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Report No: PAD2496

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US\$400 MILLION

TO THE

PEOPLES' REPUBLIC OF CHINA

FOR A

CHINA FOOD SAFETY IMPROVEMENT PROJECT

MARCH 4, 2021

Agriculture and Food Global Practice  
East Asia and Pacific Region

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## CURRENCY EQUIVALENTS

(Exchange Rate Effective February 1, 2021)

Currency Unit = Chinese Yuan (CNY)

CNY 6.5 CNY = US\$1

## FISCAL YEAR

January 1 – December 31

## ABBREVIATIONS AND ACRONYMS

AMR	Antimicrobial Resistance
APR	Annual Percentage Rate
ASF	African Swine Fever
CAC	Codex Alimentarius Commission
CAIQ	Chinese Academy for Inspection and Quarantine
CBIRC	China Banking and Insurance Regulatory Commission
CIQA	China Entry-Exit Inspection and Quarantine Association
CO2e	Carbon Dioxide equivalent
COVID-19	Coronavirus Disease 2019
CPF	Country Partnership Framework
DA	Designated Account
DARA	Department of Agriculture and Rural Affairs
DHE	Dragonhead Enterprises
DOF	Department of Finance
DRC	Department of Development and Reforms
E&S	Environmental & Social
EID	Emerging Infectious Disease
ERR	Economic Rate of Return
ESMF	Environmental and Social Management Framework
ESMS	Environmental and Social Management System
EU	European Union
EX-ACT	Ex Ante Carbon- balance Tool
FAO	Food and Agriculture Organization
FFSA	Finnish Food Safety Agency
FIRR	Financial Internal Rate of Return
FM	Financial Management
FSL	Food Safety Law
FSR	Feasibility Study Report
GAP	Good Agricultural Practices

GDP	Gross Domestic Product
GHG	Greenhouse Gas
GHP	Good Hygiene Practices
GLEAM	Global Livestock Environment Assessment Model
GMP	Good Manufacturing Practices
GRM	Grievance Redress Mechanism
HACCP	Hazard Analysis and Critical Control Points
IBRD	International Bank for Reconstruction and Development
ICT	Information and Communication Technology
IFC	International Finance Corporation
IFR	interim financial reports
IPM	Integrated Pest Management
LOC	Line of Credit
LPR	Loan Prime Rate
LQSAP	Law on Quality and Safety of Agriculture Products
M&E	Monitoring and Evaluation
MARA	Ministry of Agriculture and Rural Areas
MFD	Maximizing Finance for Development
MIS	Management Information System
MOF	Ministry of Finance
NBBL	National Biosecurity and Biosafety Law
NDC	Nationally Determined Contributions
NDRC	National Development and Reform Commission
NFGA	National Forestry and Grassland Administration
NHC	National Health Commission
NPL	Non-Performing Loans
NPM	Non-Pesticide Management
OIE	World Organization for Animal Health
PBOC	People's Bank of China
PCM	Private Capital Mobilization
PDO	Project Development Objective
PFI	Participating Financial Institution
PIU	Project Implementation Unit
PLG	Project Leading Group
PMO	Project Management Office
POM	Project Operations Manual
PPSD	Project Procurement Strategy for Development
QSTTA	Quality Standard and Testing Technology for Agro-products
RPF	Resettlement Policy Framework
RRS	Rural Revitalization Strategy
RSF	Risk Share Facility
SA	Stakeholder Assessment
SAMR	State Administration for Market Regulation

SAR	Special Administrative Region
SDG	Sustainable Development Goal
SME	Small and Medium Enterprise
SMEs	Micro, Small, and Medium Enterprises
SPS	Sanitary and Phytosanitary
ToC	Theory of Change
TSP	Third-party Service Provider
USA	United States of America
USFDA	United States Food and Drug Administration
WA	Withdrawal Application
WHO	World Health Organization
WPL	Wildlife Protection Law
WTO	World Trade Organization

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## DATASHEET

### BASIC INFORMATION

Country(ies)	Project Name	
China	China Food Safety Improvement Project	
Project ID	Financing Instrument	Environmental Assessment Category
P162178	Investment Project Financing	B-Partial Assessment

### Financing & Implementation Modalities

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Performance-Based Conditions (PBCs)	<input type="checkbox"/> Small State(s)
<input checked="" type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	<input type="checkbox"/> Hands-on Enhanced Implementation Support (HEIS)

Expected Approval Date	Expected Closing Date
25-Mar-2021	30-Jun-2027

Bank/IFC Collaboration

No

### Proposed Development Objective(s)

The PDO of the proposed project is to improve food safety management at the national and targeted subnational levels and reduce food safety risks in selected value chains

### Components

Component Name	Cost (US\$, millions)



Institution Building and Regulatory Performance	59.40
Food Safety Supervision Process	157.90
Whole Value Chain Food Safety Control	161.50
Project Implementation Support	21.10

## Organizations

Borrower:	People's Republic of China
Implementing Agency:	State Administration for Market Regulation Guangdong Provincial Department of Agriculture and Rural Affairs Ministry of Agriculture and Rural Affairs Yantai Municipal Ocean Development and Fishery Bureau

## PROJECT FINANCING DATA (US\$, Millions)

### SUMMARY

Total Project Cost	735.00
Total Financing	735.00
of which IBRD/IDA	400.00
Financing Gap	0.00

### DETAILS

#### World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	400.00
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#### Non-World Bank Group Financing

Counterpart Funding	85.00
Borrower/Recipient	85.00
Commercial Financing	250.00
Unguaranteed Commercial Financing	250.00

#### Expected Disbursements (in US\$, Millions)



WB Fiscal Year	2021	2022	2023	2024	2025	2026	2027
Annual	0.00	20.00	50.00	100.00	100.00	80.00	50.00
Cumulative	0.00	20.00	70.00	170.00	270.00	350.00	400.00

## INSTITUTIONAL DATA

### Practice Area (Lead)

Agriculture and Food

### Contributing Practice Areas

### Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

## SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	● Moderate
2. Macroeconomic	● Moderate
3. Sector Strategies and Policies	● Substantial
4. Technical Design of Project or Program	● Substantial
5. Institutional Capacity for Implementation and Sustainability	● Substantial
6. Fiduciary	● Substantial
7. Environment and Social	● Substantial
8. Stakeholders	● Moderate
9. Other	● Moderate
10. Overall	● Substantial



## COMPLIANCE

### Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes    [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes    [✓] No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03	✓	
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36	✓	
Pest Management OP 4.09	✓	
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10	✓	
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37	✓	
Projects on International Waterways OP/BP 7.50	✓	
Projects in Disputed Areas OP/BP 7.60	✓	

### Legal Covenants

#### Sections and Description

Institutional Arrangements (national level)

Loan Agreement (LA), Schedule 2, Section I.B:

1. The Borrower shall ensure that National Project Steering Group is maintained for providing overall leadership, coordination, policy and institutional guidance on Project implementation.
2. The Borrower shall, through SAMR: (a) maintain: (i) a Project leading group; (ii) the Project Management Office-SAMR; (iii) the Project Implementation Units-SAMR; and (iv) a technical expert group; and (b) enter into an Implementation Agreement with each of the Project Implementation Units-SAMR on terms and conditions acceptable to the Bank.
3. The Borrower shall, through MARA: (a) maintain: (i) the Project Management Office-MARA; (ii) the Project



Implementation Units-MARA; and (iii) a technical expert group; and (b) enter into an Implementation Agreement with the Project Implementation Units-MARA on terms and conditions acceptable to the Bank.

**Sections and Description****Institutional Arrangements (Guangdong)**

Project Agreement (PA), Schedule, Section I.A.1: Guangdong Province shall maintain: (a) a steering group at the provincial level supported by DARA; (b) the Provincial Project Leading Group; (c) the Provincial Project Management Office; and (d) the Provincial Project Implementation Units.

**Sections and Description****Safeguards**

LA, Schedule 2, Section I.D, PAs, Schedule, Section I.C: The Borrower, through MARA and SAMR, and the Project Implementing Entities shall: (a) implement the Safeguards Instruments in a manner and substance acceptable to the Bank; (b) ensure that each contract for works financed under the Project includes the obligations of the work contractors and any sub-contractor to comply with the relevant provisions of the Safeguards Instruments, as the case may be; (c) ensure that all studies and technical assistance to be supported under the Project are carried out under terms of reference acceptable to the Bank, and that such terms of reference are consistent with, and pay due attention to, the Bank's Safeguards Policies; (d) maintain policies and procedures adequate to enable them to monitor and evaluate, in accordance with guidelines acceptable to the Bank, the implementation of the Safeguards Instruments applicable to the Project; and (e) take, all measures necessary on their part to regularly collect, compile, and submit to the Bank, as part of the Project Reports, and promptly in a separate report whenever the circumstances warrant, information on the status of compliance with the Safeguards Instruments applicable to the Project.

**Sections and Description****Institutional Arrangements (Shandong)**

PA, Schedule, Section I.A.1: Shandong Province shall, and shall cause Yantai Municipality to maintain: (a) a steering group to be supported by DARA at the provincial level; (b) the Municipal Project Leading Group; and (c) the Municipal Project Management Office.

**Sections and Description****Annual Work Plans**

LA, Schedule 2, Section I.C.1, PAs, Schedule, Section I.B.1 : The Borrower shall, through MARA and SAMR, and the Project Implementing Entities shall: (a) prepare and furnish to the Bank by October 31 in each year, starting in 2021, a draft Annual Work Plan for review and comment, summarizing the implementation progress of the Project for the said year and the activities for the Project to be undertaken in the following calendar year, including the proposed annual budget for the Project; (b) taking into account the Bank's comments, finalize and furnish to the Bank no later than December 31 in each year, starting in 2021, the Annual Work Plan, acceptable to the Bank; and (c) thereafter ensure the implementation of the Project during the following calendar year in accordance with the Annual Work Plan agreed with the Bank and in a manner acceptable to the Bank.



## Sections and Description

## Project Operations Manual

LA, Schedule 2, Section I.C.2, PAs, Schedule, Section I.B.2: The Borrower, through MARA and SAMR, and the Project Implementing Entities shall apply throughout the implementation of their Respective Part of the Project, the Project Operations Manual in a timely and efficient manner acceptable to the Bank.

## Sections and Description

## Mid-term Review

LA, Schedule 2, Section II.2, PAs, Schedule, Section II.2 : the Borrower, through MARA and SAMR, and the Project Implementing Entities shall prepare, under terms of reference acceptable to the Bank, and furnish to the Bank no later than July 1, 2024, a consolidated mid-term review report for the Project, summarizing the results of the monitoring and evaluation activities carried out from the inception of the Project, and setting out the measures recommended to ensure the efficient completion of the Project and to further the objectives thereof.

## Sections and Description

## Line of Credit (Shandong)

PA, Schedule, Section I.D: Shandong Province shall, and shall cause Yantai Municipality to: shall, and shall cause Yantai Municipality to: (a) select PFIs to participate in the line of credit facility under Part 3.1 (a) of the Project, in accordance with eligibility criteria acceptable to the Bank and set forth in the Project Operations Manual; (b) ensure that the PFIs select the Eligible Beneficiaries to receive Sub-loans in accordance with eligibility criteria acceptable to the Bank and set forth in the Line of Credit Manual; (c) deposit in local currency with the selected PFI(s) the equivalent of the proceeds of Portion C of the Loan (or such other portion of the Loan allocated from time to time to Category (3) in Section III.A of Schedule 2 to the Loan Agreement), under the terms of a Subsidiary Loan Agreement to be entered into between Yantai Municipality and the respective PFI, under terms and conditions acceptable to the Bank and set forth in the Line of Credit Manual; (d) monitor the overall execution of Part 3.1 (a) of the Project in accordance with the provisions of the Project Agreement, ensure that the PFIs adhere to the provisions of their respective Subsidiary Loan Agreements in the implementation of Part 3.1 (a) of the Project, and not take or permit to be taken any action which would prevent or interfere with such performance; and (e) exercise its rights under every Subsidiary Loan Agreement in such manner as to protect the interests of the Borrower and the Bank and to accomplish the purposes of the Loan, and, except as the Bank shall otherwise agree, not assign, amend, abrogate or waive any such agreement(s) or any provision thereof.

## Sections and Description

## Risk Sharing Facility (Guangdong)

PA, Schedule, Section I.D: Guangdong Province shall: (a) select PFIs to participate in the RSF under Part 3.1 (b) of the Project, in accordance with eligibility criteria acceptable to the Bank and set forth in the RSF Manual; (b) enter into a Risk Sharing Agreement, in form and substance acceptable to the Bank, with each PFI; (c) ensure that: (i) the RSF Account is established and managed in accordance with the provisions of the Project Agreement; (ii) proposals for partial credit guarantees under the RSF submitted by PFIs for loans (on a portfolio or individual



basis, as the case may be) for Food Safety Sub-projects are reviewed and appraised in accordance with the provisions of the Project Agreement, the RSF Manual and the ESMF; and (iii) the portfolio of loans of each PFI covered by the Risk Sharing Agreement is periodically assessed, monitored and evaluated in accordance with the RSF Manual; (d) ensure that under each Risk Sharing Agreement each PFI is required to comply with the provisions in sub-paragraph (d) of Section I.D of the Schedule to the PA; and (e) ensure for its own account and for each PFI that Part 3.1 (b) of the Project is carried out in accordance with the provisions of the Anti-Corruption Guidelines.

#### Sections and Description

##### Food Safety Insurance (Guangdong)

PA, Schedule, Section I.E: Guangdong Province shall ensure that Food Safety Insurance Beneficiaries be provided with insurance coverage in respect of selected production, business continuity, and consumer liability risks, in accordance with eligibility criteria and procedures acceptable to the Bank and further elaborated in the Insurance Manual.

#### Conditions

Type	Description
Effectiveness	LA, Article IV, Section 4.01 : MARA, SAMR and each of the Project Implementing Entities have adopted the respective Project Operations Manual, in form and substance acceptable to the Bank.
Disbursement	<p>LA, Schedule 2, Section III.B.1(b): For Sub-loans under Category (3) in respect of an individual PFI, until and unless: (i) Yantai Municipality has: (A) adopted the Line of Credit Manual, in form and substance acceptable to the Bank, and incorporated said manual in its Project Operations Manual; and (B) hired an agency having experience and qualifications in the relevant technical fields, acceptable to the Bank, and under terms of reference, acceptable to the Bank, to support Yantai Municipality in carrying out Part 3.1 (a) of the Project; (ii) the Subsidiary Loan Agreement has been entered into between Yantai Municipality with such PFI, and all conditions precedent to its effectiveness (other than the disbursement of the proceeds of the Loan in respect of such PFI) have been fulfilled; and (iii) such PFI has adopted its ESMS in form and substance acceptable to the Bank.</p> <p>LA, Schedule 2, Section III.B.1 (c): For Loss Coverage under Category (4) until and unless: (i) Guangdong Province has: (A) adopted the RSF Manual, in form and substance acceptable to the Bank, and incorporated said manual in its Project Operations Manual; and (B) hired an agency having experience and qualifications in the relevant technical fields, acceptable to the Bank, and under terms of reference, acceptable to the Bank, to support Guangdong Province in carrying out Part 3.1 (b) of the Project; and (ii) in respect of an individual PFI until and unless: (A) the Risk Sharing Agreement has been entered into between Guangdong Province</p>



with such PFI, and all conditions precedent to its effectiveness (other than the disbursement of the proceeds of the Loan in respect of such PFI) have been fulfilled; and (B) such PFI has adopted its ESMS in form and substance acceptable to the Bank.

LA, Schedule, Section III.B.1(d): For Insurance Premia under Category (5) until and unless: (i) Guangdong Province has: (A) adopted the Insurance Manual, in form and substance acceptable to the Bank, and incorporated said manual in its Project Operations Manual; and (B) hired an agency having experience and qualifications in the relevant technical fields, acceptable to the Bank, and under terms of reference, acceptable to the Bank, to support Yantai Municipality in carrying out Part 3.2 of the Project; and (ii) the Food Safety Insurers are offering product(s) for insurance coverage duly approved pursuant to the laws of the Borrower and covering selected risks agreed with the Bank



## I. STRATEGIC CONTEXT

### A. Country Context

1. **China's development has entered a new phase.** Double-digit annual growth based on resource-intensive manufacturing, exports, and cheap labor has largely reached its limits and led to economic, social, and environmental imbalances. Reducing these imbalances requires shifting the economy's structure from low-end to higher-end manufacturing and services and from investment to consumption. China's key medium-term challenge is to manage an orderly transition to slower but more balanced, equitable, and environmentally sustainable growth. This requires the development of institutions that support more environmentally conscious, market-driven, and productive growth.
2. **After a deep fall in output and incomes during the first half of 2020 triggered by the COVID-19 pandemic, in recent months China's economy returned to pre-crisis rates of growth.** GDP growth was 2.3 percent for the year although the recovery has been uneven so far. China's COVID-19 economic policy response has been weighted towards supporting firms and banks and encouraging public investment. In relative terms, direct transfers to households have been limited. As a result, China's effort to shift from investment to consumption has been reversed, at least temporarily and external imbalances have increased. COVID-19 has also exposed critical structural weaknesses that will require persistent efforts to overcome. While China brought COVID-19 mostly under control within the first few months (and subsequent local flare-ups have been managed with targeted, localized interventions and thus limited economic costs), the initial outbreak revealed shortcomings in prevention and preparedness for Emerging Infectious Diseases (EIDs). It will take time and investments to establish a well-functioning multisectoral approach involving public health, environment, and agriculture and food systems that can identify and address risks of EIDs at an early stage. China's economic recovery makes it possible to focus policy attention on the country's structural and institutional weaknesses.

### B. Sectoral and Institutional Context

3. **Despite substantial efforts to improve food safety, China still faces significant food safety risks that are causing considerable global public health concerns and economic losses.** These challenges are undermining consumers' trust at home and abroad, with negative consequences for China's agriculture and food sector. Recent outbreaks of transboundary animal diseases like African Swine Fever and emerging infectious diseases like COVID-19 highlight the importance of strengthening China's animal health management systems for preventing future global public health risks.

- (a) **China bears a considerable share of the global health and economic burden of consuming unsafe food.** According to data from the World Health Organization (WHO), China lost 272 Disability Adjusted Life Years per 100,000 population.<sup>1</sup> in 2010, with the share of animal source foods being nearly 59 percent. There were an estimated 94 million annual foodborne illnesses and close to 40,000 deaths from unsafe food in that year. Currently, the annual cost of foodborne diseases in terms of human capital productivity loss in China is estimated at

<sup>1</sup> Disability Adjusted Life Years is the sum of years of potential life lost due to premature mortality and the years of productive life lost due to disability.



over US\$30 billion, equaling a third of the total productivity loss associated with foodborne disease in low- and middle-income countries and almost 50 percent of the total economic burden of foodborne diseases in Asia.<sup>2</sup> When indirect costs, such as reduced demand for food products and losses in trade and tourism, are included, these costs are much higher.

- (b) **Foodborne disease outbreaks and product recalls have damaged consumer trust and hurt China's food industry's reputation and competitiveness.** Because of various food safety incidents in recent years, over 60 percent of urban Chinese consumers are concerned or very concerned about food safety.<sup>3</sup> To reduce the perceived food safety risks, Chinese consumers have started to apply personalized coping strategies, with urban and educated consumers increasingly purchasing imported or branded foods at bigger supermarkets, sourcing food products and catering services through e-commerce platforms, and spending up to 50 percent more on higher quality food products that are deemed safer.<sup>4</sup> These growing national concerns have made food safety increasingly important for state authorities in China.
- (c) **The COVID-19 pandemic has exacerbated food safety challenges, notably in processing, packaging, and transporting agro-products.** There is no evidence that animals or food of animal origin can transmit the virus to humans, and food is considered safe with adequate handling. However, the virus may live for a long time on surfaces in colder environments, and exporters and importers of frozen or refrigerated food items will have to manage the packaging and transportation hazards to minimize the risk of accidental transmission and to restore or enhance consumer trust.<sup>5</sup>

4. Improving food safety standards in China has important global public health and climate co-benefits and can thus be considered a global public good.

- (a) **China is a global hotspot for zoonoses, animal disease outbreaks, and antimicrobial resistance (AMR).** The combination of high human population density, intensive livestock production systems with dense animal populations, wildlife abundance, changes in land use leading to fragmentation and habitat loss, and wildlife trade has increased the risk of the emergence of new zoonosis in China. Other risk factors are inadequate sanitary and hygiene practices and lax enforcement of zoning regulations in China's agricultural markets, where around three-quarters of agricultural produce are sold. The large and intensive livestock and aquatic industries with still suboptimal biosafety and biosecurity practices make China's food

<sup>2</sup> Jaffee S, Henson S, Unnevehr L, Grace D, and Cassou E; The Safe Food Imperative: Accelerating Progress in Low and Middle-Income Countries; 2019

<sup>3</sup> Yu, J. and Qiao, J., 2016, Consumer Concern About Food Safety and Its Impact on Their Familiarity with Food Traceability Systems in China. Journal of International Food & Agribusiness Marketing, 29(1), 16–28. doi:10.1080/08974438.2016.1241733, p.7.

<sup>4</sup> Soon, J. M., & Liu, X., 2020, Chinese consumers' risk mitigating strategies against food fraud. Food Control, 107298. doi:10.1016/j.foodcont.2020.107298. Han, Yang; Chu, Jingjie; Anderson, James L., 2016, Survey: Food safety becoming Chinese consumers' top priority. Accessed on August 21, 2020 at <https://www.aquaculturealliance.org/advocate/survey-food-safety-becoming-chinese-consumers-top-priority/>.

<sup>5</sup> A COVID-19 outbreak in Beijing in June 2020 was traced to a local agriculture wholesale market, and outbreaks in Dalian and Qingdao were associated with food production, distribution and marketing systems, creating occupational health concerns for workers in production enterprises, cold chain logistics, and agriculture and food markets. In July 2020, the SARS-CoV-2 virus was detected on packages of imported Ecuadorian shrimp, leading to lower consumer demand for aquaculture products and financial losses.



animals particularly susceptible to diseases. For example, the African Swine Fever (ASF) outbreak in 2018–2019 killed almost 30 percent of the Chinese pig population. The spring of 2019 decapod iridescent virus 1 outbreak affected two-thirds of shrimp farms in the Pearl River Delta. These outbreaks illustrate significant gaps in the animal health management and disease prevention systems. The widespread use of antimicrobials (about five times the international average in the pig and broiler sectors) to prevent and manage diseases, and also to promote growth, has probably contributed to increasing AMR incidence in China. AMR represents a serious foodborne public health threat as antimicrobial residues are transmitted to humans through animal products and could reduce annual global Gross Domestic Product (GDP) by 1.1 to 3.8 percent by 2050.<sup>6</sup> Effective food safety regulatory frameworks and implementation can mitigate these public health and economic risks and generate substantial national and global benefits.

- (b) **China is also a large food exporter and improvements in food safety standards are thus important for China's trading partners and China's own agricultural export competitiveness.** China is one of the largest producers and exporters of aquatic products, fruits and vegetables in the world. At the same time, China is among the countries with the highest share of agro-food rejections in the United States of America (USA) and European Union (EU) markets, frequently related to microbial hazards or toxins in aquatic products. Improving food safety regulations to meet US and EU standards would increase global supplies of safe food and create new opportunities for Chinese agricultural producers to enter higher-value markets, thus improving conditions for the introduction of more sustainable production systems.
- (c) **Improving food safety in China would reduce food loss and waste and generate large climate co-benefits.** Discarding food that is deemed unsafe because of perceived or actual physical, chemical, or microbial contamination is causing significant food loss or waste. Food that is either lost or wasted generates about eight percent of annual global greenhouse gas (GHG) emissions from decomposing organic matter, fertilizer, and the production and processing of food that is not consumed. Data from China's State Administration of Grain indicates that, in 2014, 35 percent of China's annual food produced was lost or wasted, mostly at the consumption stage. According to some estimates, reducing food loss and waste could lower China's yearly agricultural GHG emissions by up to 30 percent.

5. China's food safety challenge is exacerbated by rapid changes in domestic demand for food, the highly fragmented nature of domestic value chains, the predominance of intensive farming practices and the impact of a changing climate.

- (a) **Urbanization, rising incomes, and digitization are shaping China's food system, with implications for food safety and the regulatory framework.** Today about 58 percent of the Chinese population live in urban areas, and by 2030 over 70 percent are expected to live in cities. Rapid urbanization, rising incomes and technological progress are transforming the food system in China. First, there has been a shift in consumption from staples to more processed and animal source foods. Second, China is witnessing a rapid growth of

<sup>6</sup> Jonas, Olga B., Irwin, Alec, Berthe, Franck Cesar Jean, Le Gall, Francois G., Marquez, Patricio V.; Drug-Resistant Infections: A Threat to Our Economic Future; 2017



supermarkets, which now account for about 23 percent of the sales of fresh food, fruit and vegetables, meat and poultry products.<sup>7</sup> Third, in major cities, up to 90 percent of Chinese consumers eat their meals away from home.<sup>8</sup> Fourth, digital technologies are driving e-commerce as an essential food trading platform, and this trend has accelerated during the COVID-19 pandemic as consumers have avoided visiting crowded markets. Fifth, affluent urban consumers are demanding safer, healthier, and greener food. These trends highlight the need for agile regulatory frameworks capable of addressing the food safety challenges in a rapidly shifting marketplace.

- (b) **Highly fragmented food value chains and intensive farming practices make it challenging for China to produce safe, green, and healthy food.** China's food supply chain is particularly complex, involving close to half a million food production and processing companies, with 98 percent small and medium enterprises. Upstream of this value chain, there are at least 200 million small scale farmers who tend to have insufficient knowledge of safe production. Poor, intensive farm management practices include: (i) excessive use of synthetic fertilizers and pesticides; (ii) extensive use of plastic mulch to retain soil moisture; (iii) poor livestock waste management and insufficient aquaculture water treatment; (iv) intensive livestock production practices with low biosecurity and elevated risks of animals diseases, including zoonoses and EIDs; and (iv) excessive use of growth enhancers/promoters and antimicrobials, and other chemicals in aquaculture and livestock production systems. Poor hygiene practices in production, handling, and distribution also create food safety risks, as does abuse of food additives in food processing and poor regard to food contact materials. Addressing food safety in China requires a whole value chain approach that pays attention to the needs of the producers to adopt good agricultural practices (GAP) to protect the environment (minimize wildlife-livestock-human interactions), control pollution, and minimize contamination along the agro-food supply chains. Leveraging private sector initiatives will be critical.
- (c) **Climate change exacerbates food safety risks.** Floods increase environmental risks that bring about toxic contamination and foodborne diseases. Changing rainfall patterns, extreme weather events, and the rising annual average temperature affect the occurrence of animal pathogens and plant pests. The increased incidence of harmful algae blooms, which produce natural toxins that contaminate aquaculture products, is linked with extreme weather events and the changing sea surface temperatures in coastal areas. Climatic changes affect aquaculture systems and increase fish vulnerability to diseases. Warming of oceanic water facilitates methylation of mercury as well as its uptake in fish and mammals. Heat stress can also have adverse effects on animal welfare, and hence food safety. Projections indicate that the project areas are particularly prone to future coastal floods, cyclones, extreme heat waves, and wildfires due to climate change, as well as river flooding (Guangdong and Shandong).<sup>9</sup> As food safety risks increase with climate change, effective food safety management becomes even more important.

<sup>7</sup> For comparison, the average household in the US spends about 43 percent of all food spending on food away from home.

<sup>8</sup> Liu, H. et al, 2015, Household composition, income, and food-away-from-home expenditure in urban China, *Food Policy* 51 (2015) 97–103, doi.org/10.1016/j.foodpol.2014.12.011.

<sup>9</sup> ThinkHazard!



6. **The Government has passed several food safety related laws.**<sup>10</sup> Over the years, China has built a modern framework of legislation viz. Law on Quality and Safety of Agriculture Products (2006) and Food Safety Law (2015) and derived standards that reflect the principles of food safety developed by the international standard-setting bodies recognized by the World Trade Organization (WTO) in relation to the Sanitary and Phytosanitary (SPS) Agreement, that is, Codex Alimentarius Commission (CAC), World Organization for Animal Health (OIE), and International Plant Protection Convention. Its latest Food Safety Law of 2015 was modeled on the EU's Food Law and created the legal framework for establishing a science and risk-based food safety management process along the entire food supply chain. It also established the social co-governance approach in food safety management, building on a partnership between the government, enterprises, and consumers. Both the 2009 and the 2015 Food Safety Laws refer to the risk analysis principle defined by CAC in 'Working principles for risk analysis for application in the framework of the Codex Alimentarius'.

7. **However, important challenges that remain relate to the legal and institutional framework and implementation.** Recent legislative and regulatory progress demonstrates the government's determination to improve food safety, but regulatory capacity and enforcement remain weak. Often, national, regional, and local government levels interpret and implement the regulations differently.<sup>11</sup> Institutional fragmentation has resulted in poorly delineated responsibilities and competition among regulatory authorities, and the coordination between various institutions involved in regulating and surveilling food safety along the food supply chain is inadequate.<sup>12</sup> Even though the national framework stipulates a science-based risk-assessment approach to food safety, the practical focus remains on monitoring and testing of food products to detect unsafe food rather than managing food safety risks along the value chain. There is also an excessive focus at the production level versus the subsequent stages in the supply chain.<sup>13</sup> Limited data availability and quality hamper the implementation of the science-based risk management approach.<sup>14</sup> Furthermore, China's laboratory system for chemical and microbiological hazard and foodborne disease monitoring is not yet effective because of inadequate

<sup>10</sup> 2006: Law on Quality and Safety of Agricultural Products (LQSAP). 2009: Food Safety Law of the People's Republic of China (FSL). 2013: China Food and Drug Administration was established as centralized authority for safety issues, then subsumed into the State Administration for Market Regulation (SAMR). 2018: Food Safety Bureau of the General Administration of Quality Supervision, Inspection, and Quarantine was moved into the Customs administration. 2017: State Council issued the "Thirteen Five-Year" Plan for the National Food and Drug Safety and the "Thirteen Five-Year" Plan for National Drug Safety to clarify the guiding ideology, basic principles, development goals, and major tasks of food and drug safety work between 2016 and 2020. These plans aim at establishing a well-conceived, efficient food and drug safety management system featuring social co-governance.

<sup>11</sup> In 2012, there were "already 1,070 national food standards and 1,164 industry-specific standards in China", and there were over 3,000 food laws, regulations, and standards in 2015. Zhang, Z. et al., 2018, Transformation of China's food safety standard setting system – Review of 50 years of change, opportunities and challenges ahead, *Food Control* 93 (2018) 106–111, doi.org/10.1016/j.foodcont.2018.05.047. Wu, Y. et al. (2018). Food Safety Risk Assessment in China: Past, Present and Future, *Food Control* 90 (2018) 212–221, doi: 10.1016/j.foodcont.2018.02.049.

<sup>12</sup> Zhang, Z. et al., 2018, Transformation of China's food safety standard setting system – Review of 50 years of change, opportunities and challenges ahead, *Food Control* 93 (2018) 106–111, doi.org/10.1016/j.foodcont.2018.05.047.

<sup>13</sup> Ibid.

<sup>14</sup> Wu, Y. et al., 2018, Food Safety Risk Assessment in China: Past, Present and Future, *Food Control* 90 (2018) 212–221, doi: 10.1016/j.foodcont.2018.02.049.



equipment, challenges with data exchange among laboratories, data analysis and capacity limitations.<sup>15</sup> Food safety education is limited for both regulators and practitioners.<sup>16</sup>

**8. Enterprise investments in food safety management systems are hampered by the absence of suitable financial products.** Private sector demand for food safety investments has been increasing for various reason: (a) emerging consumer demand for safe food with premium prices and higher market shares; (b) higher liability and penalties stipulated in the 2018 revision of the Food Safety Law; and (c) stronger enforcement of food safety standards with increased sampling and inspections. However, financial sector institutions are generally reluctant to finance agriculture investments, which are perceived as high risk with low returns. Although agriculture contributes 28 percent to China's employment and 7.3 percent to its GDP, the agriculture sector accounted for only 2.9 percent of total outstanding loans in China in 2018.<sup>17</sup> It is estimated that the agriculture sector's financing gap amounts to about CNY 3 trillion (US\$435 billion).<sup>18</sup> One primary impediment to rural lending is farmers' lack of collateral and credit history. Equity and available longer-term commercial debt funding mainly cover infrastructure construction and State-Owned Enterprises. What long-term financing is available in the agriculture sector is usually targeted to larger agribusiness corporates for well-established technologies. Banks lend to SMEs typically for short-term investments and working capital only. Banks are not yet familiar with assessing food safety investments and have no experience in lending for food safety products, and specific loan products do not yet exist.

**9. To address the multiple food safety challenges, this project focuses on the improvement of regulations, their enforcement and private sector compliance in specific value chains.** It builds on and complements the Emerging Infectious Diseases (EID) Prevention, Preparedness and Response Project (P173746), but with a narrower focus on foodborne health and safety risks. The EID project introduced the One Health approach to assess, monitor and prevent EID in two provinces (Hainan and Jiangxi) in China. In the proposed Food Safety project, the emphasis is on foodborne health and safety risks in specific value chains in another two provinces (Guangdong and Shandong) and on the agricultural and food producers whose practices need to change. While the EID project supports setting-up systems to manage risks that are as yet unknown and whose origins are typically related to the interaction between humans, domesticated animals and wildlife, the Food Safety project primarily addresses risks that have already been identified, but not yet controlled along the full value chain. Both projects require multi-agency and cross-sectoral coordination as well as risk-based approaches, but the focus of the Food Safety project is narrower and hence activities drill down further towards production and trade practices.

<sup>15</sup> Wu, Y. and Chen, J., 2018, Food Safety Monitoring and Surveillance in China: Past, Present and Future, *Food Control* 90 (2018) 429–439, doi: 10.1016/j.foodcont.2018.03.009.

<sup>16</sup> Luo X. et al., 2019, Food safety related knowledge, attitudes, and practices (KAP) among the students from nursing, education and medical college in Chongqing, China, *Food Control* 95 (2018) 181–188, doi: 10.1016/j.foodcont.2018.07.042.

<sup>17</sup> Source: People's Bank of China

<sup>18</sup> Source: Chinese Academy of Social Sciences



**Table 1. Comparison of EID Prevention, Preparedness and Response Project and China Food Safety Improvement Project**

Parameter	Emerging Infectious Diseases Prevention, Preparedness and Response Project	China Food Safety Improvement Project
Regulatory Framework	Law on Infectious Disease Prevention and Control, Law on Animal Disease Prevention and Control, Law on Quality and Safety of Agriculture Products, Wildlife Protection Law and National Biosafety and Biosecurity Law	Law on Animal Disease Prevention and Control, Law on Quality and Safety of Agriculture Products and Food Safety Law
Public health risks	Public health risks and threats are relatively unknown.	The focus is mostly on diseases and health risks already identified but where regulations are inconsistent and/or enforcement and compliance are weak.
Agents	Virus, bacterial and parasites. Many EIDs are zoonotic in origin, which means that the disease has emerged from an animal and crossed the species barrier to infect humans.	Pollutants, drugs and residues, microbials, anti-microbials, food additives, and so on. Animal source food contributes nearly 59 percent of food borne diseases in China and Escherichia Coli, Salmonella, Campylobacter and Listeria are among the most common foodborne pathogens.
Transmission route	Wildlife-animal-human interactions taking place in different dimensions. Spillover of emerging pathogens can be direct wildlife to human, or via livestock to humans with no wildlife source.	Food borne zoonoses primarily thrive on domestic animal-human interactions, but wildlife interaction in livestock production or consumption is a possibility.
Geographic Focus	Project components at national and provincial level in Hainan and Jiangxi	Project components at national, provincial (Guangdong, Shandong) and municipal level.
Approach	One health approach serves as framework for coordinating and delivering prevention, detection and control of zoonoses and emerging infectious diseases. Focus on mapping and managing risks of spillovers of emerging and endemic pathogens from wildlife to livestock and humans.	One health serves as framework for coordinating and delivering prevention, detection and control of food borne diseases along selected food value chains. The project works downstream and upstream (for example, by supporting compliance of agri and food producers) to manage multiple, identified food safety risks.

