Munich Personal RePEc Archive

Pre-Feasibility Study of Sarawak-West Kalimantan Cross-Border Value Chains

Lord, Montague and Chang, Susan

Asian Development Bank

November 2019

Online at https://mpra.ub.uni-muenchen.de/97376/
MPRA Paper No. 97376, posted 11 Dec 2019 09:08 UTC

Brunei Darussalam-Indonesia-Malaysia-Philippines
East ASEAN Growth Area
(BIMP-EAGA)

PRE-FEASIBILITY STUDY OF SARAWAK–WEST KALIMANTAN CROSS-BORDER VALUE CHAINS

Brunei Darussalam-Indonesia-Malaysia-Philippines
East ASEAN Growth Area
(BIMP-EAGA)

PRE-FEASIBILITY STUDY OF SARAWAK–WEST KALIMANTAN CROSS-BORDER VALUE CHAINS

Montague Lord
and
Susan Chang

November 2019

The views expressed in this publication are those of the authors and do not necessarily reflect the views and policies of the Asian Development Bank (ADB) or its Board of Governors or the governments they represent.

ADB does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use.

By making any designation of or reference to a particular territory or geographic area, or by using the term "country" in this document, ADB does not intend to make judgments as to any legal or other status of any territory or area.

ADB encourages printing or copyright information exclusively for personal and noncommercial use with proper acknowledgment of ADB. Users are restricted from reselling, redistributing, or creating derivative words for commercial purposes without the express, written consent of ADB.

Notes:
In this publication, "$" refers to United States dollars.
ADB recognizes "China" as the People's Republic of China.

Contents

Tables, Figures, Maps, and Box v

Map of Sarawak and West Kalimantan x

Acknowledgments xi

Abbreviations xiii

Summary xv

I Introduction 1

1 Background 3
2 Objectives and Methodology 7
3 Coverage 12

II Socioeconomic Features 19

4 Sarawak's Structural Transformation 21
5 West Kalimantan's Economic Transformation 25

III Government Policies 39

6 Sarawak Public Policies 41
7 West Kalimantan Public Policies 44
8 Border Crossings and Inland Port 47
9 West Borneo Economic Corridor 54

IV Analysis of Trade 59

10 Sarawak Exports 61
11 West Kalimantan Exports 64
12 Competitive Advantages 67

V Trade Modeling and Forecasting 71

13 Modeling Trade 73
14 Forecasting Trade Benefits 81

VI Cross-Border Value Chains 93

15 Aluminum 95
16 Natural Rubber 102
17 Palm Oil 110
18 Wood Products 116
19 Fisheries 124
20 Shipbuilding 131
21 Organic Agriculture 139
22 Tourism 147
23 Medical Tourism 154
24 Higher Education and Technical and Vocational Education and Training 160

VII Cost–Benefit Analysis 169

25 Common Assumptions 171
26 Palm Oil 173
27 Natural Rubber 181
28 Wood Products 187
29 Medical Tourism 193
30 Higher Education and Technical and Vocational Education and Training 197

VIII Cost-Effectiveness Analysis for Technical Assistance 203

31 Approach and Summary Results 205
32 Aluminum: Reducing Transport Costs 208
33 Wood: High-Value Modular Furnitures 210
34 Fisheries: Reducing Trade Costs 213
35 Shipbuilding: Upgrading Technologies 216
36 Organic Foods: High Value-Added Agriculture 218
37 Tourism: Multi-Destination Travel 220

IX Program Design **223**

38 Design 225
39 Implementation 232
40 Strategic Framework 238

X Overall Monetized Appraisal 241

41 Program Viability 243

XI Overall Nonmonetized Appraisal 251

42 Rating Project Characteristics 253

XII Execution Strategy 257

43 Program Implementation 259

Appendixes

1 Project Ranking Methodology 264
2 Econometric Modeling of Trade 266
3 Project Appraisal 275

Tables, Figures, Maps, and Box

Tables

S.1 Cross-Border Value Chains for Sarawak and West Kalimantan xx
5.1 West Kalimantan Share of Land under Cultivation and Noncultivation, 2016 31
5.2 West Kalimantan and Other Provinces by Region: Average Net Monthly Income by Main Industry, 2016 36
5.3 West Kalimantan Profile 37
9.1 Stages of Corridor Development 56
13.1 Trend Growth and Average Annual Deviations of Bilateral Exports and Real GDP 76
13.2 Income and Real Cross-Rate Elasticities of Indonesia's and Malaysia's Exports with Each Other 77
13.3 Sarawak–West Kalimantan Cross-Border Trade, 2012–2017 79
13.4 Correlation between Exports at Border, Provincial and National Levels 80
14.1 Number of Trade Flows in Industry-Specific Gravity Model Equations 84
14.2 Elasticities Derived from Gravity Model Regression Estimates for Malaysia's Import Demand for Products from Key Sarawak Industries 85
18.1 West Kalimantan Domestic Investment and Employment Generation in Manufacturing Sector in 2016 117
21.1 Mapping Activities of Core Actors in Organic Vegetable Value Chain 144
26.1 Summary of Economic Internal Rate of Return and Sensitivity Analysis for West Kalimantan's Crude Palm Oil Industry 178
26.2 Summary of Economic Internal Rate of Return and Sensitivity Analysis for West Kalimantan's Palm Oil Industry 179
27.1 Summary of Economic Internal Rate of Return and Sensitivity Analysis for Sarawak's Natural Rubber Industry 184
27.2 Summary of Economic Internal Rate of Return and Sensitivity Analysis for West Kalimantan's Crude Natural Rubber Industry 186
28.1 Summary of Economic Internal Rate of Return and Sensitivity Analysis for West Kalimantan's Plywood Industry 192
29.1 Summary of Economic Internal Rate of Return and Sensitivity Analysis for Sarawak's Medical Tourism Industry 195
30.1 Summary of Economic Internal Rate of Return and Sensitivity Analysis for Sarawak's Higher Education and TVET 200
31.1 Summary of Cost-Effectiveness Analysis for Joint Sarawak–West Kalimantan Projects 206
32.1 Cost-Effectiveness of 20% Shift in Sarawak Smelter Sourcing of Aluminum Oxide from Distant Suppliers to West Kalimantan Suppliers 209
33.1 Cost-Effectiveness of Modular Furniture Sector Development in Sarawak and West Kalimantan 212
34.1 Cost-Effectiveness of 20% Shift in Sarawak Smelter Sourcing of Aluminum Oxide from Distant Suppliers to West Kalimantan Suppliers 214
35.1 Cost-Effectiveness of Shipbuilding Expansion in Sarawak and West Kalimantan 217

36.1 Cost Effectiveness of Organic Fruits and Vegetables as High Value-Added Activity for Smallholder Farms 219
37.1 Cost Effectiveness of Multi-Destination Tourism in Sarawak and West Kalimantan 222
39.1 Synthesis of Parameters for the Sarawak–West Kalimantan Integrated Border Area Development Program 232
41.1 Summary of Sarawak's Economic Internal Rate of Return and Sensitivity Analysis 244
41.2 Sarawak's Economic Internal Rate of Return and Sensitivity Analysis 245
41.3 Summary of West Kalimantan's Economic Internal Rate of Return and Sensitivity Analysis 247
41.4 West Kalimantan's Economic Internal Rate of Return and Sensitivity Analysis 248
41.5 Comparison of Sarawak and Sabah Project Appraisal Results for Border Area Development Programs 250
41.6 Comparison of West Kalimantan and North Kalimantan Project Appraisal Results for Border Area Development Programs 250
42.1 Ratings of Characteristics in Projects 255
A2.1 Representative Traded Products of Leading Sarawak and West Kalimantan Industries 266
A2.2 Unit Root Test Results for Indonesia and Malaysia Exports and Imports 268
A2.3 Results of the Error Correction Model for Indonesian and Malaysian Exports to Each Other 269
A2.4 Results of the Error Correction Model for Indonesian and Malaysian Exports to Each Other with Effect of Bilateral Real Exchange Rates 271
A2.5 Initial Estimation Results of Gravity Model for Malaysia's Import Demand for Products from Key Sarawak Industries 273
A2.6 Gravity Model Variable Descriptions and Sources 273

Figures

S.1 Border Area Development Program for Sarawak–West Kalimantan xvi
S.2 Cost-Effectiveness Analysis of Joint Sarawak–West Kalimantan Projects xviii
S.3 Project Rankings by Interest Groups xix
2.1 Six Objectives of the Study 7
2.2 Quantitative Tools Used in Each Part of the Study 9
2.3 Steps to a Successful Cost–Benefit Analysis 10
3.1 Stages of the Pre-Feasibility Study 12
3.2 Project Development Framework 13
3.3 Project Cycle 14
3.4 Stages of a Border Economic Area Development Project 17
5.1 West Kalimantan Labor Distribution by Industry 30
5.2 West Kalimantan Oil Palm Plantation Area and Palm Oil Production, 2012–2016 31
5.3 West Kalimantan Capture and Culture Fisheries, 2012–2016 32
5.4 West Kalimantan Forest Area by Type, 2016 33
5.5 Human Development Index of Indonesia Administrative Divisions, 2016 34
8.1 Entikong (West Kalimantan)–Tebedu (Sarawak) Crossing 49
8.2 Nanga Badau (West Kalimantan)–Lubok Antu (Sarawak) Crossing 50
8.3 Aruk (West Kalimantan)–Lundu (Sarawak) Crossing 50
8.4 Tebedu Inland Port Container Throughput, Actual 2011–2017 and Projected 2018–2021 51
8.5 Aerial View of Tebedu Inland Port 51
10.1 Sarawak's Major Export Categories, 2012 and 2017 61

10.2 Sarawak's Top 10 Export Products, 2017, and Growth Rates, 2010–2017 62
11.1 West Kalimantan's Major Export Categories, 2012 and 2017 64
11.2 West Kalimantan's Top 10 Export Products, 2017, and Growth Rates, 2012–2017 65
11.3 West Kalimantan Destination of Exports, 2017 66
11.4 West Kalimantan Share of Exports to Malaysia, 2007–2016 66
12.1 Sarawak Revealed Comparative Advantage of Top 20 Products, 2017 67
12.2 West Kalimantan Revealed Comparative Advantage of Top 20 Products, 2017 68
12.3 Nominal Cross-Rates of Indonesia and Malaysia 70
12.4 Real Cross-Rate of Indonesian Rupiah against Malaysian Ringgit 70
13.1 Decision Tree for Testing Trade Relationships 75
13.2 Indonesia and Malaysia Imports and Bilateral Market Shares 76
13.3 Sarawak's and West Kalimantan's Shares of Malaysian and Indonesian Bilateral Exports to One Another, 2012–2017 77
13.4 Ratio of Exports to GDP of Indonesia Provinces 78
13.5 Ratio of Exports to GDP of Malaysia's Provinces 79
14.1 Alumina Import Demand Projects Associated with Output Growth Projections of Sarawak and Its Trading Partners 87
14.2 Natural Rubber Import Demand Associated with Output Growth Projections of Sarawak 88
14.3 Palm Oil Import Demand Associated with Output Growth Projections of Sarawak 88
14.4 Wood Product Import Demand Associated with Output Growth Projections of Sarawak and Its Trading Partners 89
14.5 Fish and Crustacean Import Demand Associated with Output Growth Projections of Sarawak and Its Trading Partners 89
14.6 Vessel Import Demand Projects Associated with Output Growth Projections of Sarawak 90
15.1 Bayer Process Used by PT Indonesia Chemical Alumina 97
15.2 Major Applications of Alumina and Alumina Hydrate 98
15.3 West Kalimantan Alumina Exports by Type, 2007–2016 99
15.4 Cross-Border Value Chain of Aluminum Industry 100
15.5 Steps in Alumina Factory Processing 101
16.1 West Kalimantan—Percentage Contribution of Rubber and Rubber Manufactures to Total Manufacturing and Gross Regional Domestic Product 104
16.2 West Kalimantan—Percentage Distribution of Natural Rubber Exports, 2017 104
16.3 Sarawak—Percentage Contribution of Major Types of Natural Rubber-Based Export 104
16.4 Sarawak—Percentage Distribution of Rubber-Based Manufactured Exports, 2017 104
16.5 Cross-Border Value Chain of Natural Rubber Industry 106
16.6 Steps in Natural Rubber Factory Processing 107
17.1 West Kalimantan Oil Palm Area Planted and Production by Smallholders, 2012–2016 111
17.2 West Kalimantan Distribution of Oil Palm Area Planted and Production by Regency, 2016 111
17.3 Cross-Border Value Chain in Palm Oil Industry 113
17.4 Steps in Oil Palm Processing 114
18.1 West Kalimantan Mayor Wood Product Exports, 2017 118
18.2 West Kalimantan Mayor Types of Wood Product Exports, 2012–2017 118
18.3 West Kalimantan Destination of Wood Product Exports, 2017 119
18.4 Cross-Border Value Chain in Wood Products Industry 120

