mobile telecom services (voice), which is very high by SSA standards; and (b) Guinea-Bissau has an international internet bandwidth per capita of 0.1 kb/s, well below the SSA average of 5.6 kb/s. Public investment would be needed to substantially reduce cellular service cost and boost connectivity speed, which opens the door for IoT applications that can accelerate agricultural transformation in the country.<sup>51</sup> E-extension platforms are being implemented in neighboring countries such as Côte d'Ivoire, Ghana, Niger (see Box 10). In the medium to long term, Guinea-Bissau could learn from these experiences to improve technology transfer and adoption in the country.

#### **Box 10: E-extension services**

**E-extension services can help raise farm profits and provide a cost-effective way to reach a greater number of farmers.** With e-extension, farmers tap into relevant and real-time information to resolve both on-farm problems, ranging from sustainable farming practices, climate-smart solutions, and market access. Extension agents can use a combination of digital technologies to reduce the cost and increase the frequency of interaction with farmers.

- In Bangladesh, farmer-to-farmer videos on rice seed production produced for women led to lower production costs due to reduced seeding rates, and a 15 percent increase in rice yields.
- Plantix, a mobile crop advisory application for farmers, provides a quick diagnosis of plant diseases, pests, and nutrient deficiencies based on a photograph taken by a smartphone.
- Digital Green, which works in South Asia, Latin America, and Sub-Saharan Africa, has produced and disseminated over 5,000 locally relevant videos in more than 50 languages, enabling farmers to share knowledge on agricultural production practices with one another that provides a relatively cost-effective way of helping increase adoption of improved production practices. These videos are primarily screened off-line in communities that have limited electricity and Internet connectivity.
- In Côte d'Ivoire the National Agency for Rural Development (Agence Nationale d'Appui au Développement Rural - ANADER) introduced in 2013 electronic agricultural extension (e-extension) in its overall intervention approach through the World Bank funded West Africa Agriculture Productivity Program (WAAPP). The system in operation at ANADER is based on four main instruments: (a) the voice server sending predefined messages, (b) the electronic laboratory (e-lab) to record, analyze and process data collected through the alerts or the producers, (c) the call center for specific issues and (d) the network of experts (researchers, extension workers) to provide appropriate responses to more specific requests send by producers. With this e-extension platform, ANADER has increased its capacity to reach more rural actors in real time to disseminate good agricultural practices and increase farmers' access to information.

Evaluation is ongoing as to which forms of agricultural e-extension services work best, and under what conditions. For successful results, e-extension services need to provide timely, localized, and customized information that addresses specific farming concerns in a comprehensible format and appropriate language.

Source: World Bank Group (2019b) and ANADER <http://projet.anader.ci/1webanader2017/fichiers/programme%20e-extension.pdf>

<sup>51</sup> See World Bank Group (2019c)

*d. Fostering innovations in the cashew value-chain in Guinea-Bissau*

84. **ComCashew (former African Cashew Initiative) has developed and implemented different training modules on cashew production in six African countries** (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mozambique and Sierra Leone).<sup>52</sup> It covers a range of general topics related to Good Agricultural Practices for cashew production, such as establishment techniques; planting densities; intercropping combinations; maintenance and improvement of cashew orchards; pruning plans; harvesting; post-harvest storage, handling, and quality control; pest and disease management; and soil conservation, mulching, and use of green residues; all contributing to improving productivity and farmers' resilience to climate change. Since 2009, Comcashew and its partners have trained more than 360,000 cashew farmers to increase their yields and to improve their quality. Because of successful farmer trainings, the overall cashew yields show an upward trend since the inception of the project. Today, Ghanaian farmers who apply improved planting and good agricultural practices can reach an average of 700 kg/ha<sup>53</sup>.

*e. Taking advantage of Guinea-Bissau participation in regional organizations to foster the dissemination of existing innovations*

85. **International co-operation on agricultural research and development offers universal benefits.** Countries with weak national systems and limited resources will achieve little meaningful increase in agricultural productivity and competitiveness working in isolation. While this is generally true given the public good nature of many innovations in agriculture, it is particularly the case where global challenges are being confronted (as in the case of responding to climate change) and when initial investments are exceptionally high. The benefits of international co-operation for national systems stem from the specialization it allows and from international spillovers. In countries with limited research capacity, scarce resources could then focus on transnational research to adapt to local specificities. Within regional economic units, countries can expect to reach these objectives if they effectively work together to (a) rationalize the use of scarce human and financial resources; (b) avoid wasteful duplication; and (c) create economies of scale and positive regional spillovers, while mitigating cross-border negative impacts.

86. **The Economic Community of West African States (ECOWAS) has initiated this regional approach through its common agricultural policy and its support to a regional implementing agency,** the West and Central African Council for Agricultural Research and Development (WECARD). To take full advantage of this regional cooperation, regulations and standards at the national level need to be adequate and operational, so that improved technologies that have been developed can be officially released and disseminated.

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<sup>52</sup> <http://www.africancashewinitiative.org/>

<sup>53</sup> <https://www.comcashew.org/>

87. **As a member of ECOWAS, Guinea-Bissau can benefit from its support to agricultural productivity growth, through the West and Central African Council for Agricultural Research and Development (WECARD).** For instance, Guinea-Bissau could take advantage of the stock of climate-smart technologies, innovations and good practices generated under ECOWAS countries beneficiaries of the

**Box 11: Dissemination of the System of Rice Intensification in West Africa**

The System of Rice Intensification (SRI) is an agro-ecological, climate-smart and low-input methodology for increasing rice productivity. Based on the principles of early plant establishment, reduced competition among plants, soils rich in organic matter, and reduced water use, the SRI allows rice plants to better express their genetic potential compared to conventional approaches.

The 'Improving and Scaling Up the System of Rice Intensification (SRI) in West Africa' (SRI-WAAPP) project was implemented from 2014 to 2016 as part of the West Africa Agricultural Productivity Program (WAAPP), funded by the World Bank. At the end of the program, the average SRI yield for irrigated rice was 6.6 t/ha compared to 4.23 t/ha for conventionally grown rice, a 56% increase. For rainfed lowland systems, SRI yields averaged 4.71 t/ha, compared to 2.53 t/ha for conventional rice, an 86% increase.

Source: Styger E, Traoré G. 2018. 50,000 Farmers in 13 Countries: Results from Scaling up the System of Rice Intensification in West Africa; Achievements and Regional Perspectives for SRI; SRIWAAPP Project Summary Report, 2014-2016; West Africa Agriculture Productivity Program (WAAPP).

West Africa Agricultural Productivity Program (WAAPP), funded by the World Bank, including new improved varieties of seeds (groundnut, rice, millet, sorghum, plantain banana, cassava, sweet potatoes etc.) or improved practices (see Box 11). Guinea-Bissau could also benefit from the regional institutional arrangements established under WAAPP by fostering exchange and networking with the existing National Centers of Specialization

and the Regional Research Centers of Excellence. To take full advantage of this regional cooperation, Guinea-Bissau should seek to harmonize quickly its regulations and standards relative to technology release and dissemination.

88. **On the cashew value-chain, the country could benefit from revitalizing its partnership with the Brazilian Agricultural Research Corporation (EMBRAPA) as well as other research institutes** dedicated to the cashew value-chain such as the National Center for Agronomic Research (CNRA) in Côte d'Ivoire and its National Cashew Research Program (PNRA), the Vietnam Cashew Research and Development Center (CRDC), Naliendele Agricultural Research Institute (NARI) in Tanzania, and the Indian Directorate of Cashew Research (DCR).

*f. Rebuilding the national agricultural research system in Guinea-Bissau will require long-term efforts*

89. **On a medium to longer-term perspective, Guinea-Bissau will need to invest in its agricultural research system.** Making the national agricultural research system work will require strengthening its human capacity and improving core facilities and equipment of national research centers. Given the level of degradation of the research system, much effort will be required for the rehabilitation or construction of additional infrastructure and equipment of laboratories, experimental and seed production fields, training centers and offices.

90. **A research exchange program** for visiting scientists to allow mobility of researchers, enable knowledge exchanges and facilitate networking and partnership with other agricultural research centers across the region and the world including CGIAR (IITA, AfricaRice, ILRI, IRRI, ICRISAT, etc.) could also be developed.

91. **Learning from neighboring countries like Senegal and Cote d'Ivoire<sup>54</sup>, a national research fund** could be established **as an institutional mechanism to channel and manage resources** to support sound research program addressing agricultural development priorities. This fund could provide teams of researchers with competitive small grants to undertake priority research activities responding to key constraints along the selected priority value chains. A focus could be made on agricultural research generating climate-smart technologies and innovations to improve smallholders and other value chains actors' resilience.

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<sup>54</sup> Fonds National de Recherche Agricole et Agro-Alimentaire (FNRAA) in Sénégal and Fonds Interprofessionnel pour la Recherche et le Conseil Agricole (FIRCA) in Cote d'Ivoire

## Chapter 4: Diversification in Guinea-Bissau outside of cashew

### I. Diversification to manage agricultural risk

92. **Agricultural diversification permits farmers to manage and adapt to changing social, economic and environmental conditions and other related risks.** At the farm level, productive diversification is often used as a strategy to reduce risks and uncertainty while achieving efficiency in farming (McElwee and Bosworth 2010; Iizumi and Ramankutty 2015). Farmers diversify to minimize exposure to risks, shocks, and insecurities inherent in farming due to low marginal productivity, offsetting fluctuation in market prices, or to counter liquidity constraints (Bertoni et al. 2016; Dercon 2002)<sup>55</sup>.

93. **Farming households in Sub-Saharan Africa are often exposed to significant climate-related risk**—also in this case, diversification represents a coping strategy. Due to heavy reliance on rainfed agriculture among rural farming households in Sub-Saharan Africa, their livelihoods are highly vulnerable to climate shocks and climate change (Adhikari et al. 2015). Climate change is a particularly pertinent threat that is exposing African agriculture to various forms of risks, ranging from weather variability, increased frequency and severity of droughts and floods, changes in the occurrence and range of crop and livestock pests and diseases, or greater price volatility in output, input and factor markets. The direct impact of climate risks includes a drop in agricultural production (crops and livestock), while indirect effects may entail a decreasing demand for labor and increased local prices for inputs and the product itself (Thornton and Lipper 2013). Since most smallholder households lack the means to effectively buffer against or manage climate risks, these impacts are compelling push factors for on-farm diversification as a risk management strategy (Reardon et al. 2000)<sup>56</sup>.

94. **In addition to adopting on-farm productive diversification, farmers also hedge against uncertainties stemming from the natural environment by engaging in off-farm and value addition activities.** Studies have shown that increases in long-term variation in the length of the growing period are pushing households to diversify their production to diversify household income. For example, in Zambia, an increase in long-term variation in rainfall has been found to cause households to diversify into livestock production (FAO 2016). Weather variability and climate change also provide incentives for diversification into activities that are less susceptible to disruption from climate-related shocks, such as off-farm diversification and value addition activities (Béné et al. 2012).<sup>57</sup>

95. **The cropping system currently used for cashew plantation, based on monoculture orchards with few good husbandry practices, harbors an increased vulnerability to the emergence of pests and diseases.** A 2015 study has highlighted the harmful potential of diseases affecting cashew orchards in Guinea-Bissau<sup>58</sup> particularly in the case of the monoculture production currently in use in the country.

96. **The tight international balance of supply and demand of RCN causes price volatility.** This global price fluctuation is evident in Guinea-Bissau in both Free-on-Board (FOB) price and producer price (see Figure 11). This phenomenon creates several problems for producers, processors, and exporters. Annually, producers face a high level of uncertainty that leads to harmful practices such as bartering RCN for rice (with a tremendous economic loss), selling to non-licensed traders, extended and inadequate

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<sup>55</sup> World Bank (2019), Productive Diversification of African Agriculture and its Effects on Resilience and Nutrition.

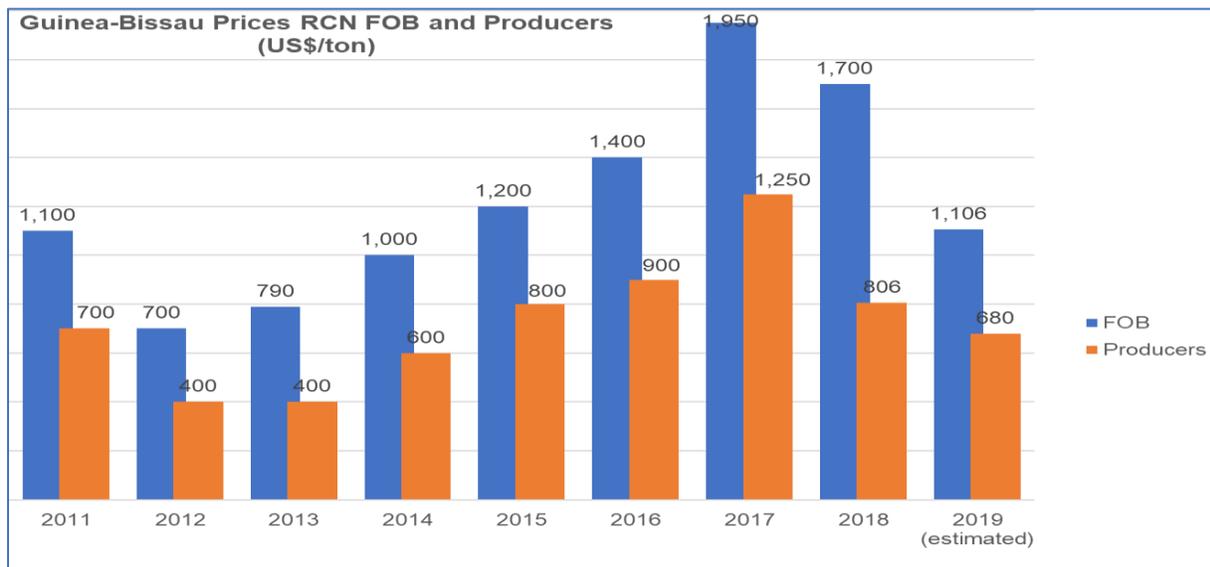
<sup>56</sup> Ibid.

<sup>57</sup> Ibid.

<sup>58</sup> <https://www.frontiersin.org/articles/10.3389/fpls.2015.00482/full>

product storage (leading to quality loss), etc. Price volatility makes it very difficult for processors to plan and forecast revenue and costs effectively, and, in consequence, invest. Exporters face the critical challenge of scarce bank financing, as some three to five years ago, established national export houses found themselves unable to liquidate their debts. This was caused by the intense volatility of prices at the time. Since then, banks have been reluctant to finance local exporters<sup>59</sup>.

**Figure 11: Guinea-Bissau RCN prices, FOB and producers (USD/ton)**



Source: Ferreira/PRSPDA & World Bank

97. **This increased vulnerability linked to the highly concentrated RCN production highlights the need to diversify agricultural production**, both at the national level and the farm level. Nevertheless, given that cashew is a perennial crop and that, particularly in the Northern part of the country, most of the land is planted in cashew trees, the diversification away from cashew will take time.

98. **Diversifying away from cashew is not a common path for farmers.** Cashew trees are well adapted to most of the soils and climate conditions of Guinea-Bissau. It is less vulnerable to inter-annual rainfall variations, requires less manpower than alternative crops and produces fruit that is easy to collect and store and doesn't require much labor or capital to generate income. At the farm level, diversifying out of cashew is a risky strategy, given the scarcity of land availability as well as the role played by cashew trees as an asset, thereby asserting your "ownership" of the land. Given also the low level of access to finance in the country<sup>60</sup>, RCN provide a yearly income and access to cash flow, at a crucial time for the beginning of the food crop campaign.

<sup>59</sup> USDA, Shelter For Life, TechnoServe (2018), SeGaBi Cashew Value Chain Study

<sup>60</sup> Over the past five years, credit to the private sector in Guinea-Bissau reached an average of 8.2 percent of GDP. More than 23 percent of bank lending is concentrated in the cashew sector and substantial collateral are required, that most farmers do not have.

**Table 8: Comparative advantage of the cashew crop in relation to other main crops in Guinea-Bissau**

Agriculture option	Days spent	Added value per day (CFA franc)	Differential advantage as compared with cashew (CFA franc)
Paddy rice	312	232	-2,478
Pluvial rice	109	177	-2,533
Maize	70	1657	-1,053
Sorghum	94	870	-1,840
Millet	114	618	-2,092
Peanuts	78	660	-2,050
Cotton	115	987	-1,723
Cashew	118	2710	0

Source : [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0103-90162015000500459&lng=en&tlng=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-90162015000500459&lng=en&tlng=en)

99. **Given the existing constraints to agricultural production in Guinea-Bissau, the fact that farm labor is allocated to cashew rather than other crops such as rice, is rational:** (a) cashew traders are a reliable source of rice supplies and demand RCN in exchange for it; (b) rice production systems are in a state of disrepair, further inputs (including seed) are often unavailable or not available when needed; and (c) marketing systems for sale of on-farm surplus rice are rudimentary at best and non-existent in many areas. These factors make it clear that allocating labor to cashew, rather than rice, is a rational response to the high cost of reestablishing rice infrastructure coupled with the relative difficulty of marketing other crops, together with the ready availability of a crop – RCN – which requires much less in terms of up-front inputs of labor and capital to establish a viable production system<sup>61</sup>.

100. **At the country level, highly concentrated, export-oriented agriculture brings significant macroeconomic risk.** Reliance on a handful of commodities (in the case of Guinea-Bissau on a single commodity-RCN) as the main means of participating in global trade can lead to major vulnerabilities by exposing an economy to price shocks. The 2018 cashew campaign exemplifies the effects of such dependency<sup>62</sup>. There are also numerous historical examples of vulnerability linked to genetic uniformity in monocultures resulting in significant economic losses<sup>63</sup>.

## II. Opportunities for diversification in Guinea- Bissau

101. **Fostering local rice production has been a political priority,** with the development of the rice sector identified as one of the key areas in Guinea-Bissau’s strategic and operational plan for 2015-2020, “*Terra Ranka*”. According to this strategy, Guinea-Bissau intends to achieve rice self-sufficiency by 2020 through the development of rice-growing in rain-fed lowlands and mangroves and the improvement of rice-growing practices. This goal of increasing local rice production has been backed by several initiatives and programs, mostly financed through donor support (see Annex 1). These interventions focus on rehabilitating rice plantations (mangroves and lowland), developing the production of improved rice seed in partnership with the National Agricultural Research Institute, disseminating good agricultural practices, and fostering their implementation among young farmers. The rice value chain has been supported mainly as a food security issue, rather than for a business purpose per-se.

102. **Given the country’s climatic conditions, geographic location, and national and international consumption trends, other opportunities for diversification have been explored and are implemented,** mostly pushed by donors. Horticulture and livestock have been promoted secondarily, mainly for self-

<sup>61</sup> Kyle, S. (2015), Rice sector policy options for Guinea-Bissau

<sup>62</sup> See Box 1, p.19

<sup>63</sup> IPES FOOD (2016), From Uniformity to diversity

consumption or trade in a nearby area, within the framework of the development of the larger rice production projects. An example of this is the PADES project supported by the International Fund for Agricultural Development (IFAD), which contains a subcomponent oriented to the development of complementary activities such as horticulture and short-cycle livestock. Through its cooperation program, the European Union has explored the country's potential for other exports crops, mainly mango and lime<sup>64</sup>. The following paragraphs analyze the documented opportunities for diversification to assess the main binding constraints for horizontal diversification in Guinea-Bissau.

#### a. Rice

103. **According to Steven Kyle (2015)<sup>65</sup>, Guinea Bissau has a strong comparative advantage in rice production.** Both lowland irrigated rice and traditional mangrove production systems have very markedly favorable Domestic Resource Cost<sup>66</sup> estimates (see Tables 9a and b).

**Table 9a: Estimated competitiveness of existing rice production systems in a normal rainfall year with 2007 rice prices (source: Spencer and Djata, 2008 by S. Kyle, 2015)**

	Mangrove Swamp - N	Mangrove Swamp - S	Irrigated - Rainfed	Irrigated – Pump	Lowland	Upland
Farm/Plot Size (ha)	2.62	4.20	0.62	0.70	0.50	1.20
Family Labor per ha (person days)	319	184	1,755	923	1,148	906
Hired Labor per ha (person days)	74	29	29	29	29	23
Paddy Yield (Kg per ha)	2,200	2,200	3,500	5,500	1,000	500
<b>Returns to Fam Lab per ha (CFA)</b>	<b>187,104</b>	<b>191,815</b>	<b>326,946</b>	<b>227,620</b>	<b>28,301</b>	<b>-1,994</b>
Private Profits (CFA/kg) (PP)	189	249	204	205	104	76
Social Profits (CFA/kg) (SP)	100	161	130	127	45	-47
Private Cost Ratio (PCR)	0.19	0.15	0.16	0.24	0.30	0.37
<b>Domestic Resource Cost (DRC)</b>	<b>0.45</b>	<b>0.33</b>	<b>0.35</b>	<b>0.43</b>	<b>0.65</b>	<b>2.40</b>
<b>Notes:</b>						
PP = (Private Revenue - Overall Costs @ market prices)						
SP = (Social Revenue - Overall Costs @ social prices)						
PCR = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ market prices						
DRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ social prices						

<sup>64</sup> Guerreiro de Brito, A., and al. (2018). Análise das Cadeias de Valor da Manga e da Lima na Guiné-Bissau

<sup>65</sup> Kyle, S. (2015), Rice Sector Policy Options in Guinea Bissau.

<sup>66</sup> Domestic Resource Cost estimates (DRCs) are generally accepted as reasonable empirical indicators of comparative advantage

**Table 9b: Estimated competitiveness of existing rice production systems in a bad rainfall year with 2007 rice prices**

	Mangrove Swamp - N	Mangrove Swamp - S	Irrigated - Rainfed	Irrigated – Pump	Lowland	Upland
Farm/Plot Size (ha)	2.62	4.20	0.62	0.70	0.50	1.20
Family Labor per ha (person days)	319	184	1,755	923	1,148	906
Hired Labor per ha (person days)	74	29	29	29	29	23
Paddy Yield (Kg per ha)	1,800	1,800	3,000	5,500	800	400
Returns to Fam Lab per ha (CFA)	127,104	143,815	266,946	227,620	4,301	-13,994
Private Profits (CFA/kg) (PP)	163	236	195	205	54	76
Social Profits (CFA/kg) (SP)	72	147	119	127	-1	-47
Private Cost Ratio (PCR)	0.22	0.16	0.17	0.24	0.46	0.37
Domestic Resource Cost (DRC)	0.53	0.36	0.37	0.43	1.01	2.40
<b>Notes:</b> PP = (Private Revenue - Overall Costs @ market prices) SP = (Social Revenue - Overall Costs @ social prices) PCR = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ market prices DRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ social prices						

104. **The country does not exploit more than 300,000 hectares to produce 110,000 tons of husked rice annually**, which represents only 40 percent of the current national food need. The remaining 60 percent corresponds to estimated imports of 150,000 tons (excluding illegal imports). Even if the local soil conditions and the availability of water resources and the different ecosystems of the country are favorable to rice production, it is still strongly dependent on random climatic conditions, due to the dilapidated state of the hydro-irrigation infrastructure<sup>67</sup>.