**10. Yantai Municipality, Shandong Province (Aquaculture).** Aquaculture is an essential sector for Yantai's economy. It accounts for over one-third of the combined total production value for agriculture, forestry, livestock and fishery in Shandong province. The sector also exhibits considerable national and international growth potential. The consumption of aquaculture products in China is expected to grow by 43 percent by 2030. Yantai's aquaculture products exports account for 20 percent of the country's aquaculture exports, and world demand for fish is projected to increase by 19 percent by 2026 (compared to the 2014–2016 average). The sector engages a large number of small and medium enterprises (SMEs), cooperatives, and family farms and has the potential to generate equitable growth. However, for this potential to be realized, Yantai's producers will have to address the food safety challenges in aquaculture



production, storage, and distribution. The main food safety hazards result from chemical hazards such as toxicity from polluted water and misuse of veterinary drugs, and microbial hazards from cross-contamination from poor cold chain services and unhygienic practices. Commercial banks in Yantai have limited exposure to the agricultural sector and specifically, lending to family farms, cooperatives and SMEs is very small.

11. **Guangdong Province (pork, aquaculture, fruit and vegetables).** Guangdong is an important agricultural province in China. It is a major pork producing province, contributing over 5 percent to the national output. Guangdong's share in national pork consumption is about 10 percent. Approximately 39 percent of its consumption comes from other provinces. Guangdong accounts for 76 and 100 percent of the mainland's supply of pork to Hong Kong Special Administrative Region (SAR), China and Macao SAR, China respectively. Like other provinces, Guangdong's pork industry was heavily affected by the ASF outbreak. Aquatic products are equally important, with Guangdong contributing 13 percent to China's total output of aquatic products. Guangdong is also a major producer of fruit and vegetables. Despite the rapid concentration in value chains, SMEs still dominate these three sectors, although traditional backyard farming is declining. Food safety risks are primarily centered around animal and plant health, originating from the misuse or improper use of veterinary drugs and pesticides in production. The Greater Bay Area Development Plan that covers Guangdong, Hong Kong SAR, China, and Macao SAR, China envisages strengthening cooperation on food safety, including traceability, emergency linking mechanisms, exchange of risk information, and establishing a certification scheme. In this context, as a major agricultural province, Guangdong wants to demonstrate that their agriculture and food producers can comply with higher food safety standards. Given the considerable lending potential, large banks as well as rural financial institutions have expressed interest in participating in the Guangdong project. These types of banks have ample liquidity but have so far shied away from agriculture lending risks. For Guangdong, risk sharing arrangements are thus more appropriate than the provision of long-term financing sources to catalyze the development of a new food-safety related business line.

### C. Relevance to Higher Level Objectives

12. **The proposed Project is consistent with the World Bank Group's Country Partnership Framework (CPF) for China (FY 2020–2025) (Report No. 117875-CN), which was discussed by the World Bank Board of Executive Directors on December 5, 2019.** The CPF shifts the focus of the World Bank Group's engagement to be increasingly selective, emphasizing China's remaining institutional gaps and the country's contribution to global public goods. One of the CPF's three engagement areas is promoting greener growth, with the specific objective of *Demonstrating Sustainable Agriculture Practices and Improving Food System Quality and Safety (CPF Objective 2.3)*.<sup>19</sup> The proposed project meets several of the CPF's selectivity criteria, namely strengthening policies and institutions, addressing regional and global public goods and strategic piloting of approaches that address development priorities, especially in areas relevant to other developing countries (see box 1).

<sup>19</sup> See: World Bank. 2019. *Country Partnership Framework for the People's Republic of China for the Period FY2020–2025*. Report No. 117875-CN.

**Box 1. Alignment of the China Food Safety Improvement Project with the Selectivity Criteria of the China CPF (FY20–25)**

- (a) **Strengthen policies and institutions** for food safety. The project will address critical institutional constraints, including weak central and local government coordination, capacity at the local levels, and coordination across sectors following the value chain approach. The project will be implemented in two provinces (Guangdong and Shandong) and include a central component working on regulatory and policy strengthening with the Ministry of Agricultural and Rural Affairs and the State Administration for Market Regulation, drawing on the experience generated by the two provincial applications. The project will strengthen both at the national and subnational level the public sector's regulatory performance, multi-sector coordination for food safety, and food safety governance. It further aims to strengthen food safety surveillance systems, food safety information analytics (and data triage), and consumer engagement for building trust and accountability.
- (b) **Promote regional and global public goods.** Given China's significant role as a food exporter, the links between food safety and the risk of zoonotic diseases, and the impact of reduced agricultural pollution on biodiversity and coastal ecosystems, the project is expected to generate significant global benefits in terms of food safety, public health and environment, and climate co-benefits. In addition, the project will generate significant climate co-benefits by contributing to reduced food loss and waste. (See detailed discussion of climate co-benefits below.)
- (c) **Strategic piloting of approaches that address development priorities, especially in areas relevant to other developing countries.** The project will generate important lessons and experiences for other countries dealing with similar food safety challenges. The project will generate good practices on the regulatory environment, food safety investments, and their environmental and climate benefits. These will be particularly relevant for middle-income countries with rising consumer demand for safe products and desiring to enhance their trade competitiveness by improving compliance with international food safety standards. The project will also organize annual international events for knowledge transfer and networking among national and international food practitioners and experts in public food control systems, private food value chains, food safety capacity building providers, research institutions, and with global networks.

13. **Climate Change.** Today China is the world's biggest GHG emitter from agriculture, accounting for 14 percent of global agricultural GHG emissions. With above 10 percent of China's GHG emissions, agriculture is the third largest source of GHG emissions after energy and industry. The proposed project will generate significant climate co-benefits and contribute to reducing China's GHG emissions and achieving its 2030 climate goals, as outlined in the Nationally Determined Contributions (NDC). Eligible investments that improve food safety outcomes and mitigate GHG emissions include biogas digestors and improved manure storage modes that reduce methane emissions, run-off, and groundwater contamination, which benefit food safety. Slow-release fertilizers in fruit and vegetables production are expected to reduce nitrous oxide emission by 50–70 percent and lower residues in food products. A low protein pig diet will significantly improve feed efficiency, reduce nitrogen and carbon content in pig manure, and reduce GHG emissions and run-off. On the adaptation front, eligible investments include water saving irrigation and drainage infrastructure facilities, aquaculture and pig farms wastewater treatment, conversion of manure to organic fertilizers, application of integrated pest management (IPM) practices in fruit and vegetables production, and soil nutrients management using fertigation technologies. These measures increase resilience against rising temperatures, rainfall variability, and increased frequency of extreme weather events, while reducing food safety hazards. Improved food safety will help to reduce food loss and waste, curtailing the amount of spoilt, rejected, or condemned



agro-products that end up in dumpsites and release GHG into the atmosphere when decomposing. The project will also promote biodegradable plastic mulch, eco-friendly food packaging, and plastics recycling. Reducing the use of plastics in agriculture production and food packaging reduces GHG emissions (reduced use of hydrocarbons) and mitigates the food safety risk from plastic residues ending up in the groundwater and oceans and ultimately in aquaculture products and other food items.<sup>20</sup>

14. The project will address gender inequalities from three angles:

- (a) **Gender in business and access to finance.** According to a 2019 International Finance Corporation (IFC) report, only 9 percent of Chinese ventures receiving financing across all sectors were woman-led.<sup>21</sup> An even lower percentage of agribusiness ventures are women-led or women-owned. This estimate is corroborated by data from an agribusiness enterprise survey conducted as part of the Feasibility Study Report (FSR) for this project. The enterprise survey showed that, on average, about 11 percent of women-led small and medium (SME) enterprises had access to finance in the form of loans (compared to 25 percent for men-led enterprises). Women-led agribusiness SMEs make about a third of the total agribusiness SMEs in the project provinces. To address these gender gaps, the project will encourage subproject investment proposals from women-owned agro-food enterprises or enterprises with a significant share of female partners through positive biased targeting policy, with a target of at least 15 percent of investee enterprises being women-owned or women-led, to reflect the average in the project areas.<sup>22</sup> To achieve this target, the project will make specific outreach efforts to women-led enterprises and their female employees, provide additional assistance during the application process, and prioritize applications from women-led enterprises.
- (b) **Gender in agriculture.** Gender gaps are prevalent in the agriculture sector that employs about 40 percent of the country's women, compared to less than 30 percent of men. Women generally outnumber men in workplaces where exposure to toxic chemicals is most common, such as intensive agricultural production systems like pig farming and agro-processing industries. More women are thus exposed to environmental hazards and emissions from the agriculture sector. Women farmers are also often the least likely to be aware of the environmental dangers in their workplace. Studies also show that gender is the single most important determining factor for income disparities in China. On average, Chinese women earn just 64 percent of their male counterparts. To improve project outcomes for women, the project will require screening for female participation in the financed value chains, target women in capacity development activities, and use gender sensitive training material and approaches.
- (c) **Gender in food quality, safety, and nutrition.** Women often carry significant responsibility for buying, processing, and preparing food. If food or markets are contaminated, it increases

<sup>20</sup> Barboza, L. et al., 2018, Marine microplastic debris: An emerging issue for food security, food safety and human health, *Marine Pollution Bulletin* 133, 336–348, doi: doi.org/10.1016/j.marpolbul.2018.05.047.

<sup>21</sup> IFC. 2019. Moving Toward Gender Balance in Private Equity and Venture Capital

<sup>22</sup> Estimates from various sources indicate that 9-11 percent is an upper bound baseline estimate for women-led or owned agribusiness SMEs with access to loans in the project areas. A 10 percent target would reflect the national average in all other sectors. Given the demand driven nature of the sub-projects and based on our preliminary enterprise demand assessments, 15 percent target has been agreed with the client to be an ambitious but feasible target.



women's exposure to food-related diseases and pollutants compared to men, with possible negative health consequences. Anemia during pregnancy is a major public health issue in China.<sup>23</sup> In the absence of high-quality and safe high protein/iron foods, pregnant women from all income categories still rely more on safer but less nutritious staple foods. Food quality and safety risks (such as foodborne diseases) also reduce women's labor productivity, thereby worsening income gaps. Women are also generally the principal decision-makers in the dietary choices of households. This makes them both victims of and responsible for food quality and safety incidents. When food quality and safety are improved, both women and their families benefit. To address the disproportionately negative food safety risks on women, the project will (i) enhance women's skills and awareness of environmental, climate, and food quality and safety risks with capacity building activities in a specific platform; and (ii) ensure that information and communication technology (ICT) based food safety management tools promoted by the project will allow women to determine greater nutrition and food safety outcomes for self and the family.. For doing so, the project will set a target that 55 percent of all users participating in the food safety risk communication toolkit or platform or other training and capacity-building events are women. The project will have extensive outreach to potential women participants.

15. **Nutrition.** The project will encourage the production of safe, high-quality, and nutritious food through fortification, reformulation towards healthier ingredients, consumer education and advocacy of healthy lifestyles including nutrition, investments in post-harvest technology, and investments in infrastructure, such as cold-chain infrastructure, which increase food safety and reduce food and waste loss.

16. **Maximizing Finance for Development (MFD).** The project will contribute to the MFD agenda from both angles: *Private Capital Mobilization* (PCM) into the project and *MFD Enabling* for future private investments in the sector. In terms of PCM, the project will leverage commercial bank finance for food safety investments through the Line of Credit and the Risk Sharing Facility activities under Subcomponent 3.1. The actual amount of the commitments/contributions from participating financial institutions (PFIs) will be monitored by an Intermediate Results Indicator (see Results Framework). The project will be MFD Enabling and promote private investments in three major areas. First, participating food producers and enterprises will co-invest in value chain infrastructure improvements and innovative technologies, including big data analytics and traceability systems, to improve agricultural product quality and food safety from farm to plate. Second, the project will provide support in developing food safety insurance services, which will enable controlling risks associated with investing in food systems. Third, the project will create a conducive environment for food safety, which is expected to attract funding beyond the project scope in terms of duration or locations.

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<sup>23</sup> Reducing anemia among pregnant women is a priority action in the National Program for Women (2011–2020); the issue is documented in various academic publications.



## II. PROJECT DESCRIPTION

### A. Project Development Objective

#### PDO Statement

17. The PDO is to improve food safety management at the national and targeted subnational levels and reduce food safety risks in selected value chains.

#### PDO Level Indicators

- Risk-based food safety management instruments developed (Number)
- Proportion of food safety events reported on subnational bigdata/traceability platforms for which mitigation measures are initiated (Percentage)
- Proportion of participating enterprises that comply with standards on biological hazards, contaminants, including pesticides and veterinary drug residues, and flavorings and food additives (Percentage)

### B. Project Components

18. **Lending Instrument.** The project will be financed using the lending instrument of Investment Project Financing (IPF) with a Financial Intermediary Loan (FIL) arrangement.

19. **Project Summary.** China's national food safety management system will be strengthened with risk-based preventive approaches and further harmonized with international standards. Guided by the One Health approach, the project takes multidisciplinary approaches for coordinating and delivering prevention, detection and control of food borne diseases along selected food value chains. The project will support food safety primarily in three dimensions viz. regulations, enforcement and compliance. The regulatory framework will be strengthened under component 1, mainly at the national and provincial level in close cooperation with the State Administration of Market Regulation (SAMR) and the Ministry of Agriculture and Rural Areas (MARA). Amongst others, the project will support the implementation of the Law on Quality and Safety of Agriculture Products (LQSAP) and Food Safety Law (FSL) at the national and subnational levels. Enforcement and supervision will be primarily supported under component 2 at the provincial and municipal levels by integrating local standards and regulations covering 'farm to plate' in specific value chains and aligning them with national regulations. The respective project components will be implemented in Foshan, Guangzhou, Huizhou, Jiangmen and Zhaoqing municipalities in Guangdong with a focus on pork, aquaculture, fruits and vegetables value chains and in Yantai municipality in Shandong with focus on the aquaculture value chain. Successful experiences and good practices will be replicated in other value chains and in other municipalities. Finally, compliance will be promoted at the enterprise level through component 3 interventions. The project will closely work with commercial banks to provide financing for food safety related investments of agriculture and food producers. A detailed project description is given below.



20. **Component 1: Institution Building and Regulatory Performance (US\$59.40 million).** The objective of the component is to enhance the institutional capacity and strengthen risk-based food safety regulatory frameworks for preventing and preparing to effectively deal with emerging animal health, food safety, and other global threats such as Anti-microbial Resistance (AMR). This component will be implemented at the national and sub-national levels, that is, provincial, and municipal levels.

21. **Subcomponent 1.1: Food safety programming guidance (US\$14.60 million).** The project will finance: (a) the review of primary and secondary legislation, including agriculture product quality and food safety management strategies, policies and guidelines, and benchmarking them with best international practice in developed countries such as the USA, Canada, EU, Australia, or New Zealand; (b) formal partnerships and collaborations with reputed universities, academic or research institutions for enhancing professional courses on food safety, undertaking applied research on emerging food safety challenges, studies and organizing national and international knowledge events and (c) a young professionals scheme for recent graduates and an internship program for graduate students in senior years for attracting young talent to food safety. The reviews and research will have a climate lens to support knowledge development on the nexus between food safety and climate adaptation and mitigation.

22. **Subcomponent 1.2: Multi-sector coordination and food safety governance (US\$2.80 million).** The subcomponent will finance activities that support the One Health approach through strengthening collaboration on surveillance of hazards, risk assessment, risk management, and standards development between institutions with a food safety related mandate. These include MARA, SAMR, and the National Health Commission (NHC) and National Forestry and Grassland Administration (NFGA) on managing public health and food safety risks from interactions between wildlife and domestic animals. Multi-sector coordination structures will be established both at the national and sub-national levels.

#### **Box 2. Implementing the Risk Based Management Approach for Food Safety**

**Risk Analysis** comprises the different tasks of risk assessment, risk management, and risk communication. Each of these functions should be established separately within the appropriate structures and adequately resourced, with an effective coordination mechanism.

**Risk assessment** is a scientific task that is carried-out in China by the China National Center for Food Safety Risk Assessment. The core of the scientific risk assessment is to forecast future risks, conduct risk assessment projects, communicate the findings of risk assessment work, and co-operate with national or international risk assessment units.

**Risk management** decisions are based on the scientific opinions from the risk assessment process and other relevant factors such as economic, social and cultural aspects. Risk management decisions should be separated from the risk assessment and the responsibility should be assigned to an agency that reports directly to the Minister. Food safety controls are one type of risk management.

**Risk communication** function cuts across the risk assessment and risk management functions. Risk communication addresses government agencies, enterprises, and the general public. Risk communicators share reasons for investigating, findings, implications, and risk management options. It is recommended to communicate decisions at the same time and to explain the decision-making process and factors considered. To be able to act rapidly in emergencies, communication lines between risk assessment and risk management must be well established.

**Risk-based controls** are a task of the risk management. They are based on expert advice and information on risk profiles of businesses, risk mitigation approaches, and other parameters.



**Risk profiling of businesses** can be based on the size of outputs, production type, co-existing risks, history of earlier control visits, food safety management systems in place, and the food safety culture of the business. According to this risk profile, the frequency and extent of official controls and fines can be adjusted.

**Risk-based Inspections** should work in the same way throughout the country and on all food premises. Controls should be understood by food business operators and be consistent over time. However, since situations vary, flexibility needs to be applied as described in the legislation. The basic method of harmonizing the inspection practice is through inspectors' training. Working methods and assessment criteria need to be clear and communicated to inspectors. Assessment criteria also need to be communicated to food business operators. It is advisable to organize intercalibration of inspection service at all levels. Intercalibration can be carried out horizontally at an operative level, especially between local units, but also vertically and between different type of inspection services. International training and collaboration can support this aspect.

23. **Subcomponent 1.3: Risk based regulatory frameworks (US\$3.70 million).** At the national level, this subcomponent will finance activities undertaken by MARA and SAMR. These will include the food safety risk assessments for the prioritized value chains; updating of food safety standards; and developing solutions that will enhance producers' compliance. The design and implementation of these pilots will be closely coordinated with the subnational level activities. At the subnational levels, this subcomponent will finance the development of local standards and regulations for the prioritized value chains; and their alignment with the national standards and regulations. This will include the development of certification systems for safe food. All food safety standards and risk assessment approaches developed at the national and subnational level will be based on the existing risk- and evidence-based information available from the Codex Alimentarius Commission (CAC) and other international independent expert scientific bodies that perform risk assessments.

24. **Subcomponent 1.4: Risk management capacity building (US\$38.30 million).** The subcomponent will be implemented at the national and subnational levels. It will finance the design and implementation of comprehensive capacity building activities for both practicing and aspiring food safety professionals. Besides the food safety objective, these activities will improve climate knowledge and build stakeholders' capacity to increase resilience to climate change. It will finance: (a) targeted training activities, including train the trainers programs for food safety regulators, food inspectors, laboratory technicians, food safety managers in value chain enterprises, personnel in food certification agencies, and researchers; (b) demonstrations, technical assistance and capacity building on risk management for helping farmers and agri-food producers to follow food safety requirements (including climate related), such as GAP, GHP, GMP, and HACCP; (c) course curricula and e-learning platforms (SAMR); (d) the development of professional certification programs for food safety and quality control personnel along the lines of the US Food Safety Management Act (SAMR); (e) exchange visits with and secondment programs to international food safety agencies;<sup>24</sup> (f) capacity building activities to support China in hosting the Codex Committee on Pesticide Residues, Codex Committee on Food Additives, and as Codex Asia Coordinator during 2020–2024; and (g) capacity building for participating financial institutions, third party service providers and insurance companies.

<sup>24</sup> These include the Global Food Safety Initiative, U.S. Food and Drug Administration (USFDA), U.S. Food Safety Prevention and Control Alliance, British Food Analysis and Evaluation Laboratory, Guelf Food Science and Technology Center, European Alliance of Safe Food Factories, Canadian Meat Association, or Canadian Dairy Association.



25. **Component 2: Food Safety Supervision Process (US\$157.90 million).** This component will be primarily implemented at the provincial and municipal level and support regulatory authorities to develop and demonstrate innovative food safety supervision models which will: (a) ensure the continued safety of food as it passes along the entire value chain, and (b) build consumers' confidence in Chinese food and in the institutions engaged in ensuring its safety. The component will improve the surveillance capacity of the participating local jurisdictions based on a scientific and risk-based approach. It will upgrade laboratories, invest in improving the availability and analytics for food safety risk detection, and finance measures that enhance risk communication among all players. This component will have three subcomponents.

26. **Subcomponent 2.1: Food safety surveillance systems (US\$58.00 million).** This subcomponent will finance activities that improve food safety control and the public system's capacity for detection and early warning about food safety risks. The activities to be financed include: (a) civil works and equipment for food safety laboratories and other testing centers; (b) creating a network of reference laboratories with specialization in specific food safety hazards; and (c) training and consulting services for strengthening laboratory information systems through linkages with a centralized big data platform for risk profiling and analytics. Investments in laboratories were identified through benchmarking that considered food safety risks in the prioritized value chains, best international practice, international accreditation requirements, and the existing laboratory landscape in the project areas. Sampling plans will be based on the risk-assessments and profiles in the prioritized value chains developed as part of the project. Related training of inspectors and laboratory staff in new sampling and testing strategies is included in subcomponent 1.4 above. Project financed infrastructure for food safety surveillance systems, including all laboratories, will be designed in accordance with biosecurity, climate resilience and energy efficiency considerations.

27. **Subcomponent 2.2: Food safety information analytics (US\$56.40 million).** This subcomponent will finance tools that enhance the availability, integration, and analysis of food safety data to enable data driven decision making for improved food safety governance. It will finance consulting services to develop a comprehensive data policy for food safety. The Policy will cover, among other data issues: (a) data governance; (b) data security; (c) protection of personal data; and I data sharing mechanisms. At the farm and enterprise levels, the project will finance pilots on the use of selected innovative technologies and digital control systems for smart food safety supervision. Technologies to be piloted support 'clean', 'green', and 'blue' production systems, increase the utilization efficiency of natural resources, reduce pollution (N, P, COD) and GHG emissions, while ensuring the production of high quality and safe food products. At the value chain level, the subcomponent will finance the development of comprehensive food safety traceability systems which allow tracking food safety at various stages of the value chain. For public regulatory systems, it will finance the linking of existing traceability platforms that are currently 'layered' (national, provincial, and municipal level) and 'siloed' (public and private). Further, this subcomponent will finance consulting services and hardware and software needed to develop integrated IT platforms, technical protocols, and data analytics to identify and report in real-time food safety risks along the whole value chain.

28. **Subcomponent 2.3: Risk communication (US\$43.50 million).** This subcomponent will support activities that contribute to increased transparency and accountability in risk management decisions making which is necessary for building trust in food safety. The subcomponent will finance consulting and non-consulting services, and goods needed for: (a) developing a comprehensive and differentiated food risk communication strategy that encourages the efficient exchange of risk assessment information,



surveillance data triage and risk management decisions between the scientific community, government/regulatory authorities, private enterprises, consumers, and extended stakeholders;<sup>25</sup> (b) developing and implementing long-term food risk communication programs including brand building around GAP, organic, green, geographic and food safety certification for enterprises and consumers, using a variety of communication tools; (c) developing and implementing an inclusive community engagement model to encourage risk management at the source and promote the project's preventive approach; (d) an interactive online communication tool for consumers; (e) establishing a food recall management mechanism; (f) training food safety managers on critical food incident management and developing approaches for consumer involvement in these activities; (g) activities for promoting the WHO's five<sup>26</sup> and for healthy lifestyle advocacy; (h) strengthening spokesperson mechanisms; and (i) conducting biennial surveys for analyzing consumer confidence and trust in China's food safety. This subcomponent will also support effective communications to farmers and other value chain actors on climate hazards using multimedia channels.

29. **Component 3: Whole Value Chain Food Safety Control (US\$161.50 million).** The objective of this component is to promote investments along the selected value chains to reduce food safety risks. This component will be implemented at the provincial level in the participating cities/municipalities by the public and private sector entities. The project will also demonstrate a combination of market-based instruments such as lines of credit (LOC), risk sharing facilities (RSF), and food safety insurance innovations (not all of these applied in each single location/geography) for creating enterprise level incentives to meet agriculture product quality and food safety standards, besides modernizing marketing and distribution infrastructure through public investments.

30. **Subcomponent 3.1: Investment support (US\$93.00 million).** The project will support PFIs to finance clean, green, and blue technologies and business solutions for helping producers take increased responsibility and improve compliance with modern food safety regulations. The engagement with PFIs aims to help them develop a new business line for financing food safety and agro-product quality investments (under LOC and RSF arrangement); and to build their capacities to lend to this sector in a sustainable manner. This subcomponent will mobilize at least US\$250.00 million of additional private capital from the PFIs.<sup>27</sup> Most of the food safety investments will entail upgrading physical facilities, improving production processes and business procedures, staff training, and accreditation processes. They will be similar for all types of borrowers but differ in scale. The sub-loan arrangements under the LOC and RSF (not in the same location/geography) are detailed below.

- (a) **Value-chain innovation financing:** The project will take a value chain financing approach, targeting farms and enterprises with formal supply or buying collaborations, contracts, or service agreements with the leading enterprise or other enterprises in the value chain.

<sup>25</sup> The project will use an optimum mix of traditional and modern food risk communication for promoting healthy lifestyle and improve government's capability in handling critical food safety incidents. The project will support activities in five strategic areas of (i) traditional food risk communication; (ii) modern food risk communication; (iii) health lifestyle advocacy; (iv) critical food incident involvement; and (v) consumer confidence & trust.

<sup>26</sup> Keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperatures, use safe water and raw materials. WHO, The Five Keys to Safer Food Programme, <https://www.who.int/foodsafety/consumer/5keys/en/>, accessed on November 21, 2020.

<sup>27</sup> The private capital mobilization of US\$250 million will be leveraged from the PFIs by about US\$50 million under the LOC arrangement, and another US\$200 million against the RSF building a new business line of food safety finance.



Within the financed value chain, food safety standards for each participating farm enterprise will be defined and monitored on a traceability platform, besides following up on loan (and client) performance, which will reduce the information asymmetry for the PFIs and consequently financing risk.

- (b) **Eligible activities:** The technology solutions that will help the enterprises to meet agriculture product quality and food safety standards are usually clean, green, and blue solutions (including low carbon, climate resilient), covering all stages of the selected value chains, from farm to plate. The sample list of investment activities includes:
- (i) **Certified production solutions such as** GAP, GHP, GMP, clean production systems; and HACCP in slaughterhouses, processing plants, agriculture markets, food businesses, and restaurants;
  - (ii) **Green production solutions** for improving production environments such as animal health and welfare systems; improved seeds and breeds for climate, pest and disease resilience; improved fertilizer and natural resource (land and water) use efficiency; and integrated pest management;
  - (iii) **Waste management solutions:** water treatment plants and waste disposal; livestock waste management; food loss reduction and waste management;
  - (iv) **Sustainable packaging solutions:** safe food contact materials, biomaterials for production, packaging, logistics;
  - (v) **Safe food distribution and logistics solutions:** e-Commerce platforms for safe food marketing; energy efficient environment control systems throughout the distribution and logistics chain;
  - (vi) **Food safety assurance solutions:** establishing food safety information embedded traceability platforms, quality management and testing laboratories, social media platforms for branding and consumer outreach; and
  - (vii) Any other investment that directly contributes to food safety.
- (c) **Eligible beneficiaries:** The beneficiaries that can access sub-loans under both LOC and RSF are family farms, professional cooperatives, agriculture small-medium enterprises, and leading enterprises with definitions applied in China.<sup>28</sup> Agriculture SMEs will undertake diverse businesses, including farm operations, slaughter and processing activities, e-commerce, distribution and cooling logistics, retail, and food businesses. The size and scale

<sup>28</sup> **Family farms** are production entities engaged in large-scale, intensive, and commercialized agricultural production with family members as the main labor for whom agricultural income is the main source of income. A **Farmers Professional Cooperative** is a registered organization that contracts members from rural households for production, processing, transportation, storage, sales, and other services related to agricultural production. Agriculture **Micro, Small, and Medium Enterprises (SMEs)** are business enterprises engaged in agriculture and related activities with an annual revenue less than 200 million CNY (annual revenue thresholds: micro enterprises less than 500,000 CNY; small enterprises between 500,000 and 5 million CNY; medium enterprises between 5 million and 200 million CNY). **Dragonhead enterprises (DHEs)** are lead firms that are committed to social responsibility by the county, provincial and/or national government to use market based approaches for delivering development impacts such as poverty alleviation (working with poorest households), agriculture modernization (working with family farms and professional cooperatives), export promotion (working with SMEs).



of business operations will determine the maximum loan sizes for different types of borrowers.

- (d) **Financing solutions:** The banks will adapt their current product offering for long term investments in food safety solutions.
- (e) **Inclusive finance:** The project will specify sub-allocations of the aggregate capital mobilization (from IBRD and PFIs' own resources) to encourage PFIs to lend to enterprise segments that they perceive as riskier.
- (f) **Maturity of sub-loans:** The working capital loans will have a loan maturity of one year, and the term loans will have a maximum tenor of 5–8 years.
- (g) **Pricing of sub-loans:** The pricing model considers the current macroeconomic conditions in China. The participating financial institutions will charge the end borrowers with market determined interest rates, benchmarked to the Loan Prime Rate (LPR) according to the established policy of the People's Bank of China (PBOC).<sup>29</sup>

31. ***Line of credit (US\$51.00 million).*** The participating municipality of Yantai will implement the LOCs under the project that will provide local currency loans to the PFIs. The project will select more than one PFI and allocate funds based on their business plans and fund utilization. The PMO will monitor the disbursements and if a PFI does not issue loans as planned; their allocation can be reallocated to other PFIs. The LOC will be administered by a third-party service provider (TSP-LOC) which will be selected competitively according to the criteria agreed with the IBRD. The TSP-LOC will help the PMO to shortlist the PFIs based on agreed criteria, such as regulatory compliance; financial soundness; strength of risk management systems; geographical coverage and prior exposure to target sectors; track record of good governance and anti-corruption measures; willingness to contribute own resources (matching LOC by at least twofold); willingness to allocate at least 60 percent of the LOC resources (IBRD + own funds) to family farms, cooperatives and SMEs; willingness to comply with social and environmental safeguards and fiduciary frameworks agreed with IBRD. Yantai has initiated a competitive process for selecting the PFIs and has completed the evaluation of Expressions of Interest (EOI) from the qualified PFIs. Based on its due-diligence, IBRD will provide no-objections to the qualified commercial banks recommended by the project. The Yantai municipal authorities will enter into subsidiary loan agreements with PFIs for making available LOC and ensure that they make sub-loans in accordance with the agreed requirements. This component will finance LOC as well as costs of TSP-LOC and other monitoring and supervision activities.

32. The project will finance TA for PFIs on food safety improvement technologies and designing appropriate financing solutions under Component 1.4. The PFIs will have the managerial autonomy to decide on sub-loan appraisal and disbursement based on their own established credit management procedures and commercial practice. The on-lending terms of the PFIs' sub-loans (using their own funds) to the targeted value chain enterprises will follow Peoples' Bank of China (PBOC)/China Banking and Insurance Regulatory Commission (CBIRC) guidelines for the agriculture sector and meet the entities' actual cash flow needs. A separate manual for the LOC will determine eligibility criteria, eligible activities,

<sup>29</sup> Loans will be priced according to the PBOC guidelines and benchmarked with Loan Prime Rate (LPR). Currently the LPR is 3.85 percent Annual Percentage Rate (APR) +/- for loans less than 1-year tenor and 4.75 percent APR for loans above 5 years. The interest rates follow pricing methodologies accounting for cost of funding, cost of risk, and operating (or administrative) costs for the different types of investments and beneficiaries.



appraisal methods, monitoring and reporting arrangements, loan withdrawal procedures, legal documentation, and responsibilities of all parties implementing the LOC.

33. **Risk sharing facility (US\$42.00 million).** The project will establish a risk sharing facility (RSF) in Guangdong for providing partial guarantees. This will be an additional collateral for loans within portfolios of food safety loans developed by the PFIs using their own funding. PFIs will be competitively selected according to the criteria and procedure described above for the LOC. IBRD funds will be utilized for risk-sharing to mitigate the risk perceived by the financial sector in providing such loans due to their lack of experience in financing food safety investments. The business plan for RSF will detail the institutional arrangements for the RSF, legal position, fund set-up and management, financial model, business procedures, accounting standards, auditing requirements, and monitoring and evaluation systems. The RSF will be administered by a third-party service provider (TSP-RSF) selected competitively according to the criteria agreed with the IBRD. The RSF will be managed based on the terms and procedures established by IBRD and the project in compliance with the relevant principles for guarantees developed by the IBRD and detailed in the dedicated manual for the RSF (RSF manual), accompanying the business plan. The RSF manual will determine eligibility criteria, eligible activities, size of loans, portfolio risk management, risk-based pricing mechanism, safeguards management, the Management Information System (MIS) and reporting requirements, legal documentation, detailed claim procedures, and responsibilities of all parties implementing the RSF. Guangdong provincial authorities will be entering into a risk sharing agreement with selected PFIs to offset losses in food safety loan portfolio and to ensure that PFI undertakes to comply with all the requirements agreed with the Bank for receiving coverage under the RSF. This component will finance RSF as well as costs of TSP-LOC and portfolio monitoring and supervision activities.

34. As in the case of LOC, the PFIs will appraise and manage the sub-loans using their existing credit management procedures and commercial practice. PFIs will determine for which loans they may need to apply for the RSF. For smaller loans, the coverage will be at a portfolio level, while for larger loans (for example, loans to dragonhead companies) the coverage will be at an individual enterprise level. The IBRD loan will be used to reimburse the PFIs the loss incurred according to the risk sharing model in the business plan. A comprehensive review of RSF will be undertaken at the mid-terms and the project will discuss with the World Bank to decide on the appropriate use of any unspent amount in the facility.

35. **Subcomponent 3.2: Food safety insurance services (US\$32.00 million).** This component will develop and pilot innovative insurance and comprehensive risk management solutions for agriculture product quality and food safety in Guangdong province. The insurance cover applies for project supported value chains.<sup>30</sup> The composite product covers the end-to-end process from production risks. This includes from animal health and crop failures to business interruption risks as well as liability to consumers due to food quality and safety related issues. In this regard, the insurers will be able to create profiles and monitor risks of each value chain player and enhance the brand performance of insured enterprises. The intervention will provide a market-based ex-ante safety regulation, which supplements government supervision and leverages the surveillance systems supported under the Component 2. The insurance pilot will evaluate the: (a) value of insurance in improving the food quality and safety compliance by the individual enterprises in the value chain; (b) optimal product structure including insurance at the individual enterprise level or at a cluster level covering the entire value chain (group insurance) as well as an appropriate level of protection or coverage; and (c) risk appetite of the insurance and reinsurance

<sup>30</sup> Specific products in each of the value chains will be identified during implementation



companies to underwrite and price the risks among others. Insurance services under the project will be administered by a third-party service provider (TSP-IS) selected competitively according to the criteria agreed with the IBRD. The TSP-IS will operationalize tripartite partnerships between the technical agencies hired for capacity building and food safety monitoring of enterprises, and the insurers; and will help to integrate insurance activities with other project components.