18.5 Steps in Modular (Knockdown) Furniture Manufacturing 121
19.1 West Kalimantan Percentage Contribution of Fisheries and Other Sectors to Gross Provincial Domestic Product, 2016 125
19.2 West Kalimantan Value of Fish Production, 2012–2017 126
19.3 West Kalimantan Mayor Fisheries Product Exports, 2017 126
19.4 West Kalimantan Mayor Types of Fish and Crustacean Product Exports, 2012–2017 127
19.5 West Kalimantan Inland and Offshore Fishing Fleets 127
19.6 West Kalimantan Geographic Destination of Fish and Crustacean Product Exports, 2017 128
19.7 Cross-Border Value Chains in Fisheries Industry 129
19.8 Ornamental Fish Production in PT Arwana Lestari 130
20.1 Ferry Transport in West Kalimantan 131
20.2 Pontianak Sea Port 134
20.3 Pontianak Shipping Arrivals, 2012–2016 134
20.4 West Kalimantan Ships Exports, 2013–2017 Average 134
20.5 West Kalimantan Destination of Ships Exports, 2012–2016 Average 135
20.6 Value Chains in Shipbuilding Industry 136
20.7 Steps in a Shipbuilding Process 137
21.1 Organic Vegetables and Manufactures: Premium Price Margins over Conventional Vegetables 140
21.2 Types of Vegetables Produced in West Kalimantan 143
21.3 Value Chain of Organic Agriculture 144
21.4 Steps in Organic Agriculture Production and Certification 146
22.1 West Kalimantan Tourism Arrivals by Entry Point, 2011–2016 149
22.2 West Kalimantan Tourism Arrivals by Origin, 2016 149
22.3 Value Chain of Multi-Destination Tourism 153
23.1 Global Medical Tourism Growth Relative to Global GDP Growth, 2017–2025 155
23.2 East Asia Medical Tourism Arrivals 156
23.3 Medical Tourism Cost Savings Relative to the United States Benchmark, by Country 156
23.4 Medical Tourism Arrivals in Malaysia, 2011–2017 157
23.5 Medical Tourism Value Chain 159
24.1 University of Sarawak Malaysia 164
24.2 Swinburne University of Technology Sarawak Campus 164
24.3 Sarawak Skills Development Centre 165
24.4 Value Delivery Network of International Higher Education and Technical and Vocational Education and Training 167
26.1 Time Path of Palm Oil Cross-Border Trade between Sarawak and West Kalimantan, 2018–2022 173
26.2 Change in Sarawak's Quantity Demanded of Crude Palm Oil and Supplies from Domestic and West Kalimantan Suppliers 177
26.3 West Kalimantan Economic Internal Rate of Return for Crude Palm Oil Industry under Alternative Scenarios 179
26.4 West Kalimantan Economic Internal Rate of Return for Plywood Industry under Alternative Scenarios 180
27.1 Projected Rubber Imports of Sarawak, 2018–2050 182
27.2 Projected Rubber Exports of West Kalimantan, 2018–2050 183
27.3 Sarawak Economic Internal Rate of Return for Natural Rubber Industry under Alternative Scenarios 185

27.4 West Kalimantan Economic Internal Rate of Return for Natural Rubber Industry under Alternative Scenarios 185
28.1 Projected West Kalimantan Timber and Semi-Processed Wood Product Exports to Sarawak, 2018–2050 190
28.2 Projected West Kalimantan Timber and Semi-Processed Wood Product Exports to Sarawak, 2018–2050 192
29.1 Sarawak Economic Internal Rate of Return for Medical Tourism Industry under Alternative Scenarios 196
29.2 Sarawak Medical Tourism Payback Schedule and Breakeven Point 196
30.1 Gap Analysis of Sarawak's Technical and Vocational Education and Training Institutions 198
30.2 Economic Internal Rate of Return for Higher Education and Technical and Vocational Education and Training under Alternative Scenarios 200
31.1 Cost-Effectiveness Analysis of Joint Sarawak–West Kalimantan Projects 207
38.1 Geographic Coverage of West Kalimantan Integrated Border Economic Area 226
38.2 Geographic Coverage of West Kalimantan Integrated Border Economic Area 227
38.3 Soft and Hard Infrastructure for Sarawak and West Kalimantan Integrated Border Economic Area 229
38.5 Representation of Sarawak and West Kalimantan Border Economic Area 231
39.1 Key Cluster Relationships in Value Chains 234
39.2 Timeline of Cluster Formation Process 236
40.1 Blueprint for Sarawak–West Kalimantan Integrated Border Area Development Program 238
40.2 Master Plan for Sarawak–West Kalimantan Integrated Border Economic Area 240
42.1 Combined Ratings of Major Project Characteristics 256
43.1 Sarawak–West Kalimantan Investment Program 260
43.2 Sarawak–West Kalimantan Sequence of Border Economic Area Development 261
43.3 Sarawak–West Kalimantan Stages of Cross-Border Collaboration under Integrated Border Area Development Program 263

Maps

1.1 West Borneo Economic Corridor 4
4.1 Sarawak Administrative Divisions 22
5.1 West Kalimantan Administrative Divisions 26
5.2 West Kalimantan Population Density 26
5.3 West Kalimantan Agriculture, Mining, and Protected Areas 30
5.4 West Kalimantan Tourist Map 33
8.1 Sarawak–West Kalimantan Border Checkpoints 48
8.2 Pan Borneo Highway 49
9.1 West Borneo Economic Corridor 55
11.1 West Kalimantan Value of Exports by Port of Exportation, 2017 66
17.1 West Kalimantan Distribution of Oil Palm Area Planted and Production, 2016 112
22.1 Southern Sarawak Tourism Map 150
22.2 West Kalimantan Tourism Map 151
38.1 Geographic Coverage of Sarawak Integrated Border Economic Area 225

Box

Comparative Profile of Sarawak and West Kalimantan 5

Map of Sarawak and West Kalimantan

Source: Adopted from Wikipedia map.

Acknowledgments

This study was prepared by consultants Montague Lord and Susan Chang, under the direction of Alfredo Perdiguero, Director, Regional Cooperation and Operations Coordination Division, Southeast Asia Department; and Gary Krishnan, Country Specialist in the Regional Cooperation and Operations Coordination Division of the Asian Development Bank (ADB).

The study responds to request by the governments of Indonesia and Malaysia to ADB that a pre-feasibility study be carried out on the potential for developing a border economic area in Sarawak–West Kalimantan that expands cross-border value chains in specific industries as well as trade in their products. Grateful acknowledgment is made to the many individuals and institutions that contributed to the information contained in this report.

For Sarawak, the fieldwork in 1–14 April 2018 benefited from information provided by the companies and institutions visited. We appreciate the guidance and information provided by the Sarawak Planning Unit (Mr. Julin Alen, Principal Assistant Director, and Ms. Genevieve Sadai), Ministry of Agriculture (Datu Ik Pahon, Permanent Secretary, Mr. Joseph Wei), Department of Agriculture (Mr. Stonton), Agriculture Research Centre, Department of Statistics Sarawak (Ms. Brenda Jee Hui Siang, Mr. Lim Chai Hong), Department of Statistics Malaysia (Mr. Liang Hung Sham), SM Inland Port Sdn Bhd (Mr. Nobel Pang), Sarawak Tourism Federation (Ms. Fiona Marcus Raja) and the BIMP-EAGA Malaysia Business Council (Hj Osaha). We also acknowledge with gratitude the coordination of visits to the borders of Sarawak and information provided by Customs and Immigration Department (Lubok Antu and Tebedu) and the District Office (Lubok Antu).

We are also thankful to the managers of the following companies located in Sarawak for allowing the Study Team to visit their facilities: Sarawak Timber Industry Development Cooperation, Borneo Medical Centre, Timberland Medical Centre, Sarawak Skills Development Centre, Swinburne University of Technology Sarawak Campus, Tebedu Inland Port, Jaya Coastal Group – Sibu, Malaysian Pepper Board, Assar Refinery Services Sdn Bhd and Borneo Highlands Resort.

For West Kalimantan, the fieldwork on 22 November through 4 December 2017 benefited from information provided by the companies and institutions visited. We appreciate the guidance and information provided by Mr. Cahyo Purnomo, Deputy Director of Indonesia Investment Coordinating Board (BKPM), Ms. Desi Ariani and Ms. Sandra Devi Rachmarani, Directorate of ASEAN Negotiation, Directorate General of International Trade Negotiation, Ministry of Trade of Indonesia; Mr. Pitono, Kepala BPS Provinsi; and Mr. Arianto, Kepala Bidang Statistik Distribusi of the Badan Pusat Statistik of West Kalimantan Province. We also acknowledge with gratitude the coordination of visits to border crossings into Sarawak and the information

provided by the officials from the Statistics Department and Customs Department from the regencies of Kapuas Hulu, Sambas and Sanggau.

We are also grateful to the owners and managers of the following companies located in West Kalimantan for allowing the Study Team to visit their facilities: PT Buana Tunas Sejahtera in Badau; PT Arwana Lestari in Putussibau; PT Indonesia Chemical Alumina in Tayan; ANTAM in Tayan; PT New Kalbar Processors in Pontianak; Steadfast Marine in Pontianak; PT Pulau Mas Khatulistiwa in Pontianak; and PT Cakrawala Persada Biomas in Pontianak.

Photos in this report are from fieldwork site visits and were taken by Alisa Lord.

Abbreviations

ADB	Asian Development Bank
AEC	ASEAN Economic Community
AMS	ASEAN member states
ARIMA	autoregressive integrated moving average
ASEAN	Association of Southeast Asian Nations
BCA	border cross agreement
BCR	benefit–cost ratio
BDS	business development service
BEA	border economic area
BIMP-EAGA	Brunei Darussalam–Indonesia–Malaysia–Philippines East ASEAN Growth Area
BKPM	Indonesia Investment Coordinating Board
BPS	Badan Pusat Statistik
BTA	border trade agreement
CEPII	Centre d'Études Prospectives et d'Informations Internationales
CGF	credit guarantee facility
CIQ	Customs, Immigration, and Quarantine
CITES	Convention on International Endangered Species of Wild Fauna and Flora
CPO	crude palm oil
CSF	cost-sharing facility
DCF	discounted cash flow
EBCR	economic benefits–cost ratio
EIRR	economic internal rate of return
ENPV	economic net present value
EPU	Economic Planning Unit
FFB	fresh fruit bunch
FIRR	financial internal rate of return
FSC	Forest Stewardship Council
GDP	gross domestic product
GMS	Greater Mekong Subregion
GPDP	gross provincial domestic product
HPK	convertible production forest
HS	Harmonized System
ICQS	immigration, customs, quarantine, and security
ICT	information and communication technology
IMF	International Monetary Fund
IMT-GT	Indonesia–Malaysia–Thailand Growth Triangle
IRR	internal rate of return
JCI	Joint Commission International
KADIN	Kamar Dagang dan Industri

LNG	liquified natural gas
LOCODE	Code for Trade and Transport Location
M&E	monitoring and evaluation
MOA	memorandum of agreement
MOU	memorandum of understanding
MPOB	Malaysian Palm Oil Board
MSEs	micro and small-sized enterprises
MT	metric ton
NEM	new economic model
NGO	nongovernment organization
NTM	nontariff measure
OER	oil extraction rate
OP/DP	old/damaged plants
PEFC	Programme for the Endorsement of Forest Certification
PK	palm kernel
PKI	Indonesian Communist Party
PKO	palm kernel oil
PLBN	The Entikong State Border Crossing Post
PPKS	Pusat Pembangunan Kemahiran Sarawak
PSC	Public Service Commission
PT	Perseroan Terbatas
R&D	research and development
RCA	revealed comparative advantage
RPJMD	West Kalimantan's Medium-Term Development Plan
RSPO	Roundtable on Sustainable Palm Oil
SBSR	Ship Repair Industry Strategic Plan
SCF	standard conversion factor
SCORE	Sarawak Corridor of Renewable Energy
SERF	shadow exchange rate factor
SEZ	special economic zone
SMEs	small and medium-sized enterprises
SWOT	strengths, weaknesses, opportunities, and threats
TA	technical assistance
TEUs	twenty-foot equivalent units
TVET	technical and vocational education and training
UN	United Nations
UNIMAS	University of Malaysia Sarawak
WBEC	West Borneo Economic Corridor
WK	West Kalimantan
WWF	World Wildlife Fund

Summary

Background

The people of Sarawak and West Kalimantan share a 966-kilometer land border, with three official border crossings. In mid-2014, trade between the two territories was halted when Indonesian authorities tightened their enforcement of cargo being transported across the border, and international commercial activity at the border ceased.

At the end of 2017, a breakthrough occurred when the governments of Indonesia and Malaysia made strong commitments to resume cross-border trade. It thereby set the stage for transforming the West Borneo Economic Corridor (WBEC) of the Brunei Darussalam–Indonesia–Malaysia–Philippines East ASEAN Growth Area (BIMP-EAGA) from a transport corridor to a full-fledged economic corridor.

Both governments are now promoting cross-border trade and investment by introducing hard and soft infrastructure that includes road upgrades and new or revitalized customs, immigration, and quarantine (CIQ); as well as policies and regulatory measures that promote cross-border collaboration.

To that end, both governments have asked the Asian Development Bank (ADB) to identify ways to drive private sector investment in specific cross-border value chains.

Motivation

(i) For Indonesia, the project emerges from the government's new country-wide program, announced in December 2016, to develop specific border areas as part of an effort to improve living standards, promote commerce, and attract workers and their families to reduce agglomeration in Java. West Kalimantan, as a gateway to Malaysia, is one of the high-profile focal border areas of the government's program.

(ii) For Malaysia, the motivation is twofold: to raise household income in the administrative divisions near West Kalimantan, and to bring cross-border trade with West Kalimantan back to normal levels after years of a virtual halt in official trade between the two territories.

Study Objective

The outcome of this study is a practical and implementable program to develop the Sarawak–West Kalimantan border area (within a broad geographic context), based on specific industry value chains (Figure S.1).

Figure S.1. Border Area Development Program for Sarawak-West Kalimantan

Source: Representation by the authors.

As such, the present study identifies concrete and high-impact projects that will advance implementation of an integrated border area development program for West Kalimantan. It maps the optimal configuration of Sarawak–West Kalimantan cross-border trade and investment in goods and services; and, concurrently, provides the design of a border area development plan for the two territories.

The options for moving project proposals forward are elaborated in sufficient detail and contain the needed concrete measures that will permit the specified program to move through subsequent stages of development and into implementation phases.

Why Cross-Border Value Chains

Clustering of industries across the two territories allows producers to bypass the need to handle the entire production process, and instead concentrate on processing stages. These complementarities permit exploitation of differences in production factors, generate scale economies and *"cross-hauling"*, thereby enhancing international competitiveness.

Pre-Feasibility Study

As a pre-feasibility study, we examine a wide range of industry options and determine which projects are economically viable within the socioeconomic, institutional, and political context of Sarawak and West Kalimantan. We follow the same analytical approach as that for the pilot project study of North Kalimantan and Sabah, which serves as a high-profile demonstration pre-feasibility study for this and other border area development programs.[1]

Project Appraisals

The optimal configuration for the portfolio of Sarawak–West Kalimantan trade and investment activities is that which generates the maximum net benefits from the feasible projects for groups of stakeholders.