105. **Guinea-Bissau counts with strengths that make the development of the rice value chain attractive in the country:** (a) the rice growing practices - in particular in mangrove – is well mastered by the population, (b) there is great potential for irrigation, (c) rice is considered a strategic product by the government to achieve food security and reduce the import bill; (d) the abundance of medium-fertility alluvial soils can yield more than 1.5 MT per ha without the use of chemical fertilizers or improved seeds; and (e) the existence of a potential internal market can absorb 150,000 MT of rice annually.

<sup>67</sup> See Box 5 on page 40 on rice production systems

106. **Guinea-Bissau is a country with an open economy, part of the Economic Community of West African States (ECOWAS).** Since January 2015, this trading union has applied a Common External Tariff that, in the case of milled rice is 10 percent.<sup>68</sup>

107. **The paddy rice yield in Guinea-Bissau rises to an average of 1.8 MT per ha,** minimal compared, for example, with 5.3 MT in Mauritania, 4.2 MT in Senegal and 3.6 MT in Mali<sup>69</sup>.

108. **Several factors explain this poor performance and undermine the competitiveness of the Guinea Bissau rice sector:**

- *Poor quality of inputs available in the country, especially low seed quality*<sup>70</sup>. The traditional varieties used are genetically degenerate, mixed with each other and with new introduced varieties, following the widely practiced seed exchange;
- *Inefficient agricultural management and lack of skilled labor.* Some examples of this are: the method of transplanting to several feet per pouch, limiting tilling; the lack of rational management of soil fertility by organic and mineral inputs to offset the export of nutrients in a monoculture context; and the strong phyto-pathological pressure exacerbated by biotic factors and the monoculture of rice.
- *Low level of mechanization.* Manual processing of paddy (threshing and hulling) by inefficient techniques resulting in losses of 15 to 25%<sup>71</sup>, and the poor performance of mechanical hullers not equipped for calibration.
- *The increasingly perceptible impact of climate change:* rising sea levels threaten mangrove rice fields, some of which have disappeared (in the islands). Rainfall variations cause either water deficits that are detrimental to the control of salinity (on mangrove), or floods inundating plants and bunds (on lowlands).
- *Lack or poor status of infrastructure* such as hydraulic systems, store capacity and rural roads.
- *The lack of well-structured farmer organizations* and as a consequence, a poor level of coordination among different actors of the value chain.
- *Scarce funding,* specifically, insufficient credit service adapted to the requirements of agricultural production.

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<sup>68</sup> Fiamohe, R. and al. (2015). Impact of the ECOWAS Common External Tariff on the Rice Sector in West Africa

<sup>69</sup> FAOSTAT, Rice paddy yield by country in the year 2017.

<sup>70</sup> See Chapter 3: Fostering innovation to boost productivity on the state of rice seed production in the country

<sup>71</sup> FIDA (2015), Projet d'appui au développement économique des régions du Sud (PADES).

## *b. Other value chains*

### **Mango**

109. **The mango value chain in Guinea-Bissau refers to the primary production of different mango varieties**, most importantly, the "Kent" variety. All production is commercialized fresh, usually by women (*bideras*), who manage the harvest and transport, in passenger vehicles, to local markets and to Bissau, the main market of the country. According to Guerreiro de Brito et al (2018), the country's net mango production was 9,000 MT per year for 2017. Thus, mango production reaches 6,923 kg per ha (considering a production area of 1,300 ha)<sup>72</sup>. There are three types of mango producers according to size: large producer (about 43% of total production), medium producer (30%) and small producer (27%)<sup>73</sup>. There are also four types of intermediaries: local retailers, semi-wholesalers for the Bissau market, retailers in Bissau and exporters, all of them intermediates organized in an informal model. The largest fraction of mango production is traded in local markets and in Bissau (63%), with a share of self-consumption (22%) and export (14%). The two most important regions, in terms of production, are Oio (50%) and Cacheu (20%).

110. **Fresh mango (fruit) is the only product associated with the mango value chain in Guinea-Bissau.** There is no processing of this product. While there are some experiences of transformation of fresh fruit into juice, jams or liquor, implemented by nongovernmental organizations, all of them are residual in the national context. Some larger producers mention the possibility of production of dried mango (dehydrated) in view of the internal market. This last form of transformation (dry mango) is practiced in some regions of the country although only for domestic consumption.

111. **The value chain of the mango is relatively linear**, from the nurseries and the plantation for production to the commercialization of the fresh fruit. The absence of drying structures prevents, for example, the processing of mangoes for export, such as the absence of storage and cold rooms, so in consequence, there is no accumulation of mango stocks.

112. **In general, mango is not sold on the formal market** (subject to tax and sanitary inspection) but on the informal market, which does not have such requirements. In addition to local trade, mango production is destined for own consumption. A fraction of mango production is exported to Senegal, to the commercial warehouses in the city of Ziguinchor and, occasionally and informally, to Guinea-Conakry. There is also a residual importation of mango juice from bordering countries, for the supply of supermarkets.

113. **The Kent variety, which is the main variety of mango fruit in Guinea-Bissau, has relatively low losses by attack of the common fruit fly** (around 25% during 2017). Losses of the Keitt variety, the second most produced species of mango, are high and are generally between 70% and 90% but may in practice reach the total production (as it was the case in 2017). For this reason, it has been abandoned by fruit growers.

114. **At the international level, the main business segments can be identified in the fresh mango value chain.** The first and most important segment in terms of volume, is composed by consumers with average purchasing power and who buy the imported by sea product. These consumers look for quality food products, but price is the preponderant factor in the purchase decision. The distribution channels

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<sup>72</sup> Guerreiro de Brito, A., and al. (2018). Análise das Cadeias de Valor da Manga e da Lima na Guiné-Bissau

<sup>73</sup> Large (more than 100 Ha of production), Medium (between 10 and 100 Ha) and Small (less than 10 Ha).

used by this segment include supermarkets / hypermarkets and neighborhood stores (see Box 12 for the case of Haiti).

115. **The second segment is more demanding** in terms of flavor and has as a main characteristic that the mango has matured in the field and its harvest only occurs when its organoleptic characteristics reach the optimum. This mango is transported by plane, the price of the product can reach a variable valuation according to the season of an additional 80 to 200 percent with respect to the price of the mango imported by sea. The distribution channels used by this segment are hypermarkets and gourmet fruit shops. This is a segment with a growing demand, and it should be noted that between 2000 -2010, Guinea-Bissau exported mango by plane to Portugal<sup>74</sup>.

### **Box 12: Mango's export value chain improvement in Haiti**

Haiti has been exporting mangoes to the United States for decades, sold for around US\$2 each in US supermarkets, of which farmers only get about two to five US cents.

Mango and avocado cultivation and marketing offer important employment opportunities to those in the poorest parts of Haiti. These products amount to almost 40 percent of the producers in this part of the country's income.

In Haiti, the first steps have been taken towards exporting mangoes and avocados, with the transformation of the transport system, as well as getting better prices for small-scale farmers, through a World-Bank financed project. In 2017 and 2018, a study was undertaken on the mango and avocado value chains, to improve the position of small-scale farmers and to strengthen relations between parties in the value chain, including the consumer.

The Wageningen Centre for Development Innovation has advised those in this sector to record information in every step of the chain, including time, temperatures, and costs. This data can be used through blockchain or other chain data applications. Parties in the chain were also brought together to learn together. An analysis of the mango value chain showed that, with a few relatively simple techniques, major strides could be made in the logistical operation of this fruit's value chain. For example, by encouraging farmers to pick mangoes at the correct time, many more mangoes can reach the market. These fruits must be harvested so that they ripen only after they have been transported.

A second important step is to digitize and make the value chain more transparent. As a test, several boxes of mangos and avocados, destined for the export market, were given a QR code. This was done right after the fruits were harvested. Whoever scanned this code with a mobile phone was directed to a webpage, providing information about the specific grower, harvesting location, and transportation temperature. The revenue distribution among the players in the chain is also displayed. Farmers can also follow the boxes from when they leave the farm. After this first pilot experience, a large fruit trader is going to use this experience for large-scale shipments for a year in 2019. A hundred mango farmers and 100 avocado farmers will be involved. In a follow-up project, farmers will receive training so as to meet these technical demands.

Source: Freshplaza. 2018

<sup>74</sup> Export made by the company Agribissau, now owned by the company Fruta e Legumes. Source: Guerreiro de Brito, A., and al. (2018). Análise das Cadeias de Valor da Manga e da Lima na Guiné-Bissau

116. **The third segment of the fresh mango market is the organic segment, which is also clearly expanding.** The main distribution channels used by this segment are the super / hypermarkets and the gourmet fruit stores. In producing countries, there are several small organizations that export the product by conventional means, with food certification of origin (e.g. Global G.A.P), but also in fair trade schemes. In the European Union, the size of the organic food market varies between 2 and 5 percent. In the case of mango, it is estimated that the European Union imports about five containers per week, corresponding to 5,000 tons per year and approximately 2.5 percent of total mango exports (Araújo, 2012). Biological or organic mangoes may be priced 15-25 percent higher on the market (cited in Galán Saúco, 2009<sup>75</sup>).

## Lime

117. **The lime value chain includes the production of fresh lime and lime vinegar,** a product derived from the processing of the lime, manually or semi-industrially squeezed by the producers. The most widely used variety in the country is the "Tahiti". Production in 2017 was estimated at 6.1 thousand tons (losses of 10 percent). There are three types of producers: large producer (56 percent of production), medium producer (38 percent) and small producer (7 percent)<sup>76</sup>. Total lime production area is estimated at about 900 hectares, with an average production of 7.5 tons per hectare. The two most important regions, in terms of production, are Cacheu (30 percent) and Tombali (28 percent). The freshly sold production account for the 33 percent of total production (for own consumption - 2 percent, export - 19 percent, and commercialized in local markets - 12 percent). The most significant part (67 percent) is processed into lime vinegar. The production of lime vinegar was estimated at 1,627 thousand liters in 2017, of which 90 percent is sold in the local market and in Bissau, with only 7 percent for own consumption and 3 percent for export.

118. **The farmers' strategy is to market a fresh portion of their production,** usually small given the excess supply to the market absorbing capacity at an attractive price, with the remaining part to be processed for vinegar before it deteriorates. This lime vinegar is a locally demanded product and is also promising in the subregional market<sup>77</sup>.

119. **The income from lime production is mostly used by vulnerable communities to address their food security.** The production of lime vinegar does not require any technological sophistication and can be stored for a significant period (maximum two years), constituting a source of income available for situations of greatest need. Women dominate the entire lime value chain. Lime vinegar is one of the few products produced and sold by women at the roadside markets or in the villages (*tabancas*). The areas under lime cultivation have recently shown some dynamism and expansion, some even replacing mango orchards. A significant proportion of lime producers (small producers) have shown interest in intensifying their production<sup>78</sup>.

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<sup>75</sup> Saúco V.G. (2009). El cultivo del mango. Instituto Canario de Investigaciones Agrarias. Ediciones Mundi-Prensa, Madrid.

<sup>76</sup> Large (more than 100 Ha of production), Medium (between 10 and 100 Ha) and Small (less than 10 Ha).

<sup>77</sup> Guerreiro de Brito, A., and al. (2018). Análise das Cadeias de Valor da Manga e da Lima na Guiné-Bissau

<sup>78</sup> Ibid

## Horticulture

120. **Guinea-Bissau's natural conditions are favorable to the production of different horticultural products** such as tomatoes, onions, potatoes, etc. Nevertheless, there are no statistics regarding the production volume since so far, it is mostly destined to self-consumption or trade in a nearby areas.

121. **The constraints in accessing markets, and transforming and conserving their products, each year lead to the rotting and waste of tons of produce**, particularly fruit and horticultural produce<sup>79</sup>. Due to geographical isolation, many households aim for agricultural self-sufficiency. Due to the lack of electricity in most of *tabancas*, transformation and conservation of produce is scarce.

## Livestock

122. **Livestock ownership is relatively high in Guinea-Bissau**, with 29 percent of households owning large livestock (i.e. cattle) and 58 percent owning medium and small livestock (i.e. chickens and goats)<sup>80</sup> with no evidence of the existence of large specialized farms. The most recent national livestock census in Guinea-Bissau (2009) indicated 1.12 million cattle, 0.3 million sheep and 0.65 million goats. This livestock was concentrated in the North and East of the country, particularly in Gabù, Bafatà and Oio regions, which are home to 86 percent of the livestock. Small ruminants (sheep and goats) follow roughly the same distribution as cattle. The 2009 census also showed that livestock and poultry accounted for 2.6 percent of total household income in the country<sup>81</sup>.

123. **Livestock products account for about 17 percent of national GDP and 32 percent of agricultural GDP**. Mostly women oversee the breeding of short-cycle animals (poultry, goats, sheep, pigs, etc.). Small units for the semi-industrial production of eggs and broilers have been developed only in Bissau<sup>82</sup>.

124. **The livestock subsector is extremely undeveloped in terms of total production, marginal productivity and processing capacity**. The livestock sector faces several constraints, such as the poor genetic quality of the breeds, animal diseases, and feeding conditions, as well as the lack of basic

### Box 13: Enhancing livestock drought resilience Project in Guinea-Bissau

This USD 9.2 million proposed project under the Green Climate Fund seeks to: (a) Restructure the transhumance practice and strengthen the technical and organizational capacities and define the pastoral routes and transhumance corridors, along which will be installed hydraulic infrastructure (water reservoirs and human-powered drilling); (b) Stabilize families of pastoralists, particularly young people, through grazing development and the installation of local hydraulic infrastructures, in particular: (a) human-powered boreholes; (b) reservoirs dual purpose livestock farming; (c) Share knowledge and disseminate lessons learned.

The project would promote livestock breeding resilient to the adverse effects of climate change. It can promote a change in livestock practices that has negative impacts on the environment. It will encourage the adoption of livestock farming practices that are not only resilient, but also allow sustainable management of natural resources and reduce conflicts between farmers and pastoralists. The project is expected to reach 1,000 livestock households, develop some 5,000 ha of pasture, and equip some 50,000 people with adaptive strategies to reduce exposure to climate change risks.

Source: Green Climate Fund (2018)

<sup>79</sup> World Bank (2007), Conflict, Livelihoods, and Poverty in Guinea-Bissau

<sup>80</sup> FAO's statistics accounts for an estimated stock of roughly 720,000 heads of cattle; 800,000 goats; 460,000 pigs; and 500,000 sheep in 2017.

<sup>81</sup> World Bank (2015). Profiling Poverty and Economic Opportunities in Guinea-Bissau

<sup>82</sup> IDA-IMF (2011) Staff Advisory Note on the second poverty reduction strategy paper.

processing facilities, including for milk and meat. In the case of cattle, the same breeds are used to produce milk and meat, yielding on average about ½ to 1 liter of milk per day, per cow, and a 48 percent carcass yield, with animals taking up to five years to reach a live weight of 200 kg. In terms of processing facilities, Bissau has one slaughterhouse, which only slaughters between 20-30 head of cattle per day (around 100 during festival periods) and does not meet minimum sanitary conditions. Some 60 percent of the animals slaughtered come from neighboring Guinea-Conakry, not from Guinea-Bissau itself, and the country imports meat, milk, and other dairy products<sup>83</sup>.

125. **The constant decline in vegetation cover and land degradation due to extreme climatic effects such as drought put increasing pressure on renewable natural resources and pastures.** Transhumance has become an unavoidable response to feed and water livestock during the dry season, which tends to become longer. Despite the intensification of transhumance with climatic disturbances, and the social problems that accompany it, Guinea Bissau has not yet organized the livestock sector to preserve livestock, agricultural production and forest resources, as evidenced by: (a) the absence of demarcated zones reserved for cattle routes; (b) lack of empowerment of pastoralists in pasture management, through formal structures; (c) the frequency of late wild bush fires with flora and fauna, caused by pastoralists to renew pasture; (d) the absence of consultation and conflict prevention frameworks bringing together the different categories of actors at the local level. A 2018 proposed project to the Green Climate Fund seeks to address these problems (Box 13).

126. **The Third National Communication to the United Nations Framework Convention on Climate Change indicates that the Energy sector contributed 63 percent of the total national GHG Emissions (10,893Gg CO<sub>2</sub> eq) followed by the Agriculture and Livestock sector which emitted 36 percent of the total.** The Land-Use, Land-Use Change and Forestry (LULUCF) – strongly associated with pastoral livestock – was the highest single sector acting as a net sink of -10,718 Gg for the year 2010. The projections for Agriculture and Livestock (along with Industry) resemble exponential variations entailing that the level of total GHG emissions in Guinea-Bissau without mitigation measures will more than triple by 2030 from the level of emissions in 2010, reaching a staggering 157,604 Gg CO<sub>2</sub> eq by 2050. Over time, a long-term strategy of breed improvement can improve feed conversion efficiency and, in parallel, reduce GHG emissions. In the immediate to short term, extension outreach to farmers directed at feed optimization (similar to the Ration Balancing Program under the World Bank-financed India National Dairy Support Project), could boost per-animal productivity through daily milk yield and lactation length, while reducing overall methane emission due to bovine rumination (Box 14).

**Box 14: Cattle feed optimization**

The Ration Balancing Program (RBP) works with farmers through organized Milk Unions and Dairy Producer Companies to adjust animal feed and nutrition for optimal dairy productivity. To date, RBP in India has covered 2.8 million cows across 33,000 villages, deploying 30,600 Local Resource Persons to advocate the program. As a result of RBP, farmers are realizing up to USD 115 in additional annual net income. On average, RBP has reduced dairy production cost by 10-12% and GHG emissions by 14%, with overall animal health improvement and reduced inter-calving periods.

Source: [www.nddb.org](http://www.nddb.org)

<sup>83</sup> World Bank (2015) Guinea-Bissau Country Economic Memorandum.

### III. Necessary conditions to foster diversification

127. **To tap into these opportunities, the country will have to set in place an enabling environment to foster farming systems diversification.** Farmers' decisions to diversify or specialize do not only rest on their understanding of the resulting impacts but are also influenced by the specific context in which the consideration is made (see Box 15). These conditions generate drivers of production decisions at the farm-level towards either diversification or specialization and can be influenced by policy decisions<sup>84</sup>. Considering the current situation in Guinea-Bissau, the level of intervention needed to promote diversification via the development of the specific value chains described previously present significant challenges. The following points will be key in unlocking the country's potential for diversification, though further interventions will also be needed on the medium to long-term.

128. **Access to inputs**, mainly to a diversified range of good quality seeds and fertilizers at the right time of the year will be crucial to drive farmers' decision to diversify their production. The development of local private suppliers is key to ensure this access to inputs in the long term<sup>85</sup>.

129. **Access to knowledge.** The skills and knowledge of the rural workforce largely determine their ability to engage in the production of certain type of products oriented to demanding markets. The provision of training and more broadly of agricultural extension services is of importance to allow Guinea-Bissau's farmers to shift in their production

#### Box 15: Farm-level drivers of specialization and diversification

Farmers' decisions to diversify or specialize do not only rest on their understanding of the resulting impacts but also are influenced by the specific context in which the consideration is made. Farmers are constrained by the realities of the environment around them, by the (oft-changing) public policies and market infrastructure, and by factors specific to the organization of society and economy in which they live and operate. These drivers are of particular importance to policy-makers since they can be influenced or prepared for by policy decisions and the set-up of institutions:

- *Environmental drivers:* Farmers pursue on-farm and off-farm diversification to adapt to or reduce risks arising from climatic or biophysical factors.
- *Policy and markets drivers:* policy measures and public expenditure can stimulate both specialization and diversification, but in SSA they have largely supported the former. Policy measures aimed at promoting national food security, productivity enhancement and commercialization, as well as regulatory measures that condition market access, are key institutional drivers of agricultural specialization. In SSA, the most common market interventions are food reserve purchases and agricultural input support program which incentivize the production of a few staple crops. Trade restrictions often lead to similar effects. Alternative approaches have also been tested. For example, the introduction of vouchers valid for purchases of inputs for a larger selection of crops and livestock products can support diverse production systems. Similarly, other regulatory measures, most prominently the removal of market-entry barriers, have also led to diversification. Beyond market intervention, public expenditure on infrastructure and on the provision of services can be an important driver of specialization or diversification.
- *Socio-economic and institutional drivers:* the importance of rules, factor endowments, power distribution and education.

Source: World Bank (2019), Productive Diversification of African Agriculture and its Effect on Resilience and Nutrition

<sup>84</sup> World Bank (2019e)

<sup>85</sup> See Chapter 3

methods and adopt new crops and practices, such as intercropping.

130. **Access to markets.** Well-functioning markets can support diversification, as farmers can respond to demand for a diverse range for agricultural products. Good infrastructure to transport products from farms to the conditioning and processing units are necessary for the success of the business, especially because the transport duration and conditions can severely affect the quality of the products. In Guinea-Bissau, due to the poor infrastructures and risky environment for the development of a vibrant private sector, farmers are dependent on the market infrastructure of the cashew value-chain. Strengthening the connectivity between rural and urban areas through transport connections, increased access to services and Information and Communication Technologies (ICT) can be an important driver of diversification. Increased connectivity with neighboring countries would also allow Guinean farmers to take advantage of the growing demand in the West Africa region. On a longer-term perspective, investment in export infrastructures and facilitated export procedures, in particular for fresh agricultural products such as horticultural products and fruits, and in a quality and standards monitoring system would allow Guinea-Bissau to take advantage of its proximity with European markets.

#### IV. What lessons learned can be applied to Guinea-Bissau?

##### a. *Intercropping*

131. **In most of Guinea-Bissau's regions, the high concentration in cashew, combined with an environment that traps farmers in RCN production, makes diversification out of cashew difficult** in the short to medium term. The replacement of the cashew root stock – that given Guinea-Bissau's aging cashew trees is becoming more urgent – provides a good opportunity to foster diversification through intercropping. Intercropping can diversify farmers' income and increase their resilience to climatic and market shocks while keeping the advantages the cashew tree offers as an asset (providing cash and securing land tenure). Intercropping will: (a) increase the agrobiodiversity of the land, diminishing the risks of pest and diseases outbreaks and increasing the resilience of farmers to climatic and market shocks, and (b) increase land productivity.

132. **Intercropping in cashew orchards involving compatible crops with varying morphological and rooting habits will enable better resource use and more returns.** Evidence shows that there are a wide range of suitable intercrops for cashew, from annual food crops (e.g., rice, maize, groundnuts) to horticultural crops (e.g., pineapple, banana, pepper) or other fruit trees (e.g., citrus). Studies conducted in Nigeria to assess weed incidence and biomass in various cashew plantations showed that intercropping reduces weed biomass by 50 percent compared to monoculture of cashew. Intercropping also reduces by 50 percent the weeding period, and thus, labor requirement and costs production compared to monoculture of cashew<sup>86</sup>. Appropriate intercropping of cashew would thus increase efficiency and reduce production cost (see Annex 2).

133. **Several experiences of intercropping within cashew plantations,** at different phases of the development of the cashew tree, have taken place around the world. They show that intercropping does not generally affect negatively cashew tree growth performance, on the contrary. A study conducted in Ghana on the effects of cashew intercropping indicates that intercropping cashew with food crops during the establishment phase (first three years) generally improved cashew seedling growth and did not

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<sup>86</sup> D. Kalaivanan and P.L. Saroj (2017), Weed Management in Cashew, in Cashew: Improvement, Production and Processing

adversely affect early RCN yield<sup>87</sup>. Additional economic analysis in Ghana further confirms the profitability of cashew intercropping with maize and yam during the establishment phase. Cashew tree growth performance noted in these studies on intercropping systems may be due to the tillage and other husbandry practices such as weed control and fertilizer application, that would not have been done in cashew monoculture.