36. The insurers will be competitively selected based on an agreed set of selection criteria, such as regulatory compliance, financial soundness, track record of good governance and strong anti-corruption measures in place, experience in liability insurance and/or agriculture and food insurance, technical competence in food safety risk analytics, geographical coverage and familiarity with the local conditions; and their willingness to conform to the environmental and social safeguards, fiduciary, and other frameworks agreed with the IBRD. Guangdong has initiated a competitive process for selecting the insurers by issuing an Expression of Interest (EOI) from qualified insurers. Based on its due-diligence, IBRD will provide no-objections to the qualified insurers recommended by the project.

37. **Subcomponent 3.3: Modernizing value chain infrastructure (US\$36.50 million).** The subcomponent will finance the civil works, consulting services and goods needed for the upgrading of value chain infrastructure and market facilities using the GAP, GMP, HACCP approaches to mitigate food safety hazards originating in agriculture production systems and agricultural markets, including zoonoses, EIDs and other public health threats such as AMR. The project will support (a) upgrade of selected value chain infrastructure facilities such as water treatment, waste management, point source pollution control solutions, that enable production of high quality and safe food products; and (b). improvement of existing markets' infrastructure and risk management practices in agriculture markets, cold chains and e-commerce hubs. The project will upgrade market infrastructure and facilities and use a HACCP approach for *transforming* selected markets *into healthy marketplaces* in the six municipalities. *Healthy Marketplace* concept envisage a package of interventions such as (a) market zoning and segregating areas that sell packaged and dry food stuffs from those that sell meat produce areas (particularly aquaculture, poultry, meat products, and so on) in marketspaces for avoiding cross-contamination between humans and animals; (ii) improving food hygiene, water and sanitation utilities; (iii) enforcing weekly closures for cleaning and disinfection of marketplaces; (iv) promoting good animal health and animal welfare practices; (v) deploying advanced animal disease and food safety testing, monitoring and surveillance systems and piloting traceability of food and animal products; and (vi) risk communication campaign from regulators, market operators, vendors and consumers.

38. This component will have considerable climate mitigation benefits by improving waste management, reducing plastics, and promoting energy-efficient market infrastructure and logistics. In addition, the *healthy marketplaces* supported by this component will have a demonstration effect for similar markets across China.

39. **Component 4: Project Implementation Support (US\$21.20 million).** The objective of this component is to support the implementation of the project activities. It will support the project management (including financial management, procurement and safeguards compliance activities), and the monitoring, evaluation and learning activities (knowledge management/global sharing).

40. **Subcomponent 4.1: Project management (US\$11.30 million).** Under this subcomponent, the project will finance the operation of the project management units (PMUs), including consultancies,



training and related material, office equipment, operational costs, establishing financial management systems, environment and social safeguards management systems, procurement management, governance and accountability systems, and knowledge management systems.

41. ***Subcomponent 4.2: Monitoring, evaluation, and learning (US\$9.90 million).*** Under this subcomponent, the project will support (i) management information systems, results tracking and reporting systems; (ii) after-action reviews; (iii) systematic review of lessons learned; (iv) qualitative studies, quantitative research surveys; (v) the development of national innovation marketplaces and case study competitions. This subcomponent will also finance Mid-Term Review (MTR) and Final Evaluation reports and underlying analytical work.

### C. Implementation Plan

42. The project aims to strengthen regulation, enforcement and compliance along selected value chains consistent with global standards and practices. It will make improvements in the risk-based food safety management systems at the national, sub-national and municipal levels in close cooperation with public authorities, local banks and food and agricultural producers.

43. ***Regulations:*** The project will undertake a benchmarking exercise of Chinese legislations, policies, guidelines and standards for agriculture product quality and food safety against equivalent regulatory frameworks in OECD countries. It will support studies, exposure visits and expert consultations to revise and update national and provincial regulatory frameworks for establishing convergence with Codex/OIE standards and protocols.

44. ***Enforcement:*** The project will promote scientific evidence-based enforcement of food safety regulations primarily at the provincial and municipal level using risk-based approaches. Standards and protocols such as Good Agriculture Practices (GAP), Good Hygiene Practices (GHP), Good Manufacturing Practices (GMP), Hazard Analysis and Critical Control Points (HACCP) will be strengthened and implemented based on the food safety risk assessments. Technical assessments by the project will identify gaps in risk-based supervision systems that will form the basis for piloting new technologies for improved food safety surveillance, upgrading investigation/laboratory capacities and improving data sharing arrangements between regulators, enterprises and consumers.

45. ***Compliance:*** The project will support farms and food enterprises for improving their compliance with food safety regulations. It will undertake outreach activities targeting enterprises in identified value chains in the project areas/clusters. Technical agencies will be hired to provide customized trainings on GAP, GHP, HACCP, and so on to all such enterprises that agree to work on achieving food safety certification standards. All participating enterprises would be brought on traceability platforms and a third-party inspection agency will undertake regular testing and supervision. Some of the enterprises that require financial assistance will be supported by the project through line of credit (in Yantai) or risk sharing facility (Guangdong) arrangements. Guangdong also plans to pilot food safety liability insurance products for eligible enterprises/clusters. In addition, risk communication campaigns will be organized in the project areas and selected agricultural markets will be upgraded under the project.

46. ***Project Costs and Duration:*** The estimated total cost of the project is about US\$735.00 million. This includes the IBRD loan of US\$400 million, counterpart funding from central and provincial/municipal



governments of US\$85.00 million, and private capital mobilization of US\$250.00 million. The project will be implemented over a period of six years. Table 2 shows the cost allocation by component and each of the four implementing agencies.

Table 2. Project Cost Table

Component	Million US\$				
	SAMR	MARA	Guangdong	Yantai	Total
<b>Component 1: Institution building and regulatory performance</b>	<b>11.80</b>	<b>0.90</b>	<b>40.00</b>	<b>6.80</b>	<b>59.40</b>
1.1: Food safety programming guidance	5.00	0.40	7.40	1.80	14.60
1.2: Multi-sector coordination and food safety governance	1.80	0.10	0.40	0.50	2.80
1.3: Risk based regulation frameworks	0.90	0.20	1.30	1.30	3.70
1.4: Risk management capacity building	4.00	0.20	30.90	3.20	38.30
<b>Component 2: Food safety supervision process</b>	<b>11.50</b>	<b>13.30</b>	<b>96.40</b>	<b>36.70</b>	<b>157.90</b>
2.1: Food Safety Surveillance	3.30	8.50	25.80	20.40	58.00
2.2: Food Safety Information Analytics	5.40	3.50	36.80	10.70	56.40
2.3: Risk Communication	2.80	1.30	33.80	5.60	43.50
<b>Component 3: Whole food safety value chain control</b>	<b>0.00</b>	<b>0.00</b>	<b>109.00</b>	<b>52.50</b>	<b>161.50</b>
3.1: Investment support	0.00	0.00	42.00	51.00	93.00
3.2: Food Safety Insurance	0.00	0.00	32.00	0.00	32.00
3.3: Modernizing value chain infrastructure	0.00	0.00	35.00	1.50	36.50
<b>Component 4: Project implementation support</b>	<b>1.80</b>	<b>0.80</b>	<b>14.60</b>	<b>4.00</b>	<b>21.20</b>
4.1: Project Management	1.60	0.70	7.60	1.40	11.30
4.2: Monitoring, evaluation and learning	0.20	0.10	7.00	2.60	9.90
<b>Total IBRD Financing</b>	<b>25.00</b>	<b>15.00</b>	<b>260.00</b>	<b>100.00</b>	<b>400.00</b>
<b>Counterpart Funding</b>	<b>0.00</b>	<b>0.00</b>	<b>70.00</b>	<b>15.00</b>	<b>85.00</b>
<b>Private Capital Mobilization</b>	<b>0.00</b>	<b>0.00</b>	<b>200.00</b>	<b>50.00</b>	<b>250.00</b>

#### D. Project Beneficiaries

47. About 300,000 farmers and 7,500 family farms, cooperatives, SMEs, and large enterprises in the agriculture and food sector will be supported by the project to better manage food safety risks and run sustainable businesses. The project will directly benefit about approximately 600,000 consumer households from Healthy Marketplaces as market users also see the risk of potential zoonotic and foodborne diseases and other health threats reduced in the project areas in Foshan, Guangzhou, Huizhou, Jiangmen and Zhaoqing municipalities in Guangdong province and Yantai municipality in Shandong province. Additionally, around 3 million residents in these municipalities are also expected to benefit from food safety risks communication campaign, which empower consumers with safe and healthy food information and promote safer food handling practices. The project will train about 20,000 government officials, field-level technical staff such as food safety inspectors, laboratory technicians, research and academia, and professionals engaged in demonstration of good agriculture practices, good hygienic

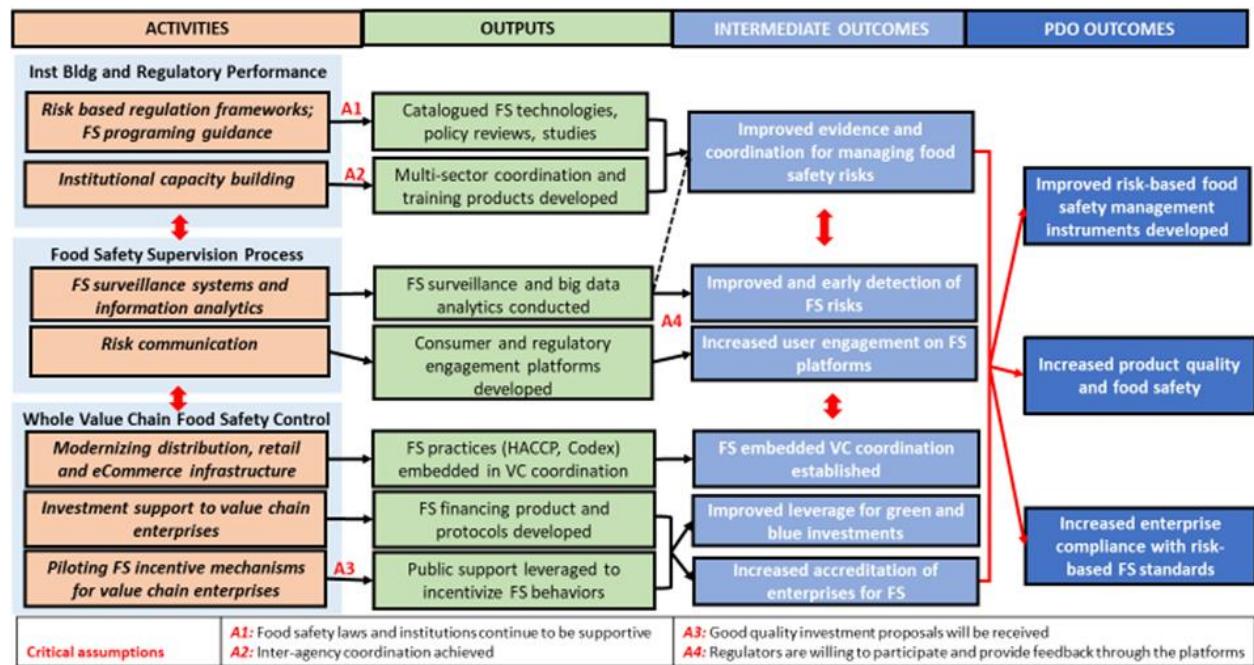


practices, agriculture product quality, food safety regulation, and the financial sector (banking and insurance). The reduction of the risks of food safety incidents, AMR, and zoonoses also provides significant global public good benefits.

#### E. Results Chain

48. The project design follows an inclusive approach that brings together the governments at the national and subnational levels, farmers, food enterprises along the entire food value chain, and consumers (farm to plate). The results chain and theory of change are graphically represented in figure 1. The proposed theory of change, aligned to the PDO, illustrates a balance between investments in “hardware” and “software” innovations and between private and public investments to support MARA and SAMR to effectively implement the Law on Quality and Safety of Agriculture Products and the Food Safety Laws.

**Figure 1. Theory of Change**



49. The development hypothesis is that strengthening food safety regulatory performance and institutional capacity and supporting private value chain actors along the entire value chain (farm to plate) to achieve regulatory compliance will improve food safety outcomes in China. The results chain for food quality and safety builds on a risk-based regulation and supervision framework, informed by scientific evidence and principles of shared responsibility (accountability, transparency, and trust) among the stakeholders. The evidence provided by food quality and safety risk assessments helps to prioritize food quality and safety risks, develop food quality and safety standards, and define acceptable tolerance levels. The risk management and control measures rely largely upon food risk surveillance, information systems, and investigation services. Piloting innovative technologies and solutions will allow enterprises to learn new ways of enhancing their compliance with food quality and safety regulations. Similarly, the project will help reduce information and coordination costs for the enterprises, farmers, regulators, and



consumers by supporting investments in traceability systems for high-quality, safe food products and implementing nuanced risk communication strategies for effective multi-stakeholder engagement both at the national and subnational levels.

**50. The project will emphasize investments in big data analytics and develop advanced food traceability systems while at the same time enhancing food safety communication with regulators and consumers, empowering them to provide feedback.** The project will also invest in capacity building and create incentives for enterprises to comply with food safety regulations. Consequently, enterprises will develop and implement risk-based food safety management instruments, thereby reducing food safety risks and increasing compliance with food safety regulations, which are the expected development outcomes. Achieving this PDO will in the medium to long run reduce public health risks and increase the competitiveness of Chinese farm and food enterprises both in local and global markets.

#### F. Rationale for Bank Involvement and Role of Partners

**51. Food safety is fundamental for achieving higher level sustainable development outcomes** as it contributes to several of the Sustainable Development Goals (SDGs), including SDGs 1–3 (ending hunger and poverty and ensuring good health and wellbeing); SDGs 6–7 (achieving gender equality and clean water and sanitation); and SDGs 12–13 (ensuring responsible production and consumption and taking climate action). The project directly supports corporate and strategic priorities for the country engagement and global agenda. World Bank support to this operation is motivated by three main reasons:

- (a) **Global public goods:** Improving food safety in China generates substantial global public goods through reducing the global health and economic costs of foodborne diseases, EIDs, and AMR. In addition, the project is expected to generate substantial environmental and global climate co-benefits by reducing GHG emissions, food waste and loss, microplastics and marine plastics.
- (b) **Engagement on critical institutional reforms:** The Government of China has made considerable efforts to improve the national food safety framework. However, to generate the potential substantial benefits from this framework, critical institutional bottlenecks need to be overcome. The project offers an opportunity to engage with China in these areas both at the national and sub-national levels, making use of the World Bank's international experience in public health, agriculture, the environment, and institutional reforms. Likewise, the project will closely work with commercial banks helping them co-create new financial products leveraging advanced financial technologies for developing a new line of agriculture finance business.
- (c) **Building on the Bank's comparative advantage and bringing in international experience:** The World Bank has extensive experience in supporting food quality and safety projects globally. Through flagship analytical studies, the Bank has accumulated a vast body of knowledge that it can share with its client countries, including China. The former Bank and the Global Food Safety Partnership had a long history of working in China to help bring the best international expertise for addressing food safety reforms, for example, in the 2014 'China Food Safety Capacity Development Needs Assessment.' The World Bank is collaborating with other development partners and international organizations to coordinate technical assistance and capacity building for the project. The USFDA, Food



Industry Asia, the Government of Finland, FAO, and other international organizations provide technical assistance to the Chinese national and provincial level institutions. USFDA is committed to providing technical training and capacity building on risk-based food safety regulations to relevant institutions at the national and provincial levels.

#### G. Lessons Learned and Reflected in the Project Design

52. **Recent analytical work and good practice reviews during technical missions informed the project design.**<sup>31</sup> The project also draws on the experiences gained under the Jilin Agricultural Product Quality and Safety project and other related projects in the country, including the Guangdong Agricultural Pollution control project. The major lessons learned from recent activities in the sector refer to the need for private sector demand-driven activities to have a key role in project design and implementation. Another important lesson is that food safety is a shared responsibility. This implies that food safety requires an appropriate division of responsibilities and an effective partnership between public and private sector players along the food value chain. Hence, the early inclusion of partnerships between private sector food enterprises and the public sector is crucial.

53. **The World Bank's recent analytical work on food safety "Food Safety Imperative – Accelerating progress in low- and middle-income countries" (World Bank, 2018)** summarized the good practice experiences of many countries. The main lessons arising from the reports are (i) strengthening food safety systems requires an integrated approach, where food safety is a shared responsibility of the State, businesses, and consumers; (ii) businesses along the value chain from farm to plate must invest in food safety to achieve compliance with regulations and standards; (iii) regulations must be science-based, and enterprises and surveillance must apply a risk-based preventative approach to food safety; (iv) effective food safety systems regulatory organizations provide compliance assistance, co-regulation, and business advice to enhance enterprise compliance. The USA, Canada, and Australia have good examples of compliance management systems that incentivize firms' compliance.

54. **Risk communication is vital for building public trust in the enforcement system and the safety of food items.** Experience from other countries where confidence had to be rebuilt shows that a strategic approach is necessary. These experiences suggest that the enforcement system should be more of a partnership between enforcement bodies and food businesses. Consumers also need to be brought into that partnership as feedback providers and recipients of food safety information originating from the private and public sector.

55. **"One Health Approach" is a collaborative, multisectoral, and transdisciplinary approach addresses the interconnectedness of the health of people, animals, and the environment.** The recent EID Prevention, Preparedness and Response Project which applies this approach, will provide lessons from improvements in risk-based surveillance systems for emerging infectious diseases, targeted prevention and control programs for identified priority zoonoses and other health threats, and investments in building the institutional capacity to scale up cost effective cross sectoral solutions.

56. **Global lessons show that multi-sectoral coordination, collaboration, and communication are critical to effectively manage food safety risks and incidents.** Some of these lessons that informed the

<sup>31</sup> Building animal health and wildlife systems for One Health in East Asia and Pacific; Joint WB-FAO Publication (under finalization)



proposed project design include: (i) lessons from Norway, Iceland, Finland, Denmark on reducing AMR, see in the annex 2; (ii) the need for multi-agency cross-government collaboration such as the horizon scanning and risk assessment group Human Animal Infections and Risk Surveillance (HAIRS) in the United Kingdom or the EU's coordination mechanism between the European Center for Disease Control and Prevention and the European Food Safety Authority for joint risk assessment for non-foodborne zoonotic or potential zoonotic hazards, and (iii) Membership in global food safety networks, such as WHO's International Food Safety Authorities' Network (INFOSAN), helps to efficiently exchange information and manage food safety risks globally. Some of these lessons were applied earlier in the design of the Emerging Infectious Diseases Prevention Preparedness and Response Project.

57. **LOCs are successful if they are priced in line with market principles, have clear eligibility criteria, and are complemented by technical assistance to PFIs.** In line with the World Bank's Policy on PFIs and associated Guidance on Financial Intermediary Financing, the project will use market principles to price financing to PFIs to avoid exacerbating market distortions, as well as to safeguard the financial sustainability of the PFIs. Turkey's Third Access to Finance for SMEs Project (P130864) confirmed the importance of using quantitative PFI and SME eligibility criteria to ensure that unsuitable PFIs and non-viable SMEs are excluded. Various projects have demonstrated that selecting only suitable and well-qualified PFIs paired with technical assistance to PFIs is indispensable for the success of LoCs. Hence, the project will provide technical assistance to PFIs. Part of this technical assistance will focus on familiarizing PFIs with the project's environment and social safeguard requirements.

58. **The design of the RSF applies the key principles for designing partial credit guarantee schemes.** The principles issued by the World Bank Group in 2014 are based on global good practices and cover the areas of governance, management, administration, sustainability, and monitoring.<sup>32</sup> Although these principles are primarily for independent legal government entities offering Credit Guarantee Schemes, some of the principles relevant for the type of risk sharing facility designed under the project will include: (i) adequate funding to achieve its policy objectives (Principle #2); (ii) sound management, internal controls, and risk management systems (Principles #6, #7, and #8); (iii) clearly defined and transparent eligibility and qualification criteria for lenders and credit instruments (Principle #9); (iv) partial guarantees provide incentives for lenders to assess risks prudentially and correctly (Principle #11); (v) claim management process should be efficient, clearly documented and transparent providing incentives for loan loss recovery (Principle #13); (vi) periodic financial reporting (Principle #14); and (vii) performance, particularly its outreach, additionality and financial sustainability, should be periodically evaluated (Principle #16).

59. **Food safety liability insurance can function as a socially beneficial food safety regulator.** Insurance can be effective in regulating food safety risks and improving public safety. Insurers act to minimize their losses through a variety of risk-reduction techniques, including contract provisions designed to give insured clients a financial incentive to lower their own risk. If insurers can use the terms of a liability insurance contract to induce food suppliers to lower their risk of transmitting foodborne pathogens, society will benefit from an overall reduction in foodborne illnesses. If an insurer can lower its premiums by reducing its risk of paying claims, it can underprice its competitors, thereby attracting more

<sup>32</sup> The Principles can be accessed at <http://documents.worldbank.org/curated/en/2015/12/25665897/task-force-design-implementation-evaluation-public-credit-guarantee-schemes-small-medium-enterprises-principles-public-credit-guarantee-schemes-smes>



business. Data and risk analytics enable insurers to assess the nature of their clients' risks and minimize moral hazard, thereby reducing overall risk and their prices. This competition among insurers makes insurance a socially beneficial food safety regulator.

### III. IMPLEMENTATION ARRANGEMENTS

#### A. Institutional and Implementation Arrangements

60. **Project Steering Group at the National Level.** A Steering Group will be established at the national level. It will be responsible for overall project direction and coordination and will facilitate project review and policy dialogue. The Steering Group will consist of representatives of the National Development and Reform Commission, Ministry of Finance, Ministry of Agriculture and Rural Affairs, State Administration for Market Regulation, and the two project provinces. The Steering Group will meet semi-annually to be informed of the project implementation progress, provide guidance on the overall direction of the project and facilitate project review and policy dialogue based on emerging evidence from project implementation. The National Food Safety Committee will be kept informed of the project achievements and invited to project events such as annual forums and high-level project seminars/workshops.

61. **Project Management Offices at the National Level.** A Project Leading Group (PLG) and a Project Management Office (PMO) will be hosted by SAMR. The PLG will be headed by the Director General of the Department of International Cooperation and will consist of representatives of the Departments of Food Safety Coordination , Food Production Safety Regulation, Food Distribution and Catering Safety Regulation, Special Food Safety Regulation, Food Safety Sampling and Monitoring, Standards Technical Management, Certification Supervision, Accreditation, Inspection and Testing, the Chinese Academy of Inspection and Quarantine (CAIQ) and the China Entry-Exit Inspection and Quarantine Association (CIQA). The PMO of SAMR will be hosted by CAIQ, with participation by CIQA. A Project Management Office will be established at the Department of Food Safety Supervision, MARA. The PLG and the PMO will be responsible for overall coordination, reporting, implementation, management, monitoring and evaluation of project activities at the national level. Key staff in the PMO will include a Project Director, Project Coordinator, Safeguards Specialist, Lead Technical Specialist, and Monitoring and Evaluation Officer. The PMO of SAMR will also provide secretariat support to the national PSG, including compilation and reporting the project progress, coordination of meetings, liaison among group members, as well as developing the MIS.

62. **Project Implementation Units (PIUs) at the National Level.** PIUs within SAMR and MARA will act as executing agencies and be responsible for the day-to-day operation of the project. In SAMR, the PIUs will be housed in the Chinese Academy of Inspection and Quarantine (CAIQ) and the China Entry-Exit Inspection and Quarantine Association (CIQA). In MARA, the PIU will sit in the Institute of Quality Standard and Testing Technology for Agro-products (IQSTTA). The PIUs will manage project procurement, including signing of contracts, project designated account, financial management, safeguards, monitoring and evaluation. The PIUs will also be responsible for preparing annual workplans, the procurement plan, and the financial reports, organizing trainings and seminars, coordinating and arranging for the Bank's supervision missions, and drafting communications with the Bank.



63. **Implementation Agreements.** SAMR and MARA will enter into implementation agreements with CAIQ, CIQA and IQSTTA to outline the roles and responsibilities of these entities in acting as PMOs and PIUs at national level and managing the IBRD loan proceeds. These agreements will be incorporated in the Project Operations Manual.

64. **Technical Expert Groups.** Technical expert groups will be set up at the national and subnational levels to provide technical expertise and support to the implementation agencies. The experts could be contracted as consultants using the loan and counterpart funding.

65. **Coordination arrangements at the provincial level.** In project provinces, project preparation has been coordinated by the Department of Finance (DOF) and the Department of Development and Reforms (DRC) in close cooperation with the relevant provincial departments. A Steering Group will also be established at the provincial level. It will be responsible for overall project direction and coordination and facilitate policy dialogue. The Steering Group will consist of representatives of the Provincial Development and Reform Commission, Department of Finance, Department of Agriculture and Rural Affairs, Administration for Market Regulation, Health Committee, and Department of Ecology and Environment. The Steering Group will be supported by the Provincial Department of Agriculture and Rural Affairs (DARA).

66. **Project Management in Guangdong province.** A Project Leading Group (PLG) and provincial project management office (PPMO) will be set up in the provincial DARA. The PLG will be headed by the Director General of DARA and responsible for overall project direction and coordination and will facilitate project review and policy dialogue. The PPMO will be responsible for implementation, overall coordination, consolidated reporting, monitoring and evaluation of the project activities, coordination and arrangement for the Bank's supervision missions, and drafting communications with the Bank. The PPMO will manage project procurement, financial management and safeguards. The PPMO will also be responsible for preparing the annual work plan, the procurement plan, and the financial reports, and organizing trainings and seminars, and will be supported by a PIU set up at Guangdong Agro-products Quality and Safety Center, a center established by DARA. Another PIU will be set up in Guangdong Administration for Market Regulation and responsible for coordinating with SMAR and implementing the activities related to market supervision and regulations. Any additional implementation structures at the municipal or county level may be set up based on needs during the project implementation period and with prior agreement with the Bank.

67. **Project Management in Yantai Municipality, Shandong Province.** The project will be implemented by Yantai municipality in Shandong. A PLG will be set up in Yantai and will be responsible for overall project direction and coordination and will facilitate project review and policy dialogue. The PLG will be headed by the deputy mayor of Yantai Municipal Government and consist of representatives of the Municipal Development and Reform Commission, Finance Bureau, the Marine Development and Fisheries Bureau, Agriculture and Rural Affairs Bureau, Market Regulation, Health Commission, Big Data Bureau, and Bank of Yantai. A municipal project management office (MPMO) will be set up in the Marine Development and Fisheries Bureau and responsible for the coordination, reporting, management, implementation, and monitoring and evaluation of their respective activities specified in the Annual Work Plans. The MPMO will also be responsible for overall coordination, consolidated reporting, and monitoring and evaluation of the project activities. Any additional implementation structures at the provincial or



municipal level may be set up based on the needs during the project implementation period and the Bank's prior agreement.

68. **LOC and RSF interventions.** The provincial and municipal PMOs will be responsible for implementing the LOC and RSF interventions. The PMOs will be responsible for selecting PFIs and monitoring PFIs' compliance with the eligibility criteria throughout the project period. The PMOs will recruit technical service providers (TSP-LOC/TSP-RSF) experienced in managing financial services and/or guarantees for agriculture and agribusiness for supporting LOC/RSF operations and food safety standard experts to support PFIs in: (i) building a pipeline of project proposals by engaging with lead enterprises of the eligible value chains; (ii) verifying the borrowing enterprises' food safety compliance; and (iii) portfolio review and follow-up. The PMOs will ensure that LOC and RSF manuals are prepared acceptable to the Bank and adhered to throughout the project period. PFIs will be responsible for building the systems required to ensure compliance with World Bank fiduciary and environmental and social (E&S) requirements, as well as effective monitoring and reporting on project activities, including on the loan performance. The PFIs will be expected to have dedicated teams to support the project activities.

- (a) **LOC:** On the advice of the Yantai MPMO, the local Finance Bureaus will enter into subsidiary loan agreement with selected PFIs. The fiduciary aspects of the LOC are elaborated in the Financial Management (FM) section.
- (b) **RSF:** Guangdong PPMO will hire an TSP-RSF (a financial services firm with experience in managing credit guarantees) through a competitive selection process. The RSF governance committee will comprise representatives of DARA, SAMR, provincial DOF, and provincial DRC, and reputed experts in rural finance and banking. The fiduciary functions will remain with the provincial PMO, and the RSF administration will be guided by the RSF business plan and RSF manuals.

69. **Insurance interventions.** The implementation of the component activities will be anchored by technical services provider for insurance services (TSP-IS) hired in the Guangdong PPMO. Selection of both the insurance company and TSP-IS will be on a competitive basis. Annex 3 contains the detailed implementation arrangements.

70. The detailed responsibilities and arrangements at the national, provincial, municipal, and county level will be further developed and included in the Project Operations Manual (POM), which will need to be acceptable to the Bank prior to the effectiveness of the legal agreements.

## B. Results Monitoring and Evaluation Arrangements

71. **The results monitoring and evaluation plan will be described in the POM.** The project PMOs will be responsible for project monitoring and evaluation. All project PMOs, with expert support, will plan, coordinate, and implement the project monitoring and evaluation activities. Based on the Theory of Change, the Results Framework describes the PDO-level indicators and the component-specific intermediate indicators, including the units of measurement, respective baselines, cumulative target values, frequency, data source and methodology, and responsibility for data collection (Section VI). The project will develop a dedicated Monitoring and Evaluation (M&E) system for tracking project inputs, activities, outputs, and impacts across all components in all project provinces and central level MARA and



SAMR within six months from project effectiveness. An MIS on a web-based platform covering all the project implementation agencies will be developed early during project implementation.

72. **At least one M&E consultant or one staff member will be recruited and appointed in each PMO.** The project will also recruit a technical consulting firm to assist in developing and managing the project M&E system, consolidating information from all components, and preparing the quarterly M&E reports.

73. To measure the intended impacts, each value chain investment subproject package submitted to financial institutions for financing under Component 3 should include the expected number of project beneficiaries and the expected food safety and environmental and social impacts from the proposed interventions consistent with the project results framework. The entities receiving value chain investments must record relevant environmental/natural resource use and food safety baselines and track green and food safety impacts before and after the investments. One independent third-party agency would be engaged to verify subproject environmental baselines at the start of the investments and carry out an impact assessment, and E&S safeguards compliance assessment at midterm and the end of the project. The World Bank will review the Terms of Reference of the verification agency during the project implementation before starting specific M&E assignments.

### C. Sustainability

74. **Several factors create a high likelihood of sustaining project results over time with long-lasting, positive impacts.** First, the project fills a strategic need and addresses the priorities of the Government, the private sector, and consumers. Second, the existing legal framework provides a good foundation for sustainable project results. Finally, the project design incorporates measures that support sustainability, as explained in the following.

75. **Component 1 - Institution building and regulatory performance.** Support under this component enables the Government to implement its 2015 Food Safety Law, which provides the primary basis for the component's sustainability. Capacity-building measures will strengthen the institutional processes and human resources for food safety programming, risk-based supervision frameworks, and multi-sector food safety governance. The activities will go beyond merely addressing current capacity deficits through discrete training events and exposure visits for present experts. Instead, the project will also build systemic food safety capacity by developing technical and functional skill standards for the farms and food industry, demonstrations, vocational training, and university curricula, as well as an online food safety training platform. Besides, the project will foster partnerships and networks among government institutions, research institutes, the private sector, which will bolster knowledge exchange and learning beyond training. For sustainability, the public sector will have to regularly allocate funds for research, extension education, training, and knowledge exchange for food safety.

76. **Component 2 - Food safety supervision process including consumer engagement.** The sustainability of this component depends on continued government funding for operating, maintaining, and replacing laboratory equipment and IT platforms. To address this risk, the implementing Government institutions will endorse sustainability plans and contribute operating budgets already during project implementation. During implementation support missions, the World Bank will monitor the actual operating costs relative to the ex-ante estimates and review the allocated operating budgets. Another necessary condition for sustainability is that the capacity of regulators, laboratory, surveillance, and IT



staff is maintained in the face of attrition and new food safety developments. The comprehensive approach to capacity development in Component 1 addresses this aspect. The project will enable public institutions to fulfill their legal obligation for consumer engagement, which provides a good foundation for sustainability.

77. **Component 3 - Whole value chain food safety control.** The sustainability of private sector food safety investments along the value chain is contingent on the continued use and updating of food safety technologies and practices. To a large degree, this will depend on the profitability of the investments. To mitigate this risk, all financing proposals will need to demonstrate that the investment is profitable. The calculations will consider price premiums that consumers are willing to pay for identifiable safe food products. The consumer risk communication and engagement measures under Component 2 support price premiums for safe food products through consumer information, improved labeling, certification, and branding efforts. Ex-post profitability data will be collected from participating firms and published anonymously to strengthen private sector incentives to invest in food safety. To ensure that the private sector has the human capacity to build and sustain a food safety culture, Components 1 and 4 invest in capacity building, knowledge management, and people networks.

78. **Networking and knowledge transfer (part of components 1 and 4).** To support the sustainability of networking and knowledge transfer for addressing new challenges and for upscaling the project, the public sector needs to mainstream such activities into its regular work program. This will require annual resource allocations for organizing and funding participation in pertinent events and knowledge management, products, and sharing platforms. Linking with international networks, universities, research institutes, and the private sector will help keep the content relevant and provide opportunities for pooling resources, contributing to sustainability.

#### IV. PROJECT APPRAISAL SUMMARY

##### A. Technical, Economic and Financial Analysis (if applicable)

###### (i) Appraisal Summary: Technical

79. Over the last decade, China has made good progress in upgrading its food safety system and moving towards a science and risk-based food safety framework aligned with best practice international standards and regulations. However, as presented in the context section, various shortcomings persist. This project aims to “improve food safety management at the national and targeted subnational levels and reduce food safety risks in selected value chains” (PDO), demonstrating the effective and efficient working of a modern food safety system aligned with best international practice. This requires a comprehensive approach.

80. Data security and protection are critical for the successful implementation of activities under component 2. SAMR will develop a data-related policy to guide the big data analytics for food safety. The policy will cover, among other data issues: (a) data governance; (b) data security; (c) protection of personal data; and (e) data sharing mechanisms. It will ensure that during data collection and/or processing, their data security and accuracy, as well as use is strictly limited to the purposes intended. In addition, the data use is explicitly authorized by law and governed by protocols that allow data sharing only under specific



circumstances. If the policy (and project activities in general) doesn't preclude the collection or processing of personal data, then it should further include dedicated section with specific provisions about the principles that would govern the collection and processing of personal data. The provisions should ensure lawful, fair and transparent collection and processing of personal data; data minimization (collecting only data that is necessary for the purpose); data accuracy (correct or erase data that are not necessary or are inaccurate); use limitations (data are only used for legitimate and related purposes); data retention (retain data only for as long as they are necessary); informing data subjects of use and processing of data; and allowing data subjects the opportunity to correct information about them. Data policy will also govern the data-related activities of all implementing agencies; and be considered when designing and implementing any technology-related activities under the project. MARA and SAMR will also develop guidelines for pre-screening and evaluating the pilots for smart food safety supervision to determine which technologies are fit-for-purpose, assessing regulatory, capacity, environmental and social, as well as data security and privacy impacts.

81. The project will promote the application of risk analysis frameworks of international standard-setting bodies like CAC, OIE, and International Plant Protection Convention and the adoption of independent, scientific risk assessments for both agriculture product quality and food safety to guide MARA's and SAMR's regulation/standard setting. It builds the necessary regulatory coordination of these institutions and other relevant agencies to ensure a consistent, risk-based approach to food safety along the entire food value chain. The project will provide risk management capacity building, strengthen risk-based supervision and encourage private enterprises' preventive action for food safety along the value chain. The project will invest in data platforms and analytics of the private and public sector, which track the safety and movement of food products through the value chain and make it possible to identify potential dangers so that action can be taken. The project will finance activities to engage consumers in two-way communication, which, together with the increased transparency of the system, will generate greater accountability of both enterprises and authorities for their actions. Demonstrating the effectiveness of the strengthened food safety framework will enhance the reputation of the quality and safety of food produced in China, thus contributing to higher-level objectives.