(i) *Monetary benefits.* We use cost–benefit analysis to measure the economic viability of cross-border trade and investment between Sarawak and West Kalimantan. This involves examining (i) current and future demand, (ii) existing sources of supply and their costs, (iii) the contribution of the proposed project to overall market demand, (iv) the benefits to be derived from the project, and (v) the sustainability of the project during its lifetime.

[1] Asian Development Bank (ADB). 2018. *Pre-Feasibility Study of Sabah-North Kalimantan Cross-Border Value Chains*. Manila.

(ii) *Forecasting benefits.* Cost–benefit analysis requires demand estimates and measurement of capital and operating costs. Demand analysis provides the justification for the project; guides the identification of the size, location, and design of the investment project; and provides the basis for the financial and economic assessment.

Forecasting cross-border trade follows a *"decision tree"*: at the first level, the importer decides how much of a good or service is needed; then, at the second level, the importer decides from what foreign supply source the good or service will be purchased.

We use an error correction model for the first decision level about overall product-specific imports, and a gravity trade model for the second decision about sourcing those imports, which in turn depends on (i) country size, (ii) transportation costs, (iii) economic distance, (iv) geographic distance between trading partners, (v) a proxy for whether trading partners share a physical border, and (vi) a proxy for whether trading partners partially share a common language.

(iii) *Nonmonetary benefits.* In addition to the application of traditional cost–benefit analysis that measures the monetized returns to projects, we include nonmonetized project appraisal. This allows various interest groups to rank projects by preference objectives, like environmental sustainability, household welfare gains at the border, health and training delivery to those border households, inequality reductions, and the like.

Key Topics Covered

The pre-feasibility study pursues six key objectives:

(i) It analyzes existing trade patterns and competitive advantages of Sarawak and West Kalimantan, as well as government objectives in promoting cross-border commercial activities.
(ii) It proposes a border economic area spread over a wide geographic area that covers a network of interrelated activities and provides a fully integrated approach to the border economic area design and implementation.
(iii) It identifies potential cross-border value chains that can serve as high-profile projects for the border economic area.
(iv) It determines the preference ordering of project features by key stakeholders such as government and development partners, commercial entities, and the local population.
(v) It estimates the net monetary returns for the project portfolio; makes a cost-effectiveness analysis of the stand-alone capacity-building projects; ranks stakeholders' nonmonetary preferences; and incorporates the preference ranking order into the project portfolio's net monetary returns.
(vi) Based on the pre-feasibility results and preference ordering of different stakeholder groups, it prioritizes projects to be implemented under the border area development program.

Focal Industries

Fieldwork visits to companies and subsequent economic analysis of those industries have led us to identify 10 potential industries that would help drive border area development:

Aluminum	*Shipbuilding*
Rubber	*Organic Foods*
Palm Oil	*Tourism*
Wood Products	*Higher Education and Technical and Vocational Education and Training*
Fisheries	*Medical Tourism*

Capital Investment Appraisals

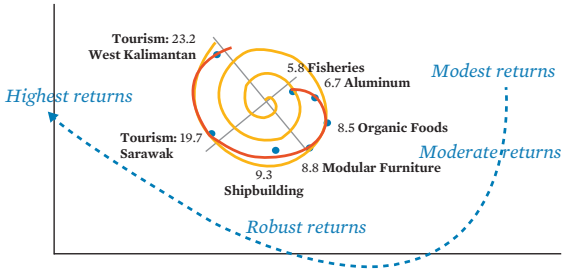
(i) For Sarawak, the economic internal rate of return (EIRR) ranges from 16% to 22% for natural rubber, palm oil, medical tourism, technical and vocational education and training (TVET) and higher education. The economic net present value (ENPV) is highest for medical tourism (nearly $183 million) and palm oil ($83 million). The economic benefit–cost ratios (EBCRs) range from 1.3 to 2.1.

(ii) For West Kalimantan's projects, the EIRR ranges from 18% to 21% for wood products, palm oil, and natural rubber. The ENPV is highest for palm oil ($250 million). The EBCRs range from 1.8 to 2.2.

Cost-Efficiency Ratios

Cost-effectiveness analysis for stand-alone capacity development projects yield the following results (see figure above):

Figure S.2. Cost-Effectiveness Analysis of Joint Sarawak-West Kalimantan Projects



Source: Representation and calculations by the authors.

(i) *Multi-destination tourism* has the highest returns among all projects because of the richness of the two territories' natural resources and cultural heritage.

(ii) *Shipbuilding* has robust returns likely to emerge from a project promoting cross-border collaboration.

(iii) *Organic foods and modular wood furniture* are two potentially huge businesses for Sarawak and West Kalimantan.

(iv) *Fisheries and aluminum* have modest returns because of considerable distrust and lack of information in Sarawak about West Kalimantan potential as a cost-effective source of raw materials supplies.

Nonmonetary Appraisal

We examine three groups of stakeholders that have different preferences for key characteristics or aspects of the products:

(i) local households and small businesses that are concerned with improvements in livelihoods and access to scale economies;
(ii) large companies whose main interest is to generate the largest commercial returns; and
(iii) government and development institutions whose objective is to maximize profits and socioeconomic welfare effects.

The results of the analysis and ratings for these nonefficiency objectives are incorporated into the results of the monetized cost–benefit analysis through scaling factors.

Program Appraisal (Table S.1)

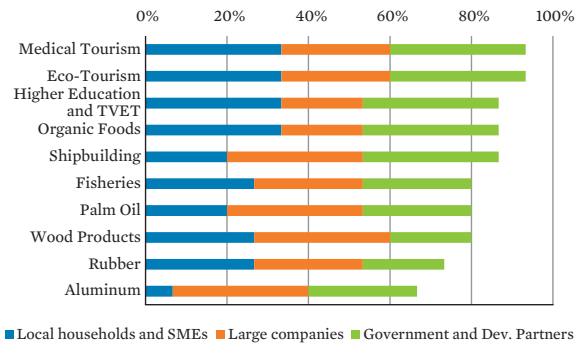
Since the Sarawak–West Kalimantan border economic area program is composed of several projects, we can jointly analyze the entire program as a single investment and evaluate its economic viability accordingly.

(i) *For Sarawak*, the analysis of the overall program generates an EIRR of 19.6%, with the ENPV equal to $397 million and EBCR of 1.3. Sensitivity analysis suggests that the program remains economically viable in the face of cost overruns, benefits reductions, and a combination of both effects.
(ii) *For West Kalimantan*, the overall program has an EIRR of 19.5%, an ENPV of $444 million, and an EBCR of 2.2. Sensitivity analysis also indicates that the program remains viable under various unfavorable conditions.

Recommendations for Implementation

(i) ***Monetary project rankings:*** Rank projects on EIRR and ENPV.
(ii) ***Capital investment projects:*** Promote cross-border value chains (CBVCs) via awareness campaigns; fiscal incentives; inland ports; CIQs; roads and maintenance (apply to medical tourism, TVET, modular furniture, natural rubber, palm oil).
(iii) ***Self-contained capacity-building projects:*** Set up champions to organize and promote clusters (apply to tourism, shipbuilding, organic fruits and veggies, modular furniture, aluminum, and fisheries).
(iv) ***Nonmonetary project rankings:*** Rank projects based on nonmonetary preferences of interest groups, namely, border households, small and medium-sized enterprises (SMEs), large companies, government, and development partners.

Figure S.3. Project Rankings by Interest Groups



SMEs = small and medium-sized enterprises, TVET = technical and vocational education and training.

Source: Representation and calculations by the authors.

Table S.1 Cross-Border Value Chains for Sarawak and West Kalimantan

Capital Investment Projects			EIRR (%)	ENPV ($ million)	EBCR (ratio)
1. Wood Furniture	Promotes diversification in wood products from large-scale plywood, veneer panels, and blockboard to high-value furniture design and manufacturing through collaborative arrangements between West Kalimantan and Sarawak.	**SW**	n.a.	n.a.	n.a.
		WK	21.2	106	2.8
2. Palm Oil	Addresses negative environmental consequences of the palm oil industry through cross-border collaboration in downstream activities for more efficient biofuel facilities in Sarawak and technology transfer.	**SW**	19.2	62	1.4
		WK	18.6	250	2.2
3. Natural Rubber	Creates economies of scale through joint production activities of rubber suppliers and end-use manufacturers to expand competitiveness.	**SW**	15.6	71	1.3
		WK	17.8	56	1.5
4. Medical Tourism	Increases access to Sarawak medical facilities, which are widely used by West Kalimantan people by developing full value chain for medical tourism in Sarawak to substantially improve access to high-end medical treatment.	**SW**	22.0	183	1.4
		WK	n.a.	n.a.	n.a.
5. Higher Education and TVET	Strengthens access to higher education and TVET for West Kalimantan through a collaborative program with Sarawak that substantially upgrades West Kalimantan's skilled workforce and facilitates technology transfers.	**SW**	19.8	83	2.1
		WK	n.a.	n.a.	n.a.
6. Overall Program	Joint evaluation of project mix incorporates economies of scale due to shared nonfactor input such as road linkages and CIQ facilities.	**SW**	19.6	387	1.3
		WK	19.5	444	2.2
Stand-Alone Capacity Building: Cost-Effectiveness Analysis					**Cost-Effect Ratio**
7. Tourism	The project supports Sarawak's and West Kalimantan's overarching strategic goals of becoming world-renowned eco-tourism destinations by jointly promoting land and sea tourism sites.				23.2
8. Shipbuilding	Aims to expand shipbuilding operations between Sarawak and West Kalimantan to provide the needed technology and know-how across companies, along with joint production and marketing.				**9.3**
9. Furniture	Jointly develops training and structural adjustment investment programs to develop the modular furniture industry in both West Kalimantan and Sarawak to add value to wood products.				8.8
10. Organic Foods	Promotes organic vegetables and prawns produced in both West Kalimantan and Sarawak to help households involved in small-scale agricultural activities move into high-value markets.				8.5
11. Alumina	Supports West Kalimantan's shipment of bauxite and alumina to Sarawak since, as a bulk commodity, export competitiveness is closely related to distance-to-market and transport cost.				**6.7**
12. Fisheries	Promotes cross-border clustering of activities in fisheries products that produce more value-added downstream products, especially seaweeds, canned crab meat, surimi, and fish meal.				5.8
13. Overall Program	Joint evaluation of project mix incorporates economies of scale due to shared factor inputs.				10.4

CIQ = customs, immigration, and quarantine; EBCR = economic benefit–cost ratio; EIRR = economic internal rate of return; ENPV = economic net present value; n.a. = not applicable; SW = Sarawak; TVET = technical and vocational education and training; WK = West Kalimantan.

Note: A project will produce overall net benefits when it has a positive economic net present value (ENPV) using the minimum required economic internal rate of return (EIRR) as the discount rate. The minimum required EIRR of the Asian Development Bank (ADB) is 9%, as noted in ADB. 2017. *Guidelines for the Economic Analysis of Projects*. Mandaluyong City, Philippines.

Source: Authors' estimates.

PART I

Introduction

1

Background

The governments of the Indonesian province of West Kalimantan and the Malaysian state of Sarawak are exploring trade and investment opportunities between their territories. To that end, they have asked that the Asian Development Bank (ADB) prepare a pre-feasibility study on opportunities in cross-border trade in potential transnational value chains in competitive and complementary industries. While both governments aim to achieve similar end-results for border area development, their motivation differs.

1.1 Indonesia's Interests

For Indonesia, the plan is part of a broader country-wide effort to develop particular border areas of the country with the intention of improving living standards, promoting commerce, attracting workers and their families to those border areas, and reducing agglomeration in Java's major urban centers.

Indonesia has four provinces having land borders with foreign countries, one of which is West Kalimantan. The others are North Kalimantan (bordering Sabah state of Malaysia), East Nusa Tenggara (gateway to Timor-Leste), and Papua (gateway to Papua New Guinea). ADB has already completed the pre-investment study for the North Kalimantan–Sabah border area development program, and that methodology is being used as the model for the present study.

The results of this study therefore support the Government of Indonesia's *Integrated Border Area Development Program* goals of (i) accelerating economic growth through increased productivity associated with economies of scale and production complementarities with its neighboring countries; (ii) generating greater employment and more value-added activities to improve living standards, reduce poverty and lower inequality; and (iii) reversing the negative investment effects from agglomeration of activities in the major urban centers of Jakarta, Surabaya, and Bandung, where population density is over 15,000 persons per square kilometer (km^2), compared with only 10 persons/km^2 in Papua and 32 persons/km^2 in West Kalimantan.[1]

1.2 Malaysia's Interests

For the Malaysian government, the motivation is twofold:

(i) First, some of Sarawak's administrative divisions near West Kalimantan have the lowest household incomes in the state, and Kepit in the southeastern part of the state, while being the largest division, has only 3 persons/km^2.

[1] ADB. 2017. *Indonesia's New Border Economic Area Program*. Manila.

(ii) Second, Sarawak's trade with Indonesia accounts for less than 2% of all trade during the present decade and, even then, trade with that country fell by a third between 2012 and 2015. By 2017, trade with that country had yet to recover its already low level of 2012. This dramatic situation was reflected in a virtual halt to official trade flows in the Sarawak–West Kalimantan border between mid-2014 and 2017.

A turnaround occurred at the 12th Annual Consultation between Malaysia and Indonesia on 22 November 2017, when Prime Minister Datuk Seri Najib Razak and Indonesian President Joko Widodo called for the finalization of the 1970 Border Trade Agreement (BTA) and Border Cross Agreement between the two countries to help bolster border development and trade between the two countries. The box on the opposite page shows a comparative profile of Sarawak and West Kalimantan. Both governments now plan to promote cross-border trade and investment by introducing hard and soft infrastructure that include roads and customs and immigration facilities along the border, as well as trade and transport policies and regulatory measures that promote cross-border collaboration.

At the center of these efforts is a border economic area spread over a wide geographic area. Instead of narrowly defined special economic zones (SEZs), the proposed border economic area will cover the operation of a network of activities that encompasses clusters associated in varying degrees of collaboration with transnational productive activities to achieve well-defined goals selected from a broad spectrum of development objectives.