**134. To foster the development of intercropping, Guinea-Bissau can build on existing research to strengthen farmers' skills and knowledge.** Guinean farmers have some knowledge of intercropping in cashew plantations as they used it mainly for rice cultivation in the first years of the plantation. There is also good knowledge and existing research on such crop associations in other countries, including in West African countries, that Guinea-Bissau could build on to disseminate and enhance farmers' knowledge on the various possibilities of cashew intercropping.

**135. Using a simulation model, estimates are obtained to show the benefit of investing in rice and mango production, along with cashew in Guinea-Bissau,** by comparing with- and without-intervention scenarios<sup>88</sup>. The baseline for the model is a typical farm size of three ha fully dedicated to RCN production. In the intensification/diversification scenario for the model, two projections are made: (a) investment in better management practices, improved irrigation and better seed varieties to intensify cashew production and increase RCN yield; and (b) the expected earnings from intercropping on a portion of the existing cashew orchard made available through intensification (i.e., 20 percent of the farm for rice and 1 percent for mango)<sup>89</sup>. For the baseline scenario, the cost side only reflects cashew production, whereas in the diversification/intensification scenario, 79 percent of the farm area is allocated to RCN production, 20 percent to rice production and the remaining 1 percent to mango production (see Figure 12).

**136.** RCN yield is assumed to increase due to investments in better management practices, improved seed varieties and improved irrigation. Additionally, intercropping can generate incremental benefits beyond RCN production, among these reduced weed biomass and weeding period when compared to monocropping<sup>90</sup>. Incremental costs are associated with rice and mango production on land formerly dedicated to RCN production. The models are calculated at the farm level and then aggregated to the whole economy.

**137.** In the baseline model, the economy-wide return from RCN is projected to be USD 146 million, which compares favorably with the approximate 2018 producer revenue from the 180,000 MT of RCN produced. For the diversification scenario, the cost of production for cashew (3 Ha) was static, albeit on reduced land area (2.37 Ha), as it was assumed that there would be increased RCN yield due to the interventions. Figure 12 shows the potential for increased returns under the diversification scenario in Year 1 following the interventions.

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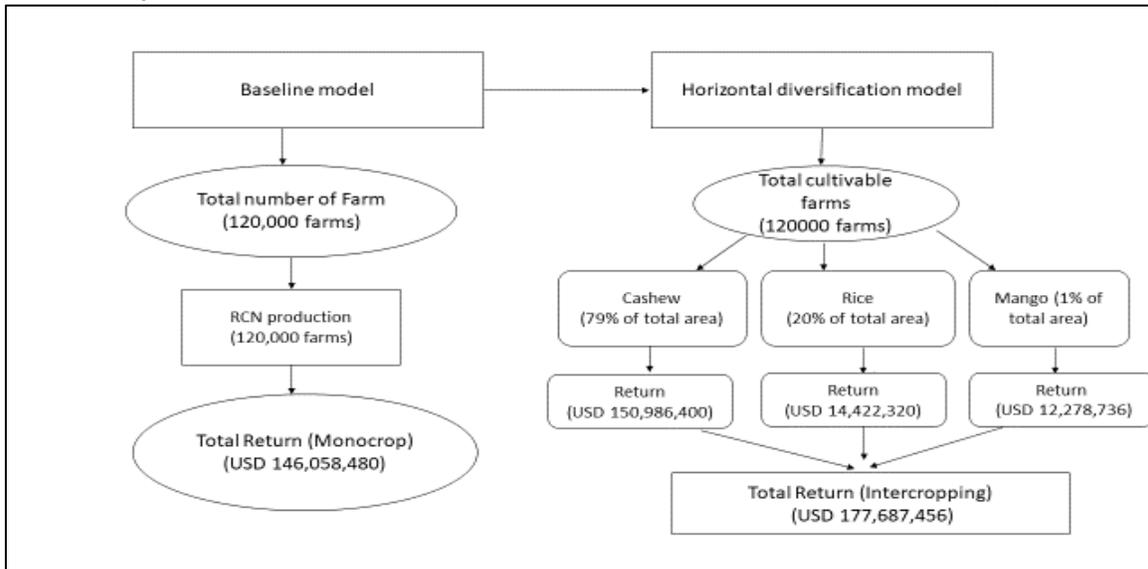
<sup>87</sup> K. Opoku-Ameyaw, F.K. Opong, F.M. Amoah, S. Osei-Akoto, E. Swatson (2012). Growth and early yield of cashew intercropped with food crops in northern Ghana.

<sup>88</sup> See Annex 4 for detailed analysis.

<sup>89</sup> Due to scarce available data from Guinea-Bissau, rice and mango production costs are computed from data sourced from Nigeria and Ghana.

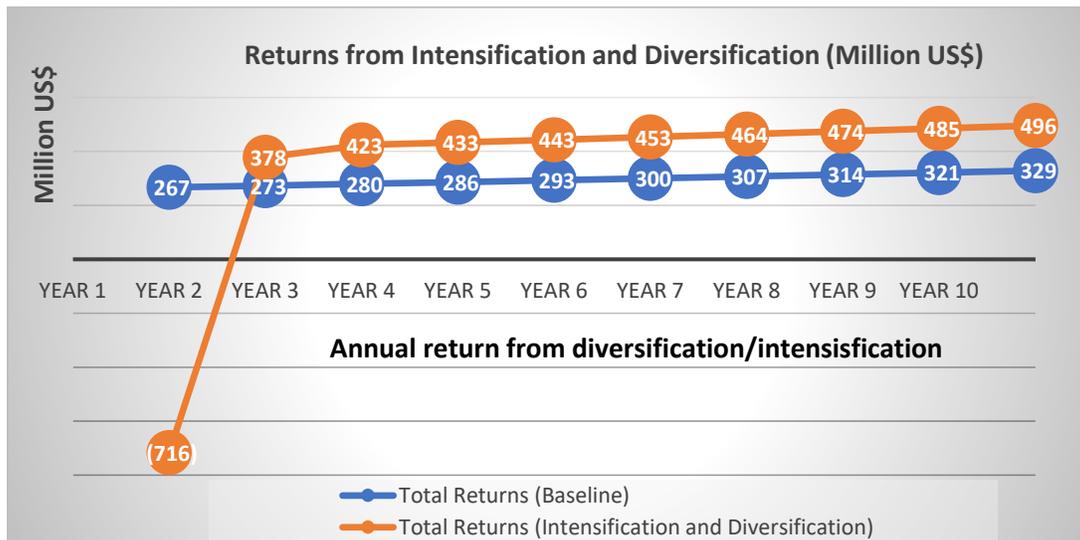
<sup>90</sup> D. Kalaivanan and P.L. Saroj (2017)

**Figure 12: Comparison between the baseline model and Diversification Model (Year 1)**



138. Figure 13 illustrates the diversification results over a 10-year horizon. Some initial costs are required for both mango and rice production. For mango production, upfront seedling cost of USD 1,000 per farm is incurred during the first year of cultivation and there is a three-year waiting period for mango trees to reach maturity for the initial harvest. As such, to diversify into mango, farmers forgo earnings from RCN production, due to the expected future returns from mango production. However, once the mango trees reach the harvesting period, the total return from mango cultivation is significantly high.

**Figure 13: Returns from Intensification and diversification, 10-year horizon**



139. The projection indicates a rise in return starting in Year three due to revenue from intercropping. In addition to these fixed costs, investment is also required for better management practices, improved seed varieties and irrigation technologies. Table 10 shows significant and robust returns for horizontal diversification. The sensitivity analysis indicates that despite price, cost or yield variations, returns are significantly high.

**Table 10: NPV and IRR from horizontal diversification**

Scenario	Base Case	10% producer price reduction	10% production cost increase	10% yield reduction
NPV (USD m.)	5,991	5,078	5,789	5,135
IRR (%)	57	49	55	49

***b. Other value-chains***

140. **Investment will be needed in the longer term to foster the development of other value-chains, in particular in the rehabilitation and development of irrigation infrastructure would be required**, for rice and/or horticulture. It is important to consider also the need for developing sustainable management schemes of such infrastructures, involving the users (e.g. water user associations) taking into account the expenditure for maintenance over time.

141. **Specifically, for the rice value chain, there are two major type of recommendations:** at farm-level and off-farm level. At farm level, the rice sector would benefit from the introduction of improved varieties adapted to local conditions and from improved crop management (the Africa Rice Center appears to be the most obvious point of contact for this considering that the country doesn't count with significant research capacity). Improving on-farm infrastructure (dikes for mangrove rice and irrigation, drainage channels and anti-erosion banks for lowland rice<sup>91</sup>), with their respective management and maintenance, is a key necessity for the reestablishment of the domestic rice production capacity. At off-farm level, establishing a functioning marketing system is a priority for rice to reach markets to decrease the rice/cashew bartering system that functions in rural areas. Post-harvest losses could be reduced through the development of private sector-led "rice business hubs", offering improved drying, paddy storage, milling and clean rice storage.

142. **For the lime and mango value chains**, given their export-orientation, the main recommendations are related to fulfilling the minimum requirements that foreign markets are demanding, such as phytosanitary requirements and production of different varieties. In this sense, trainings should focus on combating the fruit fly and managing the different varieties according to commercial opportunities. Improving phytosanitary efficacy and control in orchards by promoting large-scale use of good practices, reducing the environmental impacts of the trapping system used currently for fruit fly control<sup>92</sup>, and improving the ripening process, are a must for international markets (especially the most sophisticated ones) and will imply important up-front investments. It is thus recommended for Guinea-Bissau to follow the approach of the Avocado and Mangoes development project in Haiti (see Box 12) which is creating momentum via the development of small pilots with support from international companies and institutions (with a social development perspective).

143. **In the case of livestock**, it is necessary to improve and increase animal production through measures such as research and dissemination of improved breeds that are more productive and better adapted to the local environment and to improve animal health, particularly through the promotion of veterinary services.

<sup>91</sup> World Bank (2015) Guinea-Bissau Country Economic Memorandum.

<sup>92</sup> In particular, replacing the Malatrap product with other equally effective but less damaging to the ecosystem (e.g. Spinosad or Azadiracht) as indicated in International Resources Group - IRG / USAID Senegal (2010). USAID-Wula Nafaa & Projet Croissance Economique: Pesticide Evaluation Report & Safe Use Action Plans (PERSUAP). USAID, Washington D.C.

## Chapter 5: Climbing up the cashew value chain

### I. In the most important sector for its economy, Guinea-Bissau is capturing only a small portion of the value generated in the global cashew value chain

144. **As indicated in Chapter 1, RCN production is the main source of income for more than two-thirds of households** and account for some USD 150 million in export revenue<sup>93</sup>. Household RCN revenue drives domestic consumption, terms of trade and current account performance. Although inflation reduces overall purchasing power, there is a clear link between RCN receipts per worker and domestic private consumption, which comprises 86 percent of GDP. RCN prices have a strong effect on the current account—and on domestic savings. Higher RCN prices tend to improve the country's terms of trade, particularly with respect to rice, Guinea-Bissau's main import after fuel.

145. **Over time, the importance of the cashew sector in the country's economy has increased**, in terms of public revenue, the expansion of the agricultural frontier, exports and rural employment. This high dependence on the cashew sector leaves the economy vulnerable to external, political, and natural shocks.

146. **Guinea-Bissau produces almost exclusively RCN; processing is very limited.** The country is the fourth globally in terms of level of RCN production and its production is available at the end of the global season; as a consequence, Guinea-Bissau's farmers and local traders do not have market power in international prices, making their global position weak. As such, cashew farmers capture a small portion of the total value generated in the cashew value chain (see table 11).

**Table 11 - Cashew nut retail price breakdown**<sup>94</sup>

Steps in cashew export	Cashew price margins
1. Farmers, traders and shipping	29%
2. Shelling and processing	16%
3. Shipping and warehousing	3%
4. Roasting, packing and distribution	22%
5. Retailers margin	30%

Source: Own calculations from secondary data

147. **To improve its competitiveness, Guinea-Bissau must become more efficient in the provision of RCN for the traditional market segment** and improve different aspects of the cashew value chain to compete in more attractive market niches.

### II. What is the global context of the cashew market?

148. **High growth in cashew consumption:** Global demand for cashew kernels has grown from 234,000 MT (2000) to 680,000 MT (2013), representing an average annual growth rate of 9.3 percent. The main consumer markets for cashew kernels are India (41 percent), the USA (19 percent) and Europe (14

<sup>93</sup> World Bank (2018), Guinea-Bissau Public Expenditures Review

<sup>94</sup> CBI, available online in <https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/cashew-nuts/europe/>

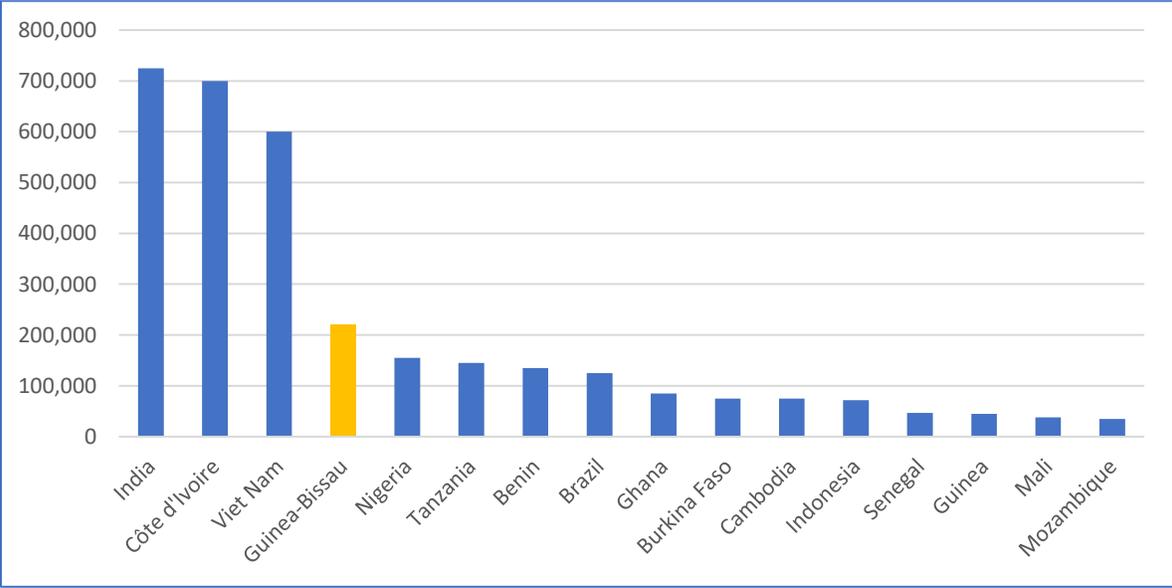
percent) which, when combined, represent close to 75 percent of global cashew kernel demand. The remaining 25 percent is in emerging markets such as Russia and the Middle East. India produces RCN for its domestic market and is also the world’s largest importer and processor of RCN and the largest exporter of cashew kernels. The other principal cashew-consuming countries import all their needs, mostly as cashew kernels. Cashew kernel demand has grown steadily in all these markets: India’s cashew kernel consumption growth was by far the highest, with consumption in the US and EU (both mature markets) flattening out, while consumption in China accelerating.

149. **High geographic concentration of RCN production:** RCN production is concentrated in four main regions: South-East Asia, West Africa, East Africa and Brazil. World RCN production reached about 3.3 million MT in 2015, with about 45 percent produced in Asia, 45 percent in West Africa (i.e., Cote d’Ivoire 702,000 MT and Guinea-Bissau 220,000 MT), 6 percent in East Africa and 4 percent in Latin America (Brazil).

150. **Africa leads in growth of RCN production** (see Figure 14). Global RCN production grew at 5.7 percent annually between 2000 and 2015 (a slower growth rate than that of cashew kernel demand). In recent years, most of this growth has been driven by increased RCN production in Africa, particularly in West Africa. East Africa and Brazil continue to lose ground, as both face decreasing RCN production mainly due to ageing and diseased cashew plantations.

**Figure 14. RCN Production in main cashew-producing countries**

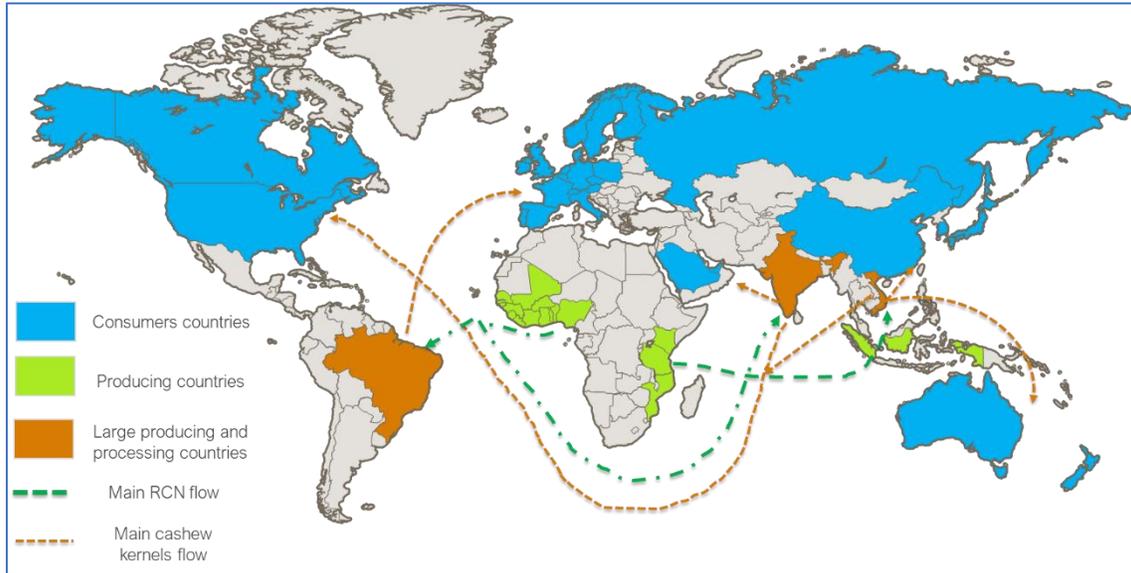
MT (2014/2015)



Source: Ricau (2013)

151. **Processing:** The flow of cashew products is organized on two fronts (see Figure 15): (a) *RCN trade* between primary production regions and processing poles (with large flows between Africa and India and Vietnam); and (b) *trade in cashew kernels and derived cashew products* (both whole and broken kernels) with flows essentially between India, Vietnam and Brazil and consuming countries (i.e., USA, EU and emerging markets).

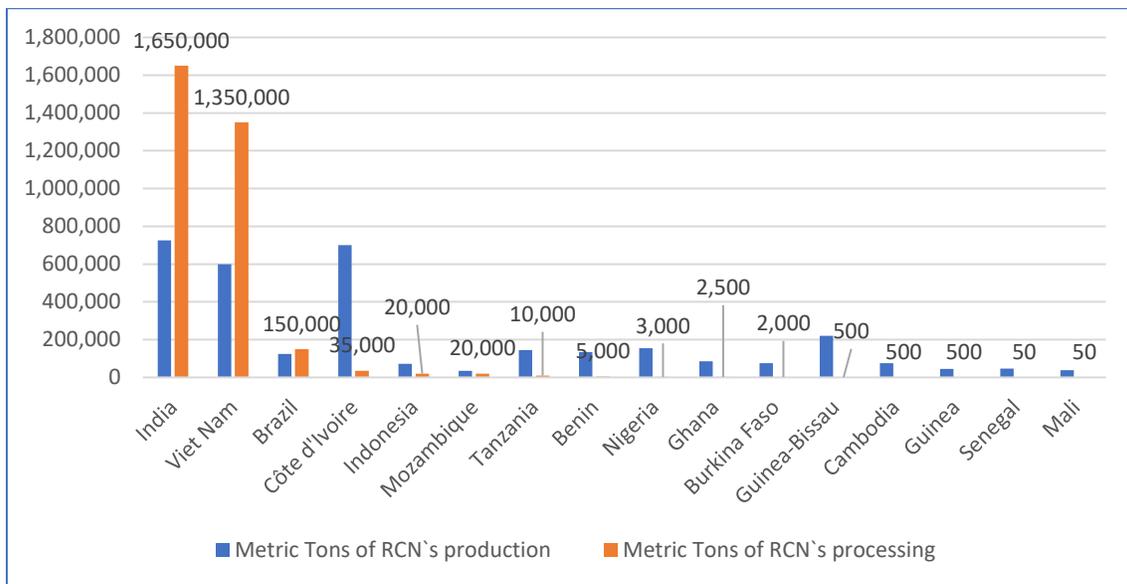
**Figure 15. Flows of RCN and cashew kernels**



Source: Ricau (2013)

**Figure 16. Quantity of cashew produced and processed in the main cashew producers' countries**

Worldwide in 2015 – MT RCN



Source: Ricau (2013)

152. **High geographical concentration of RCN processing capacity** (see Figure 16): Three countries – India, Vietnam and, to a much lesser extent, Brazil – represent 94 percent of the world's total RCN processing capacity and about 90 percent of total RCN processing. Despite their major importance as RCN producers, African countries represent only 5 percent of the total RCN processing capacity and less than 3 percent of the total volume of RCN processed. Only Mozambique, Tanzania and Cote d'Ivoire have an

annual cashew processing capacity greater than 30,000 tons, with African countries currently processing only about 6 percent of their combined RCN production. Mozambique (54 percent) and Tanzania (19 percent) are processing more than 10 percent of their RCN production. African countries thus export about 95 percent of their combined cashew production as RCN, mostly to the world’s largest processors, India and Vietnam (which process a volume of RCN more than double their own production).

153. **Existing annual RCN processing capacity in Guinea-Bissau is some 22,910 MT.**<sup>95</sup> At present, only 10 percent of this existing processing capacity is being utilized (Table 12). An analysis of vertical diversification uses a simulation model for assessing upward investment in the value chain. Table 2 depicts the current processing scenario in Guinea-Bissau. The analysis focuses on the following:

- What profit margins can be achieved by investing in increased RCN processing capacity with medium and small processing plants?
- What is the value addition to the economy by this intervention?
- How does the investment increase the contribution of cashew in total GDP?
- How does the revenue change in the economy due to investing in RCN processing?
- How does increased RCN processing capacity contribute to the export earnings of Guinea- Bissau?
- What is the IRR and NPV of investing in RCN processing?

**Table 12: Current processing scenario in Guinea-Bissau**

Category of processing plants	Capacity (MT/Year)	Capacity utilized (MT/Year)
11 medium-scale	20,900 MT	2,000 MT
6 small-scale	1,270 MT	130 MT

Sources: PRSPDA

154. **The analysis considers two types of processing plants:** medium and small capacity, semi-mechanized processing plants. The incremental benefits are shown with an increase in utilizing RCN processing capacity over a 10-year horizon<sup>96</sup>. Table 13 details the scenarios for the development of RCN processing capacity.