#### (ii) Appraisal Summary: Economic and Financial Analysis

82. **The development impact and expected benefits.** The project aims to improve food safety management at the national and targeted subnational levels and reduce food safety risks in selected value chains. Domestically, the project will generate enormous benefits in the form of improved food safety, more sustainable environmental practices, and resilience to climate change and variability. It will benefit farmers, farmer cooperatives, and enterprises through a value chain approach that improves the productivity and efficiency of farming systems while enhancing the processing and market opportunities for high quality and safe food products.

83. **Climate co-benefit.** The direct climate benefits will be accrued mainly through mitigation by adopting good agricultural and aquaculture practices under Component 3. An ex-ante analysis of the impact of value chain investment on reduced GHG emissions, compared to existing practices (the baseline), was undertaken by using Ex-Ante Carbon-balance Tool (EX-ACT) for crops and aquaculture, and Global Livestock Environment Assessment Model (GLEAM) for the livestock, developed by the FAO. Total GHG emission reduction benefits will reach an estimated 0.32 million tons of CO<sub>2</sub>eq per year at full



development, equaling 5.75 million tons of CO<sub>2</sub>eq during the project life. These benefits are included in the cost-benefit analysis (see below).

### **(iii) Cost-Effectiveness Analysis for Components 1 and 2**

84. ‘Cost-effectiveness’ is the preferred methodology for the economic evaluation of Components 1 and 2 (approximately 40 percent of total project costs). The rationale for adopting a cost-effectiveness methodology is that improved food safety regulatory performance, supervision process, and institution building will lead to significant benefits to be gained and production losses to be avoided, which are challenging to reliably quantify ex-ante. A cost-effectiveness analysis' main objective is to demonstrate that the proposed investments have a sound strategic rationale for the overall project objectives and that these objectives are met most cost-effectively.

85. Meat and aquaculture products will continue to be major food items for Chinese consumers. With rising incomes, milk products and fruit and vegetables will also become more important in the food basket. The food safety of these items is a high priority. Food additives, microbial contamination, and veterinary drugs are major food safety hazards in China, dominantly from meat, aquaculture products, and fruit and vegetables value chains. Losses from foodborne diseases in China are the highest in Asia and the world at \$30 billion a year. It will be even higher if occupational health of food system workers and other morbidities caused by trans-fat, toxic foods, and other waterborne pathogens entering the food chains were considered.

86. A single food safety incident can cost a country and producers billions of dollars in lost revenues. One example of the negative result of a failure in the food safety system is the 2008 Melamine incident in China. Infant milk producers added Melamine, a plastic compound, to the milk powder to boost protein readings, leading to loss of lives and sickness, costing dairy producers and the country billions of dollars. Also, the incident stained the reputation of China’s entire food industry for years. Likewise, poor animal health practices can result in disease epidemics, such as avian flu or the recent H1N1 (swine) flu, resulting in billions of dollars in losses.

87. The magnitude of the losses that result from food safety and animal health failures are so large that they dwarf any reasonable investment, such as this project, that could significantly reduce the risk. Thus, the rationale for investing in food safety regulation and supervision is well accepted without calculating the rate of return for these types of investments, which will be high by any conservative assumptions if data and resources were available for calculation.

### **(iv) Cost Benefits Analysis for Component 3**

88. The evaluation of the economic and financial viability of this component (with US\$ 161.50 million from Bank loan) is analyzed by comparing with-and-without project scenarios. Given the demand-driven nature of the value chain investment under the component, the specific subprojects and entities to be financed will be determined during project implementation, as they are subject to the involved financial institutions’ screening criteria and technical appraisal. Therefore, for this analysis, representative value chain investment models are developed in consultation with local experts and FSR teams, to gauge the financial profitability by major types of value chains, and the economic viability is analyzed at component level by extrapolating the aggregated investments by type and incorporating the climate benefits.



89. Based on the above, the results show that the proposed investment models for pig farming, aquaculture, and fruit and vegetables production are all financially profitable with financial internal rates of return (FIRRs) ranging from 18–25 percent. At the component level, the investment is economically viable with an Economic Rate of Return (ERR) at 19.8 percent without climate co-benefits. The ERR equals 21.8 percent with the lower shadow carbon price projection that increases linearly starting at US\$40 in 2021 and 23.9 percent with the higher shadow carbon price projection that starts at US\$80 in 2021, indicating that the investment is economically viable at the various carbon shadow prices defined in the latest current Bank guidelines. Sensitivity test shows that the project economic returns are robust. The detailed analysis with underlying assumptions for these estimations and sensitivity analyses are given in Annex 6.

## B. Fiduciary

### (i) Financial Management

90. **Financial Management Assessment.** A financial management (FM) assessment has been conducted in accordance to the Bank Directive/Bank Policy for IPF dated October 1, 2018 and Bank Directive - Financial Management Manual for World Bank Investment Project Financing Operations dated February 10, 2017 to assess the project FM arrangement and capacity of the PMO of SAMR housed in CAIQ which also works as a PIU and the PIU of CIQA; the PMO of MARA and its PIU - IQSTTA; Guangdong Provincial PMO (PPMO) under Guangdong DARA and its PIU of Guangdong Agriculture Quality and Safety Center (GD AQSC), Yantai PMO to be set up in the Yantai Municipal Marine Development and Fisheries Bureau. Given PFIs implementing the LOC component for Yantai part and the insurance companies for Guangdong part will be selected through a transparent and competitive selection process, the Bank FM requirements such as the project accounting, reporting and auditing and so on for the selected PFIs and insurance companies will be documented in the POMs which will be agreed by and acceptable to the Bank. Another PIU in Guangdong will be assessed once it is identified and decided based on needs during the project implementation and with prior agreement with the Bank which is to be set up in Guangdong Administration for Market Regulation (GDAMR) and responsible for implementing the activities related to market supervision and regulations. The assessment concluded the project FM arrangements, associated with risk-mitigating measures and with due consideration for their overall capacity, are acceptable to the Bank and that, as part of the overall arrangements for implementing the operation, provide reasonable assurance that the proceeds of the Bank loan can be used for its intended purposes. The assessed FM risk is considered substantial with a couple of inherent risks and the proposed mitigating measures being implemented by effectiveness. For further reference please see the section of "Key Risks".

91. **On-lending Arrangement.** The total project cost is estimated around US\$735.00 million which is comprised of the proposed US\$400.00 million Bank loan, US\$85.00 million equivalent counterpart funds from government resources, at least US\$50.00 million equivalent counterpart funds from PFIs of Yantai part and at least US\$200.00 million loans from PFIs leveraged by the IBRD financed risk-sharing facility. The US\$85.00 million government counterpart funds are comprised of US\$15.00 million from Yantai municipal fiscal budget and US\$70.00 million from Guangdong provincial fiscal budget. The US\$400.00 million loan agreement will be signed between the People's Republic of China represented by its Ministry of Finance and IBRD.



92. Regarding the domestic repayment responsibilities, a US\$40.00 million Bank loan (comprising of three portions due the different IBRD terms selected by the counterparts) will be repaid by the central government of China for the national part of US\$25.00 million for SAMR and US\$15.00 million for MARA. US\$260.00 million will be on-lent to Guangdong province through the on-lending agreement between MoF and Guangdong Provincial Finance Department (GPFD) and the loan will be repaid by the Guangdong provincial government. US\$100 million will be on-lent to Yantai municipal government through Shandong province, in which US\$50.00 million will be further on-lent to the selected PFIs by Yantai municipal government pursuant to subsidiary loan agreement(s). These amounts will be repaid by Yantai municipal government and the selected PFIs respectively.

93. **Flow of Funds.** Four project designated accounts (DAs) are proposed under the project. Two DAs are managed by each of two national PMOs with its PIUs for the national activities, one DA is managed by Guangdong Provincial Finance Department (GPFD) and one DA is managed by Shandong Provincial Finance Department (SPFD). The DAs are US dollar denominated segregated DAs for the World Bank loan and will be opened in a financial institution acceptable to the Bank.

94. For the national part, the two DAs will have fixed ceiling. One is with the ceiling of US\$2.00 million for the SAMR part and the other is with the ceiling of US\$1.25 million for the MARA part. The MARA's PIU IQSTTA and SAMR's PIU CAIQ will be responsible for the management, maintenance, and reconciliation of its DA activities respectively.

95. For the Shandong part, the DA is also fixed ceiling DA with a ceiling of US\$8.00 million. SPFD will be responsible for the management, maintenance, and reconciliation of the DA activities.

96. For the Guangdong part, one DA is a DA with variable ceiling which is based on disbursement forecast approved by the Bank (the TTL) from time to time. GPFD will be responsible for the management, maintenance, and reconciliation of the DA activities.

97. Further advances will be applied to the DA of Guangdong. The advances withdrew from the Bank into the DAs will be further advanced to sub-accounts (SAs) after currency conversion. The SAs in RMB will be managed by the Guangdong PPMO with its PIU of AQSC and Guangdong DAMR respectively to serve the disbursement of all eligible expenditures under the project. The GD PPMO and the PIUs should maintain segregated booking/accounting for the SA transactions including incomes/expenditures related to the guarantee of RSF and incomes/expenditures related to other activities than guarantee.

98. It is required that regular reconciliations are performed between the DA and the SAs by the GPFD and Guangdong PPMO/PIUs.

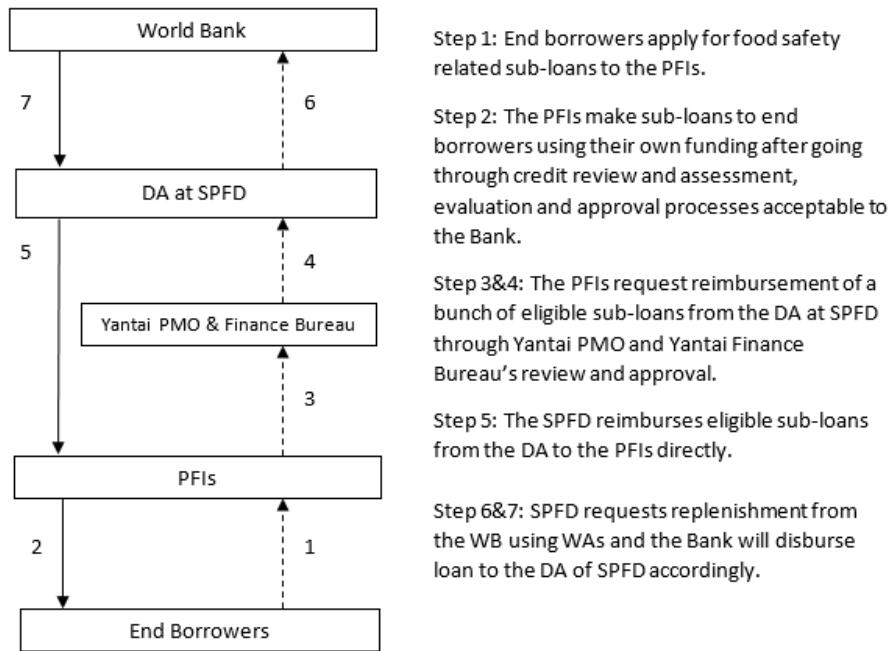
99. For the national part, the PIUs will prepare payment requests to the national DAs with appropriate and adequate supporting documents. Once the payment requests are approved by the DAs and the national PMOs, the DAs will make the payments directly to contractors or suppliers.

100. Under Shandong part, for other project expenditures eligible for being financed by the Bank loan than Line of Credit (LoC), the PMO will prepare payment requests to Yantai Finance Bureau for review, and finally to SPFD for approval. Once the requests are approved by SPFD, the proceeds of the Bank loan will flow from the DA to Yantai PMO or contractors/suppliers/service providers through Yantai Finance



Bureau based on withdrawal applications (WAs). For the LoC in Yantai, the flows of funds are proposed as following:

Figure 2. Flow of Funds for Line of Credit in Yantai



Step 1: End borrowers apply for food safety related sub-loans to the PFIs.

Step 2: The PFIs make sub-loans to end borrowers using their own funding after going through credit review and assessment, evaluation and approval processes acceptable to the Bank.

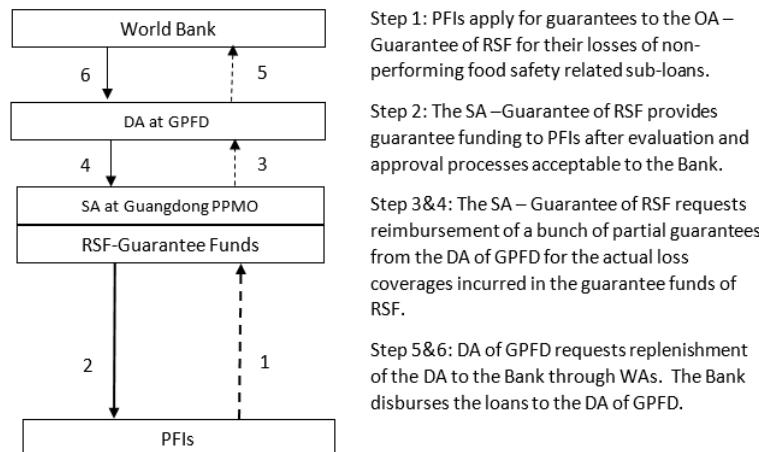
Step 3&4: The PFIs request reimbursement of a bunch of eligible sub-loans from the DA at SPFD through Yantai PMO and Yantai Finance Bureau's review and approval.

Step 5: The SPFD reimburses eligible sub-loans from the DA to the PFIs directly.

Step 6&7: SPFD requests replenishment from the WB using WAs and the Bank will disburse loan to the DA of SPFD accordingly.

101. Under the Guangdong part, for project expenditures eligible for being financed by the Bank loan, the PIU will prepare the payment request to the SA and Guangdong PPMO for review and approval, then the SA will make such payments from its balance. Then the SA will request replenishment/advance from the DA of GPFD after the Guangdong PPMO and GPFD's approval. Once the replenishment/advance requests are approved by the GPFD, the proceeds of the Bank loan will flow from the project DAs to the SA based on withdrawal applications (WAs).

Figure 3. Flow of Funds for Risk Sharing Facility in Guangdong



Step 1: PFIs apply for guarantees to the OA – Guarantee of RSF for their losses of non-performing food safety related sub-loans.

Step 2: The SA –Guarantee of RSF provides guarantee funding to PFIs after evaluation and approval processes acceptable to the Bank.

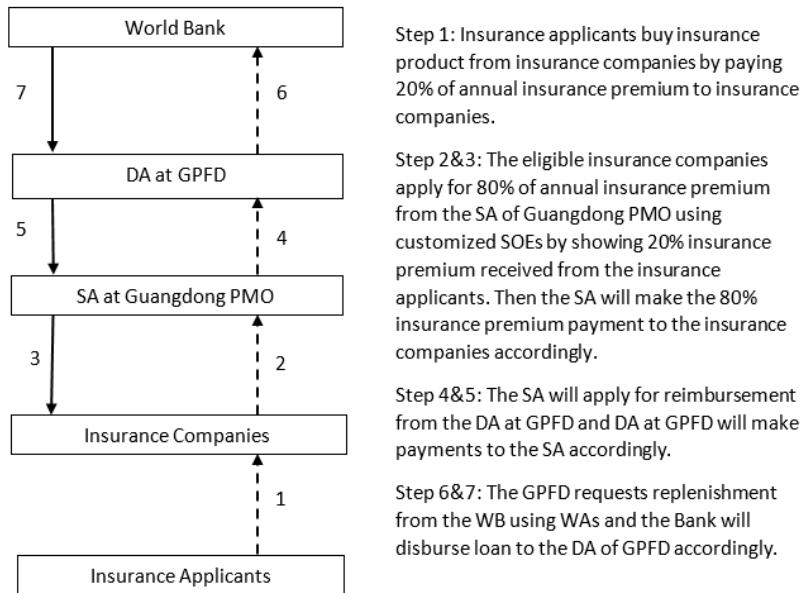
Step 3&4: The SA – Guarantee of RSF requests reimbursement of a bunch of partial guarantees from the DA of GPFD for the actual loss coverages incurred in the guarantee funds of RSF.

Step 5&6: DA of GPFD requests replenishment of the DA to the Bank through WAs. The Bank disburses the loans to the DA of GPFD.



102. For the insurance interventions in Guangdong, the flow of funds is proposed as following:

**Figure 4. Flow of Funds for Food Safety Liability Insurance in Guangdong**



103. **Reporting and Auditing.** Four sets of unaudited interim financial reports (IFRs) are required by the Bank under the project. Two sets of IFRs are prepared and submitted by the two national PMOs/PIUs for the national activities. The other two sets of IFRs are prepared and submitted by Guangdong and Yantai PMOs for the activities they execute. The unaudited interim financial reports (IFRs) are required to be submitted to the World Bank within 60 days after the end of each calendar semester period.

104. Four sets of audits are required under the project. Two are for national-level activities in two ministries respectively, one is for Guangdong and one is for Yantai. The annual audited project financial statements satisfactory to the World Bank are required to be submitted within six months after the closure of each fiscal year during the entire project life. According to the agreement reached with MOF and CNAO, the project audit reports will be made publicly available in the official websites of World Bank, ASC, and provincial audit offices.

105. **Internal Controls.** The project will maintain an appropriate internal control system which includes, but are not limited to, the following: (a) each level finance department will take its withdrawal authority with the support of PMOs to oversee and supervise the usage of the Bank loan to ensure the use of the World Bank loan for its intended purposes; (b) existing duty segregation, payment, and authorization controls are in place in the PMOs and PIUs; (c) a circular was issued by MoF about the requirements of Bank loan disbursement including supporting documents and service time, and so on; (d) technical support and oversight on the project management from the PMOs and finance departments; (e) annual external audit will be undertaken to evaluate the fairness of project financial statements and performance of the overall internal control system; and (f) technical expert panel will provide services and supports to the project implementation in particular of LOC, guarantee and insurance.



106. Under Shandong/Yantai part, US\$50.00 million will be implemented through LOC by the competitively selected PFIs which will be more than one. The control procedures include but not limited to the following:

- (a) From operational and technical perspectives, the LOC is financing eligible end borrowers for eligible set of activities under agreed value chains through acceptable LOC terms including pricing and maturity, and so on as agreed by and acceptable to the Bank which will be specified in the POM and incorporated in the manual for the LOC.
- (b) The disbursement of the Bank loan under LOC will be using report-based disbursement with a customized statement of expenditures (customized SOE). The customized SOE will be developed and agreed with Shandong/Yantai and the PFIs which includes the relevant information to make references to sub-loan terms such as maturity and interest rate and so on. The requirement on the customized SOE will be documented and specified in the POM.

107. Under Guangdong part, US\$40.00 million Bank loan will be implemented through RSF and loss from the default in principal and interest portion of the sub-loans will be covered on *pari-passu* basis between the project and the PFI according to the criteria and business process described in RSF manual. In addition, US\$2.00 million will finance the cost of Third-party Service Provider for managing risk sharing facility (TSP-RSF). The control procedures include but not limited to the following:

- (a) The Bank will provide the loss coverage according to a predetermined risk-sharing percentage to mitigate risks perceived by the selected PFIs associated with its LOC business as agreed by the Bank.
- (b) To facilitate the disbursement of the Bank loan under the guarantee of RSF, build up the Guangdong PMO's capacity of managing the guarantee funds and maintain the RSF sustainability after the project closing, the US\$40 million Bank loan will be disbursed from the Bank as advances according to a predetermined proportion of LOC annual portfolio on a rolling basis. The disbursement of each advance to the DA for RSF-guarantee is subject to the Bank's review and approval (TTL's approval).
- (c) The eligible expenditure for the Bank loan financing can only be recognized upon the occurrence of actual credit loss coverage.
- (d) Before the recognition of eligible loss coverage, the advance sitting in the DA cannot be used for other purposes.
- (e) As agreed, customized SOE will be prepared by the Guangdong PPMO with its PIU to report the actual loss coverage amount of RSF on a semi-annual basis. The customized SOE will be developed and agreed with Guangdong PPMO.
- (f) Starting from the mid-term review, the Bank team will review the implementation performance of the guarantee of RSF and the project will discuss with the Bank the appropriate use of the unspent amount of the guarantee.



108. Under Guangdong part, a US\$30.00 million Bank loan will be financing an initial insurance premium to encourage insurance uptake and product development/refinement for the first three years of the insurance intervention. In addition, US\$2 million will finance the cost of Third-party Service Provider for managing insurance service interventions (TSP-IS). The control procedures include but not limited to the following:

109. From operational and technical perspectives, the Bank loan will be used to finance the insurance premium of the eligible insurance product agreed by and acceptable to the Bank which will be specified in the insurance manual.

110. The insurance companies that show interest to develop and pilot innovative food safety insurance products will be assessed and selected by the Guangdong PPMO by the insurance administrator based on terms of references agreed by and acceptable to the Bank.

111. The insurance premium financed by the Bank for each eligible insurance applicant is 80 percent of the annual insurance premium and the other 20 percent is born by insurance applicants themselves. For each eligible insurance applicant, the Bank loan can only finance its insurance premium maximumly for three years.

112. The disbursement of the Bank loan for the insurance premium will be using report-based disbursement with customized SOE which will be developed and agreed with Guangdong PPMO.

113. The Bank loan will directly flow to the insurance companies from the SA based on customized SOEs after the evidence can show insurance applicants pays their 20 percent of the insurance premium.

114. **Disbursement.** Four Bank disbursement methods will be available under the project: (a) advance, (b) direct payment, (c) reimbursement, and (d) special commitment. The advance will be the major disbursement method for the project activities. Report-based disbursement will be used for the sub-loans (LOC) in Yantai, guaranteee, and insurance premium in Guangdong. Customized statement of expenditures (SOEs) will be developed and agreed upon with Yantai and Guangdong. Traditional transaction-based disbursement will be used for other eligible expenditures than sub-loans, loss coverage, and insurance premiums. The proposed Bank loan allocation and financing percentage are listed in below table:

**Table 3. Loan Allocation and Financing Percentages**

Category	Amount of Portion A of the Loan Allocated (US\$)	Amount of Portion B of the Loan Allocated (US\$)	Amount of Portion C of the Loan Allocated (US\$)	Percentage of Expenditures to be financed (incl. Taxes)
(1) Goods, works, non-consulting services, and consulting services Incremental Operating Costs and Training for the Borrower's Respective Parts of the Project for:	15,000,000			100%



Category	Amount of Portion A of the Loan Allocated (US\$)	Amount of Portion B of the Loan Allocated (US\$)	Amount of Portion C of the Loan Allocated (US\$)	Percentage of Expenditures to be financed (incl. Taxes)
1. MARA; and 2. SAMR	25,000,000			
(2) Goods, works, non-consulting services, and consulting services Incremental Operating Costs and Training for the Project Implementing Entities' Respective Parts of the Project for:  1. Guangdong Province; and  2. Shandong Province	190,000,000	50,000,000		100%
(3) Sub-loans for Part 3.1 (a) of the Project			50,000,000	100% of amounts disbursed
(4) Loss Coverage for Part 3.1 (b) of the Project	40,000,000			100% of amounts disbursed
(5) Insurance Premia for Part 3.2 of the Project	30,000,000			100% of amounts disbursed
<b>TOTAL AMOUNT</b>	<b>300,000,000</b>	<b>50,000,000</b>	<b>50,000,000</b>	

115. The estimated disbursement schedule for the three loans covered by the project is given below:

**Table 4. Disbursement schedule (amount in US\$, million)**

Loan Portions	2022	2023	2024	2025	2026	2027	Total
Portion A of the Loan	12.00	28.00	70.00	75.00	70.00	45.00	300.00
Portion B of the Loan	3.00	7.00	10.00	15.00	10.00	5.00	50.00
Portion C of the Loan	5.00	15.00	20.00	10.00	0.00	0.00	50.00
<b>Total</b>	<b>20.00</b>	<b>50.00</b>	<b>100.00</b>	<b>100.00</b>	<b>80.00</b>	<b>50.00</b>	<b>400.00</b>

116. **Retroactive financing.** A provision for retroactive financing will be made in the Loan Agreement, with withdrawals up to an aggregate amount not to exceed US\$80 million allowed for payments made prior to the date of the Loan Agreement, on or after December 1, 2021 as specified in Loan Agreement, for eligible expenditures.

#### (ii) Procurement

117. **Applicable procurement rules and procedures.** Procurement under the relevant components of the project will be carried out in accordance with the 'World Bank Procurement Regulations for IPF Borrowers', dated November 2020, and hereafter referred to as 'Procurement Regulations'. Procurement



by sub-borrowers under component 3.1 will usually be based on predominant commercial practices in China. No procurement is envisaged for beneficiary enterprises availing insurance services under component 3.2. ‘Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants’, revised as of July 1, 2016, shall apply to the project.

118. **Institutional arrangement for procurement.** There are 4 parallel PMOs established to manage the project implementation at national and subnational level. Though SAMR is expected to play the role of National PMO, it will be responsible mainly for liaison and reporting of project progress but not being involved in the procurement management, coordination, implementation or monitoring for the entire project. The two modalities have been designed for procurement management under this project. One modality is the PMO itself will shoulder the procurement function. SAMR and Yantai will use this model. The other modality is the PMO will not shoulder the procurement function and the procurement will be taken care of by the PIU, MARA and Guangdong will adopt the latter model. Nevertheless, no matter which modality will be adopted, the procurement function is centralized to single entity, either one PMO or one PIU, for every subproject.

119. At the national level, with regards to SAMR subproject, the PMO is housed at Chinese Academy for Inspection and Quarantine (CAIQ), a public institution affiliated to SAMR. CAIQ would carry out the procurement function and sign the contracts for the subproject. For MARA subproject, the PMO has been set up in the ministry with one PIU hosted by Institute of Quality Standard and Testing Technology for Agro-products (IQSTTA), which is a subsidiary of Chinese Academy of Agricultural Sciences, a public institution affiliated to the ministry. The procurement function of MARA subproject will be rest entirely with IQSTTA.

120. At subnational level, for Yantai subproject, the PMO has set up in the Yantai Municipal Marine Development and Fisheries Bureau, which is a government agency. The bureau will be responsible for the procurement for Yantai subproject. For Guangdong subproject, the PMO is hosted by Department of Agricultural and Rural Affairs of Guangdong Province, with one PIU in Quality Safety Center for Agro-products, a public institution under the department, and another PIU under the Guangdong Administration for Market Regulation. The center and another PIU under Guangdong Administration for Market Regulation will be responsible for undertaking the procurement for Guangdong subproject.

121. **Major procurements envisaged.** The World Bank loan will be used for the procurement of works, goods, non-consulting services, and consulting services. The PSD has been prepared to envisage the major procurement under the project. It is involving (i) consulting services for food safety risk assessment, the articulation of the food safety standards, development of comprehensive data policy for food safety, as well as risk communication; (ii) the consulting services for technical assistance and capacity building in association with the market based instruments including line of credit, risk sharing facilities, and insurance; (iii) the testing and analytical instrument/equipment for food safety laboratories and other testing centers; (iv) the renovation works for the existing laboratories and testing centers and (v) IT system or platform for food safety supervision and traceability and big data. In parallel, the major procurement under Component 3.1, if applicable, would be described in the OM, including the dedicated manuals for the LOC, RSF and insurance.

122. **Procurement strategy.** The 4 PMOs have prepared Project Procurement Strategy for Development (PPSD) covering the operational context, capacity assessment market analysis, procurement



risk analysis, and other elements. The PPSD will be consolidated and finalized and agreed with the World Bank by negotiation. The PPSD informs that for most of the works and goods to be procured under the project, there are adequate potential contractors or suppliers with the required experience and expertise to carry out the contract. Therefore, the procurement of works and goods will be procured through open competition by approaching national market. In terms of consulting services including sectoral studies, platform development, formulation of standards, and technical assistance and capacity building related to market based instruments, QCBS/QBS would be adopted as the key selection method in order to approach international market to obtain the gain the advance expertise globally and introduce the international best practice. It is expected that most of the works and goods contracts will be procured through competitive bidding approaching the domestic market and the consulting services contracts will be mostly procured through QCBS/CQS.

123. **Procurement Capacity Assessment.** Through interview with the PMOs/PIUs and the review of materials submitted, most of PMOs/PIUs lack knowledge and experience on the Bank financed procurement. Most of PMOs/PIUs have never been involved in the projects funded by international financial institutions. Their past experience in association with procurement, if any, are mostly coming from the government procurement projects. The exception is Guangdong PMO, which is hosted by Department of Agricultural and Rural Affairs of Guangdong Province. The department has an ongoing Bank financed project undertaken by another public institution affiliated to the department. The leading group for this project has included the Director of PMO for the existing project to benefit from the experience and lessons learned from the existing project. Another PIU for Guangdong subproject will be set up later at the implementation stage. The capacity assessment for this PIU will be carried out once it is identified and determined.

124. The staff at the PMOs and PIUs assigned with procurement function do not have adequate knowledge and expertise to carry out the Bank financed procurement. Most of staff also lack hands-on procurement experience nor are aware of the relevant rules and regulations. Therefore PMOs/PIUs should need to systematically familiarize the staff with the Bank procurement policies and procedures. Nevertheless, each project implementing entity has system of decision making based on comprehensive review and approval systems in place. Accordingly, the PMOs/PIUs are shaping up their internal control mechanism for the project procurement relying on the existing internal rules and regulations. In addition, the role played by each stakeholder in the procurement process, the relevant duties and obligations, as well as the decision-making and internal control process should be clearly defined and documented in the project operation manual.

125. As regards the complaint handling and rules for anti-corruption and fraud, there were designated agencies and mature mechanisms in place. The project implementation will be subject to internal and external audit. Especially, the disciplinary inspection arms sitting in the implementing agencies will be responsible for investigating the allegation involving fraud and corruptive practices. However, there were some gaps between the domestic practices and Bank requirements. The complaint handling and anti-corruption and fraud mechanism should be further enhanced by standardizing the complaint handling procedures for PMO/PIU and creating awareness of indications of fraud and corruptive practices among the bid evaluators.

126. **Systematic Tracking of Exchanges in Procurement (STEP).** The World Bank's online procurement planning and tracking tool, STEP, shall be used to prepare, clear, and update the Procurement Plans and



conduct all procurement transactions for the project excluding selection of participating financial institutions under Component 3.1 and selection of participating insurance companies under Component 3.2. It is a comprehensive and mandatory end-to-end procurement processing system applicable to all Investment Project Financing (IPF) operations, which allows the World Bank and the borrower to track and manage all procurement-related exchanges through the procurement cycle.

127. **Project Operations Manual.** A POM will be prepared to indicate the rules to be followed by the sub-borrowers for implementing the project activities under Component 3.1. The POM defines the stakeholders' roles and corresponding procurement responsibilities. The commercial practices applicable for this project are described in the POM. Moreover, the POM specifies the minimum procurement requirement in case of adopting commercial practice, which includes the following:

- (a) The World Bank's Anti-Corruption Guidelines shall apply. In particular, the contracts to be financed by the proceeds of sub-loans under the LOC shall include relevant provisions on anti-corruption.
- (b) The contracts cannot be awarded to the World Bank debarred firms or individuals (the listing of debarred firms can be found on the World Bank website: [www.worldbank.org/debarr](http://www.worldbank.org/debarr)).
- (c) It should ensure a provision in the contract, permitting the World Bank to inspect all accounts, records, and other documents relating to the procurement process and selection and/or contract execution, and to have them audited by auditors appointed by auditors the World Bank.
- (d) In addition, conflict of interest should be avoided in procurement.
- (e) Depending on the risk rating established based on the capacity assessment, a set of thresholds will be defined, and for any contract exceeding the thresholds, the commercial practice will not be applicable.

128. **Advance contracting and retroactive financing.** It is envisaged that advance contracting and retroactive financing may be applicable for some contracts. Those contracts expected to be signed in advance of loan signing would be identified during appraisal. Payments made under such contracts before the date of signing of the Loan Agreement will be eligible for retroactive financing within the limits specified in the Loan Agreement.

### C. Safeguards

#### (i) Environmental Safeguards

129. The project is classified as Category B under OP 4.01 and triggers three environmental safeguards policies, as elaborated below.

130. **Environmental Impact Assessment (OP/BP 4.01).** Through coordinated interventions in the public and private sectors with consumer engagement, the project will improve food safety management



and reduce food safety risk in selected value chains. The selected value chains are pork, vegetables, lychee, and aquaculture. The main project activities include capacity building activities such as training, establishing data platforms and traceability systems, and upgrading testing equipment and laboratories at both the national and subnational levels. The whole value chain food safety control investment under Component 3 will support producers and processors to upgrade their facilities to meet required food safety standards, focusing on SMEs. The project will contribute positively to environmental sustainability and public health, while the negative environmental impacts during its implementation will be limited and reversible and can be mitigated with appropriately designed measures. Based on the project's institutional arrangements, four implementation agencies are preparing four Environmental and Social Management Frameworks (ESMFs) for their respective project activities, respectively, two national ESMFs by MARA and SAMR and two subnational ESMFs by Guangdong and Yantai. The ESMFs include the E&S screening criteria to exclude activities with high E&S risks and outline the specific E&S issues and necessary mitigation measures associated with all project activities at national and provincial levels. All the ESMFs are developed with reference to the international good practice currently available, including relevant WHO technical guidance, World Bank Environmental, Health and Safety Guidelines, and other Good International Industry Practices. A capacity assessment has been undertaken during ESMF preparation to inform the more specific capacity building plan as an integrated part of the ESMFs, including the requirement of internal and external E&S management staffing in each national/subnational PMO. Regarding the project investments on the SMEs in Guangdong province and Yantai municipalities through qualified PFIs, the selection of PFIs will be determined during project implementation, however, the shortlists of candidate PFIs were identified by both Guangdong and Yantai PMO during project preparation. From each shortlist, one candidate PFI was selected for the assessment of its existing E&S risk management system, based on which specific requirements/procedures were included in the corresponding subnational ESMFs (Guangdong and Yantai) on the selection criteria of PFIs. Also, the selected PFIs should establish and maintain their own Environmental and Social Management System (ESMS) to identify, assess and manage E&S risks based on their respective portfolio of activities under the project. The ESMS of each selected PFI should be developed during the due diligence process subject to the satisfaction of the World Bank and applied before any investment decision is made by the PFIs.

**131. Natural Habitat (OP/BP 4.04).** The project will not negatively impact on critical natural habitat by applying the exclusion criteria developed as part of the ESMFs and to be applied during subproject screening. The ESMFs also include the assessment of potential ecological impacts on non-critical natural habitat and the necessary strategy to mitigate any negative impacts of project investments on local ecosystems (marine/terrestrial).

**132. Pest Management (OP 4.09).** To enhance food safety control from the production end, the investments proposed by MARA and two subnational PMOs (Guangdong and Yantai) will involve agriculture activities to further promote the Integrated Pest Management (IPM) approaches in farming of vegetables, fruits, pigs and aquatic products. Following the policy requirements, the Pest Management Plans have been prepared as an annex to the ESMFs involving agricultural activities, namely, the ESMFs for MARA, Guangdong and Yantai. A Pest Management Plan was not prepared as part of the ESMF for SAMR because its proposal activities involve no agricultural activities.



## (ii) Social Safeguards

133. The project is classified as Category B under OP 4.01 and triggered Involuntary Resettlement Policy (OP/BP 4.12), and Indigenous Peoples Policy (OP/BP 4.10).