1.3 Subregional Context

Equally important to the subregion is the West Borneo Economic Corridor (WBEC) of the Brunei Darussalam–Indonesia–Malaysia–Philippines East ASEAN Growth Area (BIMP-EAGA). In this subregional context, the economic corridor seeks to expand trade ties between neighboring countries to support private sector and government interests in diversifying the corridor economies to create complementary production activities that generate economies of scale and allow industries to move into high-value markets (Map 1.1).

Map 1.1. West Borneo Economic Corridor

Source: Map by Google, modified by the authors.

The WBEC links West Kalimantan, Sarawak, Brunei Darussalam, and Sabah to promote physical and cross-border mobility to enhance the subregion's competitiveness by linking local production with cross-border supply and value chains, as well as strengthen opportunities for small and medium-sized enterprises (SMEs) to participate in those production and distribution systems.

The southern portion of WBEC includes critical commercial, border, and gateway notes. The commercial nodes in the area covered by this study consist of Pontianak in West Kalimantan and Kuching in Sarawak; border nodes include all three border crossings between Sarawak and West Kalimantan; and the southern gateway

node to regional and international markets is Pontianak. Realization of the Sarawak–West Kalimantan integrated border area will therefore translate into a successful BIMP-EAGA West Borneo Economic Corridor.

Box. Comparative Profile of Sarawak and West Kalimantan

Item	Sarawak	West Kalimantan
A. Geography		
Land Surface (km²)	124,451	146,807
Capital City	Kuching	Pontianak
Administrative Divisions	Betong, Bintulu, Kapit, Kuching, Limbang, Miri, Mukah, Samarahan, Sarikei, Serian, Sibu, and Sri Aman	Regencies of Bengkayang, Kapuas Hulu, Ketapang, Kubu Raya, Landak, Melawi, North Kayong, Pontianak, Sambas, Sanggau, Sekadau, and Sintang; and cities of Pontianak and Singkawang.
B. Population		
Population	2,770,000 (2017)	4,546,439 (2014)
– % Urban	58%	33.1
– % Rural	42%	66.9
% Annual Population Growth (2010–2015)	1.4	16.6
Population Density (persons/km²)	22.3	31
% Poverty	0.611 (2016)	8 (2012)
Human Development Index	70.9 (2017)	65.9 (2016)
C. Demographics		
Ethnic Groups	Iban (30.3%), Malay (24.4%), Chinese (24.2%), Bidayuh (8.4%), Orang Ulu (6.7%), Melanau (5.4%), Indian (0.3%) and Other (0.3%)	Dayak (35%), Malay (34%), Javanese (10%), Chinese (8%), Madurese (6%), Bugis (3%), Sunda (1%), Batak (1%), Power (1%), and others (2%).
Major Languages Spoken	Malay (Official), Iban, Bidayuh, Penan, English, Chinese (Mandarin, Cantonese, Hokkien, Hakka, Fuzhou, and Teochew)	Indonesian (official); Malay (Pontianak Malay, Sambas Malay); Dayak (Iban, Kendayan, Jangkang, Bukar Sadong); Chinese (Hakka, Teochew)
Religions	Christian (42.60%), Islam (32.20%), Buddhism (13.50%), Chinese folk religion (6%), No religion (2.60%), Unknown (1.90%), Others (1.%), Hinduism (0.2%)	Islam (59%), Christian (34%), Buddhism (5%), Confucianism (1%)

continued on next page

Box *continued*

Item	Sarawak	West Kalimantan
D. Education		
Number of Universities	33	47
– Private	20	4
– State	13	43
Number of University Students	NA	81,579
– Private	NA	32,699
– State	NA	48,880
Vocational High Schools		
– Number of Schools	6 (2015)	24
– Number of Teachers	524	735
– Number of Students	4,658	7,669
% Literacy Rate	68.15	95.0
– Men	69.25	97.2
– Women	67.11	92.9
% Population that Uses Internet	34.2	10.0
– Urban	42.1	23.2
– Rural	29.9	4.2
E. Economy		
Gross Provincial Domestic Product	121,414 (RM million 2016)	1,489 ($ million 2013)
Per Capita GDP	44,141 (RM 2015)	2,357
% Real GDP Growth	4.0 (2013–2017)	4.9 (2000–2013)
– Exports (fob value, $ million)	77,354 (RM)	495.8
– Imports (cif value, $ million)	39,737 (RM)	267.0
– Trade Balance ($ million)	37,617	228.8
Average of Net Wage or Salary, $/month (2016)	1,626.8	153.4

GDP = gross domestic product, km² = square kilometer, n.a. = not applicable, RM = Malaysian ringgit.

Sources: For Sarawak: Department of Statistics Malaysia, Official Portal. https://www.dosm.gov.my/v1/index.php?r=column/coneandmenu_id=S1lsUkExNnV5bFBDZEYyUGlhZittUT09. For West Kalimantan: Badan Pusat Statistik (BPS-Statistics Indonesia).

2

Objectives and Methodology

2.1 Objective

The aim of this pre-feasibility study is to explore possible areas of cross-border trade collaboration in goods and services between Sarawak and West Kalimantan, and quantitatively determine the net economic benefits of potential investments in cross-border value chains.

To do this, the study will determine the optimal configuration of Sarawak–West Kalimantan cross-border trade and investment in goods and services; and, concurrently, prepare a preliminary (pre-feasibility) design for a border area development plan. In the context of the pre-feasibility study, the optimal configuration for the portfolio of Sarawak–West Kalimantan trade and investment activities is defined as that which generates the maximum net benefits from the set of feasible projects.

To that end, the study examines existing and potential trade between Sarawak and West Kalimantan, as well as government objectives in promoting cross-border commercial activities (see Figure 2.1). Potential cross-border value chains are identified that can serve as high-profile, demonstrable projects for the border economic area. The study estimates the net monetary returns for the project portfolio, ranks stakeholders' nonmonetary preferences, and incorporates the preference ranking order into the project portfolio's net monetary returns. Finally, the study provides an overall program appraisal for the set of projects, including an

Figure 2.1. Six Objectives of the Study

Source: Representation by the authors.

impact analysis of connectivity options. The study ends with suggested options for moving project proposals forward to implementation and project completion.

The sub-aim of the study is the application to the region of cross-border production networks, based largely on the spread of integrated global production networks. Production sharing has been largely driven by efforts to exploit either differences in factor endowments or possible scale economies of production activities across areas. In the Sarawak–West Kalimantan context, the spatial concentration of industries along the border region combines the traditional growth area model of trade and investment, based on comparative advantage and complementarities, with one based on scale economies from regionalization of production activities. Clustering of industries across the neighboring countries then allows producers to bypass the need to handle the entire production process, and instead concentrate on processing stages. These complementarities permit the exploitation of differences in the factors of production in subregions and generate economies of scale and "cross-hauling" or two-way trade between the neighboring countries, thereby increasing the competitiveness of border industries in regional and global markets.

The application of clustering and cross-hauling to trade between Sarawak and West Kalimantan follows ADB's two recently published practical guides for establishing cross-border value chains in BIMP-EAGA.[2] It also follows closely the pilot study for the North Kalimantan–Sabah integrated border economic area that was developed as a model for this and other ADB-sponsored border area development programs that are driven by cross-border value chains. These three guides demonstrate how to apply the methodology to identify potential value chains across industries and establish fully integrated networks of activities needed to promote cross-border trade and investment. The present study offers yet another case study of best practices for developing a border economic area and successfully establishing value chains.

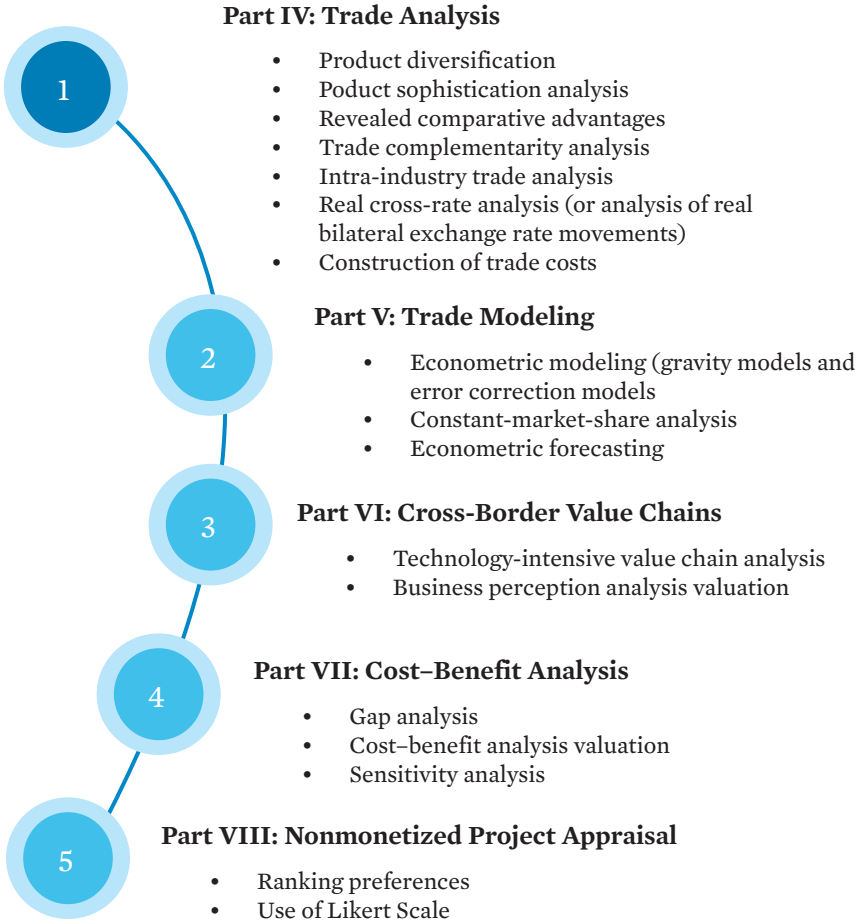
2.2 Tools

We use a variety of quantitative tools to analyze and forecast trade, determine potential value chains to carry out the project analysis, and determine nonmonetary preference rankings of alternative cross-border value chains for the border area development program. A summary of the analytical tools is shown in Figure 2.2, which include the following:

(i) *Trade analysis* invokes a variety of tools, including product diversification analysis based on the Herfindahl-Hirschman product concentration index, revealed comparative analysis, trade complementarities analysis, application of the similarity index, intra-industry trade index, construction of bilateral real exchange rate indices, and analysis of trade costs.
(ii) *Econometric modeling and forecasting* of the demand for goods and services relies on both the gravity model and error correction model, as well as time-series forecasts based on autoregressive distributed lag models.
(iii) *Cross-border value chains* are identified according to rankings by industry-based levels of technological sophistication, government priorities, and business perception

[2] ADB. 2017. *BIMP-EAGA's Economic Corridors Business Perceptions about the Investment Climate*. Manila; ADB. 2017. *BIMP-EAGA Investment Opportunities in Corridor Value Chains*. Manila.

Figure 2.2. Quantitative Tools Used in Each Part of the Study



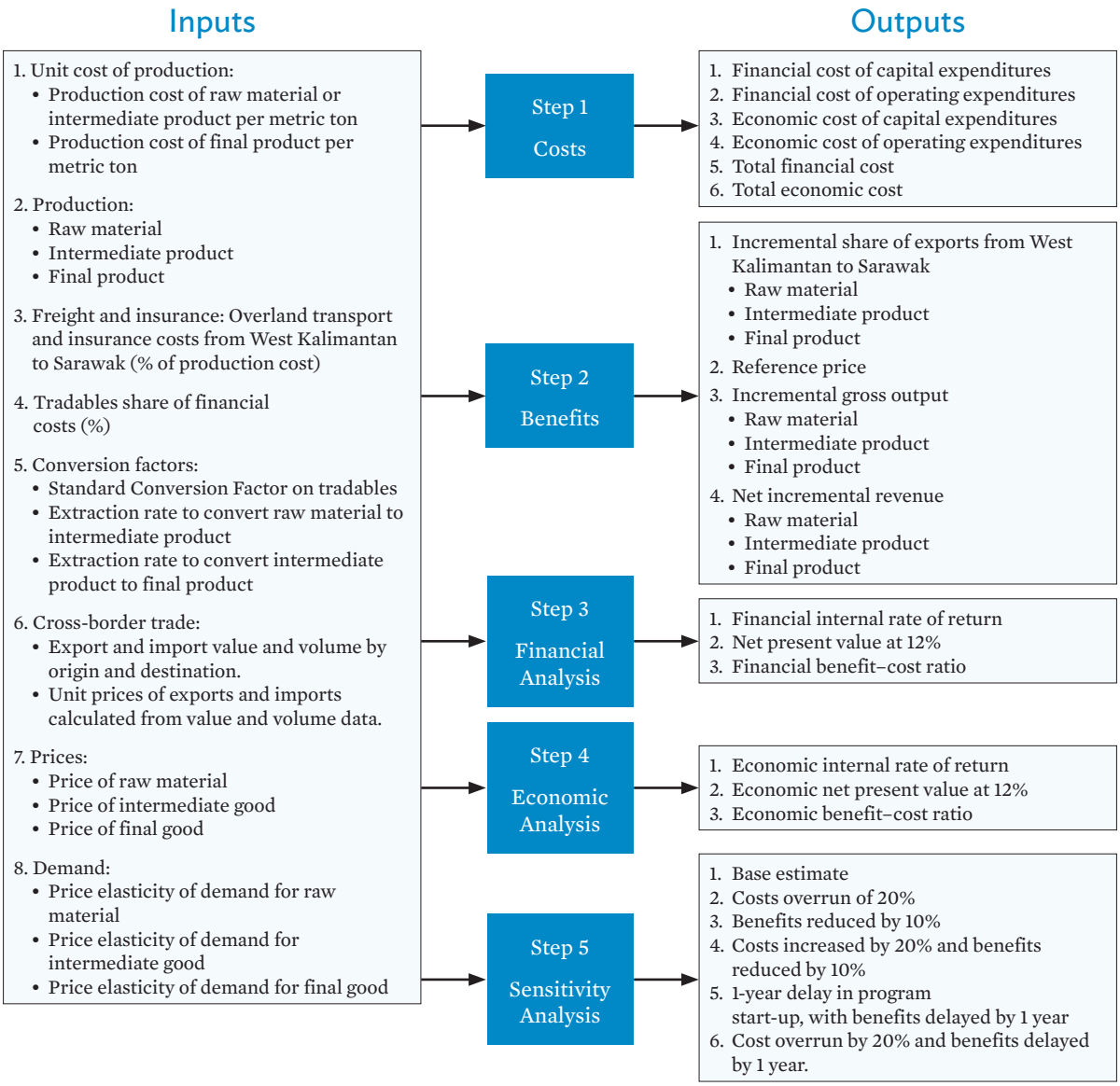
Source: Representation by the authors.

surveys. The results allow us to identify upstream and downstream linkages between Sarawak and West Kalimantan.