**Table 13: Scenarios considered for medium and small semi-mechanized RCN processing plant**

Scenario 1: Medium semi- mechanized processing plant	Scenario 2: Small semi-mechanized processing plant)
a. utilizing 10% of total processing capacity.	a. utilizing 10% of total processing capacity.
b. utilizing 25% of total processing capacity.	b. utilizing 25% of total processing capacity.
c. utilizing processing capacity of currently operational processing plants (2 plants)	c. utilizing 50% of total processing capacity.
d. utilizing processing capacity of currently operational processing plants.	d. utilizing 80% of total processing capacity.
e. utilizing 50% of total processing capacity.	e. utilizing 100% of total processing capacity.
f. utilizing 80% of total processing capacity.	
g. utilizing 100% of total processing capacity.	

<sup>95</sup> USDA, Shelter for Life, TechnoServe. 2018

<sup>96</sup> See Annex 4 for detailed analysis.

155. **To investigate if increased investment in RCN processing capacity has a positive return, NPV and IRR are estimated.** The NPV shows the stream of net benefits for different levels of processing capacity utilization. The NPV is positive when at least 50 percent of the RCN processing capacity for medium- and small-scale processing plants are utilized (Table 14). The IRR has been computed for each category of processing capacity utilization. The incremental IRR is 16 percent and 14 percent for medium- and small-scale processing plant, respectively, at 50 percent capacity utilization. Results from the sensitivity analysis suggest that the investment has a positive return if 80 percent of the total RCN processing capacity is utilized (Table 15).

**Table 14: NPV/ IRR – Medium- and small-scale RCN processing**

Scenarios	NPV	IRR
With USD 1 m. Investment		
Medium Scale - current utilization	(2,079,448)	
Medium scale - 25% capacity utilization	(1,000,671)	
Medium scale - 50% capacity utilization	330,353	16%
Medium scale - 80% capacity utilization	2,443,826	46%
Medium scale - 100% capacity utilization	3,951,063	67%
With USD 232,000 Investment		
Small scale - current capacity utilization	(280,188)	
Small scale - 25% capacity utilization	(156,960)	-7%
Small scale - 50% capacity utilization	48,418	14%
Small scale - 80% capacity utilization	294,873	31%
Small scale - 100% capacity utilization	459,176	41%

**Table 15: Sensitivity Analysis**

Scenarios	Baseline Vertical diversification		Cashew Kernel price reduced 10%		Raw materials cost increased 10%	
	NPV	IRR	NPV	IRR	NPV	IRR
<b>Medium-scale:</b>						
Current Utilization	(2,079,448)		(2,332,663)		(2,474,698)	
Current Utilization 2	(128,067)	8%	(1,094,284)		(1,636,261)	
25% capacity utilization	(1,000,671)		(1,633,710)		(1,988,798)	
36% capacity utilization	(283,260)	4%	(1,194,836)		(1,706,162)	
50% capacity utilization	330,353	16%	(935,725)	26%	(1,645,900)	
80% capacity utilization	2,443,826	46%	418,101	17%	(718,180)	-8%
100% capacity utilization	3,951,063	67%	1,418,907	32%	(1,444)	10%
<b>Small-scale:</b>						
Current capacity utilization	(280,188)		(308,441)		(324,289)	
25% capacity utilization	(156,960)	-7%	(227,594)		(267,214)	
50% capacity utilization	48,418	14%	(92,849)	1%	(172,090)	10%
80% capacity utilization	294,873	31%	68,845	15%	(57,940)	5%
100% capacity utilization	459,176	41%	176,641	23%	18,160	11%

156. **Cashew Products and by-products:** In terms of value-added, the cashew market is dominated by Whole White Kernels (in different grades based on quality). The other products – Broken Nuts, Cashew Nut Shell Liquid (CNSL), Cashew Apple – represent a small share of the total value-added of the global value chain.

- a. CNSL is obtained as a by-product during the removal of the cashew kernel from the RCN. CNSL has a wide array of applications such as friction-resistant brake and clutch linings, paints and varnishes, laminating resins, epoxy resins and adhesives. Today, the global annual CNSL production is approximately 180,000 tons, with India accounting for 35 percent of the global production, Vietnam for 30 percent and Brazil 22 percent. The USA, the European Union (mainly United Kingdom), Japan and the Republic of Korea collectively represent more than 90 percent of the global CNSL market. CNSL faces strong competition from other petrochemicals fungicides, coating materials and waterproofing agents. These competitive products are produced in large quantity and are widely known.
- b. Cashew apple (also known as “false fruit”) is the fruit to which the RCN is attached. It contains a high concentration of vitamin C and anti-oxidants and can be used to produce a wide range of products such as juice, paste or pulp and jam, alcoholic beverages such as wine and spirits, biofuel and compost.

157. **Business segmentation:** For the most important product in the Cashew Value Chain, the Whole White Kernels, there are basically two main business segments: traditional and niche.

- a. The **traditional business emphasizes cashew as a commodity:** RCN are traded following an international price which is set mostly according to the behavior of the supply and demand of the three biggest global players – India, China and Brazil. In this value chain, African RCN are exported to large processing centers located mostly in these three countries, where they are processed and packed according to the size and taste of the kernel without any further distinction such as origin or history. For the final consumer, price, quality of the cashew kernel and packaging, are the most important purchasing criteria<sup>97</sup>.
- b. The **niche cashew business** can also be named the “social and environmentally responsible” business. It is a relatively small market segment (in comparison with the traditional market) yet with strong growth potential - the total global organic market has grown by 480 percent in 15 years, reaching USD 90 Billion in 2016<sup>98</sup> and the revenue of Fairtrade International products worldwide from 2004 to 2016 has grown by 947 percent in 12 years, reaching USD 9.2 Billion USD in 2016<sup>99</sup>. The essential purchasing criteria for the final consumer are certification about origin and sustainability (in the case of Fair Trade) and certification about production practices (in the case of Organics). To ensure that these purchasing criteria are addressed, the value chain needs to be shortened in terms of actors involved and direct contact between farmers (usually via farmer organizations) and retailers (the actor in direct contact with the final consumer) becomes necessary. Along the entire cashew value chain, a robust quality control mechanism is needed.

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<sup>97</sup> <https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/cashew-nuts/europe/>

<sup>98</sup> <https://www.statista.com/statistics/273090/worldwide-sales-of-organic-foods-since-1999/>

<sup>99</sup> Statista, available via web in <https://www.statista.com/statistics/271354/revenue-of-fair-trade-products-worldwide-since-2004/>

158. **In terms of the margins captured by farmers, the niche markets allow for higher margins** when compared to traditional markets. Niche markets have less variation in pricing (i.e., fair-trade works normally with fixed prices all year long and the organic market tends to present more stable pricing than the traditional markets) allowing farmers to reduce risks related to international price fluctuation and plan future investments. In terms of market size, the niche cashew market is estimated to account for only 1 to 2 percent of the total volume of traded RCN.

159. **With regard to RCN processing, in the traditional market, economies of scale in the processing facilities (e.g., high automatization and large capacity to minimize costs) and access to inexpensive RCN are key factors for successfully capturing margins.** In a non-differentiated product like processed RCN, the international price tends to be the same globally since the margin comes from the availability of realizing significant cost reductions. On the other hand, RCN processing in the niche business implies ensuring traceability and having direct linkages with farmers, as the processing itself is part of the value proposition of the final product. Processing for niche markets allows the competition of smaller players (in term of size of facilities), thanks to the premium in terms of price that the end product provides.

160. **Guinea-Bissau's private sector, in general, faces major significant obstacles:** political instability, a difficult business climate – characterized by a complex regulatory environment and weak enforcement – as well as poor infrastructure, constraints in accessing finance and low agricultural productivity considering its overall potential. In this context, for small-scale cashew farmers (the majority of producers), without any investment, supplying the traditional business segment (commodity) via local and international traders has been the only possible way of commercializing its product and less risky option.

161. **The efforts conducted recently by the Government have mostly been directed at developing commercialization activities** at an international level (e.g. the Government seeking large deals with international companies<sup>100</sup>) and supervising the export procedure to ensure actors coordination and tax collection. Only a few efforts have been identified to increase cashew yield<sup>101</sup> (a key factor to be successful in competing in the traditional business segment) and no efforts have been identified to reach other business segments.

### III. Fostering the competitiveness of the cashew value-chain

162. **With its relatively small global position in RCN production** (just 6.7 percent of global RCN production), a cashew harvest at the end of the global season and a very small and underutilized domestic RCN processing capacity, Guinea-Bissau's cashew sector has limited market power and would not be able to grow or be competitive without addressing several factors that would permit it to be more competitive in the traditional segment and to address more attractive opportunities in niche markets.

163. **Four key areas need to be explored to improve competitiveness:** (a) boosting RCN productivity (for both traditional and niche markets); (b) changing RCN price policy; (c) strengthening value-chain links

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<sup>100</sup> One example of this is the T&T Group of Vietnam that, by direct action of the Minister of Trade, Tourism and Handicraft, pledged to buy Guinea Bissau's entirely raw cashew production in August 2018: <http://sggpnnews.org.vn/business/tt-group-of-vietnam-pledges-to-buy-guinea-bissaus-raw-cashew-76188.html>

<sup>101</sup> The Private Sector Rehabilitation and Agribusiness Development Project (PRSPDA), supported by the World Bank, is implementing different activities oriented to improve RCN yield, such as: provision of extension services and introduction of optimal tree-density and pruning strategies.

off-farm; and (d) establishing new and reshaping existing RCN processing facilities toward niche markets<sup>102</sup>.

164. **Investments in boosting RCN productivity**, in the short to medium term, (via production technology adoption, good agricultural practices, certifications, soil and water conservation, rejuvenation of ageing orchards, intercropping and others) are needed if Guinea-Bissau wants to increase its position in the global market (traditional and niche)<sup>103</sup>.

165. **As Guinea-Bissau is a price taker in the raw cashew market, wider dissemination of global RCN prices would generate greater efficiencies in transactions between farmers and wholesalers**, particularly as RCN from Guinea-Bissau come to market relatively late in the global cashew harvest cycle. Distortions in RCN farm gate prices convey inaccurate signals to both farmer and wholesale purchaser. Every year, the government declares a “RCN reference price” that is not always proportionate to current global prices. Furthermore, this price is often a de facto minimum price, which tends to delay the RCN purchases when this price is above global prices. There is no compelling evidence to indicate that this reference price provides an accurate signal to farmers to begin the RCN harvest or for RCN wholesalers (largely Mauritanian brokers) to initiate the purchase process with these farmers. Providing both farmers and traders with increased access to information on the global RCN prices, e.g., through use of ICT, would allow them to benefit more from RCN marketing.

166. **In addition, and in the longer term, off-farm interventions to strengthen the links between different value-chain actors**, such as: infrastructure to access rural areas, storage and warehousing; energy; information to farmers. All these efforts should be linked with greater access to private capital investment – either farmers’ savings/equity, external finance (e.g. banks) and/or equity capital from domestic and international partners<sup>104</sup>.

167. **For the development of the necessary local capacity** to fulfill the requirements of the most attractive segment – niche markets – additional interventions need to be implemented in the long term such as, quality standards, different types of certifications, traceability, specific marketing activities such as missions and participation in fairs, and international partnerships development.

#### *a. Lessons learned from similar experience in niche markets*

168. **Niche markets are growing** due to the increase in the number of consumers who believe that sustainability is important and are willing to pay a premium for products that can ensure the fulfillment of those attributes. Examples of these niche markets are Organic cashew nuts and Fair-Trade cashew nuts.

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<sup>102</sup> Promoting processing facilities for the traditional business (commodity) is something that this note does not explore. To be competitive, large-size facilities are needed and given the reduced installed capacity in G-B it would require enormous investment to catch up with competitors.

<sup>103</sup> See Chapter 3: Fostering innovation to boost productivity.

<sup>104</sup> For more details on this, please review Chapter 1: Setting a conducive environment through public policies.

169. **Overall, the global organic niche market demonstrates strong growth**, and cashews are no exception. Currently, it is possible to find many companies offering Organic Raw Cashew kernels in different sizes and formats (see Box 16). For Guinea-Bissau's cashew farmers, organic certification can improve their market power in a smaller and more compact value chain that serves more sophisticated consumers who are willing to pay a premium for organic certified products.

170. **According to WFTO<sup>105</sup>, Fair Trade is a trading platform based on dialogue, transparency and respect**, that seeks greater equity in international trade. Fair trade contributes to the sustainable development goals by offering better trading conditions to, and securing the rights of, marginalized producers and workers. Fair Trade organizations, backed by consumers, are engaged actively in supporting producers, awareness raising and in campaigning for changes in the rules and practice of conventional international trade. In the case of the nut Industry, it is possible to find many companies that are offering Fair Trade products (see Box 17 for some examples of Fair-Trade Cashew Nuts). In the Fair-Trade business, the origin of the RCN and the conditions under which it was produced are important for the value proposition of the product itself. As such, the farmers get a bigger portion of the value generated and, at the same time, a significant increase in their business margin.

***b. What are the challenges to implementation of the proposed intervention? How can these be mitigated or eliminated?***

171. **Availability and cost of labor.** Competing successfully in niche markets, due to the traceability assurance needed, requires mobilization of year-round labor to control and register the various phases of production, collection, processing and transportation. In the case of cashew, this represents a significant change in farm management from concentrating efforts mostly in one month per year (collection time) to a constant and year-round control and registration. On the other hand, reaching niche markets would

**Box 16: Example of Organic Cashew Nuts: NOW Foods Real Food**

<https://www.nowfoods.com/natural-foods/cashews-organic-whole-raw-unsalted>

The 50-year old US-based company Now Foods sells on-line this bag of 280 grams for USD 7.99.



In its website, only information about the properties of the nuts are presented, there is nothing about the origin or history of the RCN or processed cashew kernel.

<sup>105</sup> <https://wfto.com/fair-trade/definition-fair-trade>

allow farmers to increase their margin and withstand this increase in production costs, especially with adequate access to capital.

### Box 17: Example of Fair-Trade Cashew Nuts: Equal Exchange

<https://shop.equalexchange.coop/collections/fruits-nuts/products/organic-natural-cashews-8oz>

The American company Equal Exchange highlights in its website these stories of its cashew sold on-line (USD 6.95 per a bag of 227 grams).

#### APRAINORES, El Salvador

These farmers are proudly reclaiming an island where El Salvador's civil war once raged. After struggling for peasant rights and suffering violent reprisals during the country's 12-year civil war, they received land through a government land reform program. These 60 farmers now grow exquisite cashews in a protected mangrove sanctuary and are learning how to run a Fair-Trade farming co-operative.

In its website (in which consumers can purchase online), information about the processing methods are also provided:

[http://equalexchange.coop/sites/default/files/Cashew\\_Processing.pdf](http://equalexchange.coop/sites/default/files/Cashew_Processing.pdf).



172. **Access to inputs**, mainly to a specific range of seeds and fertilizers at the right time of year, is necessary to fulfill standards of production needed to reach sophisticated markets. The development of local specialized input suppliers is important for the development of the value chain.

173. **Access to knowledge**. The skills and knowledge of the rural workforce largely determine their ability to engage in some niche segments such as organic production. The provision of agricultural extension services as well as technical and vocational education is of importance to allow such a shift in production methods. At the farm level, cashew producers should have access to knowledge in diverse areas such as farm designing, plantation management (pruning, mulching and pests' control), intercropping, organic production and traceability systems.

174. **Access to market**. Direct relations with international sophisticated buyers and trade organizations that promote the development of socially and environmentally responsible business such as organic or fair trade, need to be established and maintained. This task should not be the responsibility of individual cashew farmers but of farmers' organizations with the capacity of becoming a positive counterpart for these international institutions. Strengthening the institutional capacity of the most dynamic farmers' organizations and cooperatives in the country is key to address this challenge.

175. **Access to credit and equity capital**. To invest in improved production methods, small-scale processing and commercialization activities, support from the financial markets will be needed, especially at the early stage when there is a need for up-front investment. The development of this type of financial agricultural product will require time and must be done with the local and regional financial system<sup>106</sup>.

<sup>106</sup> An international reference for this type of product is the Rabobank's Rising Star Loan: <https://www.raboag.com/financing/rising-star-173>.

## IV. Conclusions

176. **Guinea-Bissau has the opportunity of becoming a provider of RCN for niche markets**, thanks to its already good reputation in terms of RCN quality; the fact that most of its RCN production, even though is not certified organic, do not contain chemical products as part of the agronomical process; and farmers count with large experience in producing RCN. Nevertheless, there are many challenges to face in different links of the value chain: at farm level (labor training, input access, access to finance and farming, certification and traceability processes); transportation (traceability and infrastructure issues) and commercialization (direct contact with sophisticated demand).

177. **Great coordination is required along the entire value chain** to face the different challenges in the new strategic segments already described. Local (producers, cooperatives, processors, inputs and transportation services providers, local authorities) and international stakeholders (importers, distributors and retailers) need to be involved. An initiative to strengthen the value chain, including the definition of a strategy, a better articulation of public-private sector roles and coordination, would serve to define and prioritize specific projects needed. This initiative could be led by the *Conselho Nacional do Cajú - CNC*<sup>107</sup> (as the local institution in charge of the value chain actors' coordination) and conducted by an external institution expert in strategy and change management. Among the results expected, should be the definition of a common vision for the sector, the identification of specific projects to be implemented, public policy recommendations and a redefinition of the way the CNC operates. A first step has been taken with the analysis of the cashew value-chain made with the support of the West African Development Bank<sup>108</sup>.

178. **In the short-term, awareness raising about the niche markets can motivate local actors** to get involved in more complex yet more attractive cashew value chain. Contacting potential international buyers and taking them to Guinea-Bissau to explain how the different links of the value chain interact and the opportunities in terms of business that niches markets present could be a good option that can be complemented with the presentation of the experience of fair-trade and/or organic production and processing's farmers associations from another part of the globe such as APRAINORES from El Salvador<sup>109</sup> or FAIR TRADE ALLIANCE KERALA from India<sup>110</sup>. This action could be conducted by the *Conselho Nacional do Cajú* with support of international NGOs.

179. **Implementation of a conducive environment to foster innovation is urgent**<sup>111</sup>. Facilitating access to inputs to promote the entrance of local farmers to niche markets is necessary considering the current agricultural input market failures to avoid exacerbating inherent market distortions towards one production. Access to organic fertilizers and certified seeds are the most important inputs that need to be assured. To increase access to knowledge, it is fundamental to strengthen the capacities of farmers organizations to partner with private companies to conduct extension activities in subjects such as organic cashew farming and management of different types of certification such as IFS, FSC22000, BRC, and Fairtrade.

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<sup>107</sup> The CNC is a publicly-led institution that groups different private associations representing producers, intermediaries, exporters, and processors, plus, different governmental institutions. This institution is responsible for advising the government on all issues related to cashew, but in reality, it has few negotiation power (an example of this was the lack of capacity to convince the government in the 2018 campaign of not establishing a non-realistic price of reference).

<sup>108</sup> SOFRECO (2018), Diagnostic study for the definition of a strategy for the development of the cashew sector in Guinea-Bissau

<sup>109</sup> <http://www.aprainores.com>

<sup>110</sup> <https://www.fairtrade.org.uk/Farmers-and-Workers/Coffee/Fair-Trade-Alliance-Kerala>

<sup>111</sup> More information about this can be found in Chapter 3: Fostering innovation to boost productivity.

180. **Increasing access to finance for farmers and processors** will be vital in the longer term to trigger the process of involving them in more complex value chains due to the necessity of initial up-front investment with a medium- to long-term return<sup>112</sup>. To address this issue, a guarantee fund may be needed to encourage the local and regional banking system to get on board. Warehouse receipts can help operators access lending from financial institutions secured against commodities deposited in storage facilities<sup>113</sup>. Other options to be explored are providing access to finance via private equity funds targeting agricultural SMEs and contract farming schemes<sup>114</sup> such as the experience developed under PRSPDA (see Box 18). In both cases, a strategy to attract foreign investors will be necessary to bring that type of funds to the country.

**Box 18: Producers/Transformer Linkages Program (Private Sector Rehabilitation and Agribusiness Development Project)**

The Private Sector Rehabilitation and Agribusiness Development Project (PRSPDA), financed by the World Bank, is supporting easier access to markets for farmers through its Producers/Transformers Linkages program. In this program, three cooperatives (COAJQQ, KAFO and OPRO) benefit from support from the project to rehabilitate warehouses, train farmers, and manage a working capital fund in order to provide RCN to the local processing company ARREY. The company committed to buy 200 tons of RCN in 2017 and 2,000 tons in 2018 at a price negotiated with the cooperatives. In 2018, the farmers could benefit from a price of 650 FCFA/kg, well above the average price observed in the country of 500 FCFA/kg.

181. **To access markets**, one of the most important issues to address is to transact directly with the company in charge of commercialization of the product to the final consumer, which knows exactly the quality needed (organoleptic, certification, history, etc.). These productive business linkages between smallholder farmers and private agribusinesses companies can be fostered by promoting inclusive linkages such as out-grower schemes or farmer aggregation models in cases where existing business relationships are limited. The World-Bank funded Smallholder Commercialization and Agribusiness Development Project in Sierra Leone is an interesting example of such support<sup>115</sup>. Support from international NGOs working in the promotion of sustainable and socially responsible commercialization schemes such as Organic and Fairtrade can be sought during the first steps of this process. They can provide not only support in linking local supply with international sophisticated demand but also, in strengthening capacities, providing training to improve production and productivity<sup>116</sup>.

182. **A strong quality, standards and food safety management mechanism would be required to ensure the certification of RCN.** Given the current institutional capacity and the inexistence of a public quality standards management system, a first step could be to ensure quality management via a business partnership with the buying company.

<sup>112</sup> One example is an organic certification, EU and USDA both call for a mandatory conversion period of three-years for any perennial tree crop in a field that has been treated with unallowed substances.

<sup>113</sup> The PRSPDA has undertaken several studies to analyse the constraints to be lifted to implement such financial schemes in Guinea-Bissau.

<sup>114</sup> In this case, international buyers can provide Access to finance for the initial investment that will be repaid through buying the RCN

<sup>115</sup> See World Bank. 2016. Smallholder Commercialization and Agribusiness Development Project in Sierra Leone

<sup>116</sup> An example of Access to market effort in Guinea-Bissau is the "Producer / Transformation linkage program" financed by the PRSPDA between the processing company ARREY and three cooperatives of cashew producers: COAJQQ, KAFO and OPRO. This program includes direct support to the cooperatives in the management of a working capital fund, vehicles, warehouses rehabilitation and training for farmers, oriented to provide raw cashew nuts to ARREY for processing. In 2017, 200 tons of cashew were acquired by ARREY and the goal for 2018 was to achieve 1,000. Source: PRSPDA presentation, April 2018.

### **Box 19: Blockchain to ensure traceability**

A blockchain is a particular type of data structure used in some distributed ledgers<sup>117</sup> which stores and transmits data in packages called “blocks” that are connected to each other in a digital ‘chain’. Blockchains employ cryptographic and algorithmic methods to record and synchronize data across a network in an immutable manner.

The agricultural business has revolutionized in recent years but still faces multiple handles. The supply chain has been faced with the non-transparent, inefficient and noncommunicating network made up of processes, data, actors, and products. Disconnection and lack of transparency complicate issues of fair pricing and quality of products. The need for data integration has resulted from the regulatory pressure, scandals and food crises. Transfer of funds to business partners in other countries without delay or worry of fraudsters. Blockchain will play an important role in supply chain intelligence for technology that facilitates easy traceability of product information.