134. **Involuntary Resettlement Policy (OP/BP 4.12).** The project will be implemented in Yantai municipality in Shandong province, and initially five municipalities viz. Foshan, Guangzhou, Huizhou, Jiangmen and Zhaoqing in Guangdong province, before scaling up to other municipalities with the Bank's prior agreement. The project will invest in physical activities that may require land acquisition and includes pig farms, aquaculture farms, and fruits and vegetables orchards. Other project activities such as demonstrations/capacity building/training, establishment of data platforms and traceability systems, and upgrading of testing equipment and laboratories at both the national and subnational levels, may require using existing buildings/structures constructed in recent years. Preliminary social impact assessments have been carried out by the two national level institutions and in Yantai and Guangdong. No land acquisition and resettlement are expected at the national level, and for Yantai. Potential impact from land acquisition or resettlement will be further assessed when project activities are finalized during implementation. Based on the project's institutional arrangements, four implementation agencies have prepared four Environmental and Social Management Frameworks (ESMFs) for their respective project activities. The national PMOs housed in MARA and SAMR have prepared two national ESMFs, and Guangdong PMO, and Yantai PMO have prepared two subnational ESMFs. Yantai PMO and Guangdong PMO have prepared a Resettlement Policy Framework (RPF) as part of the ESMF to lay out the process and requirement of assessment of land use. The ESMFs and RPFs – which the World Bank has reviewed included the E&S screening criteria to exclude activities with high E&S risks and outline the specific E&S issues and necessary mitigation measures associated with all project activities at national and provincial levels. Regarding the project investments on the SMEs in Guangdong province, and Yantai through qualified PFIs, the subnational ESMFs/RPFs under preparation will also evaluate the existing system of participating PFIs on assessing impact from land acquisition and resettlement. Activities managed by PFIs that require land acquisition or resettlement will be excluded from project financing. All PFIs will be responsible for screening activities and identifying land acquisition or resettlement requirements and consider alternative designs to avoid land acquisition.

135. **Indigenous Peoples Policy (OP/BP 4.10).** Preliminary social assessment by the borrowers indicated that there might be ethnic minority presence in Guangdong as defined by OP 4.10. This policy is triggered. An Ethnic Minority Development Framework has been prepared by Guangdong as part of the ESMF. The ESMFs prepared by all four institutions at national and subnational levels provided guidance for screening for ethnic minorities at implementation stage.

136. **Public consultation and information disclosure.** During the preparation of safeguards documents, meaningful public consultations will be conducted following the World Bank's policy requirements to better understand identified key stakeholders' concerns. The project design and safeguards documents will incorporate the actions or mitigation measures to address the key concerns. The project's safeguards documents (ESMFs, Stakeholder Assessment (SA), RPFs, and EMDF (Ethnic Minority Development Framework)), both the drafts and revisions, have been disclosed locally and at the World Bank's external website on February 18, 2021.



### (iii) Citizen's Engagement

137. As part of the project design, a consultative process has been carried out to invite inputs from key project stakeholders, including the government (at different levels), nongovernmental organizations, including civil society and community organizations, academic and research institutions, and communities. Additional citizen engagement has been conducted through the social assessment process (before project appraisal) to inform communities, including farmers (disaggregated by gender) and agricultural businesses, about the proposed project activities, consult on their views, and invite feedback. The consultations covered project impacts such as opportunities for increased income and confidence in food safety through value chain investments and improved product quality, and negative impacts, including from possible land acquisition/resettlement. The consultative process will continue during project implementation as part of Component 2. Here, the project will reach out to stakeholders and citizens at large through targeted risk communication tools, consumer surveys, and consultative processes such as workshops and focus group discussions, and feedback mechanism to strengthen the co-governance approach to food safety. These activities are expected to strengthen the ownership of project interventions and enhance the sustainability of outcomes. The project monitoring and evaluation will include specific indicators to monitor continued citizen engagement to improve engagement practices in subsequent project years.

### (iv) Grievance Redress Mechanisms

138. A GRM system has been established at all four implementing agencies at national level and in Guangdong and Yantai to receive grievances from project affected people. Information containing the GRM system has been made publicly available through document disclosure. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit [www.inspectionpanel.org](http://www.inspectionpanel.org).

## V. KEY RISKS

139. **The overall risk level to achieving the PDO is “substantial”.** This reflects the substantial risks for sectoral policies and strategies, technical design, institutional capacity and participation and engagement of multiple stakeholders.

140. **The risk related to sectoral policy and strategies is rated “substantial”.** Significant gaps have been identified in the legislation, regulatory framework, and implementation of food safety laws in China,



such as the Law on Animal Epidemic Prevention and Control, Law on Quality and Safety of Agriculture Products (LQSAP), Food Safety Laws (FSL). The Government has recently revised several legislations closely related to food safety including those on infectious disease prevention and control and the biosecurity and biosafety. Other relevant laws are currently under revision, including the Wildlife Protection Law (WPL). The Government's Healthy China 2030 Plan also highlights the importance of establishing multi-sectoral collaboration, including cross sectoral, multi-disciplinary data sharing mechanisms. Cross-ministerial collaboration is generally limited, and data and information systems are mostly compartmentalized. The authorities have requested Bank support for reform that encourages greater collaboration between line ministries, informing the national policy framework and its implementation. Specifically, the project design aims to mitigate policy and strategy risks by: (i) Providing technical assistance and introducing international good practices with a view to establish equivalence between Chinese regulatory systems and good practice standards of important trading partners such as the USA, EU, Canada, Australia, New Zealand, and Japan. This includes facilitating the revision of relevant regulations on agriculture markets, food e-commerce (including cross border e-commerce), and food safety management of cold chains; (ii) SAMR under the project will take the lead in developing a robust data governance policy covering integrity, privacy, security, information sharing protocols, accountability, environment and ethics, which will unlock several constraints that preclude full use of the potential of modern data driven food systems governance for public and private data systems; and (iii) setting up project steering/leading groups at the national level and provincial level to bring together all main stakeholders to review implementation and provide feed-back into policy making. Nonetheless, the risks post mitigation are still considered substantial given the institutional complexity of the reform agenda.

**141. The risk for technical design of the project is “substantial”.** The project design is complex as it aims to transform food safety management systems by strengthening the risk-based supervision systems and the private sector's regulatory compliance. This is necessary for reducing the regulatory load and allowing regulatory agencies to focus supervision on value chains and businesses that carry high risk profiles with significant impact for food safety. This involves a paradigm shift for both sectoral agencies involved in the participating provinces and municipalities. To mitigate the technical risk, the project team undertook in depth preparatory work and included the findings in the project design. This includes (i) in-depth regional and country level analytical work on food safety, animal health systems and One Health approaches; (ii) value chain assessments carried out by the task team as well as by the clients; (iii) financial sector assessments; and (iv) annotated reviews of international good practices. The design team also combined expertise at the World Bank Group with that of the Finnish Food Safety Agency, USFDA, and Food Industry Asia. Design envisages investment support to agri-food enterprises for making food safety upgrades. IFC's advisory engagements for developing Blue investments in Shandong and promoting digital finance initiatives in Guangdong will be leveraged to build capacity of the financial sector. During project implementation, the national expert group and the World Bank team will assist the sectors and two provinces in developing their annual work plans. The residual risk after these mitigation measures is still considered high, however, and strong technical support with diverse expertise (across agriculture, financial sector and digital technologies) will be required from the Bank team particularly during the initial implementation period to rapidly address residual technical risks.

**142. The risk associated with institutional capacity for implementation and sustainability is “substantial”.** Project implementation involves two sectors viz. agriculture and market regulation at national, provincial, and municipal level. Coordination presents a significant challenge for the project. To mitigate the risk, the Project Operation Manual with a clearly defined decision-making structure will be



developed to guide project implementation. The project will partner with financial institutions to leverage food safety investments that will allow enterprises to undertake facility upgrades, workers training and risk communication with consumers. Besides general risk aversion to finance agriculture, several banks are not very familiar with food safety technologies. The project therefore takes a calibrated approach combining lines of credit, partial credit guarantees and insurance interventions to mitigate ex-ante and ex-post investment risks in the food safety sector. Technical assistance is planned for both enterprises as well as financial sector partners to help develop new lines of business. Given the complexity of the arrangements, the project will benefit from additional implementation support from the Bank's team, which will be appropriately resourced.

143. **The fiduciary risk is rated as “substantial”.** Considering the effects and impact brought by the complexity of technical design and implementation arrangements, the nature of the project activities, and application of various financing modalities as well as capacity of project management and implementation units, the fiduciary risk is considered substantial. The mitigating measures are recommended to be closely tied with the operational controls and processes including but not limited to the (i) establishment of clear roles and responsibilities and regular working mechanism/modality within all the project units; (ii) development of an operations manual including adequate operational and fiduciary processes and controls; (iii) presentation of project activities, budget items and funding sources at least for the first project year agreed with the Bank; (iv) designation of capable fiduciary staff and continuous capacity building arrangements; (v) utilization of existing government controls as supplementary to the project controls when applicable, appropriate and acceptable to the Bank; and (vi) appointment and support from external experts as needed.

144. **The key procurement risks for project implementation include:** (a) The project will involve five parallel PMOs housed at the central and local levels. Moreover, the PMOs are located under government agencies of different sectors, challenging coordination, and synchronization. (b) The project design is comprehensive and will involve various instruments with distinct procurement approaches. (c) As is common in the sphere of food safety, there are numerous public institutions affiliated with MARA and SAMR, the two ministries serving as implementing agencies for the project. The tendency to engage such affiliated institutions for research studies or implementing project activities within their respective mandates may create potential conflicts of interest. (d) The purchase of laboratory equipment constitutes one major procurement item. Based on previous experience and considering the special features of this type of equipment and the market context, complaints occur frequently and risk substantially delaying the procurement process. (e) The PMOs have no prior experience in implementing Bank-financed operations so that there is a risk of the domestic procurement practice influencing procurement under this project. The following measures will be applied during implementation to mitigate the outlined procurement risks: (a) A Project Operation Manual acceptable to the Bank will be prepared to guide the PMOs. (b) The task team will provide continuous procurement training throughout project preparation and implementation. (c) The Bank will help create awareness about potential conflicts of interest and draw the PMOs' attention to the Bank's relevant stipulations and practices. (d) The disbursement categories for incremental cost and the fund allocation should be considered in the project structuring. (e) The PMOs should develop the PSD with adequate market surveys and analysis to identify the most appropriate procurement methodologies. Besides, the PMOs should seek external assistance in formulating the technical requirements to avoid ambiguity or showing any preference; (f) Each PMO will hire a Procurement Agent with qualifications and experience working for the Bank (or other multilateral donor) projects.



145. **Environmental and Social Risks are rated as “substantial”.** Considering the pending identification of entities responsible for E&S risk management under the PFI structure and the wide range of activities supported and their E&S risks and impacts that will only be determined and assessed during the project implementation. However, a clear exclusion list has been developed for the project to rule out any activity with high E&S risks, including large-scale new investments, potential damage to critical natural habitat, and any inconsistency with local sector development plans, and the national/subnational ESMFs (totally four, one for each IA) have been developed with reference to the international good practice currently available to establish the principles, guidelines, procedures and mechanisms for effective management of anticipated E&S risks, including selection and E&S management of PFIs and institutional capacity building.

**VI. RESULTS FRAMEWORK AND MONITORING****Results Framework****COUNTRY: China****China Food Safety Improvement Project****Project Development Objectives(s)**

The PDO of the proposed project is to improve food safety management at the national and targeted subnational levels and reduce food safety risks in selected value chains

**Project Development Objective Indicators**

Indicator Name	PBC	Baseline	End Target
<b>Institution Building and Regulatory Performance</b>			
Risk-based food safety management instruments developed (Number)		0.00	20.00
<b>Food Safety Supervision Process</b>			
Proportion of food safety events reported on subnational bigdata/traceability platforms for which mitigation measures are initiated (Percentage)		0.00	95.00
<b>Whole Value Chain Food Safety Control</b>			
Proportion of participating enterprises that comply with standards on biological hazards, contaminants, including pesticides and veterinary drug residues, and flavorings and food additives (Percentage)		0.00	80.00



### Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	End Target
<b>Institution Building and Regulatory Performance</b>			
Cross sectoral management mechanism(s) established (Number)	0.00		4.00
Farmers reached with agricultural assets or services (CRI, Number)	0.00		300,000.00
Farmers reached with agricultural assets or services - Female (CRI, Number)	0.00		140,000.00
Food safety inspectors/regulators trained in risk-based regulation and supervision systems (Number)	0.00		20,000.00
Female food safety inspectors/regulators trained in risk-based regulation and supervision systems (Number)	0.00		6,000.00
Number of enterprises receiving project support for improving food safety management (Number)	0.00		7,500.00
<b>Food Safety Supervision Process</b>			
Food safety laboratories complying with agreed standards (Number)	0.00		20.00
Food systems testing, traceability, and supervision platforms integrated into big data centers (Number)	0.00		7.00
Project supported enterprises receiving food safety certification (Number)	0.00		4,000.00
Food safety risk communication products developed (Number)	0.00		20.00
Users/citizens engaged in food safety risk communication campaigns focusing on healthy and nutritious food (Number)	0.00		3,000,000.00
Female users/citizens engaged in food safety risk communication campaigns focusing on healthy and nutritious food (Percentage)	0.00		45.00
<b>Whole Value Chain Food Safety Control</b>			
Number of enterprises receiving project financing for clean, blue,	0.00		2,500.00



Indicator Name	PBC	Baseline	End Target
and/or green operations (Climate Indicator) (Number)			
Share of women owned or led enterprises receiving project financing for clean, blue, and green operations (Percentage)	0.00		15.00
Private capital mobilized for clean, green, and blue operations (Climate and PCM Indicator) (Amount(USD))	0.00		250,000,000.00
Performance of loan portfolio (Non-Performing Loans (NPL)) (Text)	0.00		<5%
Enterprises covered by food safety liability insurance (Number)	0.00		3,000.00
Total sum insured under food safety insurance coverage (Amount(USD))	0.00		1,500,000,000.00
Markets piloting "healthy marketplace" practices supported by the project (Number)	0.00		6.00
<b>Project Implementation Support</b>			
Grievances registered related to delivery of project benefits addressed (GRM indicator) (Percentage)	0.00		100.00
Share of satisfactory citizen's feedback received on services provided by Project (CE Indicator) (Percentage)	0.00		80.00

#### Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Risk-based food safety management instruments developed	This indicator is measured by risk-based food safety management instruments that are consolidated across	Annually	MIS and Progress reports	Monitoring of systems using checklist for each instrument developed	



	regulatory institutions and harmonized with globally recognized frameworks of Codex Alimentarius Commission, World Organization of Animal Health. These include improved policies and guidelines as well as risk-based surveillance, inspection, monitoring; outbreak investigations, and preventive regulatory protocols along the value chains.				
Proportion of food safety events reported on subnational bigdata/traceability platforms for which mitigation measures are initiated	This indicator measures the functionality of project financed subnational big-data/traceability platforms and the efficacy of improved food safety supervision process.	Annually	MIS and progress reports	Monitoring platforms and mitigation measures	PMO
Proportion of participating enterprises that comply with standards on biological hazards, contaminants, including pesticides and veterinary drug residues, and flavorings and food additives	This indicator measures incremental compliance of project supported enterprises with national and international standards on pesticides, veterinary drugs, food additives residues and other contaminants. Appropriate use of pesticides and	Annually	Enterprise survey and test report	Summary analysis of survey data	PMO and Independent monitoring agency



	veterinary drugs can lead to improvements in food safety, whereas inappropriate use of agrochemicals and veterinary drugs, and non-compliance with the national regulatory framework and international guidance can result in food safety risks.				
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**Monitoring & Evaluation Plan: Intermediate Results Indicators**

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Cross sectoral management mechanism(s) established	This indicator measures strengthened collaboration on risk surveillance, risk assessment, and standards development among institutions with a food safety related mandate, which include MARA, SAMR, and the National Health Commission (NHC) at the provincial level, and collaborations with the National Forestry and Grassland Administration (NFGA) on managing public	Annually	MIS and progress reports	Monitoring and reporting	PMO



	health and food safety risks from interactions between wildlife and domestic animals.				
Farmers reached with agricultural assets or services	This indicator measures the number of farmers who were provided with agricultural assets or services as a result of World Bank project support. "Agriculture" or "Agricultural" includes: crops, livestock, capture fisheries, aquaculture, agroforestry, timber, and non-timber forest products. Assets include property, biological assets, and farm and processing equipment. Biological assets may include animal agriculture breeds (e.g., livestock, fisheries) and genetic material of livestock, crops, trees, and shrubs (including fiber and fuel crops). Services include research, extension, training, education, ICTs, inputs (e.g., fertilizers, pesticides, labor), production-related services (e.g., soil testing, animal	Annually	MIS and project Reports		PMO



	health/veterinary services), phyto-sanitary and food safety services, agricultural marketing support services (e.g., price monitoring, export promotion), access to farm and post-harvest machinery and storage facilities, employment, irrigation and drainage, and finance. Farmers are people engaged in agricultural activities or members of an agriculture-related business (disaggregated by men and women) targeted by the project.				
Farmers reached with agricultural assets or services - Female					
Food safety inspectors/regulators trained in risk-based regulation and supervision systems	This indicator measures the implementation of comprehensive human resources and capacity building activities for food safety supervisors and regulators. The targeted training activities include training approaches such as training of trainers programs, for food safety regulators, food inspectors, laboratory technicians, food	Annually	MIS and project reports	Monitoring and reporting	PMO



	safety managers in value chain enterprises, personnel in food certification agencies, other food safety practitioners, and researchers. Furthermore, these activities include technical assistance and capacity building on risk management guidelines that will help farmers and agri-food producers to follow food safety requirements in the selected value chains, including GAP, GHP, GMP, and HACCP.				
Female food safety inspectors/regulators trained in risk-based regulation and supervision systems					
Number of enterprises receiving project support for improving food safety management	This indicator measures the total number of enterprises that are supported by the project, which can be in terms of financial support, TA, or capacity building. These enterprises are eligible for project financing only if they are implementing clean, blue, and green operation (which will be defined in the Project	Annually	MIS and project reports	Monitoring and reporting	PMO



	Operation Manual).				
Food safety laboratories complying with agreed standards	This indicator measures the number of laboratories and laboratory network services that meet the requirements for agreed standards. The list of agreed standards include CNAS, CMA CATL and veterinary system laboratory assessment.	Annually	MIS and lab surveys	Monitoring, reporting and verification	PMO and Independent monitoring agency
Food systems testing, traceability, and supervision platforms integrated into big data centers	This indicator measures the number of food safety supervision systems and platforms that are integrated with project financed big data centers. These platforms are expected to cover multiple sectors and with testing, tracing, and supervision functions.	Annually	MIS and progress reports	Monitoring supervision platforms using checklist of eligible platforms developed	PMO
Project supported enterprises receiving food safety certification	This indicator measures the number of project that meet the requirements to receive food safety certification. The project will do so by creating enterprise level incentives to meet agriculture product quality and food safety standards. The type of food safety	Annually	MIS and enterprise survey	Monitoring, reporting, and verification	PMO and Independent certification agency



	certifications that qualify for this indicator include edible agricultural product quality certificate, geographical indication, green certification, organic certificate, GAP, HACCP, animal quarantine certificate and meat quality certificate.				
Food safety risk communication products developed	This indicator refers to the number of food safety risk communication products in place at the project areas.	Annually	MIS and Project reports	Monitoring and reporting communication programs developed.	PMO
Users/citizens engaged in food safety risk communication campaigns focusing on healthy and nutritious food	This indicator measures the number of end users reached by food safety risk communication campaigns involving regulators, market operators, vendors, handlers and consumers. The total number can be estimated based on the population of the participating cities and the targeted consumers.	Annually	MIS and Project reports	Project Monitoring and Reporting	PMO
Female users/citizens engaged in food safety risk communication campaigns focusing on healthy and nutritious food					



Number of enterprises receiving project financing for clean, blue, and/or green operations (Climate Indicator)	<p>This indicator measures the total number of enterprises that will receive project finance (in terms of LOC or RSF). Eligibility to receive project financing includes investments plans that support 'clean', 'green', and/or 'blue' production systems, which are expected to increase the utilization efficiency of natural resource, reduce pollution and GHG emissions, improve the health of ecological environments. All of the investments are expected to have considerable climate adaptation and mitigation benefits. Additionally, they are also expected to ensure production of high quality, nutritious and safe food products.</p>	Annually	MIS and progress reports	Monitoring and project reporting	PMO and Independent monitoring agency
Share of women owned or led enterprises receiving project financing for clean, blue, and green operations	<p>This is a gender indicator that is intended to measure progress in the gender gap in terms of access to finance between women-led small and medium (SME) enterprises and male-led</p>	Annually	MIS and progress reports	Monitoring and enterprise survey	PMO and Independent monitoring agency



	SME enterprises). Women-led agribusiness SMEs make about a third of the total agribusiness SMEs in the project provinces, whereas only 11 percent of those have access to finance (compared to 25% for male-led SMEs). To address gender gaps, the project will encourage subproject investment proposals from women-owned agro-food enterprises or enterprises with a significant share of female partners through positive biased targeting policy.				
Private capital mobilized for clean, green, and blue operations (Climate and PCM Indicator)	This indicator measures project leveraged investments that support 'clean', 'green', and 'blue' production systems, which are expected to increase the utilization efficiency of natural resource, reduce pollution and GHG emissions, improve the health of ecological environments. Besides having considerable climate adaptation and mitigation	Annually	MIS and progress reports	Monitoring and reporting	PMO



	benefits, these investments are expected to ensure production of high quality, nutritious and safe food products.				
Performance of loan portfolio (Non-Performing Loans (NPL))	This indicator measures the performance of the PFIs under the project in terms of NPLs, which ensures that the PFI operations do no harm to the financial institutions involved.	Annually	MIS and financial reports	Monitoring and financial reporting	PMO and Independent monitoring agency
Enterprises covered by food safety liability insurance	This indicator measures the number of agriculture enterprises that will be covered by the project's food safety liability insurance. This will only capture the unique enterprises receiving financial support without double counting enterprises which have already received support. The enterprises will receive premium support under the project for a maximum of 3-years (sunset clause) after which they are either self-funded (by the enterprises) or else support provided by the Government. This will be	Annually	MIS and project reports	Monitoring, reporting, and verification	PMO and Independent monitoring agency



	subject to the assessment conducted after 2-3 years of insurance operation.				
Total sum insured under food safety insurance coverage	This indicator essentially measures “value of food safety risk mitigated” through the entire value chain food safety liability insurance.	Annually	MIS and progress report	Project monitoring and reporting	PMO
Markets piloting "healthy marketplace" practices supported by the project	This indicator measures the number of market places with new or upgraded market infrastructure and facilities and that use an HACCP approach for transforming markets into healthy marketplaces. More specifically, these marketplaces have the following features:(i) segregated dry and wet areas to avoid cross-contamination between humans and animals; (ii) improved food hygiene, water and sanitation utilities; (iii) enforced weekly closures for deep cleaning and disinfection of marketplaces; (iv) good animal health and animal welfare practices; (v) digital	Annually	Marketplace survey and inspection	Marketplace survey summary report and monitoring	PMO



	technologies for better animal disease and food safety testing, monitoring and surveillance and piloting traceability of food and animal products; (vi) humane destruction of sick, infected, and dead animals and appropriate disposal of carcasses and all animal products; among others.				
Grievances registered related to delivery of project benefits addressed (GRM indicator)	The indicator measures the proportion of grievances received by the Grievance Redress Mechanism system (GRM) set up by the project that are actually addressed within the standard timeframe set up by the GRM system.	Quarterly	GRM system	GRM reporting system	PMO
Share of satisfactory citizen's feedback received on services provided by Project (CE Indicator)	This indicator provides the average satisfaction/dissatisfaction received from clients from farmers on services provided by the project. It measures the share of all beneficiary feedback that is satisfactory or above.	Annually	MIS and beneficiary survey		PMO



**The World Bank**

China Food Safety Improvement Project (P162178)

**ANNEX 1: Country Program Adjustment in Response to Covid-19**

**COUNTRY: China**  
**China Food Safety Improvement Project**

1. **Impact of COVID-19.** The COVID-19 pandemic caused a severe public health crisis and a deep and broad-based contraction of economic activity in the first quarter of 2020. Labor market impacts were significant, with surging unemployment and significant labor dislocation, affecting disproportionately informal workers and migrant laborers. Following a near collapse in the first quarter of 2020, economic activity in China has normalized faster than expected, aided by an effective pandemic-control strategy, strong policy support and resilient exports. While swift, the recovery has been uneven with domestic demand recovering more slowly than production, and consumption more slowly than investment. Real GDP growth slowed to 2.3 percent last year – the lowest growth rate on record since 1978. While GDP is expected to return to its pre-pandemic level by mid-2021, the COVID-19 shock has accentuated pre-existing imbalances and highlighted structural challenges. The pandemic and ensuing recovery have caused imbalances in the structure of aggregate demand to relapse, as households increased savings, government support stressed investment, and external imbalances have widened. Public and private debt stocks —already high before the pandemic—have increased further. The crisis also revealed gaps and institutional barriers in China's social protection systems, especially the limited coverage of migrant workers. Vulnerabilities in fiscal, corporate, and banking sector balance sheets amid rising debt service costs will weigh on China's growth, especially as the economy returns to a path of secular moderation following a strong cyclical rebound this year.

2. **Main elements of the Government's response to the crisis.** The initial policy response aimed to bolster market confidence, relieve near term cash flow problems, and mitigate more permanent economic damage in the form of bankruptcy, unemployment, and rising non-performing loan ratios. As the lockdown measures rolled back, the policy focus shifted toward supporting the recovery and pledging accommodative monetary policy and additional public investment, tax relief, and social transfers. Government policies have emphasized job creation as the main economic policy objective, aiming to create nine million additional jobs and keeping the urban unemployment rate target at six percent. China's central bank ensured ample liquidity to bolster market confidence and relieve banks' near-term liquidity constraints, while policy banks provided banks with the funds to extend subsidized lending to targeted sectors and firms. Financial regulators meanwhile adopted regulatory forbearance to allow banks to cope with increased payment difficulties of their borrowers and rising non-performing loans. On the fiscal front, China adopted a more expansionary stance with a combination of revenue and spending measures, including tax cuts and deferrals, additional social transfers, and more traditional infrastructure investment. Several structural reform measures were announced to engender a stronger recovery, including steps to further relax the household registration system—a key impediment to labor mobility and equal access to social services—encouraging cities with populations under three million to eliminate hukou requirements, and megacities with more than five million people to remove hukou requirements in suburban areas. Finally, the authorities have emphasized the importance of embracing economic opening up, announcing a further shortening of further reduced the “negative list” for of sectors barred to foreign investment, more pilot programs for service sector liberalization, and equal treatment of



domestic and foreign enterprises and signed several regional trade and investment deals that provide selected improvements in market access.

**3. Specific actions or institutional measures supported by the proposed operation in response to COVID-19.** The Food Safety project aims to improve food safety management at the national and targeted subnational levels and reduce food safety risks in selected value chains. Given the links between food safety and the risk of zoonotic diseases, the project is expected to help mitigate the risk of zoonotic diseases. It will support changes in regulations at the national and sub-national level, strengthen their enforcement and promote compliance of food producers in selected value chains. The project is guided by the One Health approach, which is a collaborative and multisectoral approach that recognizes the interconnectedness of the health of people, animals, and the environment. More concretely, the project will provide technical assistance to regulatory and inspection bodies to adopt risk-based approaches focusing on data sharing, traceability platforms and risk mapping within the selected value chains. It will invest in upgrading laboratory, inspection and key market facilities, and will provide financial support to small-scale producers to meet modern and safe production standards. The Food Safety Improvement Project builds on the recently approved Emerging Infectious Diseases (EID) project (see below), but with a narrower focus on food safety and mostly already identified risks in this sector. Hence, activities drill down further towards food production and trade practices.

**4. WBG support responding to the crisis.** While China was at the center of the initial outbreak, it is no longer in an acute phase of public health emergency. Following the emergence of new clusters of infections in late December in two Northeastern provinces, in Hebei and Beijing, the daily count of new infections has fallen back below 100 as of late January as the authorities implemented localized lockdowns and wide-spread testing and contact tracing measures. The COVID-19 crisis highlighted the urgency of addressing the underlying causes of zoonotic diseases in China, with important global benefits given China's position as a hotspot for emerging infectious diseases (EID). The Country Partnership Framework (CPF) for China (FY20–25) (Report 117875-CN),<sup>33</sup> which reflected a shift in the partnership towards supporting global public goods, was well positioned to include activities that would reduce pandemic risks as a shared objective. In this context, an Emerging Infectious Disease (EID) emergency project was added to the FY20 pipeline and one health project dropped (see below). In addition, the FY21 Food Safety project, implemented at both the national and subnational (Shandong and Guangdong provinces) levels, will focus on mitigating foodborne safety and health risks and complement the EID project. The Bank also provided a series of just in time policy notes to the Chinese authorities at the outset of the COVID crisis in early 2020 and has worked with China on issues such as debt suspension for low income countries.

**5. Adjustments to the lending program.** One COVID-19 operation was added to the FY20 pipeline and prepared in just one month under urgent Bank Procedures (Situations of Urgent Need of Assistance or Capacity Constraints, as defined in Paragraph 12 of Section III of the IPF Policy), reflecting the urgency and global interest in addressing the causes of EIDs in the wake of the COVID-19 pandemic. The US\$300 million Emerging Infectious Diseases Prevention, Preparedness and Response Project (P173746), approved on June 18, 2020, focusses on reducing the risk of EIDs by piloting multi-sectoral initiatives, in line with a One Health approach, in Hainan and Jiangxi provinces. The project supports a policy shift from

<sup>33</sup> The China CPF is structured around three strategic pillars. These are: (1) Advancing Market and Fiscal Reforms; (2) Promoting Greener Growth; and (3) Sharing the Benefits of Growth. The CPF has Cooperation on Global Knowledge and Development as a cross-cutting theme.



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response to prevention and risk management, through investments in surveillance, laboratory investigation, and human resource development. It supports building a collaborative automated platform among the veterinary, food, and human health sectors to collect quantitative data on the use of antimicrobials and appearance of resistance in livestock. It involves multiple stakeholders and also promotes good practices in wildlife management. The EID project replaced the Hainan Health Sector Reform project (US\$200 million), which was planned for FY20 delivery. The Hainan Health Sector Project was dropped from the lending program as the Hainan is one of the two provinces supported by the EID project. Hainan was selected as a pilot province for the EID project due to its readiness to engage and advanced understanding of the One Health approach. The EID project could be placed in Pillar 4 of the WBG COVID-19 Crisis Response Approach Paper, “Strengthening Policies, Institutions and Investments for Rebuilding Better” and under the Resilient Recovery Stage.

**ANNEX 2: Implementation Arrangements and Support Plan****COUNTRY: China**  
**China Food Safety Improvement Project**

1. The project will require intensive implementation support and a continuous dialogue with the client. The World Bank's implementation support strategy combines periodic supervision with timely technical support and policy advice, as necessary. Implementation support will include (i) an implementation support mission every six months, (ii) interim technical discussions and field visits by the World Bank, (iii) monitoring and reporting by the PMO on implementation progress and achievement of results, (iv) third-party impact evaluations (baseline, midterm, and final), (v) annual internal and external financial audits and FM reporting, and (vi) periodic procurement post review. The implementation support mission will visit randomly selected project sites to assess and physically verify the work financed by the project. These site visits will include interaction with implementing agencies, laboratories, targeted agro-enterprises, and other players in the selected supply chains, including farmers, logistics, and distributors, as well as other stakeholder representatives.
2. In particular, in the early implementation phase, implementation challenges are expected, which will be addressed through the following measures:

- (a) Implementation support strategy. The implementation support strategy mainly builds on dialogue and partnership with stakeholders. The implementation support team will have continuous interaction with all project stakeholders to detect and advise on solving implementation challenges. This will require consistency in the composition of the core implementation support team, technical expertise, and familiarity with country/local situations.
- (b) Capacity building of the implementation agencies. Significant training and hands-on support will be required on a technical level and in terms of fiduciary and safeguards management. This will include supporting the PMO in (i) developing annual works and financial plans, (ii) task planning and task supervision, (iii) review of important ToRs for key consultancies, and (iv) coordination with development partners.
- (c) M&E and learning. Coordination of M&E and the capturing of project outcomes and results will need professional guidance from an M&E expert on the implementation support team.
- (d) Fiduciary assurance support. The proposed funds flow brings challenges for project financial management. The implementation support team will provide hands-on guidance on review and audit reporting procedures. Similarly, procurement activities will be spread widely among entities, types of procurement, and size of contracts. This will require intensive implementation support.
- (e) Social and environmental safeguards. M&E and mitigation of social risks require experienced expertise in the implementation support team with a good understanding of the culture and business process in China. In addition, sufficient staff time and resources will be provided to review site-specific environmental management measures during the investment planning process for laboratories, wholesale markets, private agribusiness enterprises, producer



cooperatives, and family farms. Particular emphasis will be placed on the (i) strengthening of the Grievance Redress Mechanism (GRM) and (ii) other feedback loops to solicit feedback and grievances from the beneficiaries. The World Bank team will be able to access the report.

3. Implementation support plan. The following implementation support plan reflects the anticipated skills mix, timing, and resource requirements over the project life. To maintain flexibility, the implementation support plan will be reviewed periodically to ensure that it meets the project's implementation support needs over time. Table 2.1 indicates the World Bank team's implementation support plan and the required skill mix.