(iv) *Cost–benefit analysis* to determine the economic viability of cross-border trade in goods and services (Figure 2.3).

(v) *Nonmonetary preference ordering of projects* rely on perception surveys of businesses and government officials using the Likert Scale.

Figure 2.3. Steps to a Successful Cost–Benefit Analysis



Source: Representation by the authors.

2.3 Terminology

Province and State

Malaysia classifies its main administrative divisions into states, while Indonesia classifies them into provinces. This distinction is maintained throughout the study, except when reference is made to the main administrative divisions of both countries jointly. In those cases, the generic term "province" is used.

Border Economic Area

Border development programs have evolved in a fairly haphazard manner across the world, often with little or no regard to the experiences and lessons of others. Nor has there been any attempt to create a set of international best practices that can guide the design and implementation of these types of programs, create a common concept framework, and use common terminology. As a result, there is a fairly large variety of programs that vary in coverage and use different terminologies.[3] In this study, we adopt the broadest designation of an economic area located along a border. It can refer to an area limited to a single country or to adjoining border areas of two or more countries. It is used throughout this study to refer to both informal and formal economic zones along a border. In all cases, however, a border economic area has specific services and facilities in customs, logistics, and other areas that help strengthen supply or value chains with the neighboring country.

Border Trade and International Trade

In the context of Sarawak–West Kalimantan trade, border trade is sometimes associated with local goods traded by people living in the border area. This terminology arises in the 1970 BTA, which regulates the amount of goods from Indonesia that can be sold between Indonesia and Malaysia along the border area. It is intended to regulate traditional movements through informal trading routes known as *jalan tikus*. When reference is made to this type of trade, we use "international border trade" to refer to cross-border commerce of internationally traded goods between Sarawak and West Kalimantan. Unless otherwise noted in this study, the term "border trade" is used in its broader sense to refer to cross-border commerce of internationally traded goods.

Program and Projects

Throughout this study, we use the term "project" to refer to individual investment activities, and "program" to refer to a set of interrelated projects for a particular geographic area or cluster of activities. The two terms are differentiated by their scope and scale. A project has a defined start and end point and specific objectives that, when attained, signify completion. A program consists of a series of related projects that meet an overarching objective. Hence, a program is defined as a group of related projects, managed in a coordinated way to obtain benefits not available from managing the projects individually.

Project Cycle Stages and Phases

In this study, we use *stages* of the project cycle to denote the six time segments of a project; and we use *phases* of the project to indicate the two major time segments of a project, namely, the planning and execution of a project.

[3] For a review of terminology, see M. Lord and P. Tangtrongjita. 2016. *Border Economic Zones in Thailand: A Practitioner's Guide*. Bangkok: Chulalongkorn University Press.

3

Coverage

3.1 Sequence

The study was carried out in three stages over a 1-year period (Figure 3.1). The first, which extended from 1 October 2017 to 30 February 2018, examined opportunities in trade of goods and services from the point of view of West Kalimantan. The second phase, which took place between 1 March and 31 July 2018, examined trade opportunities from Sarawak's point of view. Together, these two perspectives were used in the third phase of the study to prepare a joint study on potential industry-specific value chains and to design the integrated components needed to implement a program for cross-border trade and investment.

Figure 3.1. Stages of the Pre-Feasibility Study

Source: Representation by the authors.

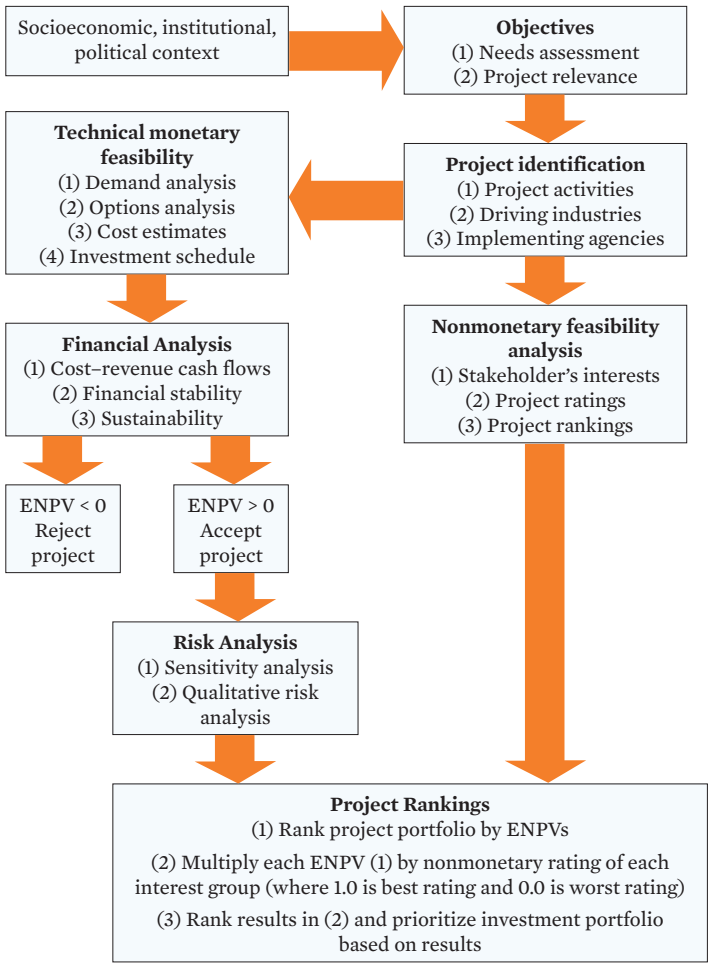
3.2 Coverage

To achieve the objective described in chapter 2, the present study provides two essential work products of the *project cycle* (Figure 3.2). The first is the main output needed in Stage 1 on identification in the project cycle. The second is the main output for Stage 2 on preparation.

(i) For project identification, this part of the study provides the *Project Concept Note*, including *Scoping Study* and *Stakeholder Needs Assessment*. The Concept Note contains the proposed project objectives, socioeconomic profile and economic analysis of the focal area, potential industry drivers, and soft and hard infrastructure for the border economic area. It also contains a likely action plan for the implementation process.

(ii) For the project preparation component, the second part of the study presents the *Pre-Feasibility Study*. It examines the options and scope of the project and makes recommendations about which cross-border value chains and soft and hard infrastructure components for the border economic area should be included in the full feasibility study at the next stage of the project cycle.

Figure 3.2. Project Development Framework



ENPV = economic net present value.

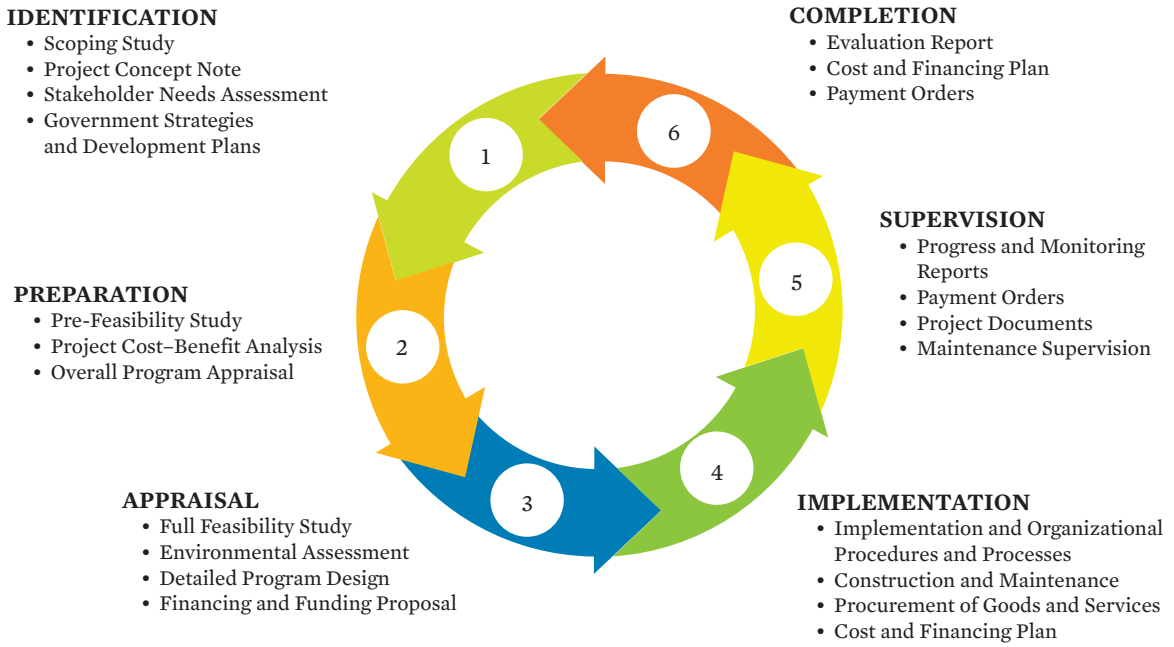
Source: Representation by the authors.

3.3 Project Cycle Context

The project cycle is the framework used to design, prepare, implement, and supervise projects. Its stages are depicted in Figure 3.3 and are widely used by national planning agencies like Malaysia's Economic Planning Unit (EPU) in the Prime Minister's Department, Indonesia's Ministry of National Development Planning (BAPPENAS), as well as international development institutions like ADB and the World Bank.[4]

[4] ADB defines five sequential steps: (i) elaboration of regional cooperation strategy or country partnership strategy, (ii) preparation, (iii) approval, (iv) implementation, and (v) completion and evaluation. The World Bank defines six steps: (i) identification, (ii) preparation, (iii) appraisal, (iv) negotiation, (v) implementation and supervision, and (vi) evaluation. Sources: ADB. *Project Cycle*. https://www.adb.org/site/disclosure/public-communications-policy/cycle; and World Bank. 1993. *The World Bank Project Cycle*. http://documents.worldbank.org/curated/en/696601478501928227/pdf/109412-BRI-WBG-PUBLIC-date-04-01-1993-The-World-Bank-Project-Cycle.pdf.

Figure 3.3. Project Cycle



Source: Representation by the authors.

The six stages consist of identification, preparation, appraisal, execution, operation, and closure and evaluation. Effective implementation of these steps is especially important when designing a program like the present Sarawak–West Kalimantan border economic area program that consists of a complex set of integrated subprojects to promote cross-border trade in goods and services.

Identification

Projects are identified by the government(s) or the private sector where the intervention will take place. Once identified, the conceptual stage of the project begins, which defines the overall project potential, identifies potential subprojects, eliminates options that are unlikely to yield desired benefits, and determines whether there is sufficient opportunity to justify the investment needed to further the overall project.

Preparation

An analysis is made of the project's technical, financial, economic, environmental, marketing, management aspects, and potential social impact. The social impact inquiry needs to include an examination of all stakeholder preferences for the project scope. That process will help to guide the focus of the intervention and ensure that it addresses the needs of the potential beneficiaries and those who may be negatively affected. The pre-feasibility study is carried out at this stage. It aims to select the preferred intervention activities from a shortlisted set defined by the scoping study, and then to assess whether the potential net benefits warrant a commitment to proceed with the subsequent step involving the full-fledged feasibility study.

Appraisal

An independent assessment is next carried out with a full feasibility study. It determines whether further action justifies moving to the next stage of the project cycle involving project design and construction. The objective of the full feasibility study is to determine the optimum configuration of the project since, once completed, the next stage involves procurement and construction efforts, at which point there is little or no further opportunity to influence the project outcome.

Execution

After approval, the implementation of the project should follow the detailed plans contained in the feasibility study to ensure that project execution costs are in line with expectations contained in the feasibility study. Reasonable alignment of expected and actual costs requires appropriate time and expenditure investment in the feasibility study and excellence in project execution. What little information is available suggests that there exists a record of failure about expectations when compared with outcomes.[5] If feasibility studies are to provide realistic and sufficiently detailed information for project outcomes to reasonably align with expectations, sufficient time and funding need to be given to pre-execution stage of the project.

Supervision

Project oversight has three major objectives. First, it ensures that the funds provided to the project are directed toward the agreed-upon activities. Second, it allows the governments or international development institutions to provide technical assistance to help the project achieve its objectives. Third, it provides a mechanism for due diligence covering the project costs, financing and implementation plans, legal and regulatory requirements, and environmental and social impact.

Closure and Evaluation

The evaluation compares project costs, benefits, timetable, and efficiency with what had been expected at the time of appraisal, and the results feed into the next cycle of projects with suggestions for project performance improvements. The entire process covers inputs, outputs, outcomes, and impacts.

3.4 Concept Report Stage

The aim of the project cycle's first step, preparation of the concept report, is to determine what the integrated border economic area should look like. The process involves carrying out a scoping study in the province and, based on those findings, preparing a concept report on program design and how it should be prepared and implemented.

[5] While published comparisons of expectations versus actual performances are nearly nonexistent, the World Bank in 1978 listed 109 operations in which a quarter had cost overruns of 25% or more, and one-tenth had cost overruns of 50% or more. Approximately half had time overruns of 25% or more, and approximately one-third had time and cost overruns of 50% or more.

The main components of the concept report are (i) program rationale; (ii) objectives, outputs, outcome, and risks; (iii) geographic delimitation of the program; (iv) socioeconomic profile of the province; (v) policy and regulatory framework; (vi) economic analysis, including comparative advantages and competitiveness and complementarities analyses; (vii) strengths, weaknesses, opportunities, and threats (SWOT) analysis; (viii) program strategy and masterplan; (ix) program components; and (x) potential cross-border value chains (Figure 3.2).