With Blockchain technology, an apple can be traced to the grower immediately. Supply chain is more transparent with blockchain. It helps in food safety responsiveness since the information about a food origin is instant; it gives information that consumers expect. Specific food products are traced at each time hence reducing food waste. Example, contaminated food products can be detected on the shelves and quickly removed<sup>118</sup>.

Other benefits that blockchain technology can bring to agriculture are: Reduced transactions and fair pricing; Reduces human error; Provides better access to financial grants and loans<sup>119</sup>; and can be used in crop insurance.

#### **Practical example: Walmart in the USA<sup>120</sup>**

Walmart, which sells 20 percent of all food in the U.S., has completed in 2017 two blockchain pilot projects. Prior to using blockchain, Walmart conducted a traceback test on mangoes in one of its stores. It took six days, 18 hours, and 26 minutes to trace mangoes back to its original farm.

By using blockchain, Walmart can provide all the information the consumer wants in 2.2 seconds. During an outbreak of disease or contamination, six days is an eternity. A company can save lives by using blockchain technologies.

#### **Practical example: mangoes, avocados and pineapples producers in Haiti<sup>121</sup>**

AgriLedger<sup>122</sup> (<http://www.agriledger.io/>), an agricultural-focused blockchain systems provider, is working on a World Bank-backed pilot that offers end-to-end full traceability through their platform to enable transparency along the value chain.

AgriLedger has joined forces with SourceTrace, and local Haitian partner Ecole Supérieure d’Infotronique d’Haïti (ESIH) to forge a new narrative for Haiti’s rural communities.

With a ‘Transparent Trade Ledger’ places the hard-earned high-quality produce of Haiti’s smallholder producers into a system that will see any intermediaries not adding value disappear unless they provide a much-needed service at a reasonable cost. Margins that were arbitrated by local exporters will revert back to producers and their families.

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<sup>117</sup> Distributed Ledger Technology refers to a novel and fast-evolving approach to recording and sharing data across multiple data stores (or ledgers). This technology allows for transactions and data to be recorded, shared, and synchronized across a distributed network of different network participants. <https://openknowledge.worldbank.org/bitstream/handle/10986/29053/WP-PUBLIC-Distributed-Ledger-Technology-and-Blockchain-Fintech-Notes.pdf?sequence=1&isAllowed=y>

<sup>118</sup> <http://www.fao.org/e-agriculture/blog/how-blockchain-can-help-smallholder-farmers>

<sup>119</sup> An example of the use of blockchain for this purpose is Banqu, available on-line in: <https://banqu.co>.

<sup>120</sup> <https://theconversation.com/how-blockchain-technology-could-transform-the-food-industry-89348>

<sup>121</sup> [https://www.openaccessgovernment.org/world-bank-blockchain-haitis-farmers/61205/?utm\\_source=dlvr.it&utm\\_medium=twitter](https://www.openaccessgovernment.org/world-bank-blockchain-haitis-farmers/61205/?utm_source=dlvr.it&utm_medium=twitter)

<sup>122</sup> The name of the company refers to the Distributed Ledger Technology (DLT). DLT refers to a novel and fast-evolving approach to recording and sharing data across multiple data stores (or ledgers). This technology allows for transactions and data to be recorded, shared, and synchronized across a distributed network of different network participants.

The Blockchain/DLT solution enables farmers to sell in more efficient markets where the spot price for their produce is determined by supply and demand rather than by the power of negotiation.

To help accomplish this, AgriLedger together with SourceTrace and ESIH are supporting the formation of businesses as platforms based on Blockchain/DLT. A custom-built platform for fresh produce chains in Haiti allow buyers to scan a mango's QR code and see whose tree the mango comes from, how the mango was packaged and transported, and what costs were involved at each step from the moment a mango was picked from a tree to the moment it's paid for by a buyer. The cold-chain logistics data including registration, certification, transport and sale documents collected along the path are made immutable and visible in friendly formats on the web and a smartphone.

**183. Considering the complexity of entering niche markets and meeting their requirements, it is recommended to begin working at a pilot level**, with a few selected farmers associations that can provide at the beginning the support needed in terms of management and quality control, besides establishing business relationships with different stakeholders such as international buyers, the financial sector and others.

## Recommendations

184. **Today, agriculture drives the economy of Guinea-Bissau.** Furthermore, RCN dominates the agri-food sector, is the main contributor to the country's GDP and exports and will remain so for the foreseeable future. The sector absorbs the majority of labor in Guinea-Bissau yet operates in a low-input, low-output equilibrium that requires technological disruption to set the country on a path toward structural transformation.

185. **Like many fragile states, Guinea-Bissau suffers from several structural disadvantages,** including a poorly diversified economy, high transportation costs to export to destination markets, limited domestic demand, weak institutions, and scarce trained personnel. As a result, the country remains highly dependent on stop-go foreign aid and rents from a single export product, RCN—an unhealthy equilibrium of “enclave development plus dependency”<sup>123</sup>. Political instability has been responsible for large falls in output and external financing<sup>124</sup>. Since nearly all public investment is financed by donors, the effect of donor disengagement in the aftermath of political instability is considerable. The uncertainty created by political turmoil also increases the risk aversion of local entrepreneurs and foreign investors alike. The high concentration of the economy in a single commodity is one of the drivers of fragility of Guinea-Bissau, reinforced by the current state of the cashew “orchards” (i.e., ageing trees with little to no husbandry practices negatively impacting the production and making them highly vulnerable to pests and diseases).

186. The preceding chapters have addressed the challenges faced by Guinea-Bissau's farmers, in terms of: (a) the overall enabling environment for agricultural development; (b) technological innovation that can facilitate land and labor productivity growth; and (c) a strategy of diversification - both horizontal (through intercropping and non-RCN investments) and vertical (by seizing the processing and value-added potential of Guinea-Bissau's RCN production). Further analysis would help refine those recommendations and address some remaining knowledge gaps, among these: (a) a full national agricultural census (pending implementation through FAO), (b) an institutional assessment of the Ministry of Agriculture and Rural Development, and (c) a deeper dive into the livestock sector and its role in both household food security and income generation.

187. **Investment – both public and private – is the quintessential ingredient to kickstart agricultural transformation in Guinea-Bissau.** Key public goods such as rural roads and consistent access to basic public services (e.g., electricity and water) must underpin the country's strategy for agricultural growth. Yet the bulk of investment will need to be directed toward the 120,000 farmers whose production options, farming practices and technology choices must evolve to capture the productivity potential of Guinea-Bissau while increasing its resilience to external shocks.

188. **Agricultural sector productivity in Guinea-Bissau remains low with yields comparing poorly to those in neighboring countries.** Higher agricultural productivity is a prerequisite for growth and development in the sector. The country has potentialities for productivity gains that can be achieved in the short-term. To do so, it is critical to support wider access to and adoption of inputs, best agricultural practices and other improved technologies.

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<sup>123</sup> For more details, see the *World Development Report 2011*.

<sup>124</sup> Political instability is associated with most periods of recession in Guinea-Bissau. Growth rates systematically decrease following instances of political instability.

189. **As presented in the previous chapters, Guinea-Bissau has the potential to diversify its agri-food sector, both horizontally and vertically and such diversification would help increase the resilience of both farmers and the economy to climate and market risks.** To foster these opportunities, several interventions will be needed, in addition to investment in essential public goods as stated above, to reduce the costs and risks for farmers and set an enabling environment, such as reducing barriers to the dissemination of foreign technology and to trade with neighboring countries, fostering the development of a private sector-led input markets, increasing access to finance, rehabilitation of irrigation infrastructures. Given the current un-enabling environment and weak institutional framework, these interventions will require a high level of investment and will only yield results in the medium to long term.

190. **Building on the challenges and opportunities identified in the previous chapters, the following priority areas have been selected given their relevance in fostering agricultural growth and yielding results in the short, medium and long term.** Coordination across stakeholders must increase to raise both the quality and the impact of the investments needed. If pursued, these recommendations could expedite the transformation of Guinea-Bissau’s agri-food sector toward greater productivity and competitiveness.

<b>Priorities and measures</b>	<b>Timeframe</b>	<b>Impact on expediting transformation of the sector</b>	<b>Technical Feasibility</b>
<b>Priority area 1: Strengthening the cashew value-chain</b>			
<b>Promote increased RCN productivity</b>			
<ul style="list-style-type: none"> <li>Promote resilient orchard rehabilitation and renovation.</li> </ul>	<b>Short-term</b>	<b>High</b>	<b>Medium</b>
<ul style="list-style-type: none"> <li>Foster adoption of best practices from benchmark countries through training, and extension services to increase productivity while reducing vulnerabilities to pest, diseases and climate change.</li> </ul>	<b>Short-term</b>	<b>High</b>	<b>Medium</b>
<ul style="list-style-type: none"> <li>Support the development of private sector-led input markets by de-risking the business environment and aggregating the demand and distribution of inputs through farmers’ organizations.</li> </ul>	<b>Medium-term</b>	<b>High</b>	<b>Medium</b>
<b>Eliminate the current RCN reference pricing and move toward greater dissemination of global RCN prices to farmers and traders</b>	<b>Short-term</b>	<b>High</b>	<b>Medium</b>
<b>Strengthen the links between the cashew value chain stakeholders.</b>			
<ul style="list-style-type: none"> <li>Foster the development of vertical linkages between farmers and processors.</li> </ul>	<b>Medium-term</b>	<b>High</b>	<b>High</b>
<ul style="list-style-type: none"> <li>Define a common vision for the development of the value-chain.</li> </ul>	<b>Medium-term</b>	<b>High</b>	<b>High</b>

<ul style="list-style-type: none"> <li>Revise the role and operational model of <i>Conselho Nacional do Cajú</i>.</li> </ul>	Medium-term	High	High
<ul style="list-style-type: none"> <li>Explore alternative markets opportunities.</li> </ul>	Long-term	High	High
<b>Priority area 2: Consolidate the agricultural innovation system</b>			
<b>Strengthen farmers' organizations to scale up technology demonstration and adoption.</b>			
<ul style="list-style-type: none"> <li>Support farmers' collective action and strengthen farmers' organizational and managerial capacities.</li> </ul>	Short-term	High	Medium
<ul style="list-style-type: none"> <li>Adopt adequate legislation on farmers' organizations and cooperatives, in line with the OHADA Uniform Act on Cooperatives.</li> </ul>	Medium-term	High	Medium
<b>Increase farmers' connectivity, leveraging ICT</b>			
<ul style="list-style-type: none"> <li>Leverage existing ICT from benchmark countries for application in Guinea-Bissau to foster farmers' access to information.</li> </ul>	Medium-term	High	High
<ul style="list-style-type: none"> <li>Finalize the broadband digital infrastructure development and engage private sector investors and internet service providers.</li> </ul>	Long-term	High	High
<b>Priority area 3: Strengthening coordination, accountability and effectiveness of policies and investment in the agri-food sector</b>			
<b>Leverage NAIP II to increase coordination, accountability and effectiveness of investments in the agri-food sector.</b>			
<ul style="list-style-type: none"> <li>Establish an effective sectoral coordination mechanism with a mandate to harmonize efforts across all stakeholders to increase the effectiveness and efficiency of agricultural development projects.</li> </ul>	Short-term	High	Medium
<b>Support key public goods essential for agricultural transformation</b>			
<b>Strengthen institutional and human capacities of the Ministry of Agriculture and other relevant public institutions to allow them to play their role more effectively</b>			
<ul style="list-style-type: none"> <li>Establish a Planning and Coordination Unit and strengthen the core capacities of the Ministry of Agriculture to coordinate and channel public and donors' resources more rapidly and effectively</li> </ul>	Short-term	High	Medium
<ul style="list-style-type: none"> <li>Strengthen the Ministry of Agriculture's expertise on the cashew value-chain both on the upstream (productivity) and downstream (marketing opportunities)</li> </ul>	Short-term	High	Medium

*Timeframe: short-term (0-3 years), Medium-term (3-5 years), Long-term (more than 5 years)*

## Priority area 1: Strengthening the cashew value chain

191. **Observations on the ground, as well as the present analysis, have highlighted the importance of cashew for both the farmers and the country.** Cashew orchards, as perennials, are long-term assets and RCN are a guaranteed annual revenue stream for almost all farmers in Guinea-Bissau and for the Government. Thus, **any development strategy for the agri-food sector must build on cashew production to increase productivity and farmers' income and foster diversification.**

- ⇒ **Promote increased RCN productivity through:** (a) orchard rehabilitation and renovation that must be accomplished in a way that maintains farmers' revenue stream while increasing the quality of the orchard as a means toward increased productivity, as is now being undertaken through the *Programa de Extensão Rural* under PRSPDA (see Box 8) and could be scaled up across the country; (b) dissemination and adoption of best practices from benchmark countries (e.g., Côte d'Ivoire, India) through training and extension services to increase productivity while reducing vulnerabilities to pest and diseases; and (c) development of private sector-led input markets, building upon successful experiences in similar countries (such as Liberia's support to agro-input supply – see box 7). Increasing RCN productivity would also help to reduce any expansion of cashew orchards at the expense of forests and protected areas, thereby conserving natural resources. Moreover, replanting of cashew orchards provides an opportunity to support farm-level horizontal diversification through the promotion of intercropping. This could be implemented in collaboration with private operators of agriculture support services, such as farmers' organizations, as tested in PRSPDA.
- ⇒ **Establish an incentive framework to support the development of the cashew sector.** As Guinea-Bissau is a price taker in the global RCN market, the current reference price policy – particularly when not aligned with global RCN prices – delays the RCN harvest and causes farmers to engage in speculative behavior that would otherwise not be justified under a more accurate price transmission (see Box 1). Another option would be to eliminate the current RCN reference pricing altogether in favor of greater dissemination of global RCN prices to farmers and traders. This would sharpen the price signal to farmers at the start of the harvest season and generate efficiencies in the transactions between farmers and traders. The PRSPDA is piloting a cashew price information system which, if successful, could be rolled out nationwide. Increased information on market prices, open access to Guinea-Bissau's RCN market for both national and international traders combined with greater bargaining power through farmers' organizations, can lead to higher margins for RCN producers.
- ⇒ **Strengthen the links between the cashew value chain's stakeholders.** The *Programa de Ligação* started under the PRSPDA is a good example of improved linkages between producers and processors. In the medium-term, at the national level, strengthening the organization and management of the value-chain would serve to prioritize specific investments needed through the definition of a common vision and to explore new markets opportunities (e.g. niche markets). The *Conselho Nacional do Cajú* could play a leading role in this area, subject to the redefinition of the way it operates.

## Priority area 2: Consolidate the agricultural innovation system

192. **Status quo will perpetuate the current low-input, low-output equilibrium in Guinea-Bissau's agri-food sector.** Investment in innovation will be key to creating positive disruption leading to gains in productivity, value-added and farmer incomes. The following recommendations can facilitate farmer uptake of new and better technologies and set them on a pathway toward agricultural transformation.

- ⇒ **Strengthen farmers' organizations to scale up technology demonstration and adoption and organize the demand and distribution of inputs.** Supporting farmers' collective action and strengthening farmers' organizational capacities would not only decrease the fragmentation of agricultural production, it would also increase farmers' bargaining power and achieve economies of scale in purchasing inputs. Farmer associations exist in Guinea-Bissau, but they are few, have no legal framework, are poorly structured and possess low managerial capacity. The Producer Company model in India has proven to be an effective means of aggregating small-scale farmers -to disseminate improved agricultural practices and create opportunities for vertically integrated value addition<sup>125</sup>. Closer to Guinea-Bissau, there are also many examples of efficient producer associations and cooperative models across West Africa. Providing training to farmer organization members to enhance their managerial capacities would increase their ability to deliver services to their members. Over the longer term, the Government of Guinea-Bissau could put in place an adequate legislative framework by implementing the Organization for Harmonization of Business Law in Africa (OHADA) Uniform Act on Cooperatives<sup>126</sup>.
- ⇒ **Increase farmers' connectivity.** While the overall level of agricultural public investment is uniformly low, even more important is the quality of public investment. Any increase in the fiscal envelope dedicated to public investment in agriculture would best be deployed to finance true public goods, as supported by global evidence, such as rural infrastructure (see Chapter 2). While rural physical infrastructure will continue to be a challenge for Guinea-Bissau in the short to medium term, cellular technology can help to bridge this gap with greater access to smart phones and other forms of connectivity, enabling farmers for example to receive market information (such as the cashew price information system developed under PRSPDA) or technical advice (e-extension). Yet significant obstacles remain and public investment to finalize both the interconnection with the submarine cable and a national fiber optic backbone would be needed in the longer-term to substantially reduce cellular service cost and boost connectivity speed, which opens the door for Internet of Things (IoT) applications that can accelerate agricultural transformation in the country<sup>127</sup>. In the medium-term, there are now off-line technologies that can help poor and even illiterate farmers to improve their production practices with no or limited mobile phone coverage and Internet connectivity (e.g., digital videos).

### Priority area 3: Strengthening coordination, accountability and effectiveness of policies and investments in the agri-food sector

193. **Greater coordination and alignment of Development Partners' support with national strategies, as well as increased coordination across all stakeholders and sectors, should be sought.** Given the current capacity weaknesses of Guinea-Bissau's public sector, compounded by its chronic fragility, this requires deliberate institutional and human capacity building at the Ministry of Agriculture and Rural Development to be successful.

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<sup>125</sup> See Shah (2016). Producer companies differ from cooperatives in that they: (a) are legally registered as for-profit companies; (b) professionally managed by a Board of Directors and Chief Executive Officer; and (c) hold Annual Meetings and publish annual financial reports.

<sup>126</sup> For more information on the Uniform Act on Cooperatives, see <https://www.ohada.org/index.php/en/component/content/article?id=545:uniform-act-relating-to-cooperative-societies>

<sup>127</sup> See World Bank Group (2019c)

- ⇒ **Leverage NAIP II to increase coordination, accountability and effectiveness of investments in the agri-food sector.** As Development Partners contribute significantly to the agricultural public budget, greater coordination and alignment of their support with national strategies will maximize results on the ground. The Ministry of Agriculture and Rural Development should coordinate efforts across all stakeholders (relevant ministries and agencies, donors, private sector, civil society) and sectors to

**Box 20: Strengthening agriculture public service delivery in Haiti (2009-2014)**

Haiti's socio-economic situation deteriorated throughout the 1990s and early 2000s: poverty remained endemic, inequality was severe, and social indicators were among the lowest globally, signaling a chronic humanitarian crisis. The Haiti Strengthening Agriculture Services project (USD 6.9 million) sought to enable the Ministry of Agriculture, Natural Resources and Rural Development (MARNDR) to: (a) prioritize and target investments according to sector policies; and (b) improve local agriculture support services. Haiti had struggled to emerge from a cycle of political instability and internal conflicts that devastated its economy, further weakened state institutions, augmented poor governance practices, increased poverty and, at times, prompted the withdrawal of external assistance to the government. In 2009, there were an estimated one million farmers in Haiti, who in large part lived in poverty. Land holdings averaged about 0.5 ha and productivity was constrained by the dominance of small-scale subsistence farms, few or non-existent agriculture extension services, insufficiently developed inputs and food supply chains, limited access to rural finance markets, and the inability to meet increasingly important food safety standards.

The Project represented the first stage of an expected 15-20-year engagement with Haiti on agriculture public sector reform and development. The government, through the MARNDR, was to regain the stewardship of the public sector resources dedicated to agriculture, fulfilling its normative and regulatory and coordinating mandate. While ambitious, the project was a significant first step in reengaging with the government for sustainable agricultural development in Haiti. The Project built basic capacities in MARNDR, supporting its capacity to function and deliver on its mandate. The project has also helped to improve transparency of resources used with the introduction of software-based accounting and financial management and a return to a systematic budgeting process with an annual report. Institutional capacity has been built by establishing (a) a unit for monitoring and evaluation; (b) an environmental unit; (c) a permanent procurement unit; and (d) a nascent IT unit laying the groundwork for the Ministry of Agriculture to deliver on its mandate to provide services to the rural communities and its responsibilities for agriculture and natural resources. Lessons learned from the Project included the following:

- *Institutional capacity building in a challenging environment.* Even in a country fraught with crises and challenges, a relatively small institutional capacity building project can result in significant improvements in MARNDR's performance, if the government is truly on board and with intensive Bank supervision.
- *Implementation without a PIU in a situation of weak institutional capacity.* MARNDR directly implemented the Project (i.e., without a PIU), which required a simple project design and well-defined implementation arrangements. Moreover, institutional projects are time consuming, but have the potential for high rewards.
- *Client ownership.* The Project's results framework should be simple, with the linkages between the activities and the indicators readily understandable to have adequate buy-in to collect data to assess the outcomes.
- *Needs for continued institutional change and reform.* Policy dialogue at the ministerial level, ownership of technical staff and active involvement of a broad range of stakeholders are important for institutional change.

Source: World Bank. 2015d. "Strengthening Agriculture Public Services. Implementation Completion and Results Report".

deliver on the goals of achieving increased agricultural growth. NAIP II (currently under preparation) could serve as a platform to network the various stakeholders and harmonize proposed and ongoing

interventions to reduce or eliminate duplication. Providing short-term technical assistance for the finalization of NAIP II, and the formulation of a sound development program identifying key priorities, resources to mobilize and expected outcomes would be a first step toward that direction. Establishing regular meetings between the Ministry of Agriculture, other ministries involved in the development of the agri-food sector, Development Partners and Farmers' Organizations would also help focus limited resources on the most important national priorities and avoid dilution of effort.

- ⇒ **Support key public goods essential for agricultural transformation in the medium to long-term.** The weight of current public investment in agriculture is low and does not reflect the sector's importance to the country's GDP. Any increase in the fiscal envelope dedicated to public investment in the agri-food sector should be targeted to finance public goods that have the most potential to facilitate private investment in the sector (e.g., rural roads, electricity and connectivity, access to water) and de-risk technology adoption and diversification through strong innovation systems.
- ⇒ **To sustain these interventions and given the current weak capacity of Guinea-Bissau's public sector, it is necessary to invest over the long term in raising the institutional and human capacity of the Ministry of Agriculture and Rural Development.** Strengthening core managerial functions and enhancing administrative and fiduciary management within the Ministry of Agriculture though a lengthy process can help lay the foundation for the Ministry to deliver on its mandate. Capacity building would focus on closing some knowledge gaps, on policy analysis and monitoring and on providing new instruments for a strong, efficient, and results-oriented service delivery system. An institutional assessment of the Ministry of Agriculture would help identify the core functions to build on and strengthen its mandate. The World Bank-funded Haiti Strengthening Agriculture Services project provides a successful example of interventions that can be undertaken in a fragile environment (see Box 20). In the short-term, strengthening the capacities of the Ministry of Agriculture to coordinate and channel public and donors' resources could increase the transparency and targeting of the resources used. Reinforcing the Ministry of Agriculture's expertise on the cashew value-chain would also increase its capacities to formulate and coordinate adequate cashew sector policies and investments.

194. **In sum, key public and private investments in Guinea-Bissau's agri-food sector can foster inclusive economic growth and reduce poverty.** These priority areas of action, if pursued, could yield tangible results, among these increases in: (a) land and labor productivity; (b) greater overall agricultural competitiveness, particularly in the cashew sector; (c) farm-level horizontal diversification of agricultural produce; and (d) farmers' market linkages. These interventions would also lay the foundation for sustained (and sustainable) economic growth and mitigate several drivers of the country's chronic fragility<sup>128</sup> by reducing farmers' vulnerability to market and production risks, kick-starting the diversification of the economy and improving the rural service delivery.