**Table 2.1. Implementation Support Plan**

Time Needed	Focus	Skills
0–18 months	<ul style="list-style-type: none"><li>• Setting up core team at the PMO, project management systems including fiduciary, safeguards, and M&amp;E</li><li>• Onboarding technical staff</li><li>• Staff capacity building</li><li>• Baseline surveys</li><li>• Conduct research on product quality and safety, and risk-based supervision standards</li><li>• Detailed design of the capacity development activities, including collaborations with other organizations.</li><li>• Call for proposals for laboratories, data platforms, traceability systems, 'wet' market upgrading</li><li>• Food safety financing pipeline</li></ul>	<ul style="list-style-type: none"><li>• Core team, particularly FM, procurement, M&amp;E, Environment &amp; Social experts.</li><li>• Food safety expert</li><li>• Laboratory expert</li><li>• Agribusiness and value chain specialists</li><li>• Financial Sector specialist</li><li>• IT expert</li></ul>
18–36 months	<ul style="list-style-type: none"><li>• Review of implementation strategies and developing a scale-up plan</li><li>• Assessments of the risk surveillance and control measures</li><li>• Review of the environmental and financial performance of subproject investments</li><li>• Review of laboratories' performance</li><li>• Evaluation of food safety in targeted value chains and scale-up plans</li><li>• Integration of databases/platforms into integrated data center and customized reports generated</li><li>• Facilitate exchange among laboratories, enterprises, farmer cooperatives, and farmers to learn from each other</li></ul>	<ul style="list-style-type: none"><li>• Core team, particularly FM, procurement, M&amp;E, Environment &amp; Social experts</li><li>• Food safety expert</li><li>• Laboratory expert</li><li>• Agribusiness and value chain specialists</li><li>• Financial Sector specialist</li></ul>



Time Needed	Focus	Skills
36–54 months	<ul style="list-style-type: none"> <li>Continued improvements in project management systems including fiduciary, safeguards, and M&amp;E</li> <li>Midterm evaluation of the project</li> <li>Prepare detailed learning and analysis framework</li> <li>Stocktaking of project interventions and design improvements</li> </ul>	<ul style="list-style-type: none"> <li>Core team, particularly FM, procurement, M&amp;E, Environment &amp; Social experts</li> <li>Technical specialists based on thematic focus of missions</li> </ul>
54–60 months	<ul style="list-style-type: none"> <li>Completion of activities</li> <li>Understand failure and success parameters in close dialogue with the implementing agencies</li> <li>Facilitate knowledge exchange and events to consolidate project learnings</li> <li>Finalize detailed learning and analysis and prepare for end-of-project evaluation</li> <li>Support technical and financial analysis of project investments</li> <li>End-term evaluation and project completion report</li> </ul>	<ul style="list-style-type: none"> <li>Core team, particularly FM, procurement, M&amp;E, Environment &amp; Social experts</li> <li>Food safety expert</li> <li>Laboratory expert</li> <li>Agribusiness and value chain specialists</li> </ul>

4. **Skill mix.** The skill mix and team composition for supporting project implementation is proposed in the table below:

Table 2.2. Skill Mix and Team Composition

Skills Needed	No. of Staff Weeks	Number of Missions	Comments
Task team leader	12	Two per year but three in the first year	Staff in the country office or Washington, DC
Procurement specialist	3	Two per year including field travel	Staff in the country office
FM specialist	3	Two per year including field travel	Staff in the country office
Social safeguards specialist	3	Two per year including field travel	Staff in the country office
Agribusiness and value chain expert	8	Two per year but three in the first year	Consultant (national)
Food safety expert	8	Two per year but three in the first year	Staff in the country office
Financial sector expert	8	Two per year but three in the first year	Staff in the country office
Laboratory expert	6	Two per year including field travel	Consultant (national)
Bigdata and data analytics Expert	6	Two per year including field travel	Consultant (national)

**ANNEX 3: Detailed Project Description**

**COUNTRY: China**  
**China Food Safety Improvement Project**

**1. Project Description, Components, and Estimated Costs.** The project will support the implementation of the Law on Quality and Safety of Agriculture Products (LQSAP) and Food Safety Law (FSL) at the national and subnational levels. At the national level, the State Administration for Market Regulation (SAMR) and the Ministry of Agriculture and Rural Areas (MARA) will implement the project. At the sub-national level, the project will be implemented in Foshan, Guangzhou, Huizhou, Jiangmen and Zhaoqing municipalities in Guangdong with focus on pork, aquaculture, fruits and vegetables value chains and in Yantai municipality in Shandong with focus on aquaculture value chain, before replicating good practices in other value chains or scaling up in other municipalities. The SAMR and MARA will provide strategic guidance and technical oversight for the demonstration activities for improved food safety regulation in the subnational project locations and design strategies for systematically replicating them in other parts of China. To support China aligning with best-practice international food safety systems, there is a need to apply the principles of evidence, accountability, and transparency as follows:

- (a) Applying preventive and evidence-based approaches to the management and regulation of food safety hazards by both private and public sectors;
- (b) Focusing on food safety management along the entire value chain, from production to consumption;
- (c) Shifting the responsibility for food safety to producers and enterprises; and
- (d) Incorporating ‘risk communication’ and food information for consumers more broadly along the whole value chain to improve communication and trust between consumers, food producers, and the government.

**2.** Moreover, the project applies the One Health approach to food safety. One Health is a collaborative, multisectoral, and transdisciplinary approach that recognizes the interconnectedness of the health of people, animals, and the environment. It involves collaboration across human and animal health, environment, and other relevant sectors at the local, regional, national, and global level to achieve the best health outcomes for people, animals, and plants in a shared environment.

**3.** The proposed project will consist of the following four components: Component 1 - Institution building and regulatory performance, Component 2 - Food safety supervision process, Component 3 - Whole Value Chain Food Safety Control, and Component 4 - Project implementation support. Under Component 1, China’s national food safety standard system will be strengthened with risk-based approaches and further harmonized with CAC standards. At the provincial and municipal level, integrated local standards and regulations covering ‘farm to plate’ will be developed relevant to the prioritized value chains and aligned with national standards and regulations. Preventive and risk-based supervision approaches will be designed, as a whole, at the central level by SAMR and MARA under their respective mandates for food production and primary food. Under Component 2, the project will strengthen food safety supervision systems at the provincial and municipal levels with investments in laboratories, data analytics, and risk communication to achieve effective and efficient surveillance with a social co-



governance approach, supported with comprehensive and differentiated risk communication. Under Component 3, enterprises receive financial support to invest in food safety, combined with technical assistance, to help them achieve compliance. The sequencing of activities is laid out in Annex 2 on the Implementation Support (table 2.1).

4. **Component 1 - Institution building and regulatory performance (US\$59.40 million).** This component will be implemented at the national and sub-national levels, that is, national, provincial, and municipal levels.

5. ***Subcomponent 1.1 - Food safety programming guidance (US\$14.60 million).*** The project will finance (i) the review of primary and secondary legislation, including agriculture product quality and food safety management strategies, policies and guidelines, and benchmarking with best international practice in developed countries such as the USA, Canada, EU, Australia, or New Zealand; (ii) formal partnerships and collaborations with reputed universities, academic or research institutions to support (a) scientific research, analytical studies, and policy reviews on food safety-related areas, (b) embedding food safety in graduate education in the fields of agriculture, veterinary, nutrition, human medicine, and so on, (c) annual international events, hosted by each of the five agencies on a rotating basis, on themes related to agriculture product quality and food safety to exchange knowledge, scientific advancements, and review evidence generated from project implementation to enrich the policy dialogue; and (iii) a young professional scheme for recent graduates and an internship program for graduate students in senior years for attracting young talent and shaping their technical knowledge and managerial skills to successfully drive, achieve, and sustain the food safety initiatives. The reviews and research will have a climate lens to support knowledge development on the nexus between food safety and climate adaptation and mitigation.

6. ***Subcomponent 1.2 – Multi-sector coordination and food safety governance (US\$2.80 million).*** The subcomponent will finance activities that support the One Health approach through strengthening collaboration on surveillance of hazards, risk assessment, risk management, and standards development between institutions with a food safety related mandate. These include MARA, SAMR, and the National Health Commission (NHC) at the provincial level, and collaborations with the National Forestry and Grassland Administration (NFGA) on managing public health and food safety risks from interactions between wildlife and domestic animals. The project will finance (i) promotion of food safety and One Health networks, including small equipment, and other operating costs for such networks; (ii) multi-stakeholder meetings and joint reviews, research, and studies to explore the quality and safety of agricultural products in close collaboration of MARA, SAMR, and other relevant agencies such as NHC at the provincial level; (iii) creating the technical requirements, protocols, and frameworks for sharing supervision data on product quality and safety and for conducting joint data analytics on surveillance and foodborne diseases and risk assessment; and (iv) improving the trade access for edible agricultural products origin. The outcomes of this collaborative work will feed into updating the regulatory framework, capacity building measures, and risk communication supported in other subcomponents. This multi-sector coordination and risk assessment will strengthen early warning systems for climate risks and hazards, enhancing climate adaptation benefits.

7. ***Subcomponent 1.3 Risk based regulation frameworks (US\$3.70 million).*** The project will finance at the national level (i) food safety and quality risk assessments for the prioritized value chains, conducted in close coordination between the China Centre for Food Safety Risk Assessments and the Institute of



Quality Standards and Testing Technology for Agro-Products; (ii) the updating of standards and protocols applicable to both regulators and private sector enterprises; (iii) the formulation of Good Agriculture Practices (GAP), Good Hygiene Practices (GHP), Good Manufacturing Practices (GMP), Hazard Analysis and Critical Control Points (HACCP), and other risk management guidelines applicable in the selected value chains; (iv) measures to support active participation in the CAC's work including supporting surveillance and total diet study data sharing. The project will also support (v) pilots that SAMR and MARA will undertake in different agro-climatic zones, including in the project areas, to develop a catalog of innovative technologies and solutions that can help producers comply with the revised food safety standards. The pilots will make it possible to test the improved risk based regulatory framework, including onsite inspections and sampling methodologies, and identify the need for further adjustments. The design and implementation of these pilots are coordinated with the subnational levels. The risk-based regulatory frameworks and standards will be improved and updated to enhance sustainable and climate-smart agriculture for the selected value chains.

8. At the subnational levels, the project will finance (vi) developing standards and regulations specific to the prioritized value chains from farm to plate and aligned with the national standards and regulations. In Guangdong province, the subcomponent will support developing group standards<sup>34</sup> and specifications for fruits, vegetables, pork, and aquatic products. In Yantai, it will establish sets of aquatic product quality standard systems for sea cucumbers, oysters, prawns, flounder soles, scallops, and other aquatic products. It will also (vii) enhance existing organic, harmless (veterinary drug and pesticides free) agriculture, green agriculture, and geographical identification system (GIS), popularly known as 3+1 certification in the project areas.

9. To promote convergence with international standards, science based approaches, and make efficient use of resources, all standards and risk assessments will be developed based on existing risk- and evidence-based information available from the CAC, the OIE, and other international independent expert scientific bodies that perform risk assessments for pesticide residues (The Joint Food and Agriculture Organization (FAO)/WHO Meeting on Pesticide Residues), microbiological risk assessment (Joint FAO/WHO Expert Meeting on Microbiological Risk Assessment), food additives (Joint FAO/WHO Expert Committee on Food Additives), and nutrition (Joint FAO/WHO scientific advice committees, the Joint FAO/WHO Expert Meetings on Nutrition). Alignment with international standards also supports harmonization among the subnational levels and with the central level. Horizontal and vertical alignment within China will be supported by coordinating work plans so that central level activities inform and guide the work at the subnational levels. The project will also support alignment by instituting review mechanisms that involve different levels. For instances without relevant CAC or other international scientific bodies regulations and standards, the regulatory framework will be harmonized to other countries' legislation or other existing international frameworks or private standards.

10. **Subcomponent 1.4 – Risk management capacity building (US\$38.30 million).** The subcomponent will be implemented at the national and subnational levels. It will finance the design and implementation of comprehensive human resources and capacity building activities for both practicing and aspiring food safety professionals. Besides the food safety objective, these activities will improve climate knowledge and build stakeholders' capacity to increase resilience to climate change. It will finance (i) targeted training

<sup>34</sup> Group standards are approvals for a group of hazardous substances of a similar nature, type or use. A group standard sets out conditions that enable a group of hazardous substances to be managed safely.



activities, including cascaded training approaches such as training of trainers programs, for food safety regulators, food inspectors, laboratory technicians, food safety managers in value chain enterprises, personnel in food certification agencies, other food safety practitioners, and researchers; (ii) demonstrations, technical assistance and capacity building on risk management for helping farmers and agri-food producers to follow food safety requirements(including climate related) in the selected value chains, including GAP, GHP, GMP, and HACCP (MARA); (iii) course curricula and e-learning platforms (SAMR); (iv) the development of professional certification programs for food safety and quality control personnel along the lines of the US Food Safety Management Act (SAMR); (v)<sup>35</sup>; (vi) capacity building activities to support the Chinese government's leadership on hosting Codex Committee on Pesticide Residues, Codex Committee on Food Additives, and as Codex Asia Coordinator from 2020–2024; and (vii) technical assistance and capacity building to participating financial institutions, third party service providers and insurance companies.

11. **Component 2 – Food Safety Supervision Process (US\$157.90 million).** This component will support regulatory authorities to develop and demonstrate innovative food safety supervision models which will (i) ensure the continued safety of food as it passes along the entire value chain, and (ii) build consumers' confidence in Chinese food and in the institutions engaged in ensuring its safety. The component will improve the surveillance capacity of the participating province and municipalities based on the scientific and risk-based approach. It will upgrade laboratories, invest in improving the availability and analytics for food safety risk detection, and finance measures that enhance risk communication among all players. This component will have three subcomponents:

12. **Subcomponent 2.1 – Food safety surveillance systems (US\$58. 00 million).** This subcomponent will finance activities that improve food safety control and the public system's capacity for detection and early warning about food safety risks. The financed activities include (i) civil works and equipment for the facility and technology improvements in food safety laboratories and other testing centers to support investigations on a broad spectrum of analytes; (ii) creating a network of reference laboratories with specialization in specific food safety hazards; and (iii) training and consulting services for strengthening laboratory information systems through linkages with a centralized big data platform for risk profiling and analytics. Investments in laboratories were identified through benchmarking that considered food safety risks in the prioritized value chains, best international practice, international accreditation requirements, and the existing laboratory landscape in the project areas. Sampling plans will be based on the risk-assessments and profiles in the prioritized value chains developed as part of the project. Related training of inspectors and laboratory staff in new sampling and testing strategies is included in the training subcomponent. Project financed infrastructure for food safety surveillance systems, including all laboratories, will be designed with climate resilience and energy efficiency considerations.

13. **Subcomponent 2.2 – Food safety information analytics (US\$56.40 million).** This subcomponent will finance implementation of a framework that will promote the use of data driven decision making for food safety governance at three levels, that is, farms, value chains, and the public regulatory systems.

<sup>35</sup> These include the Global Food Safety Initiative, U.S. Food and Drug Administration (USFDA), U.S. Food Safety Prevention and Control Alliance, British Food Analysis and Evaluation Laboratory, Guelf Food Science and Technology Center, European Alliance of Safe Food Factories, Canadian Meat Association, or Canadian Dairy Association.



Various regulatory and food traceability systems are being implemented across the different agri-food sectors, resulting in pockets of information in disparate systems.

14. To unlock the potential of data driven food safety analytics, the project will finance (i) consulting services and coordination meetings to develop a comprehensive data policy for food safety. The policy will cover aspects of data/meta data standards, data ownership, data privacy, data protection, data security, data interoperability and sharing protocols, data usage, data environment management, data accountability, and ethics. SAMR will take the lead and coordinate with all implementation agencies, associated ministries, the private sector, and other stakeholders.

15. At the farm and enterprise level, the project will (ii) finance pilots on food safety technologies, disruptive digital control systems for smart food safety supervision. Demonstration of on-farm technologies will support 'clean', 'green', and 'blue' production systems, increase the utilization efficiency of natural resource, reduce pollution (N, P, COD) and GHG emissions, improve the health of ecological environments, while ensuring the production of high quality, nutritious and safe food products. The project will support the responsible use of 5G, artificial intelligence, high-definition video surveillance, drones, blockchain, Internet of Things sensor applications, and cloud computing for process automation, resource optimization, and real-time and precision supervision. Artificial intelligence and machine learning technologies will also be financed to assist in the detection of sub-optimal practices of some food business operators and minimize related risks. The technologies will lower monitoring costs, help control the production environment, and increase production efficiency. Farm level behavioral insights pilots are proposed using high-definition video surveillance, unmanned aerial vehicles and other methods to collect production information and predict non-standard behaviors using artificial intelligence identification analysis. All technologies will be purchased and deployed with specific terms of reference regarding their application with scope limitations, as well as an assessment of relevant regulatory compliance, environmental and social impacts, data security and privacy impacts, as well as capacity of enterprises, or farmers or other entities expected to use such technologies. The project will evaluate the pilots to determine which technologies are fit-for-purpose and what measures are required for their sustainable and responsible use.

16. At the value chain level, the project will finance (iii) developing comprehensive food safety traceability systems that allow tracking food safety along the value chain, including digital labeling and certification solutions. All enterprises receiving finances under the project will be encouraged to join the nationally accredited traceability platforms. Currently, there are several traceability systems 'layered' (national, provincial and municipal level) and 'siloed' (public and private), which the project will link. The project will attempt to demonstrate exchange food safety information within the value chain as well as connect with the public big data systems.

17. At the food safety governance level, the project will support developing integrated information technology platforms to identify and report in real-time food safety risks along the whole value chain. It will finance (vi) hardware/equipment for developing robust IT platforms with big-data capabilities that comply with the formulated data protocols and governance framework; (vii) consulting services for developing business intelligence through data analytics and visualization tools. The integration will be achieved by collecting and analyzing information on food product movement and testing results from (i) enterprises and laboratories through a variant of a traceability system; (ii) supervisory agencies on the risk profiles of enterprises and their inspection records; and (iii) consumer feedback from official



platforms. The data will be integrated using data chain and cloud storage technology based on a distributed architecture system. For analyzing data, big data analytics approaches, including machine learning and artificial intelligence, are applied. Training for operations and maintenance of the integrated platform system and data analytics is included under the training subcomponent.

18. ***Subcomponent 2.3 – Risk communication (US\$43.50 million).*** This subcomponent will support activities that contribute to transparency in risk management decisions and accountability of risk managers necessary for building trust in food safety. This subcomponent will support activities that contribute to increased transparency and accountability in risk management decisions making which is necessary for building trust in food safety. The subcomponent will finance consulting and non-consulting services, and goods needed for: (i) developing a comprehensive and differentiated food risk communication strategy that encourages the efficient exchange of risk assessment information, surveillance data triage and risk management decisions between the scientific community, government/regulatory authorities, private enterprises, consumers, and extended stakeholders;<sup>36</sup> (ii) developing and implementing long-term food risk communication programs including brand building around GAP, organic, green, geographic and food safety certification for enterprises and consumers, using a variety of communication tools; (iii) developing and implementing an inclusive community engagement model to encourage risk management at the source and promote the project's preventive approach; (iv) an interactive online communication tool for consumers; (v) establishing a food recall management mechanism; (vi) training food safety managers on critical food incident management and developing approaches for consumer involvement in these activities; (vii) activities for promoting the WHO's five<sup>37</sup> and for healthy lifestyle advocacy, including use of nudge based approaches; (viii) strengthening spokesperson mechanisms; and (ix) conducting biennial surveys for analyzing consumer confidence and trust in China's food safety. This subcomponent will also support effective communications to farmers and other value chain actors on climate hazards using multimedia channels.

19. **Component 3 – Whole Value Chain Food Safety Control (US\$161.50 million).** This component is implemented at the subnational level in the participating municipalities aiming to promote investments along the selected value chains for reducing food safety risks. The project will also demonstrate a combination of market based instruments such as lines of credit (LOC), risk sharing facilities (RSF), and food safety insurance innovations (not all of these applied in a single location/geography) for creating enterprise level incentives to meet agriculture product quality and food safety standards, besides modernizing marketing and distribution infrastructure through public investments.

20. ***Subcomponent 3.1 – Investment support (US\$93.00 million).*** The project will support the participating financial institutions (PFIs) to finance clean, green, and blue technologies and business solutions for helping the producers take increased responsibility and improve compliance with modern food safety regulations. The engagement with PFIs aims to help them build a new business line for financing food safety and agro-product quality investments and building their capacities to lend to this

<sup>36</sup> The project will use an optimum mix of traditional and modern food risk communication for promoting healthy lifestyle and improve government's capability in handling critical food safety incidents. The project will support activities in five strategic areas of (i) traditional food risk communication; (ii) modern food risk communication; (iii) health lifestyle advocacy; (iv) critical food incident involvement; and (v) consumer confidence & trust.

<sup>37</sup> Keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperatures, use safe water and raw materials. WHO, The Five Keys to Safer Food Programme, <https://www.who.int/foodsafety/consumer/5keys/en/>, accessed on November 21, 2020.



sector in a sustainable manner. This subcomponent will mobilize at least US\$250.00 million of additional private capital from the PFIs. The sub-loan arrangements under LOC and RSF (not in the same location/geography) are detailed below.

- (a) **Value-chain innovation:** The project will take a value chain financing approach, targeting farms and the enterprises with formal supply or buying collaborations, contracts, or service agreements with the leading enterprise or other enterprises in the value chain. Within the financed value chain, food safety standards for each participating farm enterprise will be defined and monitored on a traceability platform besides following up on loan (and client) performance, which will reduce the information asymmetry for the PFIs and consequent financing risk. Financing arrangement will be of the form of tri-partite arrangements between the PFI, the lead enterprise and the supplier firms in its value chain. The availability of information and data from the commercial relations in the value chain (between the lead firm and its suppliers) coupled with digital technologies will enable improved credit risk assessment, loan monitoring and collections thus enabling better credit performance.
- (b) **Eligible activities:** The technology solutions that will help the enterprises to meet the agriculture product quality and food safety standards are also usually clean, green, and blue solutions (including low carbon, climate resilient), covering all stages of the selected value chains, from farm to plate. The sample list of investment activities includes:
  - (i) **Certified production solutions:** organic production systems; good agriculture practices (GAP); good hygiene practices (GHP); good manufacturing practices (GMP); clean production systems; hazard analysis and critical control points (HACCP) in slaughterhouses, processing plants, agriculture markets, food businesses, and restaurants;
  - (ii) **Green production solutions:** improving production environment like water treatment, sanitation and hygiene; animal health; biosecurity and biosafety measures; animal welfare systems; improved seeds and breeds for climate, pest and disease resilience resulting in low use of pesticides and veterinary drugs; safe agriculture inputs and livestock feed production (reduced enteric fermentation), fertilizer resource use efficiency; pest control including integrated pest management (IPM), non-pesticide management (NPM);
  - (iii) **Waste management solutions:** water treatment plants and waste disposal; livestock waste management; food loss and waste management;
  - (iv) **Sustainable packaging solutions:** safe food contact materials, biomaterials for production, packaging, logistics;
  - (v) **Safe food distribution and logistics solutions:** e-Commerce platforms for safe food marketing; energy efficient environment control systems throughout distribution and logistics chain;
  - (vi) **Food safety assurance solutions:** establishing food safety information embedded traceability platforms, quality management and testing laboratories, social media platforms for branding and consumer outreach; and
  - (vii) Any other investment that directly contributes to food safety.



21. Most food safety investments will entail upgrading physical facilities, improving production processes and business procedures, staff training, and accreditation processes. They will be similar for all types of borrowers but differ in scale. For instance, cold chain facilities include mega cold storage or an insulated cooler box for long-distance transportation. An energy-efficient environment control system could be a fully automated control system or a semi-manual system (that is, ventilation fans in the pig barn). An ecommerce platform can take the form of a full-fledged internet-based solution like JD.com or a simple APP on WeChat. Testing laboratories can come as small testing laboratories in the agriculture market or advanced testing laboratories in lead enterprises. Overall, investments will focus on well specified equipment, machinery services (for example, accreditation, training), and some working capital, that will improve food safety standards in the targeted sectors and for the targeted or eligible project beneficiaries.

- (c) **Eligible beneficiaries:** The beneficiaries that can access sub-loans under both LOC and RSF are the family farms, professional cooperatives, agriculture small-medium enterprises, and the leading enterprises (dragon head enterprises, DHEs) with the definitions applied in China.<sup>38</sup> Agriculture SMEs will undertake diverse businesses, including farm operations, slaughter and processing activities, e-commerce, distribution and cold logistics, retail, and food businesses. The size and scale of business operations will determine the loan sizes for different types of borrowers.

**Table 3.1. Estimated Loan Sizes by Borrower Types**

Types of Borrowers	Value Chain Stages	Loan Sizes
Family Farms	Farm production	Up to CNY 500,000
Professional Cooperatives	Production, processing, distribution, logistics	Up to CNY 5 million
Small and Medium Enterprises	Production, processing, distribution, logistics, retail and food business operations	Up to CNY 10 million
Leading Enterprises (Dragonhead Enterprises)	Integrated production, processing, distribution, logistics, retail	Up to CNY 25 million
Private Markets (Upgrades)	Wholesale and retail	According to the project size

- (d) **Inclusive finance:** The project will specify sub-allocations of the aggregate capital mobilization (from IBRD and PFIs' own resources) to encourage PFIs to lend to enterprise segments that they perceive as riskier:
- (i) Family farms, professional cooperatives, and SMEs – 60 percent

<sup>38</sup> **Family farms** are production entities engaged in large-scale, intensive, and commercialized agricultural production with family members as the main labor for whom agricultural income is the main source of income. A **Farmers Professional Cooperative** is a registered organization that contracts members from rural households for production, processing, transportation, storage, sales, and other services related to agricultural production. Agriculture **Micro, Small, and Medium Enterprises (SMEs)** are business enterprises engaged in agriculture and related activities with an annual revenue less than 200 million CNY (annual revenue thresholds: micro enterprises less than 500,000 CNY; small enterprises between 500,000 and 5 million CNY; medium enterprises between 5 million and 200 million CNY). **Dragonhead enterprises (DHEs)** are lead firms that are conferred social responsibility by the county, provincial and/or national government to use market based approaches for delivering development impacts such as poverty alleviation (working with poorest households), agriculture modernization (working with family farms and professional cooperatives), export promotion (working with SMEs).



- (ii) Women-owned or women-led enterprises – 15 percent
- (e) **Financing solutions:** The banks will adapt their current product offering for long term investments in food safety solutions;
- (f) **Maturity of sub-loans:** The working capital loans will have a loan maturity of one year, and the term loans will have a maximum tenor of 8 years.
- (g) **Pricing of sub-loans:** The pricing model considers the current macroeconomic conditions in China. The participating financial institutions will charge the end borrowers with market determined interest.<sup>39</sup>

**Box 3.1. Illustration of Food Safety Investments in Targeted Food Value Chains**

**Project support to the aquaculture industry.** China is the largest producer, importer, and consumer of global aquaculture products. The top two provinces in China for aquaculture production are Shandong and Guangdong covered under the project. The aquaculture industry can be heavily impacted by hazard weather, together with market price fluctuations and challenges in cold transportation. As a result, the aquaculture industry has long been regarded as a high-risk segment for financial institutions to engage. Most of the practitioners in this industry are small stakeholders. Without proper guidance on good practices, these small producers, such as family farms, cooperatives, and Micro, Small, and Medium Enterprises (SMEs) often misuse and overuse antibiotics, medicines, and additives to increase the freshness of their products. This has been a long-standing food safety problem. The project will finance a systematic capacity building program to improve small producers' knowledge and technical skills to upgrade their practices to meet food safety standards and leverage innovative agricultural insurance being implemented locally to mitigate the weather risks and production risks to encourage long-term and short-term finance to the sector.

**Project support to the pork industry.** The pork industry is one of the most important agricultural industries in China. In the past ten years, China produced and consumed nearly 700 million hogs per year, about 50 percent of the world's total. In China, 63 percent of all consumed meat is pork. A series of food safety-related incidents, such as foot-and-mouth disease, African Swine Fever, overuse and misuse of antibiotics, have challenged the pork industry and eroded consumer trust. In the meantime, pork price fluctuations during the pig cycles also put pressure on pig farmers and SMEs. This proposed project will introduce higher food safety standards in the pork value chain and integrate pig contract farming to protect small producers from pig cycle price fluctuations. The project will also introduce innovative agricultural insurances to mitigate production risks and encourage investments in modern farming infrastructures and technologies by leveraging funds from the IBRD and commercial banks for long-term and short-term finance to improve food safety in the pork industry, as a demonstration case to the market.

**Project support to the fruit and vegetable industry.** Of all agricultural industries in China, the vegetable sector accounts for most of the employment and has contributed significantly to increasing the per capita disposable income of rural residents. The production volume and areas of vegetables have grown steadily since 2010. China is also the largest fruit producer in the world, accounting for 31.1 percent of the global fruit production. The increasing market needs for green/organic fruit and vegetables, and the emergence of cool chain logistics and e-commerce platforms, have accelerated the transformation of the industry for higher food safety standards and with financing needs for investing in new technologies. The funding provided under the project will finance modern plantations of fruit and vegetables, update relevant standards in line with international best practices,

<sup>39</sup> Loans will be priced according to the PBOC guidelines and benchmarked with Loan Prime Rate (LPR). Currently the LPR is 3.85 percent Annual Percentage Rate (APR) +/- for loans less than 1-year tenor and 4.75 percent APR for loans above 5 years. The interest rates follow pricing methodologies accounting for cost of funding, cost of risk, and operating (or administrative) costs for the different types of investments and beneficiaries.



provide food safety training to small producers on the safe use of fertilizers and pesticides, and set up laboratories and a traceability platform.

22. ***Line of credit (US\$51.00 million).*** The Yantai municipality will implement LOCs under the project that will provide local currency loans to the PFIs. Each municipality will select more than one PFI. The project will allocate funds to the selected PFIs based on their proposed amounts and fund utilization. The Project Management Office (PMO) of the project will monitor the disbursements and if a PFI does not effectively disburse as planned, their allocation can be reallocated to other PFIs. The provincial/municipal governments will shortlist the PFIs based on the agreed criteria, such as (i) regulatory compliance to PBOC, China Banking and Insurance Regulatory Commission (CBIRC); (ii) financial soundness (such as capital adequacy ratio, liquidity ratio, non-performing loans, loan loss provisions, and so on); (iii) non-performing loans in the total portfolio being less than 5 percent; (iv) demonstrated strength in credit risk management systems and procedures, loan monitoring and collections; (v) track record of good governance and strong anti-corruption measures in place; (vi) experience in financing agriculture, agribusiness, and MSME loans in the targeted segments in project areas; (vii) geographical coverage of the PFI in terms of network (branches, agents, digital channels) to cover various stakeholders across the entire value chain (the outreach of the rural commercial banks seldom exceeds beyond a county or two); (viii) willingness to contribute own resources matching LOC by at least two times (given the IBRD involvement a few potential PFIs, during the preparation, showed interest to making own investments in the project for building a new line of business); (ix) willingness to allocate at least 60 percent of the LOC resources (IBRD + own funds) for financing family farms, cooperatives and agriculture SMEs; and (x) the willingness to conform to the environmental and social safeguards, fiduciary, and other frameworks agreed with the IBRD. Yantai has initiated the competitive process for selecting PFIs and completed the evaluation of Expression of Interest (EOI) from qualified PFIs. Based on its due-diligence, IBRD will provide no-objections to the qualified commercial banks recommended by the project. The Yantai municipal authorities will enter into subsidiary loan agreements with PFIs for making available LOC and ensure that they make sub-loans in accordance with the agreed requirements. This component will finance LOC for US\$51.00 million. In addition, US\$1.00 million is allocated towards costs of TSP-LOC and other monitoring and supervision activities.

23. The project will finance technical assistance for PFIs to understand food safety improvement technologies, evaluate investments in such technologies, manage risks and design appropriate financing solutions under subcomponent 1.4. PFIs will have the managerial autonomy to decide on sub-loan appraisal and disbursement based on their own established credit management procedures and commercial practice. The on-lending terms of the PFIs' sub-loans (using their own funds) to the targeted value chain enterprises will follow PBOC/CBIRC guidelines for the agriculture sector and meet the entities' actual cash flow needs. A separate project implementation manual for the LOC will determine the eligibility criteria, eligible activities, appraisal methods, monitoring and reporting arrangements, loan withdrawal procedures, and responsibilities of all parties implementing the LOC.

24. ***Risk sharing facility (US\$42.00 million).*** The project will establish a risk sharing facility (RSF) in Guangdong for providing partial guarantees. This will be an additional collateral for loans within portfolios of food safety loans developed by the PFIs using their own funding. PFIs will be competitively selected according to the criteria and procedure described above for the LOC. IBRD funds will be utilized for risk-sharing to mitigate the risk perceived by the financial sector in providing such loans due to their lack of experience in financing food safety investments.



25. The business plan for RSF will detail the institutional aspects of the RSF, legal position, fund set-up and management, financial model, business procedures, accounting standards, auditing requirements, and monitoring and evaluation systems. The RSF will be administered by a third-party service provider (TSP-RSF) with experience in credit risk management and administering risk sharing facilities. The TSP will be selected competitively according to the criteria agreed with the IBRD. The expression of interest process has been initiated. The TSP fee will be assessed as a percentage (to be determined) on the value of the guaranteed loans on annual basis. The RSF will be managed based on the terms and procedures established by IBRD and the project in compliance with the relevant principles for guarantees developed by the World Bank and detailed in the dedicated project implementation manual for RSF (RSF operational manual), accompanying the business plan and financial model. The RSF operational manual will determine the risk coverage, the terms of coverage (including fees), eligibility criteria, eligible activities, max/min size of loans, portfolio risk management, safeguards management, the Management Information System (MIS) and reporting requirements, detailed claim procedures, and responsibilities of all parties implementing the RSF. Guangdong provincial authorities will be entering into a risk sharing agreement with selected PFIs to offset losses in food safety loan portfolio and to ensure that PFI undertakes to comply with all the requirements agreed with the Bank for receiving coverage under the RSF. This component will finance RSF with an investment of US\$40.00 million. In addition, US\$2.00 million have been allocated towards the costs of TSP-RSF and portfolio monitoring and supervision activities.

26. As in the case of LOC, the PFIs will appraise and manage sub-loans using their existing credit management procedures and commercial practice. The project will finance technical assistance for PFIs to understand food safety improvement technologies, evaluate investments in such technologies, manage risks and design appropriate financing solutions under subcomponent 1.4. The PFIs will determine for which loans they may need to apply for the RSF. For exposures of small borrower, the coverage will be on portfolio basis while for larger exposures (for example, loans to dragonhead companies) the coverage will be on individual loan basis. The loan size limits to determine the inclusion in the portfolio or individual treatment will be cumulative per borrower (to avoid arbitraging). The IBRD loan will reimburse the PFI the loss according to the risk sharing model in the business plan. Following claim payment, PFIs are expected to continue efforts to collect and in which case they will reimburse funds to RSF as they collect post claim payments. Fees will be charged to ensure replenishment of capital to cover claims payments and coverage of administrative costs. A comprehensive review of RSF will be undertaken at the mid-terms and the project will discuss with the World Bank to decide on the appropriate use of any unspent amount in the facility.

27. **Subcomponent 3.2 – Food safety insurance services (US\$32.00 million).** This component will support the development and testing of a market-based food safety solution that supplements government supervision to improve the food quality and safety standards of various entities in Guangdong province. The insurance cover applies for project supported value chains.<sup>40</sup> The project will pilot test innovative insurance and comprehensive risk management solutions for food quality and safety risks in five municipalities – Foshan, Guangzhou, Huizhou, Jiangmen and Zhaoqing. The insurance pilot will evaluate – (i) value of insurance in improving the food quality and safety compliance by the individual entities; (ii) optimal product structure including insurance at individual entity-level or at a cluster level covering the entire value chain (group insurance) as well as an appropriate level of protection or coverage;

<sup>40</sup> Specific products in each of the value chains will be identified during implementation



and (iii) risk appetite of insurance and reinsurance companies to underwrite and price the risks among others. Successful products from the pilot locations will be scaled up to the entire province.

28. Furthermore, as part of insurance services, risk prevention and control measures incl. compliance to food safety regulation and production process standardization at the enterprise level will be enforced through a partnership with third-party services providers (TSPs) on inspection under subcomponent 2.1 and customized training and technical assistance to entities involved in the four value chains under subcomponent 1.4. The risk profiles of each value chain player as well as the cluster aggregate will be created and monitored in the interoperable database, fully leveraging the surveillance systems developed and embedded in the information analytics ecosystem of subcomponent 2.2. Agriculture products procured from the insured entities/clusters will have insurance certification labels as quality assurance for the end consumers and will actively track consumer feedback as part of risk communication under subcomponent 2.3. Thus, the insurance mechanism will play a market-based ex-ante safety regulatory role, which supplements law enforcement and strengthens traceability of agricultural product quality and safety on the entire value chains.

29. **The key activities supported by this subcomponent are grouped into three major categories:** (i) financing the insurance pilot (ii) technical assistance to entities in the value chains by appointing a TSP (iii) hire an insurance administrator to operationalize tripartite partnerships among regulator, TSPs and insurers, support proper work integration with other components as well as overall project management. The TSP's responsibilities include: (i) assisting the supervisory body with food safety inspection with improved effectiveness and efficiency; (ii) coordinating with relevant agencies to develop and implement production standardization and risk prevention/control measures; (iii) providing training and technical consultations and services to value chain players on food safety and risk management; and (iv) assisting the insurer with risk assessment and claim settlement.