3.5 Pre-Feasibility Study Stage

The aim of the project cycle's second step, preparation of the pre-feasibility study, is to determine whether the subprojects have a solid market and sound financial base; and whether they support the objectives of stakeholders that include the public and private sectors, the donor community, and households. In the context of government and ADB support to the program, it also aims to determine possible capacity building through technical assistance needed to promote and develop specific projects and overcome obstacles to cross-border trade and investment.

This pre-feasibility study follows standard international practices for the steps needed to carry out such an analysis. First, it conceptualizes the interrelationship between different cross-border components that are needed to make the program successful in reaching well-defined objectives specified by the governments of Indonesia and Malaysia. Second, it determines the key project parameters in terms of location, financial requirements, technical support needed, gains to major beneficiaries, preliminary cost estimates, financial and economic feasibility, implementation program, and timeline. It focuses on methods to optimize each program component in conjunction with an in-depth analysis of project parameters that make the overall integrated program successful.

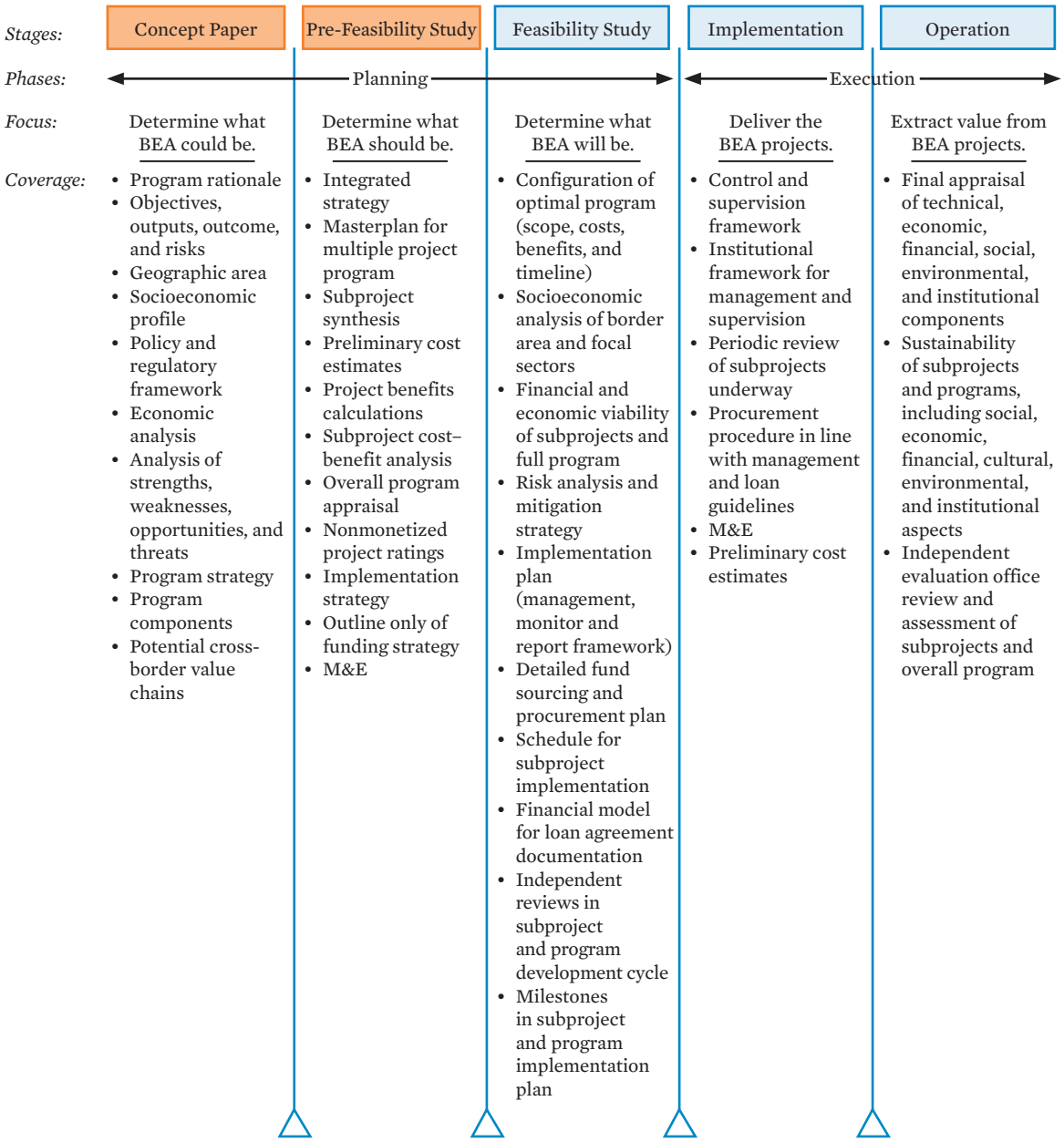
To the extent that the study accomplishes these objectives and that the program proves to be viable, the full feasibility study should then carry out minor adjustments to all the details of the present study to optimize the returns of investments made to the program, and thus guide its design and implementation (including its construction stage where appropriate) and final operation.

3.6 Contents

Figure 3.4 summarizes the stages of a border economic area development project. Adopting this framework, this report is structured as follows:

(i) Part I contains an introduction to the study. It provides the economic rationale for the pre-feasibility study, the methodologies employed, and the study's objective and contents.
(ii) Part II, on socioeconomic profiles, offers a comprehensive look at Sarawak and West Kalimantan in terms of their overall socioeconomic characteristics and specific activities of interest in possible areas of economic collaboration.
(iii) Part III, on government objectives, explores national and state or provincial government strategic objectives in developing each of the territories and how those objectives complement one another.
(iv) Part IV, on trade, offers detailed information about traded products and analyzes trade patterns and areas of competitiveness and complementarities.

Figure 3.4. Stages of a Border Economic Area Development Project



BEA = border economic area, M&E = monitoring and evaluation.
Source: Adapted by the authors based on W. Mackenzi and N. Cusworth. 2017. The Use and Abuse of Feasibility Studies: 2016 Update. Paper presented at an AusIMM Conference, Adelaide.

(v) Part V, on trade modeling and forecasting, looks at relationships between border, provincial or state, and national trade and uses the characterization of those relationships to project future trade in products of key industries having potential cross-border value chains.
(vi) Part VI, on value chains, profiles key Sarawak and West Kalimantan industries, assesses their potential areas of cross-border collaboration, and offers a preliminary economic analysis for each industry.
(vii) Part VII, on cost–benefit analysis, explores the economic and financial viability of each of the proposed cross-border projects, building on the governments' strategies for the industries, stages of value addition, and demand forecasts.
(viii) Part VIII, on cost-effectiveness analysis, determines the costs and outcomes of cross-border collaboration between Sarawak and West Kalimantan of stand-alone technical assistance projects.
(ix) Part IX, on program design, provides a master plan for the integrated approach to developing cross-border trade and investment between Sarawak and West Kalimantan through a border economic area program. It also describes each of the key projects that would make up the integrated program.
(x) Part X, on the overall program viability, offers an integrated approach to multi-project appraisal and possible economies of scale within project clusters.
(xi) Part XI, on nonmonetized project appraisal, examines project preferences by different stakeholder groups based on nonefficiency objectives such as environmental sustainability, livelihood enhancement, and pro-poor growth. It offers a theory-consistent approach to ranking preferences for those objectives by the different stakeholder groups.
(xii) Part XII, on program execution, describes the various stages of cross-border collaboration and proposes a timeline for implementation of the projects and overall program. It concludes with a summary of the key findings and recommendations of the study.

The report also has three appendixes. Appendix 1, on the project ranking methodology, describes the approach used to rate each project according to stakeholder interests and rank them according to socioeconomic objectives. Appendix 2, on econometric modeling of trade, shows the steps involved in forecasting industry demand and project benefits, specifically in terms of modeling demand relationships, incorporating price-competitiveness effects, and specifying and estimating gravity trade models. Appendix 3, on project appraisal, explains financial and economic internal rates of return, and consumer preferences in nonmonetized project analysis.

The material contained in this report will be of interest to (i) Malaysia's and Indonesia's policy makers; (ii) commercial businesses interested in extending their upstream and downstream activities across Sarawak's and West Kalimantan's borders to achieve scale economies, increase competitiveness, and broaden markets; (iii) the medical tourism industry; (iv) private education and vocation training institutions; and (v) businesses interested in promoting multi-destination tourism services. It will also be useful to practitioners interested in the design, analysis, and application of border area development.

PART II

Socioeconomic Features

4

Sarawak's Structural Transformation

4.1 Overview

Sarawak's production activities largely focus on processing and manufacturing. Because natural resources are limited or unavailable, enterprises often depend on upstream supplies from distant foreign sources. Yet the state's central location within the West Borneo Economic Corridor (WBEC) makes those resources readily available from nearby suppliers like those of West Kalimantan, a situation that significantly increases industry competitiveness when transport expenses are important components of total production costs.

The importance of location cannot be underestimated in fragmented production processes. Multinational processes, in which different stages are carried out in specialized plants around the globe, have become essential in competitive markets and distance between production stages a more critical factor than price of inputs since delays in one stage can become very costly. Already, nearly 40% of Malaysia's exports embody foreign inputs, a proportion that places the country among the top 10 countries in the world whose production activities depend on global value chains.[6]

The proximity of Sarawak's value chains to upstream supplies from West Kalimantan could bring much-needed savings to enterprises. Yet our fieldwork indicates that there is an acute lack of enterprise-level information about cross-border opportunities, leading many companies to instead contract supplies from distant suppliers. These distant relationships have resulted in poor competitiveness indicators and loss of growth momentum for several leading industries. Much of the work involved in the development of cross-border networks will therefore need to involve promoting contacts with businesses in West Kalimantan and making Sarawak enterprises aware of those large potential cost-saving opportunities.

4.2 Geography and Demographics

Geography. Sarawak has a land area of about 124,451 km^2, or 1.7 times the size of West Kalimantan. It makes up 37.5% of the total land area of Malaysia. To the west, the state is separated from North Kalimantan and East Kalimantan by ranges of high hills and mountains that are part of the central mountain range of Borneo.

Climate. The climate is stable throughout the year except for two monsoons, with average daily temperature varying between 23°C (73°F) in the morning to 32°C (90°F) in the afternoon at coastal areas. One monsoon, from the northeast, occurs between November and February, bringing heavy rainfall. The other, from the southwest occurs between March and October

[6] OECD. Import Content of Exports. Paris. https://data.oecd.org/trade/import-content-of-exports.htm.

and brings somewhat less rainfall. Humidity is usually high, exceeding 68%, with annual rainfall varying between 330 centimeters (cm) (130 inches [in]) and 460 centimeters (cm) (180 in) for up to 220 days a year. At highland areas, the temperature can vary from 16°C (61°F) to 25°C (77°F) during the day and as low as 11°C (52°F) at night.[7]

Eco-Regions. Sarawak is divided into three eco-regions (footnote 7):

(i) The coastal region is rather low-lying and flat with large areas of swamp and other wet environments. The ports of Kuching and Sibu are built some distance from the coast on rivers while Bintulu and Miri are close to the coastline where the hills stretch right to the South China Sea.
(ii) The second region consists of hilly terrain and accounts for much of the inhabited land where most of the cities and towns are found. The ports of Kuching and Sibu are built some distance from the coast on rivers while Bintulu and Miri are close to the coastline where the hills stretch right to the South China Sea.
(iii) The third region is the mountainous region along the Sarawak–Kalimantan border. A number of rivers flow through Sarawak, with the Sarawak River being the main river flowing through Kuching. The Rajang River is the longest river in Malaysia, measuring 563 km (350 miles [mi]) including its tributary, Balleh River. To the north, the Baram, Limbang, and Trusan Rivers drain into the Brunei Bay.

Administrative Divisions. The 12 administrative divisions are Kuching, Samarahan, Serian, Sri Aman, Betong, Sarikei, Mukah, Sibu, Kapit, Bintulu, Miri, and Limbang (Map 4.1).

Demographics. Sarawak has a population of 2,636,000 (as of 2015) and it is the fourth most populous state in the country. Because of its large geographic size, it has the lowest population density in the country with only 20 people/km^2. The average population growth rate of 1.8%, from 2000 to 2010, is very close to the national average of 2.0%. Nearly 60% of the population resided in urban areas, and that percentage is expected to rise gradually as more people move to the cities.

Map 4.1. Sarawak Administrative Divisions

Source: Ministry of Industrial and Entrepreneurial Development of Sarawak. http://www.mied.sarawak.gov.my/page-0-105-54-Existing-Industrial-Estate-Under-MIED-Sarawak.html.

The urban population is predominantly Malay, Melanaus, and Chinese, with a small proportion of Ibans and Bidayuhs. The latter two are among the more than 40 subethnic groups of Sarawak, many of whom still inhabit remote areas and are referred to as Orang Asal. The Orang Asal, and Malays, of Peninsular Malaysia, Sarawak and Sabah are referred to collectively as Bumiputera (son of the soil).

[7] Sarawak Tourism Board. Pasir Panjang, Kuching. https://web.archive.org/web/20151227125143/http://sarawaktourism.com/attraction/pasir-panjang/ (accessed 20 October 2019); Sarawak Tourism Board. Damai Beach Resort. https://web.archive.org/web/20151117112532/http://sarawaktourism.com/attraction/tanjung-batu-beach/, (accessed 20 October 2019); and Sarawak Tourism Board. Tanjung Batu Beach, Bintulu. https://web.archive.org/web/20151117112532/http://sarawaktourism.com/attraction/tanjung-batu-beach/ (accessed 20 October 2019).

This classification grants them special privileges in education, jobs, finance, and political positions (footnote 7).

Ethnic Groups. Sarawak has six major ethnic groups, namely, Iban, Chinese, Malay, Bidayuh, Melanau, and Orang Ulu, as well as smaller but still significant populations like the Kedayan, Javanese, Bugis, Murut, and Indian. The *Iban and Bidayuh* are indigenous ethnic groups of Sarawak, and they are officially recognized by the Government of Malaysia as comprising the Dayak people (footnote 7). The Iban were, in the past, a society that emphasized social status, especially for those who displayed martial prowess as well as to those who demonstrated expertise in fields such as farming. Despite modern influences, the Iban still observe many of their traditional rituals. The *Chinese* presence dates back to 6th century AD, but most immigrated during the Brooke era, whose family founded and ruled the Kingdom of Sarawak from 1841 to 1946. The migration was driven by employment opportunities in gold mines and their settlement occurred throughout Sarawak. During the Brooke era, Sarawak *Malays* were predominantly fishermen, leading to their villages being concentrated along river banks. However, with the advent of urban development, many Malays have migrated to seek employment in public and private sectors.