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<sup>128</sup> See Table 1 p14

## Annexes

### Annex 1 – Development Partners’ interventions in the agri-food sector in Guinea - Bissau

Donor	Project	Region	Intervention	Date	Budget	Website 1
African Development Bank	Project for the development of the rice value chain in the regions of Bafata and Oio (PDCV RIZ)	Regions of Bafata and Oio		2017-2020	UAC 4,560,000	<a href="https://www.afdb.org/en/projects-and-operations/project-portfolio/p-gw-a00-003/">https://www.afdb.org/en/projects-and-operations/project-portfolio/p-gw-a00-003/</a>
Chinese government	Machinery and inputs donation to the government.	G-B	Os donativos estão constituídos em 2638 ( dois mil e seiscentos e trinta e oito) toneladas de arroz, 1002 (mil e duas) toneladas de fertilizantes, 44 (quarenta e quatro) tratores com diversas alfaías, 20 (vinte) ceifeiras, 160 (cento e sessenta) debulhadoras, 110 (cento e dez) descascadores, 20 (vinte) moinhos, 9 (nove) motocarros, 10 (dez) motorizadas, 10 (dez) motobombas, 100 (cem) pulverizadores, 100 (cem) atomizadores, 50.000 (cinquenta mil) foices, 60 (sessenta) ceifaras simples, 10(dez) motocultivadores, 10 (dez) transplantadores, 300 (trezentos) fatos macacos, 100 (cem) capas, 100 (cem) galojas, 14 (catorze) caixas de chaves e 3 (três) máquinas de s	2019	No information	<a href="http://www.odemocratagb.com/?p=20093">http://www.odemocratagb.com/?p=20093</a>
Chinese government	Machinery and inputs donation to the military.	Neste momento as forças armadas guineenses dispõem de três campos agrícolas nomeadamente, Fâ-Mandinga de 130 hectares, Bedinga Na Nhasse de 60 hectares e campo de Salato.	seis (6) máquinas agrícolas nomeadamente, tratores de lavoura, máquinas debulhadoras-cheiradora de arroz e milho, máquina bulldozer, pá escavadora, carregador de rodas e grade-charrua e cinco (5) máquinas de construção civil a fim de melhorar a produção do arroz.	2019	385 milhões de franco CFA.	<a href="http://www.odemocratagb.com/?p=19697">http://www.odemocratagb.com/?p=19697</a>
Chinese government	Road infrastructure	A estrada, explicou o embaixador, vai ligar a rotunda do aeroporto internacional Osvaldo Vieira a Safim, num total de 8,2 quilómetros, e terá três faixas de cada lado. Aquela estrada é principal entrada na capital da Guiné-Bissau e recebe o trânsito proveniente do norte e sul do país.	Bissau	2018	30 M\$	<a href="http://www.odemocratagb.com/?p=18210">http://www.odemocratagb.com/?p=18210</a>
Chinese government	Seaport infrastructure	Construção da segunda fase do porto de pesca do Alto do Bandim	Alto do Bandim	2018	22M EUR	<a href="http://www.odemocratagb.com/?p=18590">http://www.odemocratagb.com/?p=18590</a>
European Union	Analysis of the Mango and Lime Value Chain in Guinea-Bissau, European Commission	Country	Study part of the Value Chain Analysis for Development (VCA4D)	2018-2019	No information	<a href="https://europa.eu/capacity4dev/valu-e-chain-analysis-for-development-vca4d/wiki/210-guinea-bissau-mango-lime">https://europa.eu/capacity4dev/valu-e-chain-analysis-for-development-vca4d/wiki/210-guinea-bissau-mango-lime</a>
European Union	Integrated territorial and collective actions to develop agriculture (EU ACTIVA) for Guinea-Bissau	Bafata, Quinara and Tombali	(1) improving territorial governance, (2) improving communications with rural areas to facilitate agricultural production and improve access to basic social services and (3) sustainably intensifying agricultural production and increasing its economic value by strengthening farmers' organisations.	2015-2019	EUR 15 M	<a href="https://ec.europa.eu/europeaid/file/44072/download_en?token=roL3u3H0">https://ec.europa.eu/europeaid/file/44072/download_en?token=roL3u3H0</a>
European Union	PRO-GB - Program for Resilience and Socioeconomic Opportunities for Guinea-Bissau		<ul style="list-style-type: none"> <li>• ProGB Civil Society (total amount: EUR 8 million)</li> <li>• ProGB Water and Energy Services (total amount: EUR 9 million)</li> <li>• ProGB Mangrove Agriculture (total amount: EUR 11 million)</li> <li>• ProGB Poultry value chain (total amount: EUR 1,5 million)</li> </ul>	2019-2024	EUR 38 M	<a href="https://eeas.europa.eu/delegations/guinea-bissau/42251/european-union-launches-call-express-interest-pro-gb-program-resilience-and-socioeconomic_en">https://eeas.europa.eu/delegations/guinea-bissau/42251/european-union-launches-call-express-interest-pro-gb-program-resilience-and-socioeconomic_en</a>
European Union / FAO	Aplicação Lei da Terra	Estabelecer comissões Fundiarias Estabelecer Observatorio Fundiario Delimitação das Comunidades Locais e Planos de Uso da Terra e Recursos Naturais Estabelecer o Sistema de Impostos Fundiarios	Guinea-Bissau	2018-2021	Standby	

Donor	Project	Region	Intervention	Date	Budget	Website 1
International Finance Corporation	Cashew Sector Development Project		i) Improving the ability of cashew sector actors to meet environmental, social and trade standards / ii) Improving the business environment for investments in cashew production and processing	2017-2020		
International Fund for Agricultural Development	Economic Development Project for the Southern Regions (PADES)	Regions of Tombali, Quinara, Bolama and Bijagos.	Support local communities Microfinance Infrastructure for better access to markets Promotion of rice production with mangrove rehabilitation	2015-2021	18.97M\$	<a href="https://www.ifad.org/en/web/operations/project/id/1757/country/guinea-bissau">https://www.ifad.org/en/web/operations/project/id/1757/country/guinea-bissau</a>
International Fund for Agricultural Development	Family farming diversification, integrated markets, nutrition and climate resilience Project. (REDE)	Regions of Bafata, Cacheu, Gabu and Oio.	i) Diversification of family farming adapted to climate change and nutrition improvement and ii) Market integration and rural entrepreneurship.	2020-2025	52.2M\$	Not available yet
SWISSAID	Skills Center in agroecology	Cacheu and Bafata regions	Training in Agroecology	2015-2018	EUR 65.000	<a href="http://www.agrisud.org/en/pays-nosactions/guinee-bissau/">http://www.agrisud.org/en/pays-nosactions/guinee-bissau/</a>
United States Department of Agriculture (USDA)	USDA/FAS Food for Progress LIFFT-Cashew SeGaBi Value Chain Study	the SeGaBi cashew production zone of West Africa encompasses parts of the Gambia, the Casamance region of Senegal, and most of Guinea-Bissau.	Our program addresses this by developing value chain linkages necessary to support an integrated regional trade network for the cashew value chain, and enhancing the production and trade of cashews in local and international markets. LIFFT-Cashew will create durable trade infrastructure, increase access to financial services, organize and train smallholder farmers to increase production and bargaining power, and build the capacity of local processors to add value to kernels in the SeGaBi cashew production zone. As a result, the program will benefit smallholder farmers, a range of processors, and a variety of other businesses along the cashew value chain.	2018-2023	This program will directly benefit 21,700 individuals (producers, processors, SMEs owners and employees, and other value chain actors) across all three countries, and is projected to cost <b>\$26,621,355 USD</b> . Source: <a href="https://ngojobsinafrica.com/job/request-proposals-cashew-value-chain-study-year-1-senegal-gambia-guinea-bissau/">https://ngojobsinafrica.com/job/request-proposals-cashew-value-chain-study-year-1-senegal-gambia-guinea-bissau/</a>	<a href="https://www.shelter.org/sen-p1">https://www.shelter.org/sen-p1</a>
West African Development Bank	Food Security Support Project in the regions of Biombo, Gabu and Tombali / Rice promotion project for young people	Biombo, Gabu and Tombali			10 MM CFA	
West African Development Bank	Infrastructure	G-B	the approval of CFAF 20 billion (about € 30 million) for asphaltting 80 kilometers of roads in the national priority network for Guinea-Bissau, including the construction of the south Bissau and the Bissau-Birfa-Nhacra road. Another approved project, also worth CFAF 20 billion, relates to the rehabilitation and modernization works at the Osvaldo Vieira international airport in Bissau.	2019 ->	EUR 30 M	<a href="https://www.boad.org/projets-approuves/">https://www.boad.org/projets-approuves/</a>
World Bank Group	PRSPDA (PRIVATE SECTOR REHABILITATION AND AGRIBUSINESS DEVELOPMENT PROJECT)	Cacheu, Oio e Biombo	i) Promoting the development of agribusiness / ii) Developing Entrepreneurship	2015-2020	8.2 M\$	<a href="http://projects.worldbank.org/P127209?lang=en">http://projects.worldbank.org/P127209?lang=en</a>

## Annex 2 – Intercropping with Cashew in Guinea-Bissau

### a. How has Guinea-Bissau addressed this up to the present?

1. Cashew plantations in Guinea-Bissau are typically implemented in fallow lands within semi-natural or savanna woodlands. The vegetation is slashed and burned, for celerity, reduction of labor requirements and for enhancement of soil fertility. Food crops (e.g., rainfed rice, millet, sorghum, maize or groundnuts), mostly for the farmers' own consumption, are intercropped with the cashew trees during the first three years. Once the cashew trees begin to produce fruit, farmers cease intercropping and little additional labor and inputs are applied to the cashew orchard. A 2016 biodiversity survey conducted in 21 villages in Bafatá and Gabu determined that only two percent of the cashew orchards displayed other species (mostly wild species).

2. So far, Guinean farmers are dependent on market infrastructure related to the RCN supply chain. There are few inputs suppliers in rural areas. Most of the seeds are provided through NGOs or donors' projects or by purchasing them in neighboring countries. Access to other inputs such as fertilizers, or to small mechanization, is both scarce and costly. The only organized market in the country is the cashew market, with traders going to the fields to purchase RCN with high transportation costs due to the poor rural infrastructure.

### b. What is intercropping?

3. Intercropping is defined as the practice of cultivating two or more crops in the same space simultaneously. Farmers intercrop to minimize risks. Intercropping efficiently uses growth factors because it makes better use of the available water and nutrients, reduces pests and diseases and suppresses weeds. Farmers minimize risk through diversification of the crops grown and of increasing productivity per unit of land<sup>129</sup>. When two or more crops are growing together, each must have adequate space to maximize cooperation and minimize competition between the crops. To accomplish this, four things need to be considered: a) spatial arrangement, b) density, c) maturity dates of the crops being grown, and d) plant architecture<sup>130</sup>.

4. Intercropping tree crops during the establishment phase with food crops has long been practiced. The benefits of such practice may include household food security, income generation to partially offset the cost of establishment of the orchard, weed control, and better use of growth resources. However, the success of cashew intercropping will depend on whether the crops compete with the young cashew seedlings for growth resources.

#### Box 1: Bioecology of Cashew

The cashew tree, *Anacardium occidentale*, is an evergreen tree growing to a height of 8-20m depending on soil and climate characteristics. It normally starts bearing fruits on the third or fourth year, attaining full production by the seventh or eighth year. The period of full production can last up to 15-20 years. The cashew tree grows in mean annual temperatures ranging from 17-38°C. Distribution of rainfall is more important than the amount and the tree grows in a range of 500 – 3500mm of rainfall. It can adapt to a large variety of soils, as long as it is well drained. The maximum

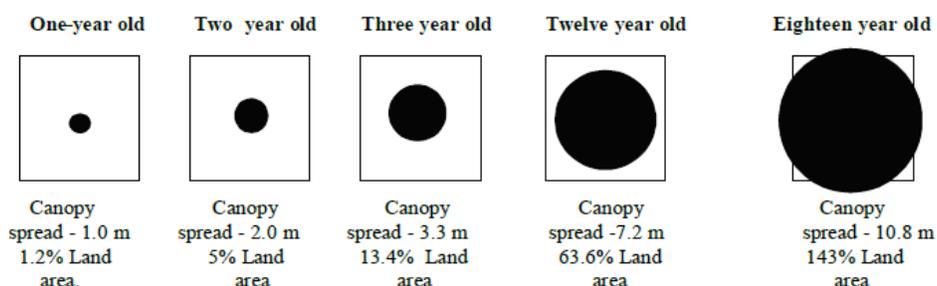
<sup>129</sup> FAO, Climate Smart Agriculture Sourcebook, <http://www.fao.org/climate-smart-agriculture-sourcebook/en/>

<sup>130</sup> Intercropping principles and production practices, P. Sullivan, Appropriate Technology Transfer for Rural Areas, 2000

yield of nuts of a mature tree is in the range of 7-11 kg per tree. Performance of cashew depends on how much light in a day the cashew tree gets. If both morning and afternoon sunlight is available, performance of cashew will not be affected by intercropping.

Optimal planting space of cashew orchards is around 7.5m \* 7.5m (177 plants/ha). During the first years cashew uses hardly 1.2 percent of the land area provided to the crop. During the second and third year, the canopy coverage is only 5 and 13.4 per cent respectively (see graphic below). This pattern of canopy development offers tremendous scope for intercropping in cashew in early years<sup>131</sup>.

**Figure 1: Canopy development pattern of cashew tree in relation to age**



5. In perennials, the choice of intercrop can be determined with short-term perspectives, to take advantage of the low canopy development in early years of development and with longer term perspectives. Indeed, other perennials can be intercropped with cashew trees to keep a diversified income once the cashew tree has reached its maturity.

6. Comparisons between diversified systems and monoculture are favorable when total outputs are assessed, rather than specific crop yields. Intercropping can produce 1.7 times more harvested biomass on average than monoculture and is 79 percent more productive than the average monoculture<sup>132</sup>. Intercropped farming systems demonstrate improved pest management through rich synergies between different species.

7. Risk is a daily reality for many farmers and crop and livestock diversification is seen as a form of self-insurance, allowing income to be stabilized in the face of variable yields, seasonal shortages or market failures.

***c. Why is it crucial for Guinea-Bissau agri-food sector?***

8. Intercropping, if done when cashew root stock is replaced, can diversify farmers' income and increase their resilience to climatic and market shocks while keeping the advantages the cashew tree offers as an asset (providing cash and securing land tenure). Intercropping will: (a) increase the agrobiodiversity of the land, diminishing the risks of pest and diseases outbreaks and increasing the resilience of farmers to climatic and market shocks, and (b) increase land productivity.

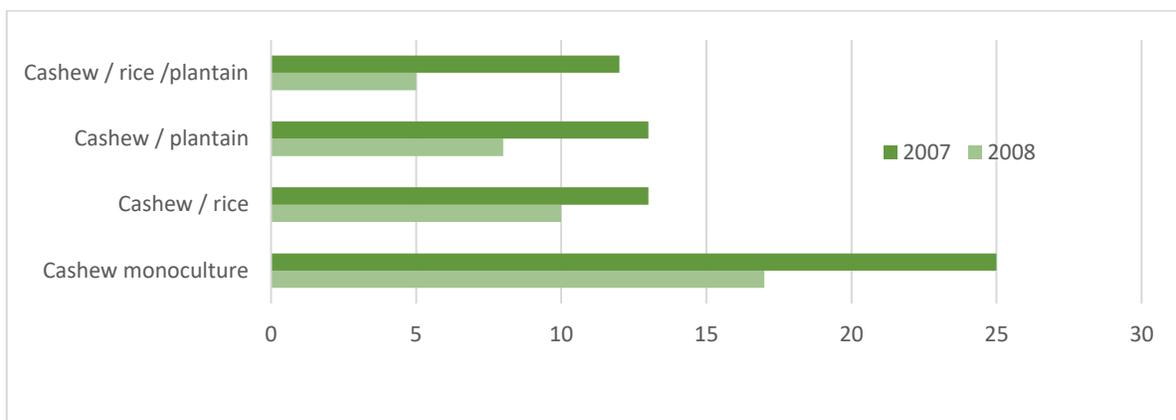
<sup>131</sup> Cashew: improvement, production and processing/editor Prof. P.L. Saroj, 2017

<sup>132</sup> IPES FOOD, 2016, From uniformity to diversity

**d. What are examples/ outcomes that would be relevant to Guinea-Bissau?**

9. Intercropping in cashew orchards involving compatible crops with varying morphological and rooting habits will enable better resource use and more returns. Evidence shows that there are a wide range of suitable intercrops for cashew, from annual food crops (e.g., rice, maize, groundnuts) to horticultural crops (e.g., pineapple, banana, pepper) or other fruit trees (e.g., citrus). Studies conducted in Nigeria to assess weed incidence and biomass in various cashew plantations showed that intercropping reduces weed biomass by 50 percent compared to monoculture of cashew (see Figure 1). Intercropping also reduces by 50 percent weeding period, and thus, labor requirement and costs production compared to monoculture of cashew<sup>133</sup>. Appropriate intercropping of cashew would thus increase efficiency and reduce production cost.

**Figure 1: Effects of cashew intercropping on weed biomass (t/ha) in Nigeria**



Source: adapted from D. Kalaivanan and P.L. Saroj, *Weed Management in Cashew*, 2017

**Early stage intercropping with food crops**

10. In Nigeria, the intercropping of cashew with rice and plantains proved useful in reducing weed incidence in cashew orchard with negligible negative impact on the cashew tree growth and early RCN yield while providing additional and steady income through rice and plantain harvests<sup>134</sup>. Cashew girth and height were also improved within these intercropping systems<sup>135</sup> (see Table 2).

<sup>133</sup> D. Kalaivanan and P.L. Saroj, *Weed Management in Cashew*, in *Cashew: Improvement, Production and Processing*, Indian Council of Agricultural Research, 2017, pp.265-275

<sup>134</sup> Cases studies – Nigeria – Effect of cashew/rice/plantain intercropped on weed incidence in Edo State and Cost effectiveness of intercropping patterns by cashew farmers in Oyo State

<sup>135</sup> *Cashew: improvement, production and processing*, editor Prof. P.L. Saroj, 2017

**Table 2: Effect of cropping systems on the development of three-year old cashew plants two years after intercropping and the proportion of plants flowering at four years of age in Bole (Ghana)**

<i>Cropping System</i>	<i>Girth (mm)</i>	<i>Height (cm)</i>	<i>Crown Spread (cm)</i>	<i>Proportion of Plants Flowered (per cent)</i>
Sole cashew	37.5 <sup>c</sup>	125.0 <sup>c</sup>	195.6	78.8 (64.1)
Cashew + groundnut	38.4 <sup>bc</sup>	132.9 <sup>bc</sup>	190.5	81.6 (65.9)
Cashew + maize	41.9 <sup>a</sup>	159.1 <sup>a</sup>	236.4	77.3 (66.0)
Cashew + sorghum	38.4 <sup>bc</sup>	146.9 <sup>ab</sup>	199.1	62.1 (53.3)
Cashew + yam	40.1 <sup>ab</sup>	122.5 <sup>c</sup>	194.2	87.9 (71.3)
Cashew + sorghum/groundnut	41.4 <sup>ab</sup>	139.0 <sup>bc</sup>	205.7	90.9 (75.1)
Cashew + groundnut/maize	37.4 <sup>c</sup>	130.6 <sup>bc</sup>	205.9	83.4 (67.3)

Values followed by the same letters in a column are not significantly different at  $p = 0.05$ ; values in parenthesis are transformed data.

Source: *Cashew: improvement, production and processing*, editor Prof. P.L. Saroj, 2017

11. Cashew tree growth performance noted in these studies in intercropping systems may be due to the tillage and other husbandry practices such as weed control and fertilizer application, that would not have been done in cashew monoculture. A study conducted in Ghana on the effects of cashew intercropping indicates that intercropping cashew with food crops during the establishment phase (first three years) generally improved cashew seedling growth and did not adversely affect early cashew nut yield<sup>136</sup>. Economic analysis confirms the profitability of cashew intercropping with maize and yam during the establishment phase (see Table 3). In the savannah agro-ecological zone of Ghana (Bole region), intercropping cashew plantations with yam and maize for the first two and three years respectively, can generate income to partially offset the cost of establishment.

**Table 3: Economics of intercropping food crops with cashew during the establishment phase in Bole (Ghana)**

Cropping system	Cost of production (US\$ ha <sup>-1</sup> )			Revenue (US\$ ha <sup>-1</sup> )			Net revenue (US\$ ha <sup>-1</sup> )		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Sole cashew	56.71	64.90	95.65	–	–	–	–56.71	–64.82	–95.65
Cashew + groundnut	147.32	289.66	294.91	85.72	149.03	135.45	–61.60	–140.66	–159.46
Cashew + maize	272.33	364.10	297.72	100.52	484.35	556.82	–171.81	+120.27	+259.10
Cashew + sorghum	100.30	248.87	359.24	–	92.71	38.28	–100.30	–156.16	–320.96
Cashew + yam	194.71	112.94	737.83	249.21	575.62	718.01	+54.50	+462.68	–19.76
Cashew + sorghum/ groundnut	100.30	289.66	294.91	–	139.46	116.49	–100.3	–150.66	–178.42
Cashew + groundnut/ maize	147.30	364.10	297.72	82.17	395.74	479.99	–65.13	+31.64	+182.27

Source: K. Opoku-Ameyaw, F.K. Opong, F.M. Amoah, S. Osei-Akoto, E. Swatson (2012)

### **Early stage intercropping with horticultural crops**

<sup>136</sup> K. Opoku-Ameyaw, F.K. Opong, F.M. Amoah, S. Osei-Akoto, E. Swatson (2012). Growth and early yield of cashew intercropped with food crops in northern Ghana, *Journal of Tropical Agriculture*, 49 (1-2): 53-57.

12. In western India, cashew can be intercropped with pineapple for the first five to seven years. Beyond seven years, the shade cast over the pineapple by the developed cashew trees reduces yield. Also, it will be more difficult to harvest RCN within pineapple trenches. Generally, 15,000 pineapple suckers can be planted in one hectare of cashew plantation. Studies conducted in India show that mean soil moisture content in cashew – pineapple plantation was significantly higher than in cashew monoculture. Studies have also shown that pineapple intercropping in cashew plantations increases cashew yield by 30-50%. This yield increase was mainly due to increased soil moisture conservation and better weed control. The studies also highlight that with intercropping, cashew trees receive regular attention, better care and improved management<sup>137</sup>.

13. Ginger can also be intercropped in the initial three to four years of cashew plantation. A study conducted in western India reports that ginger height and leaf area index were significantly higher than in monoculture, with an expected yield of around 60 quintals of ginger per hectare in intercropped cashew plantations<sup>138</sup>.

### ***Later stages intercropping***

14. Studies on cashew-based intercropping with pepper vines allows higher resource use efficiency. Trailing pepper on the stem and branches of mature cashew trees (i.e., greater than six years) is adopted in western India. Five to six years after planting the pepper with fairly good management and sufficient water resources,<sup>139</sup> a farmer can get 0.5kg of dry pepper per vine<sup>140</sup>.