30. **Selection of insurance company(s).** The selection of the insurance company(s) will follow similar approach to that of PFI selection. The rationale for selecting insurers based on a set of selection criteria – a) new product with no previous experience of similar product in China (or developing world other than OECD; c) premium rates will vary depending on the value chain, the enterprise within the value chain (that is, producer vs. processor vs. logistics/storage and so on), and type of enterprise being insured (small, medium, large) and so on. Also, differential premium rates within the same value chain to incentivize enterprises adopting good food quality and safety practices. Hence, trying to select insurers based on premium rates quoted will not be feasible nor appropriate. Instead the decision was made to select insurers and leave the selection and negotiation of the premium rates to the enterprises. Once the enterprises pay their share of the premium contribution the project will pay the balance of the premium directly to the insurer. Detailed arrangements for the management of this component, including the payment of the premium will be set out in a dedicated manual to be prepared by the Guangdong PPMO.

31. **Selection criteria for selecting insurers:** The insurance company will be selected based on agreed set of selection criteria. The Guangdong province will shortlist the Insurers based on the agreed criteria, such as (i) regulatory compliance to China Banking and Insurance Regulatory Commission (CBIRC); (ii) company reputation and financial soundness (such as quality of service and product performance, insurance claims service processing, no record of major punishment, and good/sound financial performance incl. reserving practices (no report of under reserving), solvency margins and so on); (iii) Professional ability/technical competence – ability to identify and understand risks along the agriculture



and food value chain and establish holistic risk management system; (iv) Business capabilities – strong business presence in Guangdong, diverse insurance offering, and a broad portfolio of agricultural insurance products; (v) track record of good governance and strong anti-corruption measures in place; (vi) Service experience/experience in liability insurance and or agri and food insurance – experience in agricultural products service, with corresponding insurance/service cases, existing insurance products specific to agriculture and food products, and information security management experience; (vii) Service area/ geographical coverage of the Insurer –meets the needs of the project and is familiar with the local conditions in the service area in terms of network (branches, agents, digital channels) to cover various stakeholders across the entire value chain; and (viii) the willingness to conform to the environmental and social safeguards, fiduciary, and other frameworks agreed with the IBRD.

32. ***Subcomponent 3.3 – Modernizing value chain infrastructure (US\$36.50 million).*** The subcomponent will finance the civil works, consulting services and goods needed for the upgrading of value chain infrastructure and market facilities using the GAP, GMP, HACCP approaches to mitigate food safety hazards originating in agriculture production systems and agricultural markets, including zoonoses, EIDs and other public health threats such as AMR. The project will support (a) upgrade of selected value chain infrastructure facilities such as water treatment, waste management, point source pollution control solutions, that enable production of high quality and safe food products; and (b). Improvement of existing markets' infrastructure and risk management practices in agriculture markets, cold chains and e-commerce hubs. The project will upgrade market infrastructure and facilities and use a HACCP approach for transforming selected markets into healthy marketplaces in the six municipalities. Healthy Marketplace concept envisage a package of interventions such as (a) market zoning and segregating areas that sell packaged and dry food stuffs from those that sell meat produce areas (particularly aquaculture, poultry, meat products, and so on) in marketspaces for avoiding cross-contamination between humans and animals; (ii) improving food hygiene, water and sanitation utilities; (iii) enforcing weekly closures for cleaning and disinfection of marketplaces; (iv) promoting good animal health and animal welfare practices; (v) deploying advanced animal disease and food safety testing, monitoring and surveillance systems and piloting traceability of food and animal products; and (vi) risk communication campaign from regulators, market operators, vendors and consumers.

33. This component will have considerable climate mitigation benefits by improving waste management, reducing plastics and promoting energy-efficient market infrastructure and logistics.

34. ***Component 4 – Project Implementation Support (US\$21.20 million).*** This component strengthens the project implementation. It is organized into two subcomponents project management and monitoring, evaluation, and learning.

35. ***Subcomponent 4.1 – Project management (US\$11.30 million).*** Under this component, the project will finance the operations of project management units (PMUs), including consultancies, training and related material, office equipment, operational costs, establishing financial management systems, environment and social safeguards management systems, procurement management, governance and accountability systems, and knowledge management systems.

36. ***Subcomponent 4.2 – Monitoring, evaluation, and learning (US\$9.90 million).*** The project will support (i) management information systems, results tracking and reporting systems; (ii) after-action reviews; (iii) systematic review of lessons learned; (iv) qualitative studies, quantitative research surveys;



(v) the development of national innovation marketplaces and case study competitions. This subcomponent will also finance Mid-Term Review and Final Evaluation reports and underlying analytical work.

**37. Programmatic approach.** The implementing agencies are encouraged to tailor project activities under different components and subcomponents to develop comprehensive food safety management programs catering to local contexts. Strategic interventions such as reducing salmonellosis, campylobacteriosis, listeriosis or AMR reduction in the aquaculture or pork value chains are few such examples. These also involve multi-agency collaboration and synchronizing with the activities financed under other project components. Specifically, the project can support (i) studies to identify critical antimicrobial use and resistance determinants, assess transmission and risk pathways, and ensure alignment with existing standards and assessments of the CAC and other international bodies that address high priority risks; (ii) demonstrations, technical assistance and capacity building interventions that reduce the use of antimicrobials in pig and aquaculture farms; (iii) investment support for family farms, cooperatives, Ag SMEs, lead enterprises, (iv) food safety liability insurance interventions, (v) upgrading of value chain infrastructure such as source point pollution control, water and waste treatments, (vi) upgrading of laboratory service networks related to animal and wildlife diseases, food safety, drug quality, and public health; (vii) the development of protocols and technical equipment for sharing on antimicrobial use and AMR in animals, food, and the environment; (viii) data analytics systems that track AMR surveillance data to guide prevention and control strategies; and (ix) periodic assessments and results reporting. It will also pilot the animal health and food quality/safety management model (application of food safety standards), including third-party certification, in specified value chains to demonstrate the One Health approach to outbreak investigation on zoonotic and foodborne diseases. It is expected that these pilots will further improve standards and risk management approaches developed under the project.

#### Box 3.2. Reducing the Risk of AMR – Lessons from Scandinavia

##### Elements of a Comprehensive AMR Policy as Applied in Scandinavian Countries

- (a) Veterinarians are banned to take profit from sales of medicines.
- (b) Dispensing of medicines is restricted and antibiotics for internal use are prescription-only-medicines.
- (c) The use of antibiotics as growth promoters is banned.
- (d) Veterinarians are required to physically diagnose an animal before prescribing antibiotics. Remote selling of antibiotics without diagnosis is not allowed.
- (e) The use of antibiotics in prevention, eradication, or treatment of salmonellosis in swine, poultry, bovines, fur animals, and in aquaculture is prohibited.
- (f) The use of critically important antimicrobials in human medicine is banned for animals.

##### Implementing a Comprehensive AMR-Strategy

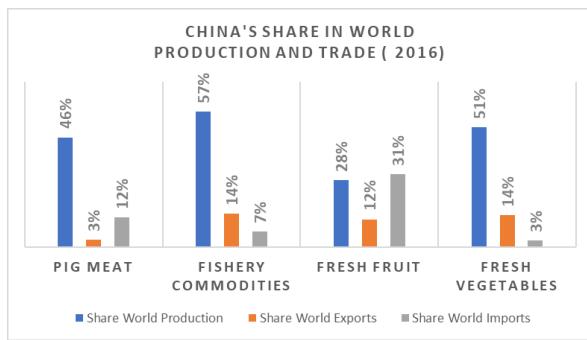
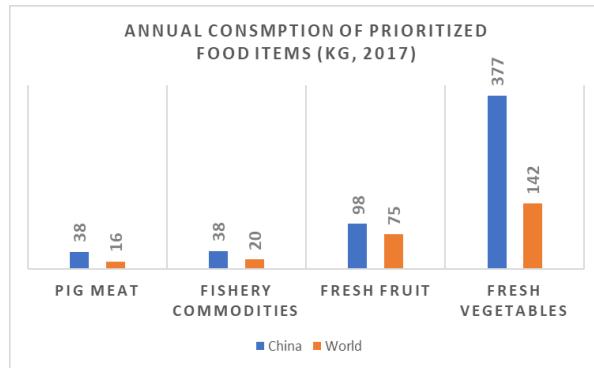
- (a) Appointing a One Health task force (human health, veterinary and food safety professionals) to set targets and to oversee surveillance, monitoring and control programs.
- (b) Training professionals and stakeholders.
- (c) Demonstrations, technical assistance and capacity building of farms and enterprises



- (d) Surveillance of zoonotic, pathogenic and indicator bacteria resistance (in particular extended-spectrum beta-lactamases, AmpC, carbapenemase, methicillin-resistant *Staphylococcus aureus*).
- (e) Monitoring the quantity of (i) antimicrobials used on animals based on sale statistics; (ii) antimicrobials used on animals based on user data covering all animal species.
- (f) Preventing infections and controlling the spread of multi-drug-resistant bacteria by
  - (i) Quarantine and examination practices for the importation of all production animal materials (including feed) to prevent entry of viral infections and difficult-to-manage bacterial infections.
  - (ii) Introducing farm and pet animal health care systems through (i) developing production structure of production animals towards improved animal welfare and animal health (spacing, housing infrastructure, compartments, vertical integration); (ii) preparing biosecurity plans for every production animal farm and verifying these plans by audits; (iii) ensuring availability of vaccines necessary for the prevention of animal diseases and availability of narrow spectrum antimicrobials; (iv) focusing on pet animal breeding to prevent unnecessary animal health and welfare problems.
- (g) Drafting and updating guidelines on antimicrobial use for professionals.
- (h) Research.

**ANNEX 4: Demand Assessment for Food Safety Investments in the Project Areas****COUNTRY: China**  
**China Food Safety Improvement Project**

1. The purpose of this annex is to (i) demonstrate the importance of the prioritized products and locations for food safety reform and financing in the value chains; (ii) illustrate food safety investments and amounts by enterprise type; (iii) provide an estimated value chain financing pipeline for the first two years of the project. The analysis is based on secondary data, key informant interviews, surveys with up to 930 enterprises of all types (family farms, farmer cooperatives, agriculture SMEs, and lead enterprises).
2. The products are selected because of their importance for national production, consumption, and exports. Their significance makes the prevalent food safety issues in the value chains relevant to other locations, which will facilitate upscaling of lessons and good practices.

**Figure 4.1. China's Share in World Production and Trade of Prioritized Food Items (2016)****Figure 4.2. China's and the World's Per Capita Annual Consumption of Prioritized Food Items (kg, 2017)**

Source: FAOStat. 2020

**Assessment Findings – Investments to Improve Food Safety in Prioritized Value Chains**

3. Agri-food producers have to comply with 1,260 national food safety standards. Out of these, the interviewed food enterprises identified four national food safety standards as the most challenging for compliance and creating the highest operation costs: “Maximum Residue Limits (MRL) of Pesticides in Foods (GB 2763–2016)”, “Maximum Residue Limits (MRL) of Veterinary Drugs in Animal Derived Foods (MARA)”, “General Hygienic Regulation for Food Production (GB14881)”, and “Emission Standard of Pollutants for Livestock and Poultry Breeding Industry (GB 18596–2001)”.
4. Meeting MRL requires good agriculture practice, including biosecurity and bio-safety measures and animal and plant health management to reduce the amount of animal drugs and pesticides used in production. Inadequate infrastructure and facilities, microbial contamination during processing, insufficient cleaning and disinfection, and deficient record management were reported as other major



difficulties to complying with GB14881. Lack of finance was reported as biggest challenge for implementing GB14881. Structural changes to processing plants, investment in new equipment, and in product investigation/analysis are the largest cost items according to the research on the follow-up evaluation of “General Hygienic Regulation for Food Production” in China.<sup>41[58]</sup> Below table lists for different stages of the value chain the major areas of investments that would help improve compliance with the above standards.

**Table 4.1. Major Types of Food Safety Investments in the Prioritized Value Chains by Value Chain Stage**

Improvement Required	Production	Processing	Distribution
<b>Specific areas</b>	GAP, organic food, safe inputs, livestock manure handling, animal health, biosecurity, animal welfare, seeds and breeds improvement for climate and disease resistance, pest control, fertilization efficiency	Production facility, cleaning and disinfection equipment, cold chain facility	Cold chain distribution, e-commerce platform FS control, food loss and waste
<b>Common areas</b>	Sanitation and hygiene, testing lab, traceability, ISO/HACCP/GHP, climate smart technologies, energy efficient technologies, safe packaging materials, waste management, water treatment, staff training, documenting system.		

#### **Yantai – Value Chain Assessment (Aquaculture)**

5. Yantai has a comparative advantage for aquaculture production. It is located in the central part of Shandong Peninsula, with a coastline of 1,037.9 kilometers and a corresponding sea area of 26,000 square kilometers. The fishery business plays an important role in Yantai’s economy, attributing about 33 percent to the combined production value for agriculture, forestry, livestock and fishery (2018). According to the Yantai Statistical Bulletin (2019), the annual output of aquatic products was 1.78 million tons. In 2018, Yantai exported 258,000 tons of aquatic products outside the mainland of China, with an export volume of US\$1.45 billion, accounting for one-third of the province and one-fifth of the country.

6. Yantai’s aquaculture production is dominated by SMEs, cooperatives, and family farms. There are 125 lead firms (or “dragon head enterprises”) in production, and 39 lead firms in logistics.

<sup>41</sup> Liu, H. et al., 2018, The follow-up evaluation of “General Hygienic Regulation for Food Production” in China, Food Control 93 (2018) 70–75.

**Table 4.2. Structure of Yantai's Aquaculture Value Chain**

Value Chain Stage	Yantai Aquaculture Value Chain Structure
Production	Production value 33.8 billion CNY (2019); 1.86 mt tons, of which marine 1.85 mt, fresh water 13,400 mt; marine catching 0.5 mt, marine farming 1.33 mt Firms >761, of which SMEs >636 (84 percent), DHEs <125 (16 percent), cooperatives >300 Employees 640,000
Processing	Production value 42.3 billion CNY; 1.95 mt Processors 385, of which DHE 39, SME 346
Logistics	Total logistics enterprises 3,000, of which large logistics centers 11, sub-centers 14, distribution stores 5,000, cold chain service providers 120 (400,000 mt capacity); restaurants >3,065
Distribution	Export value 8.7 billion CNY, 258,000 mt
Retail	2.9 trillion CNY (2020) Aquaculture wholesale enterprises 116, aquaculture wholesale markets 8, stalls in aquaculture wholesale market >1000
Consumers	Consumers >7 million (households 2.45 million)

7. Food safety risks occur at various stages of the aquaculture value chain, but mostly at the production level. Major risks stem from polluted or contaminated water and overuse of drugs for animal disease management, resulting in violations of residue limits for aquaculture products. The table below presents the major food safety risks at different stages of the aquaculture value chain.

**Table 4.3. Major Food Safety Risks in Yantai's Aquaculture Value Chain**

Value Chain Stage	Cause of Risk
	Physical hazards: foreign materials Chemical hazards: malachite green, nitrofuran metabolites, nitrofurazone, chloramphenicol, heavy metals, dioxin, polychlorinated biphenyls, malathion, oxalitic acid, oxytetracycline, fish and shellfish toxin, and so on Biological hazards: vibrio cholera, vibrio parahaemolyticus, salmonella, staphylococcus aureus, total bacteria.
Production	Drugs, feeds, industry pollutants, toxic animals/plants
Processing	Cross contamination, abuse of food additives, toxic animals/plants, residues in aquatic products
Distribution	Cross contamination, toxic animals/plants, residues in aquatic products
Logistics	Cross contamination, toxic animals/plants, residues in aquatic products
Retail	Cross contamination, expired food, fraud food, toxic animals/plants, residues in aquatic products
Consumers	Cross contamination, poor hygiene practice, toxic animals/plants, residues in aquatic products

8. Various investments along the value chain have been identified to manage the food safety risks. Types of investments and investment amounts differ by value chain segment and enterprise types. Lead



enterprises in Yantai presented preliminary investment proposals to improve food safety in their value chains, which will engage about 8,000 linked family farms in the first year of the project. The tentative demand for bank loans totals 521 million CNY, subject to further assessment and approval against the project's selection criteria. During project preparation, this pipeline will be further developed.

**Table 4.4. First Year Pipeline for Food Safety Investments in Yantai**

Scope	Investment Activities
521 million CNY estimated investment 7 enterprises 8,000 linked family farms	Automatic shellfish cleaning, sewage collection and concentration device, traceability, marine shellfish cold chain processing workshop, cold chain transportation system, digital system, cold storage standardization construction, environmental monitoring and sewage treatment system, food safety traceability system and information construction, food inspection and testing center and system construction, upgrading and reconstruction of factory circulating aquaculture workshop, aquatic product quality traceability system, artificial reef construction, marine ranch environment observation network

### Guangdong – Value Chain Assessment

9. In 2019, the total output of aquatic products in China amounted to 64.8036 million tons, including 13 percent from Guangdong. Guangdong's the total fishery output in that year totaled 145.85 billion CNY. Guangdong province is one of the largest pork producers in China, contributing 5.4 percent the national output of 693.82 million pigs in China. Guangdong is a major importer and exporter of fruit and vegetables, importing annually US\$3.3 billion worth of fruits and US\$7.93 million of vegetables, and exporting fruit and vegetables at US\$260 million and US\$280 million, respectively.

10. The Greater Bay Area Development Plan, issued by the State Council on February 18, 2019, includes Guangdong, Hong Kong SAR, China, and Macao SAR, China, and foresees strengthening cooperation on the safety of agricultural and food products, including traceability, emergency linking mechanism, exchange of risk information, and the establishment of a certification scheme. In this context, Guangdong province as a major agricultural province wants to demonstrate the ability of its agriculture and food sector to comply with stringent food safety standards.

**Table 4.5. Structure of Guangdong's Aquaculture Value Chain**

Value Chain Stage	Aquaculture Value Chain
Production	Production 8,660 mt/year DHE 40, family farms 180,000, cooperatives 2,300, fish farmers 1.38 million
Processing	Processing enterprises 1,034, of which DHE 64, SME 866
Distribution	550 mt/year, imports US\$1.4 billion, exports 550,000 tons, export value US\$1.2 billion Wholesalers 90
Logistics	Enterprises 400–500, of which with cold chain 50–60
Retail	Enterprises 1,000, of which supermarkets 800–1,000, agricultural markets >4,000
Consumers	>100 million people



11. Small fishery units account for the bulk of aquaculture producers in Guangdong. Its pork industry has been consolidating during the last decade, but it is still dominated by SMEs, cooperative, and family farms, while traditional backyard small farmers are disappearing due to urbanization. The majority of pig farms produce between 50–2,000 pigs per year. The fruit and vegetables value chain in Guangdong includes multiple players from production to consuming market, with small and medium producers dominating production. The below tables summarize the structure in Guangdong's prioritized value chains.

**Table 4.6. Structure of Guangdong's Pork Value Chain**

Value Chain Stage	Pork Value Chain Structure
Production	Production 37 million/year DHE 110, Pig farms >300,000, cooperatives 1,187 50–500 pigs/year (44 percent), 500–2,000 pigs/year (45 percent), 2,000–10,000 pigs/year (10 percent), >10,000 pigs/year (3 percent)
Processing	Slaughtering 2.8 mt/year Plants 31 300,000 mt/year 20, 100,000–300,000 mt/year 89, 20,000–50,000 mt/year 72, <20,000 mt/year 270
Distribution	Wholesale markets >200 Export 9,000 tons; export of 380,000 live pigs/year to Hong Kong SAR, China
Logistics	Logistics companies >1,800, of which with cold chain logistics >120
Retail	Retailors 25,309, of which supermarkets 20,239, agricultural markets 5,070; restaurants 1.9 million
Consumers	Population >100 million

**Table 4.7. Structure of Guangdong's Fruit and Vegetables Value Chain**

Value Chain Stage	Fruits and Vegetables Value Chain Structure
Production	DHE 134, fruits farms >400 (16 mt/ year), vegetable farms >3,000 (35 mt/year), cooperatives 1,239
Processing	Enterprises >2200, of which DHE 41, SME >2,000
Distribution	Fruit exports 180,000 mt/year, US\$260 million/year (2018), fruits imports US\$3.3 billion/year Vegetables exports 560,000 mt/year, US\$280 million (2019), vegetables imports 10,000 mt/year, US\$7.93 million (2019) Wholesale 97,000, of which wholesale markets >200
Logistics	Logistics companies >1,800, of which with cold chain logistics >120
Retail	Retailors 25,309, of which supermarkets 20,239, agricultural markets 5,070; restaurants 1.9 million
Consumers	Population >100 million



12. **The food safety risks in aquaculture and pork value chains in Guangdong were also analyzed as is the case of aquaculture in Yantai.** In the fruit and vegetables sector, the prime food safety risk are pesticides residues. Other food safety risks stem from overusing chemical fertilizers, growth promoters and microbial cross contamination. Lead enterprises in Guangdong province presented preliminary investment proposals to improve food safety in their value chains, which will engage about 3,580 family farms. The tentative demand for bank loans totals 145 million CNY, subject to further assessment and approval against the selection criteria by the project. During project preparation, this pipeline will be further developed.

**Table 4.8. First Year Pipeline for Food Safety Investments in Guangdong Province**

Scope	Investment Activities
145 million CNY estimated investment	Safe agricultural inputs, biological control of pests and diseases in greenhouse, biosafety facilities and equipment, animal health, biosafety, fertilizer resource efficiency, pest control, water treatment plants, waste treatment, quality management and testing laboratories
8 enterprises	
3,580 linked family farms	

### **Profitability of Investments**

13. **Certain segments of Chinese consumers are willing to pay more for high quality safe food products, with price premiums between 30 to 50 percent for fruit (apples) and between 10 to 30 percent for meat, aquaculture, and vegetables.**<sup>42</sup> These are supermarket prices paid by affluent, urban consumers. A case study of AoNong Group on pork value chains shows that price premiums of up to 10 percent at the farm gate are feasible. However, these premiums can only be obtained if the quality and safety can be credibly established. While the incremental benefits in terms of price premiums take time to develop as brands and certification schemes are built, adopting food safety technologies in a value chain approach will already generate efficiency gains in the absence of price premiums. Those gains stem from improved productivity, cost savings, reduced risk of product failures, and reliable markets for producers and buyers. The financial analysis undertaken for this project calculated financial returns of 24 percent for aquaculture investments, 18 percent for orange and lychee orchard plantations, and 20 percent for pig farming, all implemented according to environmental and food safety standards.

### **Survey findings for demand for food safety investments in project areas**

14. **As part of the preparation of feasibility study report, a field survey on the demand and supply side of food safety investment was conducted by Yantai municipality of Shandong province and Guangdong province.** The survey was guided by the designed questionnaires for financial institutions, family farms, SMEs/cooperatives and DHEs engaged in the selected value chains of pork, vegetable & fruits and aquaculture in project areas. 200 questionnaires were circulated to the actors of each value

<sup>42</sup> These premiums are indicative as data on price premiums is not widely available. Several published studies have established that Chinese consumers are willing to pay more for food products that they perceive high quality and safe. See for example Soon, J. M., & Liu, X., 2020, Chinese consumers' risk mitigating strategies against food fraud. *Food Control*, 107298. doi:10.1016/j.foodcont.2020.107298. The price premiums are taken from Han, Y. et al., 2016, Survey: Food safety becoming Chinese consumers' top priority. Accessed on August 21, 2020 at <https://www.aquaculturealliance.org/advocate/survey-food-safety-becoming-chinese-consumers-top-priority/>. Their findings are based on a survey with 1,500 consumers in 6 major cities in China.

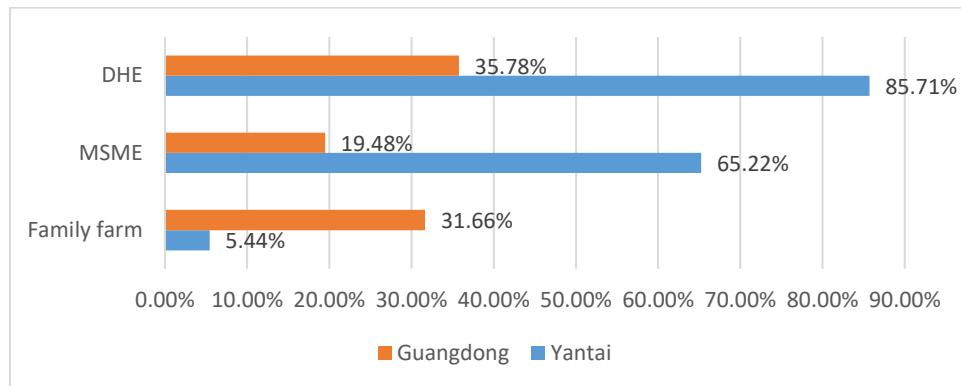


chain and returned with total 930 responses, of which 200 from Yantai and 730 from Guangdong. By business type, 73 percent of the responses in Yantai are from family farms, 23 percent from SMEs, and 4 percent from DHE. Among Guangdong responses, there are 27 percent family farms, 43 percent for SMEs and 30 percent for DHEs respectively. The key findings of the survey are pointed below:

**15. Women play active role in the selected value chains, with disparity in women's participation at different regions and across different types of enterprises.** Female employees account for 44 percent of the workforce in family farms, 42 percent in SMEs, and 22 percent in DHEs in Yantai. Similarly, in Guangdong women's participation is 54 percent in family farms, 50 percent in SMEs and 48 percent in DHEs. However, in both places, men-led enterprises greatly outnumbered women-led ones, with the extreme disparity in family farms in Yantai (97 percent men-led vs. 3 percent women-led). From the perspective of female employees, family farms and SMEs employ twice the percentage of female employees than DHEs in Yantai, while in Guangdong the three types of enterprises generally are gender balanced in the number of employees.

**16. Agribusiness have limited access to loans, but women enterprises are more dependent on formal loans.** Agricultural producers particularly family farms and SMEs have limited access to commercial bank loans. In Yantai, 13 percent of the family farms and 38 percent of the cooperatives and SMEs have accessed loans for agriculture and agribusiness investments, while 59 percent of DHEs could access loans, indicating bias in financing for larger enterprises. In Guangdong, less than 32 percent in each category of agri-food enterprises (family farms, cooperatives, SMEs and DHEs) have borrowed loans from the commercial banks. However, this percent was higher for women-led enterprises which also indicate their higher dependency on loans from formal financial institutions than informal sector. While up to 20 percent of the men-led enterprises took up informal loans, there is no women-led SMEs and DHEs took informal loan. In Yantai, only 5 percent of the family farms have outstanding loans from the commercial banks, and more than 90 percent of the loans are of less than 1-year tenor.

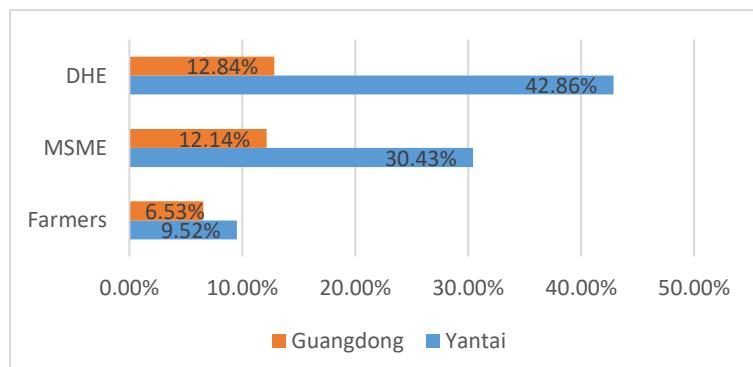
**17. Project related technical risks and lack of guarantee/collaterals are major constraints for accessing bank loans.** Over 50 percent of the interviewed enterprises in Guangdong and Yantai reported project related technical risks and lack of adequate collateral restrict their access to bank loans. For example, in Yantai, 69 percent of family farms reported that commercial banks consider agriculture sector financing very risky, so does 51 percent of SMEs and 53 percent of DHEs in Guangdong engaged in agriculture and agribusinesses. This is largely stemming from two reasons. Firstly, the large commercial banks do not have good understanding of the techno-economic aspects of agriculture production/processing technologies, investment needs, seasonality cycles, and so on. Secondly, they do not consider movable assets, particularly bio-assets (animals, birds, stock of fish, and so on) as eligible collateral. Other hinderances in Guangdong include lack of familiarity with loan officers and bank procedures, low annual income and lack of credit history. But when it comes to enterprises in Yantai, the technical risks, particularly in aquaculture sector, outweigh all other challenges for accessing loans.

**Figure 4.3. Percentage of Enterprises with Formal Loans in Guangdong and Yantai**

Source: Feasibility Study Reports, Yantai and Guangdong

18. **Lack of understanding of food safety technologies and off-the-shelf financing solutions exacerbate financial access challenges for family farms, cooperatives and SMEs.** Lack of understanding of food safety technologies, unclear cost/benefits and lending bias to large firms for food safety investment have resulted the commercial banks ignoring this huge business opportunity in agri-food sector. More specifically, (i) the banks do not have specific financing solutions for food safety improvements, due to lack of understanding of safe production/processing technologies, investment and returns and risk evaluation model for food safety.

19. **The current financing arrangement does not adequately meet financing needs for investment capital.** Less than 13 percent of the interviewees in Guangdong are satisfied with the current financing arrangements for investment capital. In Yantai, such satisfaction rate is varied, 9 percent of family farms, 30 percent of SMEs/cooperatives and 43 percent of DHEs. The survey also shows that the average long-term cover less than 10 percent of the investment needs for family farms and less than 30 percent for SMEs and about 42 percent for DHEs in Yantai. The coverage of bank loans in total investments in Guangdong is much poor.

**Figure 4.4. Current Financing Arrangements Meeting Investment Needs of Value Chain Enterprises**

Source: Feasibility Study Reports, Yantai and Guangdong

20. **The increasing demand for food safety investment in private sector is driven by regulatory compliance and market incentives.** More than 80 percent of the interviewees in Guangdong and Yantai



are familiar with the environmental, quality and food safety standards. 100 percent interviewed agribusiness expressed interest for food safety investment. But the study also revealed that the family farms are conservative to borrow bank loan for food safety investment given the unclear cost benefit relationship other than the fear of business closure for non-compliance. This reflects the need for tailored technical assistance and capacity building programs for family farms on GAP, HACCP, and so on. And helping them make a business case for food safety. In contrast, larger enterprises have stronger willingness to borrow bank loans to improve food safety practice with foreseen benefits such as brand reputation and favorable brand positioning in premium markets, cost of product rejections, food recall and customer tort claims. Yantai has generated about 31 loan requests amounting to CNY 148 million, Guangdong has identified 715 potential beneficiaries with loan request for about CNY 3.5 billion. The women-led enterprises however showed preference for loans with softer terms and longer repayment schedule.

**Table 4.9. Demand for Food Safety Loans and Expected Loan Terms**

Province/ Municipality	Parameter for Loan Demand	Family Farms	Cooperatives MSMEs	DHE
Yantai	Average size of loan (CNY million)	0.36	2.94	9.15
	Repayment period (months)	12	35	36
Guangdong	Average size of loan (CNY million)	1.24	2.94	10.92
	Repayment period (months)	30	26	27

**21. Family farms, professional cooperatives and SMEs are moving towards formal contractual relationship with the lead firms.** In Yantai, more than 80 percent of the interviewees are settled in cooperative partnership among value chain players. In Guangdong, although currently only 32 percent of family farms are reported in value chain partnership but 100 percent of those who are not yet expressed interest in such partnership, indicating the space for expanding value chain cooperation among family farms in the future. Formal contracts between DHEs and productions/processing SMEs also act as collateral for the commercial banks to structure value chain financing solutions.

**22. There seemed to be a mixed impact of COVID-19 pandemic on lending.** Survey data shows that the COVID-19 has limited negative impact on the enterprises with lending in Yantai, of which nearly one-fifth of the SMEs claim to have been affected, while only less than 10 percent of family farms were affected. In contrast, 46 percent of family farms have been negatively impacted by the pandemic in Guangdong. Therefore, the project should design financial interventions to targeted enterprises factoring the impact of COVID-19 and its effects aftermath. Banks are also standing by and reserving available liquidity to support businesses during the recovery from the financial challenges related to the economic contraction due to COVID-19. In response to the pandemic situation, the government has issued policies that request banks to provide financing to support farmers and SMEs, including with deferred repayments of principals, renewing loans without repaying principals, reducing lending interest rates, and interest rate subsidies to ensure enough liquidity in the financial market and increase the risk tolerances for non-performing loans.

**ANNEX 5: Supply Side Assessment for Food Safety Investments in the Project Areas****COUNTRY: China  
China Food Safety Improvement Project**

1. The project provinces (and participating municipalities) are unique in terms of geography, economy, institutions and the banking sector development. Guangdong occupies strategic position given its size of economy, almost rivalling the economy of South Korea with nominal GDP is US\$1.59 trillion,<sup>43</sup> its diversified agriculture base and handling significant volume of cross border trade in agri-products and being part of ambitious Greater Bay Area Development Plan. Guangdong has matured banking sector with a fair combination of large national banks, regional banks and rural commercial banks. It has also majorly suffered reverses in food security (pork meat) due both ASF and COVID-19 and it plans to organize longer supply chains with formal contracts between value chain players. Yantai is a coastal city in Shandong province with aquaculture playing predominant role in the local economy and with significant export contribution with regional/city commercial banks playing active role in supporting policy initiatives. Incidentally, all project locations have high population density, high volumes of livestock production and reported incidence of food borne disease outbreaks. The project will be implemented across pork, aquaculture, fruits and vegetables value chains in the Guangdong province and aquaculture value chains in Yantai. It is expected that successful experiences of financing food safety investments will be replicated in other food value chains.

2. On the lines of demand side assessment for food safety financing presented in the previous section, a quick supply-side assessment of agri-food sector financing by commercial banks in the project areas was undertaken during the preparation. The assessment involved review of secondary data, primary data-collection through structured questionnaires and in-depth interviews with selected commercial banks that make significant contribution to the overall lending to agriculture in these jurisdictions.<sup>44</sup> Due to data policy issues, only some banks shared complete data so the analysis covers 11 banks in Guangdong province and 8 banks in Yantai that have provided required information. Table 5.1 looks at macro level data and aggregated total deposit and loan data aggregated for each of the project areas viz. Guangdong Province, Shandong Province (and more specifically Yantai municipality).

**Table 5.1. Banking Sector Indicators in the Project Areas**

	Guangdong (2019)	Shandong (2019)	Yantai (2018)
GDP (US\$, billions)	1,538.00	1,015.25	120.00
Share of agriculture sector in GDP	11%	8%	4%
Deposits (US\$, billions)	3,320.84	1,466.81	126.34
Loans (US\$, billions)	2,399.92	1,195.76	85.39
Loan to Deposit Ratio	76%	82%	68%
Agriculture loans to total loans	12.2%	31.2%	~ 5%

<sup>43</sup> World Economic Outlook Database. IMF.org.

<sup>44</sup> It was not possible to obtain data to determine the exact percentage of agricultural lending these interviewed banks represented.