4.3 History

In the mid-15th century, the Bruneian Empire was established in the coastal regions of Sarawak, and the Kuching area was known to Portuguese cartographers during the 16th century as Cerava, one of the five great seaports of Borneo. The Sultanate of Sarawak emerged as a local kingdom that lasted for almost half a century before the territory was reunited with Brunei Darussalam in 1641.

In the early 19th century, the Bruneian Empire declined, and territorial wars were fought between the Iban and a Kenyah-Kayan alliance during this period. Civil unrest in 1839 led Sultan Omar Ali Saifuddin II (1827–1852) to seek order with the help of James Brooke, who succeeded in quelling the revolt and was rewarded with the governorship of Sarawak, which at that time consisted only of a small area centered on Kuching. The Brooke family, later called the White Rajahs, set about expanding the territory they had been ceded. With expansion came the need for efficient governance and thus, beginning in 1841, Sarawak was separated into the first of its administrative divisions. By 1912, a total of five divisions had been established in Sarawak, each headed by a resident. The Brooke family generally practiced a paternalistic form of government with minimal bureaucracy, but did establish a legal framework. Expanding trade led to the formation of the Borneo Company Limited in 1856 and the company remains involved in a wide range of businesses in Sarawak today.

The Japanese occupied Borneo in 1941 and Sarawak remained part of the Empire of Japan until 1945. After the surrender of Japan, Sarawak was placed under British Military Administration and managed by Australian Imperial Forces (AIF) until April 1946. Lacking the resources to rebuild Sarawak after the war, Charles Vyner Brooke ceded Sarawak to the British Crown, and Sarawak became a colony.

In 1961, Tunku Abdul Rahman, the Prime Minister of the Federation of Malaya, announced a plan to form a greater federation together with Singapore, Sarawak, Sabah, and Brunei Darussalam, to be called Malaysia. Five political parties in Sarawak formed a united front that supported the formation of Malaysia, and Sarawak was officially granted self-

government in 1963 as part of a federation with Malaya, North Borneo (now Sabah), and Singapore to form the Federation of Malaysia on 16 September 1963.

The governments of Brunei Darussalam, Indonesia, and the Philippines opposed the federation. In 1962 the Brunei revolt broke out, and Indonesian President Sukarno responded by deploying armed volunteers and, later, military forces into Sarawak. Indonesia's defeat resulted in the fall of Sukarno, and negotiations were restarted between Malaysia and Indonesia that led to the end of the confrontation in 1966.

Today, Sarawak has two branches, namely, the executive and legislative. There is no Sarawak judiciary branch because of the federalization of the court system in Malaysia. The head of the state is the chief minister of Sarawak, who is the indirectly elected head of the Government of Sarawak. Official appointment is made by the governor, who selects the person most likely to command the confidence of the majority of the members of State Legislative Assembly. The chief minister heads the State Cabinet, whose members are appointed by the Yang di-Pertua Negeri on the advice of the chief minister.

4.4 Economic Profile

Sarawak remains heavily dependent on primary commodity exports. Its abundance of natural resources, and primary industries such as mining, agriculture, and forestry accounts for 32.8% of the state's gross domestic product (GDP). Manufacturing activity covers food and beverages, wood-based products, basic metal products, petrochemicals, and tourism. Liquefied natural gas (LNG) accounts for over half of total export revenue and crude petroleum adds over 20 percentage points, while palm oil, sawlogs, and sawn timber account for about 9%. The government aims to further diversify the economy into manufacturing that adds value to its raw materials and local produce.

5

West Kalimantan's Economic Transformation

5.1 Overview

In traditional models of economic development, West Kalimantan's current situation would be classified as that of natural resource dependence during its take-off stage of development. However, this view is recognized as being oversimplified because it suggests depletion of resources and entrenched development activities.

Instead, a more realistic and modern vision of West Kalimantan's situation is one of diversification and conversion to a more sustainable economic base. More importantly, it shares with Sarawak a cognizant view on the part of the private sector and government that internationalization of production activities gives rise to efficiency and a competitive edge over self-contained production activities of single enterprises.

West Kalimantan business leaders are therefore focusing their attention on interenterprise relation (networks) that operate in a variety of different scales and on the dynamics of cross-border value chains, especially with neighboring countries when transportation expenses represent a significant share of production costs.

The importance of these cross-border value chains for West Kalimantan enterprises is that it provides a means by which transfer of technologies can take place. The result is a movement by those enterprises toward downstream activities and increased value added to their products for regional and international markets. This characterization of West Kalimantan's leading industries is followed throughout this study and motivates the proposed integrated border area development projects.

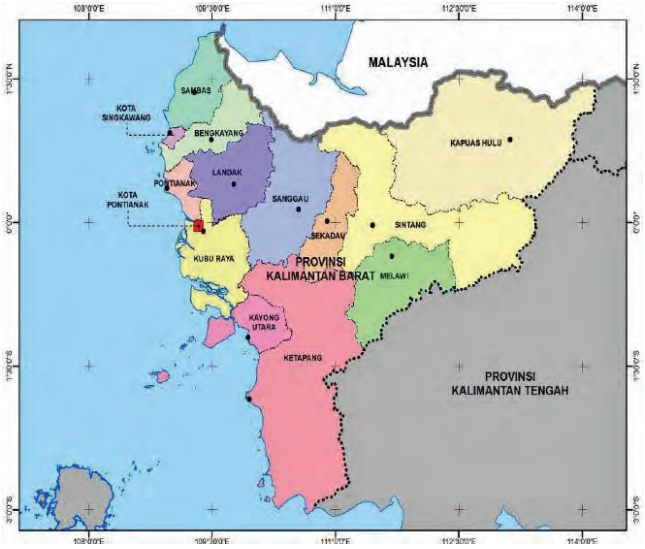
5.2 Geography and Demographics

Geography. West Kalimantan has an area of 72,567 km^2. It is bounded by the Malaysian state of Sarawak to the north, the Java Sea and Central Kalimantan to the south, East Kalimantan to the east, and the Natuna Sea and Karimata Strait to the west. The Upper Kapuas mountain range forms the border between West Kalimantan and Sarawak.

The administrative divisions consist of 2 cities and 12 regencies (Map 5.1). The size of its territory is ±5% greater than that of East Kalimantan and Central Kalimantan, 2 times greater than that of North Kalimantan, and nearly 4 times greater than South Kalimantan.

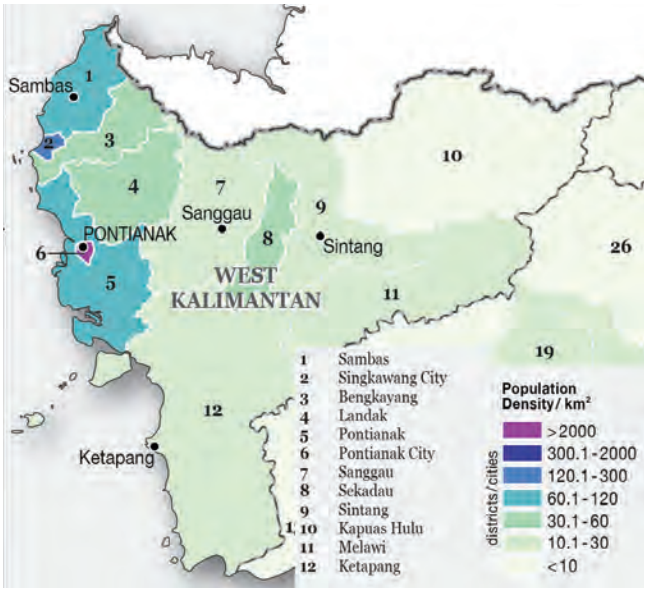
Population. West Kalimantan's population size is much greater than the other Kalimantan provinces, as is its population density. Its population is 20% greater than South Kalimantan, 50% greater than East Kalimantan, 2 times larger than Central Kalimantan, and 7 times larger

Map 5.1. West Kalimantan Administrative Divisions



Source: BPS-Statistics Indonesia. 2017. *Kalimantan Barat in Figures 2016*. BPS-Statistics of Kalimantan Barat.

Map 5.2. West Kalimantan Population Density



Source: CartoGIS Services, College of Asia and the Pacific, The Australian National University. Maps Online. http://asiapacific.anu.edu.au/mapsonline/base-maps/kalimantan-districts (accessed 30 November 2017).

than North Kalimantan. Its population density is one-third greater than East Kalimantan, 2 times greater than Central Kalimantan, and 3 times greater than North Kalimantan. Only South Kalimantan has a higher population density, equal to 3 times more than that of West Kalimantan. At the national level, West Kalimantan is the third largest province, after Papua and Central Kalimantan, but its population density ranks in the bottom fifth of all the provinces.

Population Distribution. Within the province, the population distribution varies greatly among the administrative divisions (Map 5.2). The Western Group of subdivisions, which includes the provincial capital city of Pontianak and the city of Singkawang, is more densely populated than the Eastern Group. Nearly 30% of the province's population lives in the capital area of Pontianak, located in the delta of the Kapuas River, which is Indonesia's longest river and one of the world's longest island rivers. The seven regencies in the Western Group have an average population density of 51 persons/km^2, while those in the Eastern Group average 22 persons/km^2. Kapuas Hulu Regency, in the northeast and bordering Sarawak, has the smallest population density of only 8 persons/km^2. It is home to a diversity of indigenous groups, including the Silat and Iban, a branch of the Dayak people of Borneo.

Ethnic Groups. There are nine important ethnic groups in the province. The largest are the Dayak (34.9%) and Malays (33.8%). The Dayaks live mainly in the interior, while the Malays live in coastal areas. The Javanese (9.7%) settled in during the 1930s transmigration areas and, earlier on, the Chinese (8.2%) settled in the urban areas of Singkawang and Pontianak, as did the Madurese (6.3%), who also live in Kubu Raya Regency, south of Pontianak. Other ethnic groups are the Bugis (3.13%), Sunda (1.13%), Batak (0.60%), Power (0.52%), and Banjar (0.33%).

Languages. Besides Indonesian, the official language, there are numerous dialects within the major languages. For Malay, there are the Pontianak Malay and Sambas Malay associated with the dialects spoken in Pontianak city and Sambas regency. In the Dayak language, there are about 188 dialects and, in Chinese, there are two dialects, namely Hakka and Teochew.

Religions. The main religion is Islam (51% of the population). The second largest is Christian, composed of Roman Catholics (24%) and Protestants (12%). Buddhism is followed by another 12% of the population, while 2% follow Confucianism.

5.3 Early History

Dayaks and Malays. The Dayaks were the original inhabitants of West Kalimantan. They represented a confederation of over 200 ethnic groups, each with its own dialect and located in the central and southern interior of Borneo. After the 17th century the Malays migrated to West Kalimantan and built their own sultanates. During the 18th century, the sultan leaders imported Chinese labor for gold and tin mining, and the Chinese population grew throughout the province.

Chinese Influence. As Dutch imperialism spread in Indonesia, several Chinese leaders in West Borneo made efforts to protect their people from the Dutch. One such leader was Luo Fangbo, head of the Southern Company, whose headquarters was located in Guangdong province of the People's Republic of China. He left a written account of his creation of the Lanfang Republic in western Borneo in 1777, after his Chinese miners defeated the local Malay sultans.[8] As a republic, the government under Luo Fangbo implemented numerous democratic principles, including consultations with the citizenry on important matters to the republic. He also created a comprehensive set of executive, legislative, and judicial branches of the government. The Lanfang Replublic was allied with Sultan Abdurrahman of the Pontianak Sultanate.

Pontianak Sultanate. The Pontianak Sultanate (Malay: Kesultanan Pontianak) was an Islamic Malay state that existed on the western coast of the island of Borneo from the late 18th century until its disestablishment in 1950. The Sultanate was located at the mouth of the Kapuas river in what is today the Indonesian province of West Kalimantan, and the Sultan's residential palace was situated in what later grew to become the modern-day Indonesian city of Pontianak. The Pontianak Sultanate was founded in 1771; they established the Kadariah Palace and received endorsement as the Sultan of Pontianak by the Dutch East India Company in 1779.

Dutch Colonization. In 1884, the Government of Lanfang Republic was overthrown in West Kalimantan by the Dutch. The Dutch as well as the British gained a footing in Borneo in the early 17th century. The Dutch began to trade on the west coast in 1604, and the British appeared around 1609. By 1698, the British had established a settlement at Banjermassin in South Kalimantan. But they were soon expelled by the Dutch, who thereafter dominated the southern and western Borneo coastal areas.

[8] For details, see L. Blussé, H. T. Zurndorfer, and E. J. Zürcher, eds. 1993. Conflict and Accommodation in Early Modern East Asia: Essays in Honour of Erik Zürcher. *Sinica Leidensia*. Vol. 29. https://books.google.co.th/books?id=pXLO2k1oaPsC&printsec=frontcover&source=gbs_ge_summary_r&redir_esc=y#v=onepage&q&f=false (accessed 20 October 2019).

The spread of the Dutch sphere of influence in southern and eastern Borneo began with their restoration of authority in Java in 1816. A series of treaties, culminating with a treaty in 1817 with the Sultan of Banjarmasin, established Dutch sovereignty over southwestern Borneo. Then, in the 1830s, the Dutch claimed the more northerly Tidung region, which had previously been regarded as vassal to the Sultan of Sulu.[9]

The British and Dutch concluded agreements in 1824 and 1871 delimiting their spheres of interest in the region. Most of Borneo was allocated to the Dutch East Indies, while the North (Sarawak, the Sultanate of Brunei, and North Borneo) went to the British. Sarawak had been granted as a fief in 1841 to James Brooke and continued to be ruled by his successors until 1946. Sarawak became the North Borneo Protectorate in 1888.