15. Cashew trees can also be intercropped with other fruit trees, such as citrus, papaya, coconut. A study conducted in Sri Lanka on coconut and cashew intercropping shows no significant nutrient competition between the two crops<sup>141</sup>. Given that the trees have similar height, to avoid canopy competition, the density of cashew trees planted per hectare may be reduced, resulting in lower yields. Nevertheless, coconut/cashew intercropping increases the biodiversity on the land and reduces vulnerability to pests and diseases outbreaks and climate risks. By providing a different source of income to the farmer, the intercropping several fruit trees on the same land mitigates market risks.

16. In Brazil, in the later stages of cashew tree development, annual crops that were intercropped were replaced by pasture.

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<sup>137</sup> Case study – India – Cashew and Pineapple intercropping in West and South Garo Hills and Cashew: improvement, production and processing, editor Prof. P.L. Saroj, 2017

<sup>138</sup> Case study – India – Performance of ginger in cashew plantation (as intercrop)

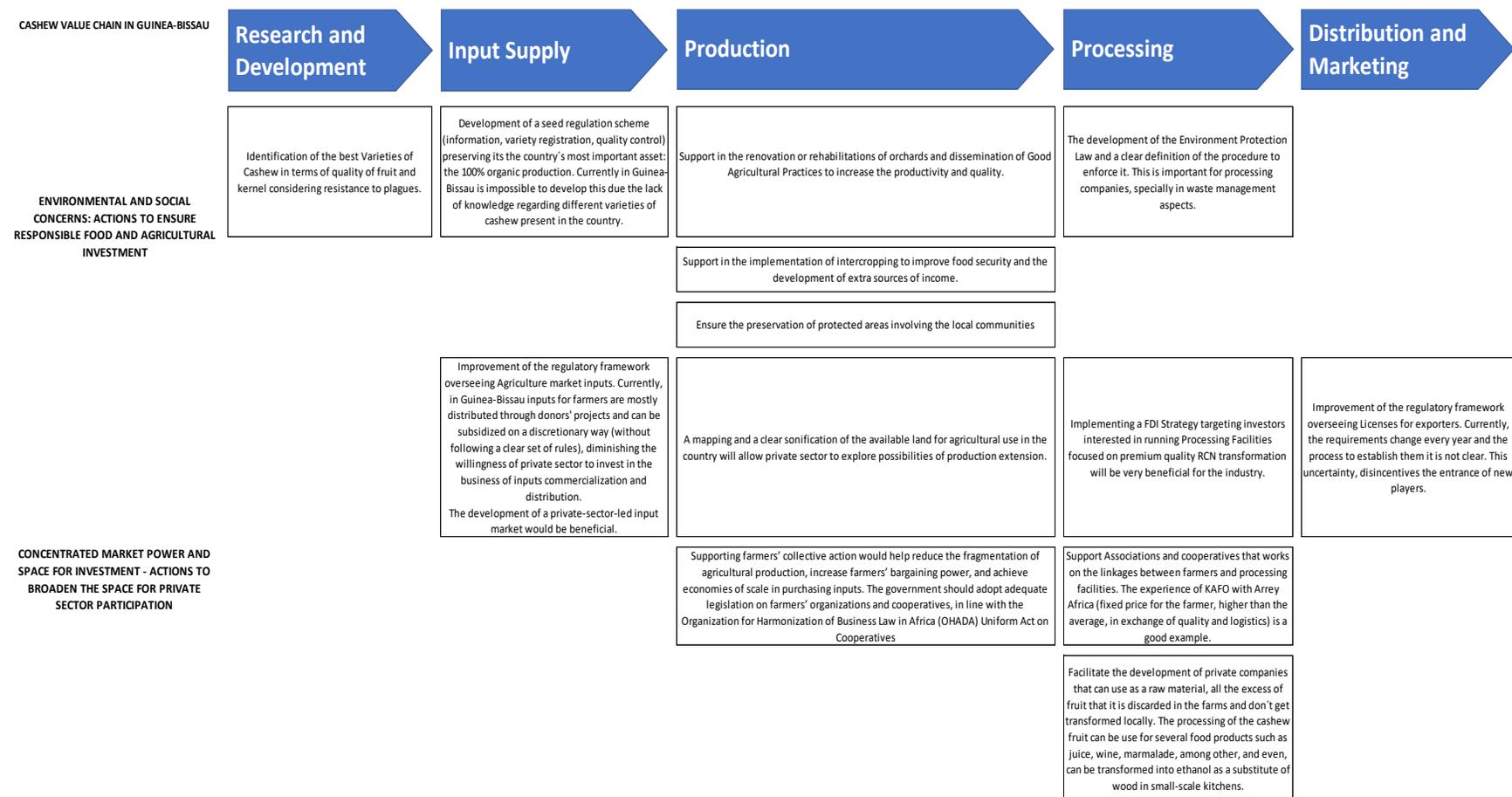
<sup>139</sup> Pepper requires around 2000mm of yearly rainfall that can be supplemented by irrigation.

<sup>140</sup> Cashew: improvement, production and processing, editor Prof. P.L. Saroj, 2017

<sup>141</sup> Case study – Sri Lanka – Technical feasibility of Coconut and Cashew intercropping system in Putalam district

## Annex 3 – Guinea-Bissau’s Cashew value chain analysis

Based on World Bank (2019), “Operationalizing Maximizing Finance for Development in the Agriculture and Food Sector, Guidance Note V1”





**CONSTRAINING PUBLIC POLICIES AND REGULATIONS: ACTIONS TO IMPROVE POLICY AND REGULATORY ENVIRONMENT**

Countries such as China, have been providing the country large amounts of inputs such as small and heavy machinery, via donations. This type of actions disincentives private sector participation in the inputs supply. Changing the scope of this donations, from the direct supply of inputs to the support (via seed capital, training, international contacts, etc.) in the development of local (even regional) suppliers companies will generate better incentives for the private sector to participate.

Reducing barriers to the dissemination of foreign technology and encourage private investment in technology generation

Reviewing the definition of the reference price for cashew purchasing at the farm level. Every year, the government determines a reference price though without clear links with international prices. For example, in 2018 the RCN reference price was 1000 CFA/kg and was enforced as a minimum price for several months leading to delays in the beginning of the campaign and lot of uncertainty in the industry as a whole. After the removal of this minimum price, the average price ended up being around 500 CFA/kg. To increase farmers' information about markets, the government should disseminate an RCN reference price that accurately reflects global RCN prices and without enforcing it as a minimum price. This would allow greater efficiencies in the transactions between farmers and buyers. A cashew price information system is being experimented with under the PRSPDA and could be extended.

Implementation of Land Policy ("Ley da Terra") to avoid conflicts on the use of land and to increase banks participation in financing the activity.

In 2019, the Government announced the removal of the export tax on kernel. If maintained over the years this would help foster the processing industry.

Setting-up a public, transparent and easy to access market information system that provide valuable information for producer's decision making such as price and weather conditions. First actions on this direction were made by the PRSPDA project through the provision of information via SMS, but there is still room for improvement.

Supporting local private banking system in financing farmers operation via different risk management tools such as credit guarantees. Warehouse receipts can help operators access lending from financial institutions secured against commodities deposited in storage facilities. This is particularly beneficial for farmers and small enterprises that are often unable to secure borrowing requirements due to lack of sufficient conventional loan collateral. Based on the analyses and technical assistance provided under the PRSPDA, the government may want to pass legislation covering agricultural warehousing receipts.



**HIGH TRANSACTION COSTS AND RISKS: OPPORTUNITIES FOR PUBLIC INVESTMENT TO INDUCE PRIVATE INVESTMENT**

Investment in roads, energy provision and communication infrastructure.

Support Associations and cooperatives that works on the linkages between farmers and processing facilities. The experience of KAFO with Arrey Africa (fixed price for the farmer, higher than the average, in exchange of quality and logistics) is a good example.

Implementation of a program focused on training the workforce needed by cashew transformation's facilities.

**LIMITED PUBLIC GOODS AND SERVICES**

Investment in INPA (Instituto Nacional de Pesquisa Agraria) for the development of all the R&D necessary to identify better cashew seeds varieties and the later transfer to the private sector companies in charge of seeds commercialization and services provision. Currently, INPA is working with very limited resources, not conducting long-term research and with barely no infrastructure in conditions.

Promoting links between INPA and private inputs providers.

Investment in the development of a national brand and a high-quality cashew nuts market research.

Investment in seaport's infrastructure and management improvements.

Support a strong quality and standards control mechanism.

## Annex 4 – Economic analysis on horizontal and vertical diversification in Guinea-Bissau

### *a. Background and Context*

1. Low diversification in the agricultural sector and similarly low levels of domestic RCN processing are significant obstacles for inclusive economic growth and sustainable development in Guinea Bissau. However, private investment and government initiative are both required. In that case, World Bank group’s approach to leverage finance through MFD can help to meet these goals with the limited public budget available and complementary donor support. Investing in diversifying the cashew sector both horizontally (i.e., intercropping with rice, millet, pineapple, mango and lime) and vertically (i.e., investing upward to the cashew value chain) can help to meet the SDGs in Guinea Bissau.
2. This economic analysis focuses on how investment through diversification can generate income, both on farm and off farm. The analysis assesses the potential of adopting market-based approaches in processing capacity for future aggregate economic benefits. Both horizontal and vertical diversification are considered into two separate models. The economic analysis applies simulation models to assess the impact of investment in cashew intercropping, as well as expanding RCN processing capacity. Due to scarce data from Guinea-Bissau, secondary data are used from the neighboring countries of Côte d’Ivoire, Ghana and Nigeria.

### *b. Methodology (horizontal diversification - intercropping)*

3. Since RCN has a comparative advantage in Guinea-Bissau’s economy, diversifying away from it is not economically efficient in the short to medium term. As such, the present analysis assesses intercropping as an incremental income option at the farm level. The aim here is to focus on selected crops that have the potential to be cultivated in Guinea-Bissau’s climate (i.e., crops that have a demonstrated comparative advantage, such as rice and mango). The model estimates how investing in rice and mango production, along with cashew, can generate household income over a 10-year horizon. The model is based on a comparison of with- and without-intervention to establish the incremental economic benefit for project implementation. The baseline model is used to indicate the current scenario of the cashew sector for a typical farm size of three ha. In the intensification/diversification model, two projections are made. First, an investment was made in better management practices, improved irrigation and better seed varieties to intensify cashew production and increase RCN yield. Second, a projection was made to investigate the expected earnings from intercropping on a portion of the existing cashew orchard (i.e., 20% of the farm for rice and 1% for mango). Due to scarce data from Guinea-Bissau, rice and mango production costs are computed from data sourced from Nigeria and Ghana.
4. On the cost side, the farmer production costs are calculated. For the baseline model, the costs side associate only with cashew production. In the diversification/intensification model, 79% of the farm area is projected to be in cashew production, while 20% is dedicated to rice production and the remaining 1% to mango production. RCN yield is assumed to increase due to the investments in better management practices, improved seed varieties and improved irrigation. In addition, intercropping can generate incremental benefits beyond cashew production. Studies show that intercropping can reduce the weed biomass and weeding period by 50%, compared to monocrop.<sup>142</sup> For the ease of the analysis, it is also assumed that intercropping accrues an increased yield compared to the baseline model for RCN production, due to these external benefits. However, there are costs associated with rice and mango

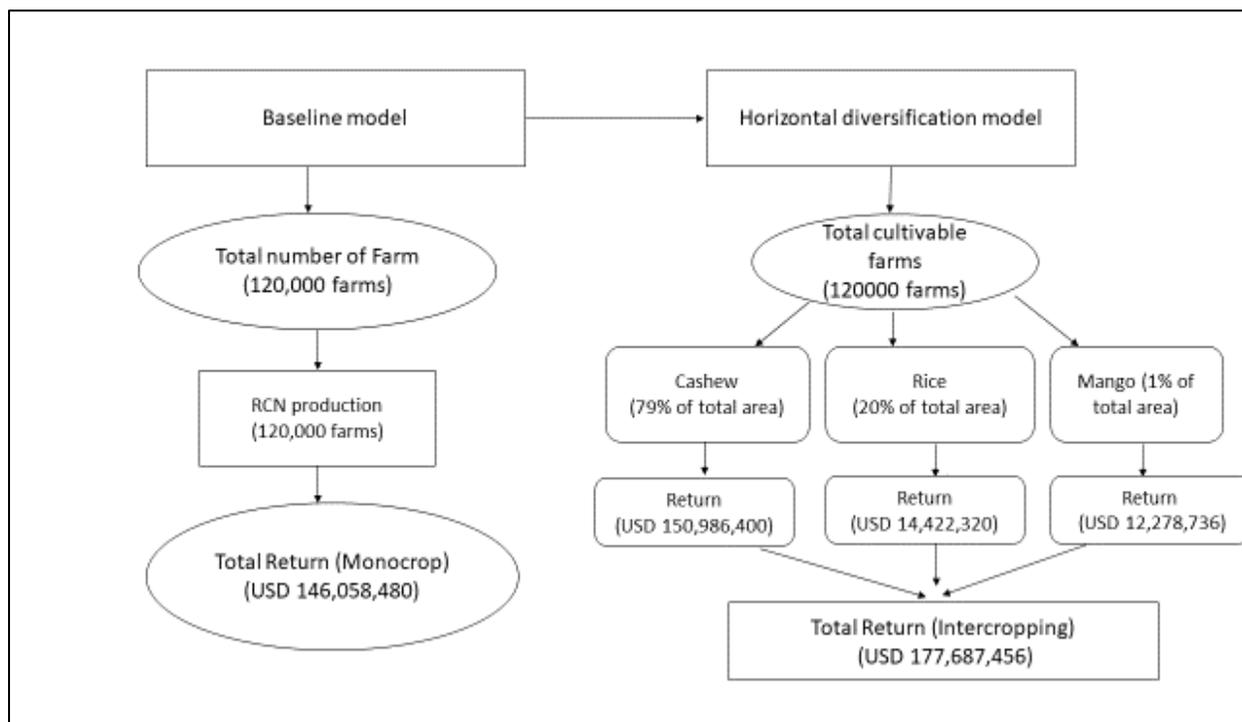
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<sup>142</sup> D. Kalaivanan and P.L. Saroj (2017)

production on land formerly dedicated to cashew orchard; the diversification/ intensification model takes these costs and investments into consideration. The models are initially formed for a farm level in Guinea-Bissau and then aggregated to the whole economy by multiplying by the total number of farms. Financing of public investment, capacity building or improvement of business climate has not been incorporated into the model but would otherwise be expected to enhance the outcomes. However, those costs are important but difficult to quantify. For this reason, the analysis is assumed to be conservative.

- In the baseline model, cashew is being produced in all available farms (Figure 1). In monocrop, the total return from cashew is projected to be USD 146,058,480. For the diversification model, the projection was made for Cashew (79% of total land), Rice (20% of total land) and Mango (1% of total land). Since the cost of production for cashew (3 Ha) land will remain the same for the reduced land allocated for cashew production (2.37 Ha) in intercropping, it is assumed that there will be an increase in total RCN production (due to a scope of investing in improved seed varieties, better management practices and better agricultural practices). The figure below demonstrates a comparison between the baseline model and diversification model.

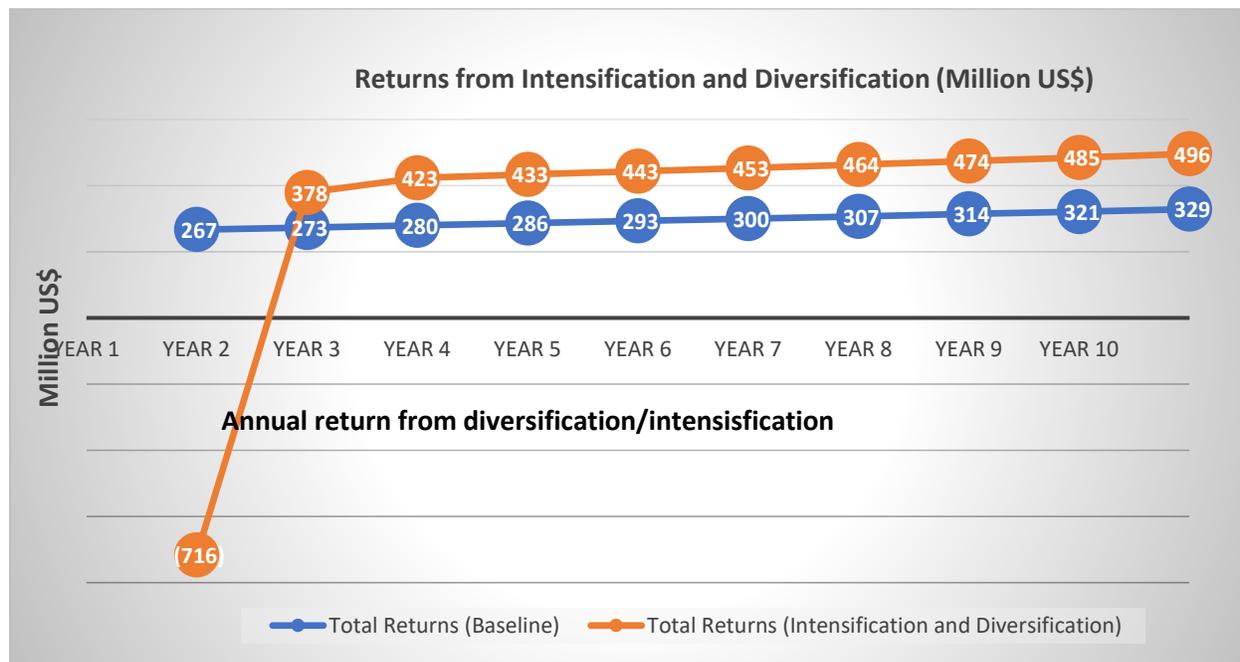
**Figure 1: Comparison between the baseline model and Diversification Model (Year 1)**



- Figure 1 illustrates that, in the baseline model, total agricultural returns are stemming from RCN production. For the intensification/ diversification model, cashew income is increasing due to a spike in RCN yield resulting from investing in better management practices, improved seed varieties and irrigation. Incomes are also generated from intercropping rice and mango. The illustration above shows that intercropping can increase total return from agriculture by 22%, compared to monocropping.
- Figure 2 illustrates the results from the simulation model of horizontal diversification. The projection was made over a 10-year horizon. At the beginning of the intervention, some initial costs are required for both

mango and rice production. For mango production, seedling cost is incurred during the first year of cultivation. In addition, there is a three-year waiting period to mango trees to reach maturity for the initial harvest. During this period, mango growers can't earn any revenue from mango production. This works as a negative externality among the mango growers. So, for producing mango, farmers forgo earnings from RCN production, due to the expected future returns from mango production. However, once the mango trees reach the harvesting period, the total return from mango cultivation is significantly high.

**Figure 2: Returns from Intensification and diversification**



8. Figure 2 suggests that during the first three years, returns from intercropping are less than the those from monocropping, due to fixed costs associated with both rice and mango production. For example, cultivation of mango requires upfront investment of USD 1000 per ha for seedlings. The projection indicates a rise in return starting in year three due to revenue from intercropping. In addition to these fixed costs, investment is also required for better management practices, improved seed varieties and irrigation technologies. Table 1 shows significant and robust returns for horizontal diversification. The sensitivity analysis indicates that despite price, cost or yield variations, returns are significantly high.

**Table 1: NPV and IRR from horizontal diversification**

Scenario	Baseline	10% producer price reduction	10% production cost increase	10% yield reduction
NPV (USD m.)	5,991	5,078	5,789	5,135
IRR (%)	57	49	55	49

*c. Methodology (Vertical diversification):*

9. Export revenue in Guinea-Bissau is generated from exporting RCN to India and Vietnam. There are some RCN processing plants in Guinea-Bissau; existing annual RCN processing capacity is some 22910 MT of RCN.<sup>143</sup> At present, only 10% of this existing processing capacity is being utilized. Foregone RCN processing into cashew kernel is a significant loss of potential income for the country. Full utilization of the existing processing capacity – and in fact expanding processing capacity – will require incremental fixed and variable costs. Investing upward in the cashew value chain can significantly improve export earnings of the economy. This analysis of vertical diversification assesses the simulation model for investing upward to the value chain. Table 2 depicts the current processing scenario in Guinea-Bissau. Only 10% of the existing processing capacity is being utilized in Guinea-Bissau. The aim of the vertical diversification economic analysis model is to investigate how investing in increased RCN processing capacity can generate economic benefit for the country.

**Table 2: Current processing scenario in Guinea-Bissau**

Category of processing plants	Capacity (MT/Year)	Capacity utilized (MT/Year)
11 medium-scale	20900 MT	2000 MT
6 small-scale	1270 MT	130 MT

Sources: PRSPDA

10. The analysis is focused on answering the following research questions:
- What profit margins can be achieved by investing in increased RCN processing capacity with medium and small processing plants?
  - What is the value addition to the economy by this intervention?
  - How does the investment increase the contribution of cashew in total GDP?
  - How does the revenue change in the economy due to investing in RCN processing?
  - How does increased RCN processing capacity contribute to the export earnings of Guinea- Bissau?
  - What is the IRR and NPV of investing in RCN processing?

The analysis considers two types of processing plants: medium and small capacity, semi-mechanized processing plants. The incremental benefits are shown with an increase in utilizing RCN processing capacity over a 10-year horizon. Table 3 details the scenarios for the development of RCN processing capacity. Increasing RCN processing capacity requires additional investment. The model also focuses on whether the investment is viable upon achieving efficiency over the time. Assumptions are made based on the available data for RCN processing plant in Guinea-Bissau. Data are also generated from Côte d'Ivoire's RCN processing plants. Appendix 1 details the underlying assumptions applied for the model.

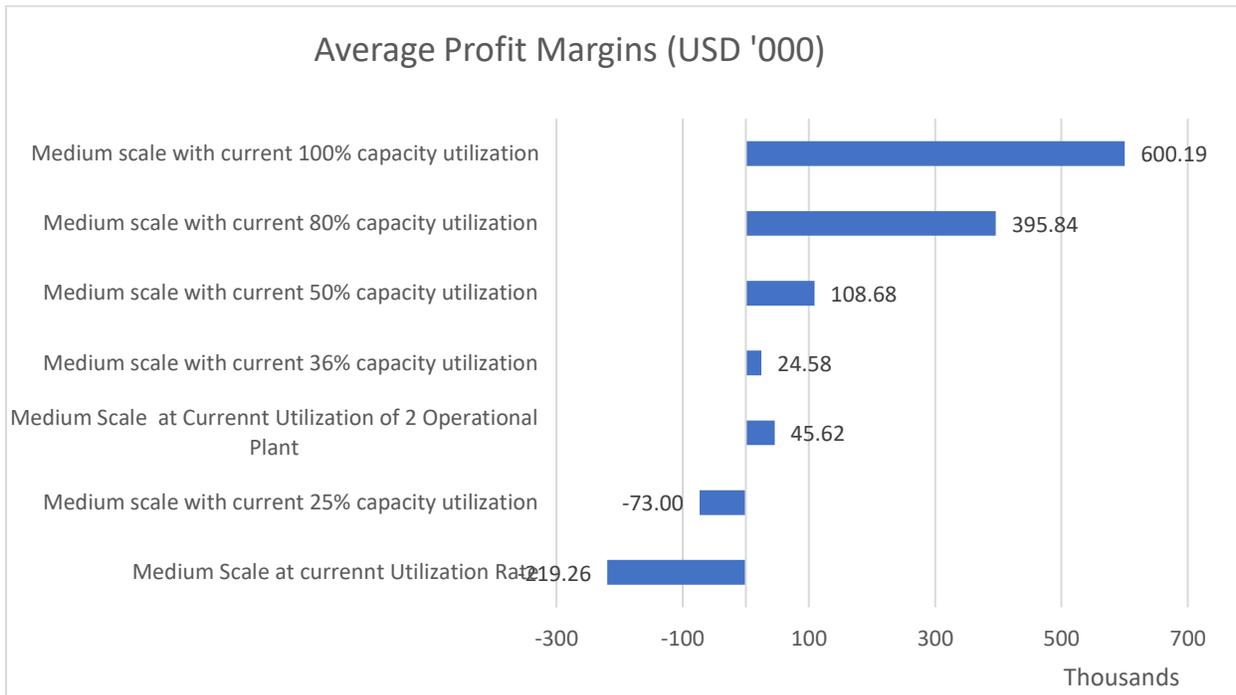
<sup>143</sup> Katarina Kahlmann and Melanie Kohn, "USDA/FAS Food for Progress LIFFT-Cashew," 2018.