	Guangdong (2019)	Shandong (2019)	Yantai (2018)
Deposits <360 days to total deposits	58%	45%	57%
Short term loans to total loans	40%	49%	46%

(Source: CBIRC published data, PMOs' supply side assessments, Yantai Year-Book)

### Information on Agriculture Lending by the Banks

3. Based on the interviews and the available data:

- (a) **Agriculture loans in China is synchronous with rural finance**, they cover "San Nong", refers to three key issues of rural development in mainland China, that is, agriculture, rural areas, and farmers" and often loans to SOEs for rural infrastructure development, housing or personal loans to farmers crowding out real agriculture finance. Accordingly, loans for agriculture in total bank lending exceeds the share of agriculture in GDP. For the available data in the project locations, the loans to primary agriculture activities such as crops, orchards, livestock and aquaculture constitute roughly 20–25 percent of the agriculture portfolio.
- (b) The Loan Deposit Ratio (LDR) was 76 percent for Guangdong province, 82 percent for Shandong province and still lower at 68 percent for Yantai Municipality, imply that there is headroom for further expansion of loan portfolios. However, looking also at the overall use of loans in terms of maturity (term loans), it is equally split between short term and longer term. Based on discussions, the mid-sized city/regional banks prefer to provide longer loans destined for larger enterprises as a means to better manage their risk when they take a longer-term exposure.
- (c) Banks' loan to deposit ratios leave room for liquidity in the Guangdong and Yantai, but this liquidity is for the larger banks (rather than the mid-sized regional banks), and particularly for term loans, tends to focus on larger enterprises.
- (d) State owned enterprises and large private enterprises are able to raise medium term and longer-term loans. SMEs, cooperatives and family farms are usually provided with working capital loans with single bullet payment of principal and interest at loan maturity rather than periodic payments during the duration of the loan.
- (e) The share of non-performing loans in total lending is low, ranging between around 1–3 percent for many banks, pointing to overall low lending risk or perhaps rather very conservative approach that focus on large enterprises and limits exposure to smaller/medium firms.
- (f) Some banks engage in value chain financing. There are three possible models. Lending through the lead firm, lending tri-partite meaning the bank finances the supplier who signs a contract with the lead firm to reimburse the banks or, the lead firm provides some risk sharing to attract the banks. However, rather than adopting taking integrated view for value chain financing, banks adopt the more traditional lending practice and finance a lead enterprise that extends loans to their suppliers. Most interviewed banks see excellent potential for expanding value chain financing as a business strategy because of the trend in



and the government's policy support for consolidation in the agriculture sector. However, especially the second and third tier banks – while familiar with lending to agriculture enterprises in the value chain – are unfamiliar with adapting lending products for food safety through vertically integrated value chains.

- (g) Given the strong consumer demand for high quality and safe food, banks acknowledge opportunities for financing food safety investments. They are also unfamiliar with the types, returns, and duration of such investments and assessing them.
- (h) Credit guarantees exist in the project areas to mitigate risks from insufficient collateral, but they do not effectively address the constraint of collateral risk for longer-term financing. Two modalities are used for managing credit risks. First and more widely used is risk sharing arrangements offered without a fee (free) to borrowers/banks by provincial and municipal governments. Second is fee-based credit guarantees through state agriculture guarantee companies established during 2017–18. They typically only cover small number of loans that are usually working capital loans with short tenor, even though they have a provision to cover loans with maturity up to 8 years, largely due to technical and sectoral risks.

#### **Market Failure in Agro-food Safety Lending That the Project Addresses**

4. The banks and enterprises assessed in the prioritized value chains state the following main constraints for lending: (i) lending is going primarily to larger agriculture enterprises; (ii) perceived risk of agriculture projects resulting in narrow banking; (iii) banks' unfamiliarity with types of food safety investments, their benefits and risks, profitability, and cash flow profiles; and (iv) inability of the banks to recognize bio-assets as loan collaterals preclude access to finance for smaller enterprises. The project's approach to lending and capacity building addresses a variety of loan risks and helps overcome these market failures:

5. The project is addressing an important market failure through sharing of exposure between public funds (IBRD supported line of credit) and the own funds of the banks to build food safety portfolio. Food safety financing which has become highly relevant especially at a time when all the major outbreaks of COVID-19 in Wuhan, Beijing, Dalian and Qingdao emanated from food systems. Using IBRD financing to leverage additional social or private capital into this area, is also aligned with the spirit of MFD. Local commercial banks have emphasized that the WBG's support is a high value add and helping them build a new business line. On their part, they were willing to commit to create space in their portfolio over the project period in favor of (i) inclusive finance to family farms, cooperatives, SMEs, FOR (ii) food safety improvements. At the time of closing of REOI issued by Yantai Finance Bureau last Friday, five commercial banks have agreed to participate in the project and committed to (i) provide 2X resources to accompany LOC, and (ii) allocate 60 percent of LOC resources to family farms, cooperatives, and SMEs. Incidentally, CASA resources comprise large part of their working fund.

6. **Enhances small and medium agriculture enterprises' access to longer-term loans.** The enterprise surveys confirm that in particular small enterprises are constrained in borrowing for long term investment capital. To participate in the project and benefit from its technical assistance and risk reducing strategies, all PFIs must contribute their own funds and increase the share of longer term lending to SMEs to a specific threshold, thus mobilizing private financing for food safety and overcoming an important lending constraint.



7. **Reduces banks' risk for lending to a new market such as food safety lending.** The project reduces the perceived risk (due to its newness) of lending for food safety investments in agriculture and livestock value chains through various measures:

- (a) **Improves information about borrowers to reduce information asymmetry and moral hazard.** The lack of information about small-scale farmers makes it challenging to assess their repayment capacity and attitude and the information asymmetry provides opportunities for moral hazard. The project will integrate farmers into value chains and collect detailed borrower data through financial technologies, which significantly improves banks' information on-farm operations and reduces their information asymmetry and lending risk.
- (b) **Makes farmers' cash flows more predictable.** The agriculture sector with seasonality in production is prone to large price fluctuations that affect borrowers' financial and loan repayment ability, adding to banks' financing risk. This project integrates farmers into value chains with formal contracts that specify farmers' products' prices, making their cash flows more predictable and reducing banks' lending risks.
- (c) Supports investments that reduce farmers' risks and, in Guangdong, a risk sharing facility and a comprehensive insurance scheme. The agriculture sector production and yields heavily depend on external factors such as the climate or the occurrence of pests or plant and animal diseases, which increases the lending risk for banks. Many of the food safety investments promoted in this project, such as climate-smart farming techniques, Good Agricultural Practices, and animal health practices, mitigate these risks, thus reducing banks' financing risks. In Guangdong province, the province will address production risks through the piloted comprehensive insurance scheme, thus reducing banks' loan risks.
- (d) **Provides technical assistance for banks to develop suitable financing solutions for food safety.** All banks that expressed interest in participating in the project are unfamiliar with lending for food safety investments, increasing the perceived lending risk for all borrower types. The project will provide dedicated technical assistance to banks for pipeline and product development, and risk management and controls.
- (e) From a public policy point of view, the fact that food safety is a public good reinforces the idea that the government should take some of the risk in funding the sector to pay for its transformation, through variety of instruments including credit enhancements, equity investments and performance incentives. Viewed in this context, Guangdong proposes to set-up a dedicated risk sharing facility and comprehensive insurance scheme to mitigate banks' lending risks. Typically, banks require collateral or guarantees to reduce their lending risks, which – as the enterprise surveys confirm – is a primary impediment to accessing loans for most small-scale farmers. Credit guarantees exist in the project locations to mitigate risks from insufficient collateral, but they do not effectively address the constraint of collateral risk for longer-term financing as the current focus is on working capital loans. The instruments will allow leveraging private capital financing for food safety investment. In case of Yantai, the municipal government will facilitate coordination between the PFIs and the provincial and municipal guarantee companies for extending policy guarantee cover for eligible loans.



### **Yantai Municipality (Shandong)**

8. Yantai Tier 2 banks are active in the agriculture sector lending, with agri-loans accounting from 6 to 34 percent in their loan portfolio. Almost all agriculture loans are short-term, pointing to the need for making available longer-term financing for the sector. Their Loan to Deposit Ratio (LDR) varies between 59 and 98 percent, suggesting that with projected credit growth some mid-sized banks may be approaching liquidity constraints. The non-performing loans have been under 3 percent due to extreme conservatism of the banks in financing agriculture and agribusinesses. However, one of the rural banks interviewed has high NPL.

**Table 5.2. Loan Portfolio of Sample Banks in Yantai Municipality (US\$, billions)**

Bank	Deposits	% of Deposits with Maturity < 1 Year	Loans	% of Loans with Tenure of < 1 Year	Loan Deposit Ratio (%)	NPL (%)	Ag Loans	Share of Agri-loans (%)
BK 1	7.03	28.34%	7.97	33.46 %	113.32 %	1.79 %	2.95	36.99 %
BK 2	6.64	26.02 %	3.07	37.71 %	46.24 %	0.34 %	0.81	26.43 %
BK 3	0.86	91.15 %	1.06	84.52 %	124.21 %	0.24 %	0.07	6.18 %
BK 4	2.15	96.55 %	1.83	61.53 %	85.26 %	2.33 %	0.62	33.72 %
BK 5	30.40	84.54 %	24.69	32.83 %	81.21 %	1.65 %	4.32	17.49 %
BK 6	8.09	21.11 %	6.61	59.63 %	81.73 %	2.97 %	0.15	2.20 %
BK 7	4.94	25.98 %	3.80	81.63 %	76.82 %	8.82 %	0.33	8.62 %
BK 8	0.19	67.67 %	0.12	39.83 %	65.41 %	0.63 %	0.00	0.00 %

(Note: Data anonymized)

9. Because of lack of existing demand, none of the mid-sized banks offer loans for food safety investments. At the same time, the banks stated that they lack capacity about food safety investments, assessing their financing potential (for example, generated cash flows), their risks, and structuring/adapting suitable loan products. They will welcome the liquidity (as means of sharing risk exposure in a loan portfolio in a new market) and technical assistance to be provided under the project.

10. Some of the interviewed banks are planning to invest in the aquaculture sector. But, the current lending approaches to value chain financing is focused on financing smaller firms through a lead firm. There is potential to explore other lending models such as financing enterprises along the value chain that are linked to a buyer or a lead firm through a tripartite arrangement as is being implemented in other sectors.

11. Also, in Yantai, fee-based loan guarantees are a relatively new instrument and not yet widely used. Shandong Agricultural Development Credit Guarantee Company was established in 2017 and offers a guarantee for farmers and SMEs' working capital loans. Yantai Municipal re-guarantee Company's product serves the same clientele and tenure segment.

12. Because of the limited geographic scope and single value chain of the Yantai project intervention, only local banks with stronger local presence and connection with the local economy have expressed interest in participating in the project. These banks' ratio of longer-term deposits to overall deposits is



small and restricts their ability to extend investment loans. Again, given their risk preference, their lending is also concentrated on large loans, making it challenging for smaller enterprises to access loans. In this context, the project proposes to provide access for local banks to longer term funding through a Line of Credit with the condition for participating financial institutions (PFIs) to increase the portion of longer-term lending, including to small enterprises, which account for the majority of aquaculture producers in Yantai.

*Line of Credit in Yantai*

13. Among the assessed banks in Yantai, primarily the mid-sized, regional banks, local in character, expressed an active interest in participating in the project. They are interested in local economic development and welcome the project's support to improve their product knowledge and capacity in the value chain and food safety financing. It will allow them to catch up with large banks and position themselves as innovators with the prospects to improve their market share. Hence, they see the project as a business opportunity for portfolio development rather than a windfall for financing business as usual. They also plan to focus more on farmers and SMEs, as a strategy to strengthen the supply chains in upstream for their current clients, that is, large lead firms (dragon head companies). But they would need technical assistance to develop this lending model.

14. The proposed support to commercial banks for financing food safety investments in the prioritized value chain in project location will overcome the above constraints as follows:

- (a) The support will fund mostly SMEs for new technologies in food safety, taking a value chain approach. Currently, no bank caters to these segments.
- (b) The value chain approach partly mitigates the financing risk for banks. In the envisaged value chains for food safety, producers commit to greater control of the buyer on quality of inputs, production environment, adoption of GAP, GMP, GHP, and output quality and quantity. The predetermined prices and quantity provide predictability for both buyer and seller. The traceability and quality and safety testing systems reduce information asymmetry with potential applications using blockchain technologies and/or other IT solutions serving as key enablers.
- (c) The approach works as a demonstration model and is expected to unleash other banks' financing for food safety investments in the project areas and beyond. In a conducive market environment, the approach demonstrates how the package of regulatory reforms, technical assistance to enterprises, and liquidity for banks work together to develop a new and promising business line.
- (d) The line of credit foresees that banks will contribute from their own resources as long as IBRD resources are available to leverage. The project will create an account within each bank to which the IBRD funds and the commercial bank's counterpart funds will be transferred. Loans to agribusinesses will be disbursed from that account *pari passu*, in the ratio of banks to IBRD funds, and loan collections will happen to this account. This setup will also support M&E and managing guarantees because everything is contained in one project account.



## Guangdong Province

15. For Guangdong, data was made available by large national banks, regional/city commercial banks and rural credit union. Depending upon the business portfolio of each banks, the data shows agriculture/lending widely varies between 1.7 percent and 73.5 percent. Loans to crops, livestock, aquaculture and poultry contribute to about 25 percent of the Ag portfolio. The banks also clarified in the interviews that this lending category included a large portion of housing loans. This is also corroborated by the fact that the high share of their agricultural loans (61 percent and 76 percent respectively) are for medium to longer term durations but they tend to serve SOEs and larger enterprises. Nearly 80 percent of the small loans are secured by physical assets of third party guarantees and 90 percent of them had a tenor of less than 360 days. Very low NPLs suggest that their portfolio risk is well managed, albeit with narrow banking approach. Two of the rural banks have relatively high NPLs exceeding 6 percent.

**Table 5.3. Loan Portfolio of Sample Banks in Guangdong Province (US\$, billions)**

Bank	Deposits	% of Deposits with Maturity < 1 Year	Loans	% of Loans with Tenure of < 1 Year	Loan Deposit Ratio (%)	NPL (%)	Ag Loans	Share of Agri-loans (%)	NPL for Agri Loans (%)
BK 1	220.11	80.70%	162.37	40.20 %	73.77 %	0.69 %	5.87	3.61 %	3.04 %
BK 2	162.47	64.09 %	145.38	21.35 %	89.48 %	0.71 %	2.91	2.00 %	0.69 %
BK 3	84.34	-	42.87	14.35 %	50.83 %	0.43 %	8.32	19.42 %	1.48 %
BK 4	391.73	41.53 %	262.13	24.23 %	64.11 %	3.34 %	73.10	27.87 %	6.49 %
BK 5	80.67	49.91 %	58.62	37.82 %	72.67 %	1.84 %	5.19	8.85 %	-
BK 6	2.00	58.59 %	1.20	28.26 %	60.30 %	0.67 %	0.88	73.46 %	0.45 %
BK 7	6.92	86.92 %	4.68	14.07 %	67.65 %	0.78 %	2.15	46.04 %	1.18 %
BK 8	5.58	59.74 %	3.58	30.80 %	64.22 %	2.57 %	1.18	32.84 %	0.98 %
BK 9	11.57	51.97 %	7.55	46.13 %	65.28 %	1.03 %	1.68	22.30 %	0.60 %
BK 10	2.90	56.28 %	1.72	30.40 %	59.27 %	1.25 %	0.03	1.70 %	7.22 %

(Note: Data anonymized)

16. None of the above banks finances investments in food safety. Few banks offer products and services using an agriculture value chain business approach; instead, they invest in individual businesses. Given the innovative scope of the project spanning the entire province and covering multiple value chains, even large national banks have shown interest to participating in the project and develop a new line of business. Considering that they have significant own resources mobilized locally,

### *Risk Sharing Facility in Guangdong*

17. Guarantees are not yet widely used as alternative collateral for agriculture loans and the loan amounts covered are rather low. Guangdong Agriculture Financing Guarantee Company (GAFG) started operations in 2017 and targets all agriculture enterprises in the value chain. The maximum guaranteed loan size is 10 million CNY for dragon head enterprises and 3 million CNY for SMEs, with a maximum duration of 8 years. But in practice the average loan amount guaranteed was 114,000 CNY in 2019 (2018: 104,428; 2017: 774,193). So far, only very few guarantees have been issued for SMEs and for more



traditional type of investments (with well-established and known technologies) that banks and the guarantee company are more or less familiar. Given the conservative approach of the guarantee company so far, there is reluctance to move into new areas when they have barely four years since starting. They also see demand and scope to continue deploying their capital to offer guarantees for loans funding traditional forms/established technologies for investments. Accordingly, the project has proposed to set up a risk sharing facility to be managed by a professional technical services firm.

**Table 5.4. Comparison between Guangdong PAFGC and the Proposed Risk Sharing Facility**

S. No.	Particulars	Guangdong Province Agriculture Finance Guarantee Company	Proposed Risk Sharing Facility
1	Area of operation	Guangdong province	Guangdong focus on 100 modern agriculture clusters
2	Types of guarantees offered	Individual	i. Portfolio (for borrower exposures up to CNY 10 million) ii. Individual (for borrower exposures above CNY 10 million)
3	Coverage	80%	75 %
4	Stop Loss Provision	First loss up to 5 % NPL	First loss up to 10 % of NPL
5	Eligible activities	Agriculture	Agriculture, Agribusiness, Agriculture Marketing
6	Eligible borrowers	Individual Cooperatives SMEs Large Enterprises <b>SOEs</b>	Individual Cooperatives SMEs Large Enterprises
7	Maximum loan sizes allowed for each borrower category	Individual Farms CNY 100,000 Cooperatives CNY 3 million SMEs CNY 3 million DHEs CNY 10 million	Family Farms CNY 500,000 Cooperatives CNY 5 million SMEs CNY 10 million DHEs CNY 25 million At least 60 % for loans up to 5 million
8	Maximum tenor	Up to 3 years	Up to 5 years
9	Guarantee fees	0.50 % - Grain, poverty alleviation 0.75 % - Small loans (up to 3 million) 2.00 % - Large Loans (above 3 million)	Portfolio guarantee is expected to lower the transaction cost. Risk based pricing mechanism to be fine-tuned during implementation
10	Time taken to issue the guarantee	Up to two months	Coverage of small loans is automatic as in the case of portfolio guarantees Large loans – within 10 working days from receipt of proposal
11	Trigger for claim	Claim triggered after 60 days of default, or 30 days before it is classified as NPL.	When a loan is classified as NPL, that is, usually when it is 90 days past due, but a loan can also be classified NPL before that.



S. No.	Particulars	Guangdong Province Agriculture Finance Guarantee Company	Proposed Risk Sharing Facility
12	Social and environment safeguards	Guarantee company ensures compliance to relevant social and environmental regulations depending upon the nature of the business.	RSF ensures compliance to social and environmental regulations by the PFI.

**ANNEX 6: Economic and Financial Analysis**

**COUNTRY: China**  
**China Food Safety Improvement Project**

**The development impact and expected benefits**

1. The project aims to improve food safety management at the national and targeted subnational levels and reduce food safety risks in selected value chains. Domestically, the project will generate enormous benefits in the form of improved food safety, more sustainable environmental practices, and resilience to climate change and variability. It will benefit farmers, farmer cooperatives, and enterprises through a value chain approach that improves the productivity and efficiency of farming systems while enhancing the processing and market opportunities for high quality and safe food products.
2. The project will also generate significant global public goods in the form of (i) limiting the spread of zoonotic diseases; (ii) exporting high quality and safe food; (iii) contributing to global anti-microbial resistance; and (iv) institutional development and knowledge sharing for developing countries. These benefits are difficult to quantify and beyond the conventional scope of financial and economic analysis.
3. Further, the project will generate direct climate benefits mainly through mitigation by adopting good agricultural and aquaculture practices under Component 3. An ex-ante analysis of the impact of value chain investments on reducing GHG emissions, compared to existing practices (the baseline), was undertaken by using Ex-Ante Carbon-balance Tool (EX-ACT) for crops and aquaculture, and the Global Livestock Environment Assessment Model (GLEAM) for the livestock, developed by the FAO.
4. Benefits from reduced GHG emissions will be generated from (i) lower emissions of nitrogen substances as a result of improved animal feed composition that is lower in proteins; (ii) improved management of animal manure with anaerobic treatment for biogas and organic fertilizers; (iii) carbon sequestration from good aquaculture practice; and (iv) carbon sequestration from fruit tree plantations.
5. Total GHG emission reduction benefits will reach an estimated 450,705 tons of CO<sub>2</sub>eq per year at full development, corresponding to a total of about 8.1 million tons of CO<sub>2</sub>eq during the project life. These benefits are included the cost-benefit analysis (see below).

**Cost-effectiveness analysis for Components 1 and 2**

6. 'Cost-effectiveness' is the preferred methodology for the economic evaluation of Components 1 and 2. The rationale for adopting a cost-effectiveness methodology is that improved food safety regulatory performance, supervision process, and institution building will lead to significant benefits to be gained and production losses to be avoided, which are challenging to reliably quantify ex-ante. The key objective of a cost-effectiveness analysis is to demonstrate that the proposed investments have a sound strategic rationale for the overall project objectives and that these objectives are met in the most cost-effective way.
7. The project is expected to generate significant positive economic benefits from: (i) a reduction in long term human mortality and health costs resulting from consumers' and producers' exposure to unsafe



agricultural products or production practices; (ii) a reduction in livestock and fishery mortality and long term environmental damage from the use of bad agricultural and aquaculture practices; (iii) a reduction in reputational risks and consequent financial losses, from food safety failures; and (iv) the social and financial benefits of increased income for small-scale farmers integrating into high value food supply chains.

8. Meat and aquaculture products will continue to be major food items for Chinese consumers. With rising incomes, milk products and fruit and vegetables will gain importance in the food basket. Food safety of these items is a high priority. Food additives, microbial contamination, and veterinary drugs are major food safety hazards in China, and prevalent in the meat, aquaculture, and fruit and vegetables value chains. Losses from foodborne diseases in China are the highest in Asia and the world at US\$30 billion a year. This cost will be even higher if occupational health of food system workers and other morbidities caused by trans- fat, toxic foods, and other waterborne pathogens entering the food chains taken were factored in.

9. A complete analysis of the benefits of an agricultural product safety system will require an evaluation of the underlying risks and the degree to which they are mitigated by the system. Risks could be calculated by using the health and mortality rates associated with known hazards (such as pesticide or veterinary residues, environmental contaminants such as heavy metals, and microbial contaminants) and combining these with observed exposure levels (such as consumption levels of products with high levels of pesticide or veterinary residue, heavy metals or microbial contaminants). While science widely supports the link between diseases/mortality and exposure to agricultural chemicals, veterinary residues, environmental contaminants, and microbials, the causal relationships will have to be fully established by long term medical studies.

10. As such, it is challenging to quantify the economic benefits of the project on the above aspects. Moreover, food safety goes beyond the purely economic trade-offs to issues of socially acceptable minimum food standards. Also, a single food safety incident can cost a country and producers billions of dollars in lost revenues. One example of the negative result of a failure in the food safety system is the 2008 Melamine incident in China. Infant milk producers added Melamine, a plastic compound, to the milk powder to boost protein readings, leading to loss of lives and sickness, costing dairy producers and the country billions of dollars. Also, the incident stained the reputation of China's entire food industry for years. Likewise, poor animal health practices can result in disease epidemics, such as avian flu or the recent H1N1 (swine) flu, resulting in billions of dollars in losses.

11. The magnitude of the losses resulting from food safety and animal health failures are so large that they dwarf any reasonable investment, such as this project, that could significantly reduce the risk. Thus, the rationale for investment in food safety regulation and supervision is well accepted without calculating the rate of return for these types of investments, which will be high by any conservative assumptions if data and resources were available for calculation.

12. Furthermore, the cost-effectiveness approach is appropriate, considering the enforcement of food safety legislation. In accordance with the China Agricultural Products Quality and China Food Safety Law and the China Food Safety Law, improved food safety regulatory performance, supervision process, and institution building are top priorities. In fact, the Government has requested the World Bank as a knowledge institution to assist in achieving the cost-effectiveness of the investment by adopting



internationally recognized policies, norms and standards, and good practices for food safety regulation and supervision.

### **Cost benefits Analysis for Component 3**

13. Through innovative financing arrangement (see Component 3 description), the component will generate incremental benefits from value chain development, including (i) increased production of high quality and safe food products through adopting good practice production standards and technology packages; (ii) improved product processing and/or packaging; (iii) better access to services, markets, and information; (iv) price premium achieved for improved product quality and market differentiation (for example, product certification, branding for high quality and safe food products); and (v) efficiency gains from economies of scale.

14. The evaluation of the economic and financial viability of the project is analyzed by comparing with-and-without project scenarios. Ideally, the effect of project interventions in each of the supported activities will be investigated with the direct and indirect costs and benefits considered. However, given the demand-driven nature of the value chain investments under the component, the specific subprojects and entities to be financed will depend on the involved financial institutions' screening and technical appraisal during project implementation. Therefore, for this analysis, representative value chain investment models are developed in consultation with local experts and FSR teams to gauge the financial profitability for major types of value chains. Then, the economic viability is analyzed at the component level by extrapolating the aggregated investment by type and incorporating the climate benefits estimated above.

15. **Financial Analysis.** The financial analysis aims to assess the financial viability of potential subprojects from the investors' viewpoint. Representative value chain models were prepared in local currency (Chinese yuan) applying market prices. Financial analyses were undertaken for each value chain model based on their current and projected production, investments, and operating costs. Major assumptions for the financial analysis are (i) Project life: In line with the prevailing practice in the food downstream value chain sector, the project life is assumed to be 25 years; (ii) Constant prices in 2020: all the investment cost and operating costs, and input and output prices, and the projected future cash flows are in constant 2020 prices; (iii) Investment costs and the residual value of fixed assets: The Investment costs used in the analysis are based on cost estimates, including procurement and installation of equipment, and technical training and extension cost to link up with the contract farmers; (iv) The residue value of the fixed assets is estimated as 5 percent of their book values and treated as cash inflow at the end of the project life; and (v) Incremental working capital, depending on the capacity utilization, and management of current assets and liabilities, is projected by the factory management and included in the analysis.

16. **Aquaculture model.** The model covering 1,000 mu (66.7 ha) of marine water body aims to make full use of the sea resources, building an artificial reef with a three-layer production system including shellfish, algae, and sea cucumber. Compared with traditional practice, this model will improve the marine ecological environment as the ocean's natural resources are optimally utilized, resulting in less pollution and emissions. The model also covers a shellfish cleaning and processing workshop with cold storage facilities. The proposed investment cost is CNY 3.5 million (US\$0.54 million). Annual sales at full



development will reach 23 tons per year. The annual net income will then reach CNY 1.31 million (US\$0.20 million). The FIRR of this model is estimated at 22.9 percent.

17. **Fruit trees model.** The model consists of a 1,000 mu orchard (66.67 ha) planted with orange and lychee. The plantation will be phased over a three-year investment period. Fruits will start producing in Year 4, and the orchard will reach full production in Year 8 with yields of 1.6 tons per mu (24 tons per ha) for orange and 0.35 ton per mu (5.25 per ha) for lychee. Compared with traditional practice, the orchard will not use pesticides (replaced by IPM techniques) and reduce the use of chemical fertilizers by half. The proposed investment cost is CNY 25.6 million (US\$3.94 million). Annual net income will reach CNY 15.3 million (US\$2.36 million) at full development. The FIRR is estimated at 18.3 percent.

18. **Pig farming model.** The model consists of the following three elements: (a) the production of feed with customized formulas for various animals; (b) raising sows for the production of piglets and using manure to produce biogas and organic manure. The primary revenue source is the sale of piglets (and a proportion of unproductive sows every year). The enterprise will also sell organic manure annually at CNY 960 per ton. Biogas will not be sold but used by the enterprise to heat the animal premises, thereby saving electricity expenditures. The green benefits arise from the three steps of the production cycle: (a) the production and use of low-crude protein animal feed, leading to better feed efficiency and reduced release of GHG-emitting N elements during the animal production cycle; (b) electricity and water savings throughout the entire cycle of production; and (c) the manure treatment in anaerobic conditions to produce biogas and organic manure instead of a combination of short pit storage and uncovered anaerobic lagoon that will cause high GHG emissions. The financial results have been calculated for each of these three elements separately. The production of piglets is the most profitable, with an FIRR of 24.4 percent. The production of feed has an FIRR of 21.7 percent, covering the investment and recurrent costs with relatively modest profits. As expected, the manure treatment has a negative FIRR (6.2 percent), indicating that the investment is generating a loss, explaining why conventional businesses are reluctant to invest in such facilities. However, the integrated business model (pig value chain) shows good financial results, with an FIRR estimated at 20.5 percent.

19. **Economic Analysis.** The economic analysis was undertaken to assess the economic viability of the entire Component 3, including the benefits from the financial analysis and the mitigation co-benefits from increased carbon sequestration. The following assumptions were used: (i) Converting financial/market prices into economic values, by using either shadow prices when price distortions are evident or calculating parity prices for tradable goods. It was assumed that most financial prices reflect the actual value of investment and goods given the limited distortions in the current Chinese economy; (ii) The overall investment equivalent to US\$161.5 million (Component 3) is used as the loan/guarantee to finance the investments, leveraging some US\$250 million of private capital ; (iii) Phasing of subproject investments is 10 percent in Year 1, 20 percent in Year 2, 30 percent in Year 3, and 40 percent in Year 4; (iv) Investments will be equally shared between the three types of enterprise models; (v) Economic costs and benefits are aggregated from the value chain models ; (vi) Shadow price of carbon. Per the Bank's latest guidelines, projects' economic analysis should use a low and high estimate of the carbon price starting at US\$40 and 80, respectively, in 2020 and increasing to US\$50 and 100 by 2030; and the low and high values on carbon prices are extrapolated from 2030 to 2050 using the same growth rate of 2.5 percent per year implicit for the change between 2020 and 2030, leading to values of US\$64 and US\$128 by 2040; and (vii) Opportunity Cost Capital (Economic Discount Rate): In line with the National Development and Reform Commission



(NDRC) guideline and the current practice of Bank projects, the opportunity cost of capital is set at 8 percent.

20. The component level ERR was estimated at 19.8 percent (without climate co-benefits). It amounted to 21.8 percent with the lower shadow carbon price projection that increases linearly starting at US\$40 in 2021. The ERR equaled 23.9 percent with the higher shadow carbon price projection that starts at US\$80 in 2021), indicating it is economically viable and robust with the carbon shadow prices at various levels as defined by the current Bank guidelines. It should be noted that the results are only indicative given the demand-driven nature of the subproject selection process by financial institutions involved, and the models developed serve only as a tool and reference for the comprehensive analysis during project implementation when actual investments realize.

21. The sensitivity analysis was undertaken to test the negative impact of the key variables of investment cost and annual net revenues. Sensitivity tests were conducted to assess the project's economic viability in case of any cost over runs or potential reductions in expected revenues. The project will still yield an ERR of 17.5 percent under a conservative assumption of a cost overrun of 30 percent. Similarly, the project will yield an ERR of 17.3 percent if the expected project revenues decline by a third from the baseline scenario. These results indicate that the project's economic viability is robust.

### **GHG Emission Reduction Calculation**

22. The ex-ante quantification of GHG emission reductions is an essential step in managing and ultimately reducing GHG emissions.

23. **Methodology.** To estimate the impact of agricultural investment on GHG emissions and carbon sequestration, the World Bank has adopted EX-ACT, developed by the FAO since 2010. EX-ACT allows the assessment of the project's net carbon balance, defined as the net balance of CO<sub>2</sub> equivalent GHG emitted or sequestered due to project implementation compared to a without-project scenario, assumed to be the adoption of conventional technologies. EXACT estimates the carbon stock changes (emissions or sinks), expressed in equivalent tons of CO<sub>2</sub> per hectare and year.

24. Specific (Tier 2) emission factors and emission reduction potential for livestock were derived from calculations based on the GLEAM model developed at the FAO. GLEAM is a biophysical model of livestock supply chains that calculates animal herd dynamics, feed rations, production, and GHG emissions with Tier 2 methodology (IPCC 2006), with a life cycle approach. Three gases are considered in the calculations: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). The latest available global warming potential from the Intergovernmental Panel on Climate Change (2014) are used to convert all emissions into CO<sub>2</sub> equivalent (298 for N<sub>2</sub>O and 34 for CH<sub>4</sub>). Warm temperate moist climate and soils with low activity clay were assumed to represent the provinces' conditions. The reference value of 0.839 ton CO<sub>2</sub>eq per MWh of electricity (Tier 1 in China) was applied to estimate the impact of electricity consumption on GHG emissions.

25. **Aquaculture model.** The model, covering 1,000 mu (66.7 ha) of water body, aims to make full use of the sea resources by building an artificial reef with a three-layer production system including shellfish, algae, and sea cucumber. Compared with the traditional aquaculture model, which requires different batches and boats for each species, the new model can harvest sea cucumbers, fish and shrimps in one



go, which greatly reduces fuel use during harvest through (i) reduction in diesel consumption, and (ii) improved fishing operations. An EX-ACT analysis was conducted, applying the Inputs Investment module for diesel consumption and Fish Aquaculture module efficiency improvement. Over the project life of 20 years, emissions will be reduced by 1,877 tCO<sub>2</sub>eq (that is, -1.4 tCO<sub>2</sub>eq per hectare per year), with 225 tCO<sub>2</sub>eq derived from the reduced diesel consumption, and 1,652 tCO<sub>2</sub>eq from improved fishing operations.

26. **Fruit tree model.** The GHG emissions reductions from the fruit model result from the lower use of inputs, the conversion of degraded forest land into orchard, and/or the rehabilitation of degraded orchard. EX-ACT (management degradation model) was used to make projections. The conversion of 1,000 mu (66.7 ha) to fruit trees will result in a total of 16,100 tons of CO<sub>2</sub>ep reduction during project life. Besides, assuming that pesticides are substituted with biological control or IPM techniques and that nitrogen-phosphorus-potassium fertilizer is reduced by half, a further 6,416 tons CO<sub>2</sub>eq of GHG emissions are avoided. The orchard will reduce an estimated 16.9 tons of CO<sub>2</sub>eq per ha per year equaling 22,515 tons per orchard unit over the 20-year project life.

27. **Pig farming model.** GHG reduction in this model will originate from three sources. First, anaerobic digesters are one of the most promising practices for mitigating CH<sub>4</sub> emissions from manure. When correctly operated, anaerobic digesters are also a source of renewable energy in the form of biogas, which is 60–80 percent CH<sub>4</sub>. Second, higher quality and digestibility of feed results in reduced manure emissions and better animal growth performance. Decreasing the proportion of direct proteins and increasing the share of higher quality ingredients (for example, grains, oilseed cakes, minerals, additives, especially lysine and methionine) in the feed basket improves digestibility and animal growth performance and reduces manure emissions because less N and organic matter are found in feces per unit of meat produced.

28. Improvement of manure management and improved feeding were modeled with GLEAM-i. A baseline scenario on herd dynamics for pigs in the province was compared with the project's proposed pig farming practice. The amount of manure treated in anaerobic digestion was increased to 100 percent. Biogas produced by anaerobic digestion of manure was estimated and the equivalent CO<sub>2</sub> emissions saved from fossil fuel substitution calculated. This scenario compares with the baseline that practices 40 percent short pit storage and 60 percent uncovered anaerobic lagoon. Improved feeding consists of switching from 13 percent by-products from soy, 6 percent vegetable oil, 61 corn grains, and 20 percent synthetic components to improved feed composed of 10 percent by-products from soy, 6 percent vegetable oil, 64 percent corn grains, and 20 percent synthetic components. GLEAM-i estimates that these changes will reduce emissions by 26,999 tons of CO<sub>2</sub>eq per year at full development.

29. In addition, pig farm model also includes 286 tone of CO<sub>2</sub>eq reduction from using bio-gas to replace coal and 17,207; and 17,207 tons of CO<sub>2</sub>ep reduction from electricity saving (10% efficiency improvement) at full development.

30. Based on the total units by value chain developed by the whole project, it is estimated that the whole project will reduce GHG of 0.32 million tons of CO<sub>2</sub>eq per year at full development, equaling about 5.75 million tons of CO<sub>2</sub>eq during the project life. Detailed calculations of the GHG are contained in the EX-ACT files and EXCEL file for economic analysis (on file).