**Table 3: Scenarios considered for medium and small semi-mechanized RCN processing plant**

Scenario 1: Medium semi- mechanized processing plant	Scenario 2: Small semi-mechanized processing plant)
h. utilizing 10% of total processing capacity.	f. utilizing 10% of total processing capacity.
i. utilizing 25% of total processing capacity.	g. utilizing 25% of total processing capacity.
j. utilizing processing capacity of currently operational processing plants (2 plants)	h. utilizing 50% of total processing capacity.
k. utilizing processing capacity of currently operational processing plants.	i. utilizing 80% of total processing capacity.
l. utilizing 50% of total processing capacity.	j. utilizing 100% of total processing capacity.
m. utilizing 80% of total processing capacity.	
n. utilizing 100% of total processing capacity.	

An investment is economically viable when the profit earned by the investment is positive. The analysis emphasizes the potential earnings on investing upward to the cashew value chain.

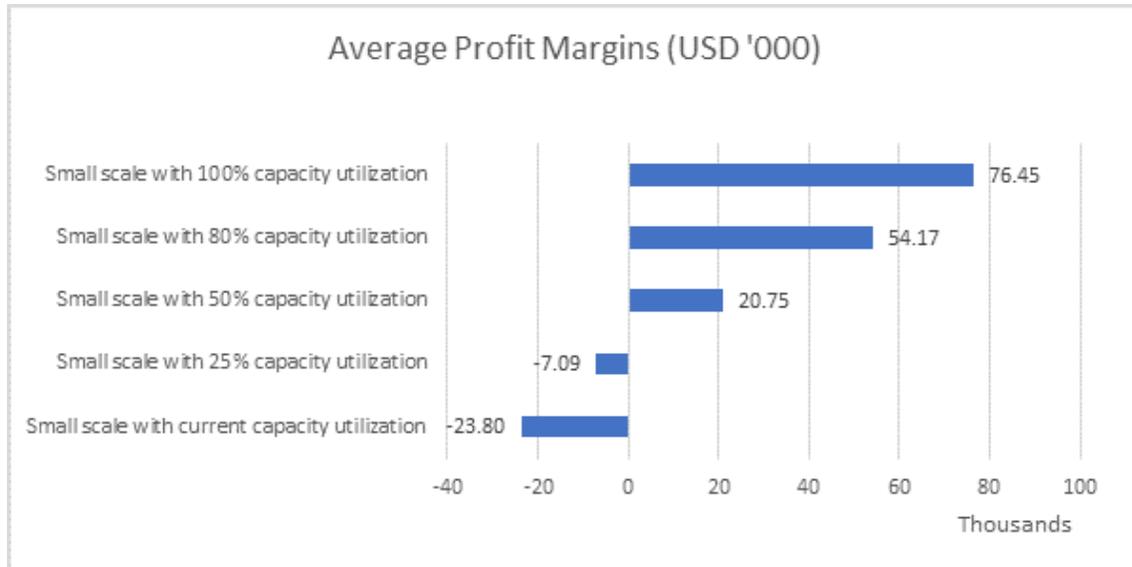
**Figure 3: Average profit margin (medium-scale RCN processing)**



11. Different scenarios are included to show how investing at different processing capacity levels can incrementally change the profit margins. Figure 3 suggests that, by utilizing the current processing capacity, the processing plants are accruing a negative profit margin. Logically, investment is not viable in existing processing capacity because the investment made for the processing plants is huge compared to the revenue. Now, if investment is made to increase the processing capacity of a medium semi-mechanized processing plant to utilize 25% of the processing capacity for all the 11 existing processing plants, then net profit is still negative. The figure shows that the existing processing plants in Guinea-Bissau can make profit by at least utilizing 36% of the total processing capacity. In addition, by utilizing 50% of the processing capacity, the average profit margin can reach USD 108,000 annually. In terms of

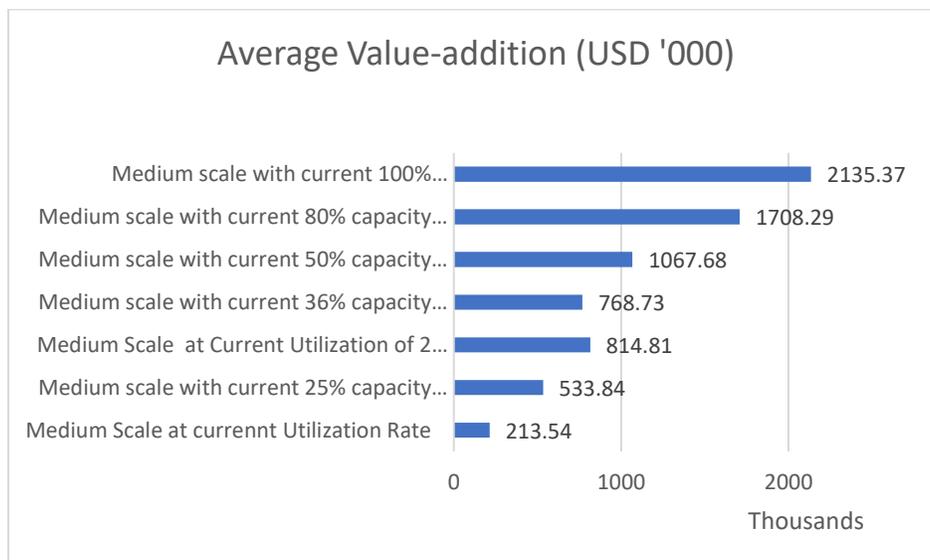
the small semi-mechanized plants, the average annual profit margin can reach up to USD 20,750. Utilizing 100% percent of the processing capacity can increase the profit margin up to USD 76,450 (Fig. 4).

**Figure 4: Average profit margin (small-scale RCN processing)**



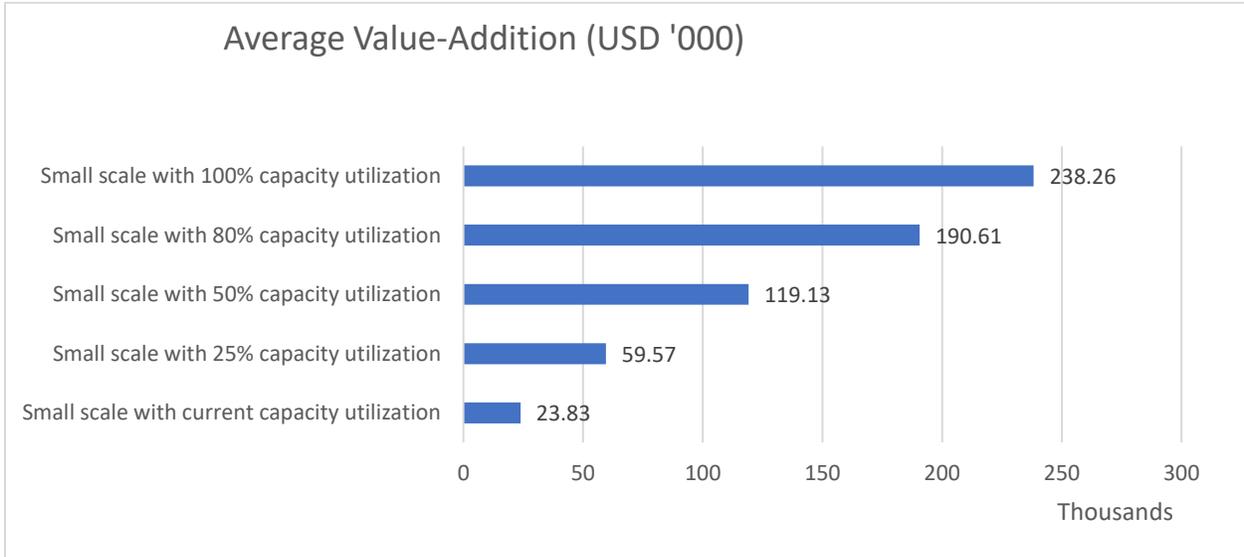
12. Processing RCN into cashew kernel also adds value to the economy. Figure 5 suggests that the annual value addition for medium-scale processing plants utilizing the current capacity is USD 213,540. However, if the processing capacity can be increased by utilizing 50% of the capacity, the value addition can increase significantly. Figure 5 shows that utilizing 50% of the processing capacity on average can add USD 1,067,000 while utilizing 80% of the total processing capacity can increase the value addition to USD 1,708,000 for medium-scale, semi-mechanized processing plants.

**Figure 5: Average Value-Addition (medium-scale RCN processing)**



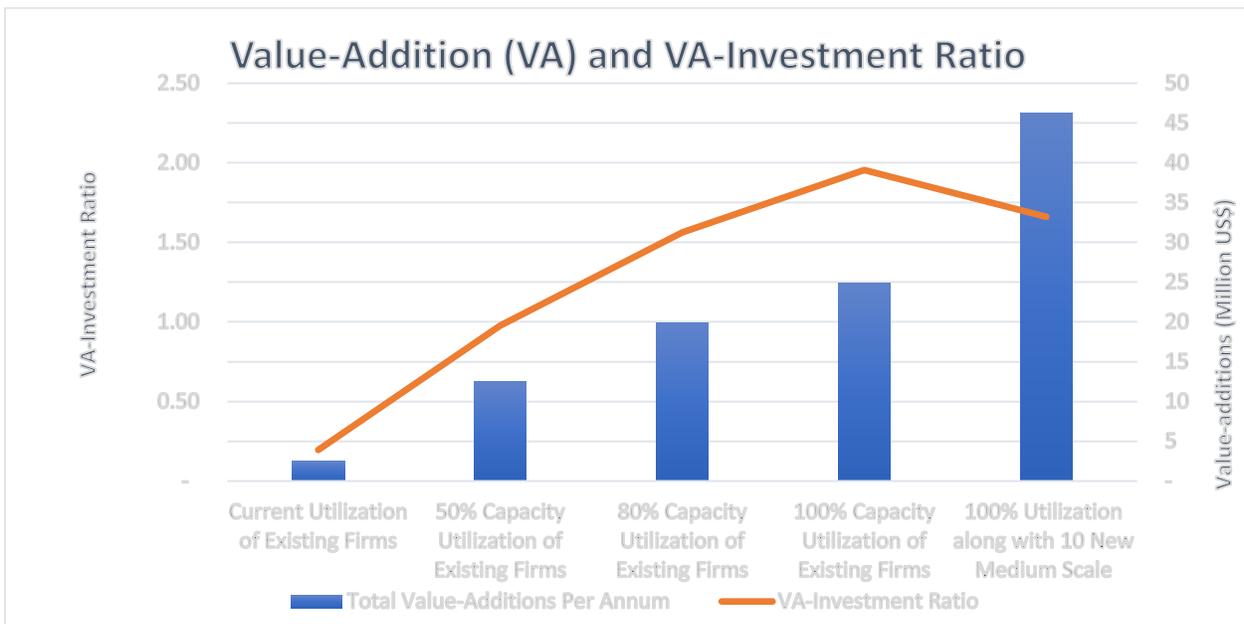
13. In terms of the small-scale, semi-mechanized RCN processing plants, the value addition is low. Figure 6 suggests that utilizing 50% of the processing capacity can raise the value addition to USD 119,130, whereas utilizing 80% of the capacity can increase the value addition to USD 190,000.

**Figure 6: Average Value- Addition (Small Processing Plant)**



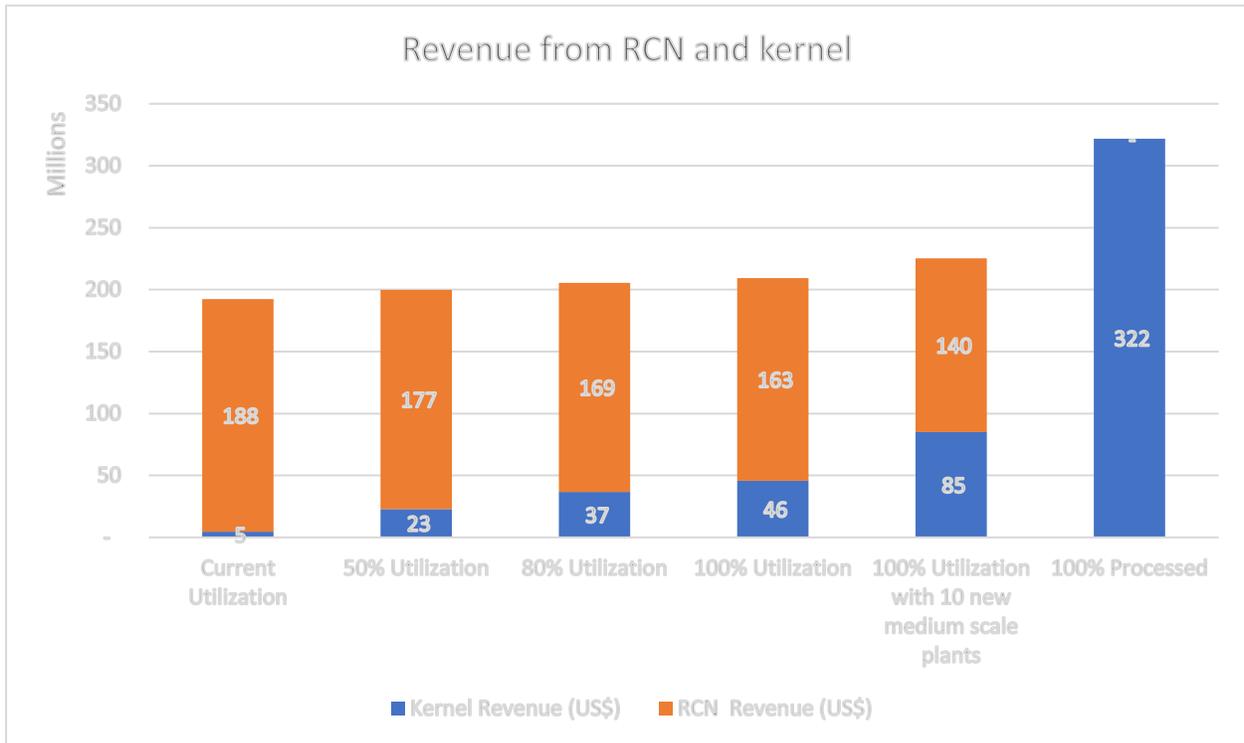
14. Figure 7 suggests that investment in RCN processing capacity and average value addition has a positive correlation in the economy. Higher investment for utilizing more of the processing capacity can increase the value addition, and total value addition per year increases due to an increased investment in processing.

**Figure 7: Value-Addition and VA Investment Ratio**



15. Results from the simulation suggest that when processing capacity utilization is low, revenue from cashew is mostly generated from RCN. With an increase in processing capacity utilization, revenue from kernel increases relative to that for RCN. The simulation suggests more revenue can be accrued over time if processing capacity is increased (Fig. 8).

**Figure 8: Changes in Revenue due to processing capacity utilization**



16. To investigate if increased investment in RCN processing capacity has a positive return, NPV and IRR have been computed. The NPV shows the stream of net benefits for different processing capacity utilization. The NPV is positive when at least 50% of the RCN processing capacity for medium- and small-scale processing plants are utilized (Table 3). The IRR has been computed for each category of processing capacity utilization. The incremental IRR is 16% and 14% for medium- and small-scale processing plant, respectively, at 50% capacity utilization.

**Table 3: NPV/ IRR – Medium- and small-scale RCN processing**

Scenarios	NPV	IRR
With USD 1 m. Investment		
Medium Scale - current utilization	(2,079,448)	
Medium scale - 25% capacity utilization	(1,000,671)	
Medium scale - 50% capacity utilization	330,353	16%
Medium scale - 80% capacity utilization	2,443,826	46%
Medium scale - 100% capacity utilization	3,951,063	67%
With USD 232,000 Investment		
Small scale - current capacity utilization	(280,188)	
Small scale - 25% capacity utilization	(156,960)	-7%
Small scale - 50% capacity utilization	48,418	14%
Small scale - 80% capacity utilization	294,873	31%
Small scale - 100% capacity utilization	459,176	41%

17. The sensitivity analysis was carried out to investigate what impact would be made if the cost of raw materials (RCN) is increased by 10% and the price of cashew kernel is reduced by 10%. Results from the sensitivity analysis suggest that the investment has a positive return if 80% of the total RCN processing capacity is utilized.

**Table 4: Sensitivity Analysis**

Scenarios	Baseline Vertical diversification		Cashew Kernel price reduced 10%		Raw materials cost increased 10%	
	NPV	IRR	NPV	IRR	NPV	IRR
<b>Medium-scale:</b>						
Current Utilization	(2,079,448)		(2,332,663)		(2,474,698)	
Current Utilization 2	(128,067)	8%	(1,094,284)		(1,636,261)	
25% capacity utilization	(1,000,671)		(1,633,710)		(1,988,798)	
36% capacity utilization	(283,260)	4%	(1,194,836)		(1,706,162)	
50% capacity utilization	330,353	16%	(935,725)	26%	(1,645,900)	
80% capacity utilization	2,443,826	46%	418,101	17%	(718,180)	-8%
100% capacity utilization	3,951,063	67%	1,418,907	32%	(1,444)	10%
<b>Small-scale:</b>						
Current capacity utilization	(280,188)		(308,441)		(324,289)	
25% capacity utilization	(156,960)	-7%	(227,594)		(267,214)	
50% capacity utilization	48,418	14%	(92,849)	1%	(172,090)	10%
80% capacity utilization	294,873	31%	68,845	15%	(57,940)	5%
100% capacity utilization	459,176	41%	176,641	23%	18,160	11%

## Appendix 1

### Model Assumptions

Assumptions used in this analysis				
No	Subject	Unit	Rate	Source
1	Exchange Rate	CFA/US\$	588	By using current exchange rate
	Cashew production cost	US\$/Ha		PSPDA (Guinea-Bissau Cashew Value chain and Competitiveness)
2	Horizontal diversification			
	Rice			
	Production cost of RCN	US\$		Based on the study “Guinea-Bissau Cashew Value chain and Competitiveness” by TECHNOSERVE
	Rice (Yield)	MT		Based on the concept note of the ASA
	Rice production cost	US\$		Based on Nigeria rice production cost from “Cost and return analysis in small scale rice production in Cross River State, Nigeria”.
	Farmgate price	US\$		Based on farmgate price of rice/kg of Cote D’Ivoire.
	Mango			
	Mango yield	MT		Based on the concept note of the ASA
	Production costs of mango	US\$		IDH study for Ghana mango production “
	Mango farmgate price	US\$		Using mango farmgate price from Cote D’Ivoire.
3.	Vertical diversification			
3.1	Capacity and yield			
	Installation capacity	MT		Based on the study “Guinea-Bissau Cashew Value chain and Competitiveness” by TECHNOSERVE. Used the average capacity of 11 existing medium scale processing plants in Guinea Bissau.
	Capacity Utilized	MT		Based on the study “Guinea-Bissau Cashew Value chain and Competitiveness” by TECHNOSERVE
	Kernel Yield (Whole and broken)			Cashew processing value chain study of Cote D’Ivoire

	Kernel average sale prices (Whole and Broken)	US\$		Based on the study “Guinea-Bissau Cashew Value chain and Competitiveness” by TECHNOSERVE. Used the average capacity of 11 existing medium scale processing plants in Guinea Bissau
<b>3.2</b>	<b>Total capital cost</b>			
	Contingency Mechanized /medium Semi Mech	%	10	
	Small Semi Mech & Manual	%	5	
	Land and Building			Cashew processing value chain study of Cote D’Ivoire
	Equipment needed			Cashew processing value chain study of Cote D’Ivoire
	Building cost			Cashew processing value chain study of Cote D’Ivoire
	IRR			Calculated from day 1 of period
<b>3.2</b>	<b>Fixed cost</b>			
*	Fixed salaries			Based on the
*	Depreciation			
<b>3.3</b>	<b>Variable cost</b>			
	Raw materials	US\$		Based on the study “Guinea-Bissau Cashew Value chain and Competitiveness” by TECHNOSERVE.
	Trucking to processing plant	US\$		Estimates based on Cote D’Ivoire value chain study
	Electricity cost	kw/h	0.162	Estimates based on Cote D’Ivoire value chain study
	labor costs	US\$/Month	104	As per legislation
	Worker Training/ Indian/Vietnamese trainers	Trainer US\$/P.A.	20000	Estimates based on Cote D’Ivoire value chain study
	Road haulage to port for kernels	US\$/Ton	60	Estimates based on Cote D’Ivoire value chain study
	Export costs shipping kernels to FOB Port	US\$/Ton	60	Based on the study “Guinea-Bissau Cashew Value chain and Competitiveness” by TECHNOSERVE.
	Export quality control	US\$/Ton	25	Based on researched
	Insurance - cargo & product	%	0.25	High end basis quotations
	Consumables - RCN Jute Bags	\$/bag	1	Cost of one jut bag distributed to farmers and used for raw material storage

	Consumables- Kernels Packaging & gas	\$/carton	1.5	Estimates based on Cote D'Ivoire value chain study
	Consumables - machines, spare parts			Estimated based on experience of other countries.
	Insurance - buildings & staff	%	0.2	
	Supply Chain Management	US\$	Lumpsum	Estimates based on Cote D'Ivoire value chain study
	arrangement	US\$	Lumpsum	
	Bank charges export orders	US\$/container	150	Charge for handling export shipping documents assuming CAD terms
	External Management	US\$	Lumpsum	

#### Note 1

##### Nature of the scenario

Since cashew has a comparative advantage in GB's economy, diversifying away from cashew is not an economically efficient option. The analysis will assess the manner in which intercropping can generate incremental income for farmers. The aim here is to focus on selected crops (rice and mango) that have potential to be cultivated in GB's climate.

#### Note 2

##### Use of the scenario

The aim of this analysis is to indicate how intercropping cashew with rice and mango can generate household income within a time frame of 10 years. The analysis also shows, due to intercropping there is no significant change in earning from raw cashew nut (RCN).

#### Note 3

##### Cost and income from intercropping with rice

Since we do not have adequate data, we looked for data from countries that have similar background (e.g., Nigeria) and is investing in intercropping. We used the production cost and income for producing rice intercropped with cashew in 20% of a cashew farm.

#### Note 4

##### Cost and income from intercropping with mango

Since we do not have adequate data, we looked for data that have similar background (e.g., Cote Ivoire) and is investing in intercropping. We used the production cost and income for producing mango intercropped with cashew in 1% of a cashew farm.

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