Indonesian–Malaysian Border in Borneo. The Indonesia–Malaysia territorial division in the island of Borneo began with the arrival in Sarawak in 1841 of James Brooke from England to become the territory's governor. The Dutch–Indies government in Batavia (currently Jakarta) felt threatened in their position over Bornean coastal trade. As a result, Dutch Governor General J. J. Rochussen issued a decree in February 1846 outlining Dutch terrestrial interests in Borneo. This document provided a division of Borneo based on the flow of watersheds and it became the blueprint that was subsequently negotiated between the Dutch and British in the Anglo-Dutch Treaty of 1891.[10]

Land Border. The Border Convention or London Convention of 1891 is the principal document determining the land border between Indonesia and Malaysia on the island of Borneo. It was signed in London between Great Britain and the Netherlands on 20 June 1891. The convention stated that the eastern end of the border would start at the 4° 10′ north latitude, proceeding westward across the island of Sebatik off the coast of Sabah near Tawau town, bisecting it. The border then crosses the water channel between Sebatik and the mainland and travels up along the median line of the Tambu and Sikapal channels up to the hills that form the watershed between the Simengaris (in Indonesia) and Serudung (in Malaysia) rivers.

The border travels generally northwestward toward 4°20′N, and then generally westward, but accommodating the watershed, although the Pensiangan, Agisan, and Sibuda rivers are allowed to intersect the border. The border then follows the line of ridges along the watershed between major rivers flowing northward into the South China Sea; and those flowing eastward, southward, and westward into the Celebes Sea, Java Sea, and Karimata Straits until Tanjung Datu at 109°38′.8E02°05′.0 N in the western extremity of Sarawak. The watershed is, however, not followed in a short stretch southwest of Kuching between Gunung Api at 110°04′E and Gunung Raja at 109°56′E where the border follows streams, paths, crests, and straight lines marked by boundary markers and pillars.

Recent Demarcation of Border. On 26 November 1973, a memorandum of understanding was signed between Indonesia and Malaysia for the joint survey and demarcation of their common land border. Work began on 9 September 1975 and was completed in February 2000. As of 2006, a total of 19 memoranda of understanding with 28 maps had been signed between

[9] University of Hawaii Press and New Asian Library. 2000. *Historical Atlas of Indonesia*. http://people.duke.edu/~charvey/Classes/wpg/glossary.htm (retrieved 27 November 2017).

[10] This material draws from International Boundary Study. 1965. *Indonesia–Malaysia Boundary*. Vol. 45. http://www.law.fsu.edu/library/collection/LimitsinSeas/IBS045.pdf.

the two countries pertaining to the survey and demarcation of the border covering a distance of 1,822 km of the 2,020-km border.

5.4 Contemporary History

Transmigration Plan. During the 1930s, the Dutch colonial powers initiated a *transmigration plan* to move people from heavily populated islands such as Java, to the less populated islands of Irian Jaya and Kalimantan. The plan sought to reduce poverty and overpopulation in Java and to provide a workforce to better utilize the natural resources of other areas of the country. The plan became controversial because of fears by native populations of so-called *Javanization* and *Islamization*, and it strengthened separatist movements and communal violence.

Japanese Occupation. From 1942 to 1945, the Japanese occupied West Kalimantan until Indonesia declared its independence. The Pontianak incidents of 1943–1944 in present-day West Kalimantan province resulted in the deaths of the sultans of Pontianak, Sambas, Ketapang, Soekadana, Simbang, Koeboe, Ngabang, Sanggau, Sekadau, Tajan, Singtan, and Mempawa in the hands of the Japanese Imperial Army. Among the 29 people of the Sultan of Pontianak's family who were beheaded by the Japanese was the heir to the Pontianak throne.[11]

Dayak Leadership. The Japanese execution of the Malay elite of Pontianak paved the way for a new Dayak elite to arise in the West Kalimantan political and administrative system. The Dayak ruling elite were mostly left unaffected because they were in the hinterland and because the Japanese had little interest in them. This situation gave an advantage for the Dayak leaders to fill administrative and political positions after Indonesia's independence. The Dayak Unity Party became an important force in West Kalimantan at the time of the 1955 Indonesian Constituent Assembly election. It was later disbanded after an order by then-president Soekarno prohibited an ethnic-based party. Afterward, its party members continued in other political parties and several subsequently became important national and provincial leaders.[12]

Indonesian–Malaysian Confrontation. West Kalimantan was the site of substantial fighting during the Indonesia–Malaysia *Konfrontasi* (Confrontation) under the Sukarno government in the mid-1960s. After Suharto deposed Sukarno in 1965, the confrontation was quickly resolved. Domestic conflict continued, however, for another 10 years between the new military Suharto government and fighters organized during the confrontation and backed by the banned Indonesian Communist Party (PKI).

Madurese–Dayak Conflict. In the 1960s the Indonesian government granted the Madurese rights to clear forests for palm oil cultivation. This conflicted with the local Dayak tribes' traditional way of life. The tensions between the two ethnic groups resulted in major eruptions

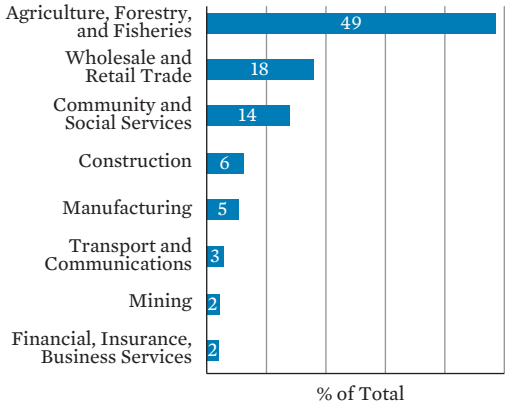
[11] J. S. Davidson. 2003. Primitive Politics: The Rise and Fall of the Dayak Unity Party in West Kalimantan, Indonesia. *Asia Research Institute Working Paper Series*. No. 9. Asia Research Institute of the National University of Singapore. https://web.archive.org/web/20140518224034/http://www.ari.nus.edu.sg/docs/wps/wps03_009.pdf.

[12] J. B. Avé. 1972. Kalimantan Dyaks. In F. M. LeBar, ed. *Ethnic Groups of Insular Southeast Asia, Volume 1: Indonesia, Andaman Islands, and Madagascar*. New Haven: Human Relations Area Files Press. pp. 185–187.

Map 5.3. West Kalimantan Agriculture, Mining, and Protected Area

Source: Farelli. Indonesia Traveling Guide. http://www.indonesiatravelingguide.com/kalimantan-maps/west-kalimantan-nature-reserves-mining-plantations/ (accessed 30 November 2017).

Figure 5.1. West Kalimantan Labor Distribution by Industry



Source: BPS-Statistics Indonesia. 2017. *Kalimantan Barat In Figures 2016*. BPS-Statistics of Kalimantan Barat.

of violence in 1996, the Sambas riots in 1999, and the Sampit conflict in 2001, which resulted in thousands of deaths.[13]

5.5 Economic Profile

West Kalimantan's economy has traditionally been highly dependent on its natural resources. Initially, that dependence focused on forestry. But deforestation has shifted attention to plantations, initially those for rubber and, more recently, those for oil palm. Overall, the contribution of the agricultural and mining sectors is substantial, especially since West Kalimantan is the only province in Borneo that does not have significant oil and gas reserves.

Land under Cultivation. Plantations cover an area of nearly 2.5 hectares of the province, or 16.8% of the land.[14] Table 5.1 shows the proportion of each administrative subdivision that is under cultivation (see also Map 5.3). On average, 56% of the province is under cultivation. But there are large differences among regencies, ranging from a high of 78% of Kapuas Hulu that is under cultivation to a low of 28% in the central regency of Sekadau. Along the border with Sarawak, the eastern regencies of Kapuas Hulu and Sintang have above-average proportions of land under cultivation, while the western regencies of Sambas, Bengkayang, and Sanggau have below-average proportions. These five provinces are highlighted in Table 5.1.

Labor Distribution among Industries. Nearly half of employed people in the formal sector operate in the agricultural, forestry, and fisheries sector (Figure 5.1). Of these, nearly 60% are male and 40% are female. The other two dominant sectors are (i) wholesale and retain trade, including the hospitality industry; and (ii) community, social, and

[13] Y. Mar and Y. Supriyadi. 2017. The Relationship between Dayak and Madura in Retok. http://yohanessupriyadi.blogspot.com/2008/06/relationship-between-dayak-and-madura.html. See also Global Security. Dayak. https://www.globalsecurity.org/military/world/para/dayak.htm (retrieved 19 November 2017).

[14] BPS-Statistics Indonesia. 2017. *Kalimantan Barat in Figures 2016*. BPS-Statistics of Kalimantan Barat.

Table 5.1. West Kalimantan Share of Land under Cultivation and Noncultivation, 2016

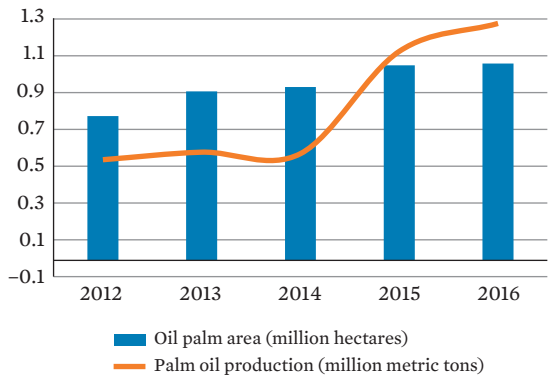
	Cultivation Area		Noncultivation Area		Total	
Regency/City	Hectares	Share of Total (%)	Hectares	Share of Total (%)	Hectares	Share of Total (%)
Kab. Kapuos Hulu	*2,366,805*	*76*	*746,554*	*24*	*3,113,359*	*100*
Melawi	752,223	74	259,625	26	1,011,848	100
Kayong Utara	258,163	62	155,578	38	413,741	100
Ketapang	1,804,033	59	1,233,535	41	3,037,568	100
Sintang	*1,309,660*	*59*	*909,001*	*41*	*2,218,661*	*100*
Kubu Raya	417,130	47	465,954	53	883,084	100
Sanggou	*550,943*	*43*	*723,101*	*57*	*1,274,044*	*100*
Pontianak	74,685	38	121,411	62	196,096	100
Bengkayang	*200,499*	*36*	*353,099*	*64*	*553,598*	*100*
Sambas	*178,699*	*30*	*407,832*	*70*	*586,531*	*100*
Landak	244,138	29	591.567	71	835,705	100
Sekadau	156,852	28	404,666	72	561,518	100
Singkawang Cfcy	7,943	15	46,497	85	54,440	100
Pontianak City	674	6	11,300	94	11,974	100
West Kalimantan	**8,322,448**	**56**	**6,429,719**	**44**	**14,752,167**	**100**

Note: Regencies highlighted in darker shade are regencies bordering Sarawak.
Source: BPS-Statistics Indonesia, 2017. *Kalimantan Barat in Figures 2016*. BPS-Statistics of Kalimantan Barat.

personal services. Construction and manufacturing only absorb 5%–6% of the total workforce; mining employs 2% of the workforce; and transport and communications, and financial and business services account for 2%–3% of the workforce.

Oil Palm. Figure 5.2 shows the rapid expansion of land dedicated to oil palm fruit and production of palm oil in the province. Between 2012 and 2016, the amount of land dedicated to fruit expanded by 36%. Palm oil production rose by 135% in the same period. The largest producing regencies are Ketapang in the south, and Sanggau and Sintang in the north, bordering Sarawak. The other three bordering regencies are also large producers of palm oil. Sanggau and Sintang are also the largest rubber-producing regencies in the province. For details about West Kalimantan's industry, see chapter 11.

Figure 5.2. West Kalimantan Oil Palm Plantation Area and Palm Oil Production, 2012–2016



BPS-Statistics Indonesia. 2017. *Kalimantan Barat in Figures 2016*. BPS-Statistics of Kalimantan Barat.

Major Food Crops. Rice is the major food crop. Secondary crops include the following:

(i)	Maize	(vii)	Pepper	(xiii)	Spinach
(ii)	Cassava	(viii)	Coffee	(xiv)	Leaks
(iii)	Sweet potato	(ix)	Cocoa	(xv)	Chili
(iv)	Peanut	(x)	Cucumber	(xvi)	Tomato
(v)	Soybean	(xi)	Mustard	(xvii)	Stringbean
(vi)	Mungbean	(xii)	Water cabbage		

Chickens are raised commercially throughout the province, especially in Kubu Raya, Singkawang, and Mempawah regencies, all of which are around Pontianak.

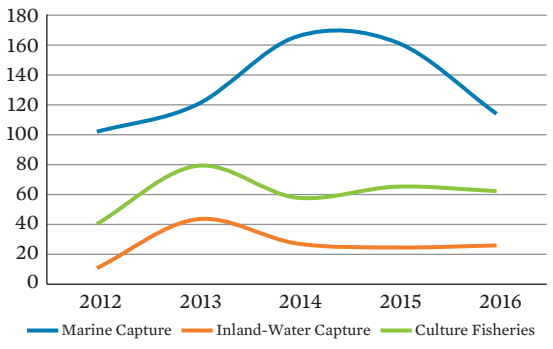
Major fruits produced in the province are as follows:

(i)	Avocado	(vii)	Mangosteen	(xiii)	Banana
(ii)	Starfruit	(viii)	Mango	(xiv)	Rambutan
(iii)	Langsant	(ix)	Coconut	(xv)	Salak
(iv)	Durian	(x)	Jackfruit	(xvi)	Sapodilla
(v)	Guava	(xi)	Pineapple	(xvii)	Soursop
(vi)	Orange	(xii)	Papaya	(xviii)	Breadfruit

For details about West Kalimantan's agricultural food industry, see chapters 17, 19, and 21.

Fisheries. Marine capture accounts for the largest proportion of West Kalimantan's fish production (Figure 5.3). Currently, it accounts for 56% of all fish production, while culture fisheries represent 31%, and inland-water capture the remaining 13%. Nevertheless, culture fisheries have been gaining in importance. Its share of total production rose by 5 percentage points between 2012 and 2016. Within the province, Ketapang Regency in the south dominates marine captures. It currently accounts for 70% of all marine catch in the province. It is also the largest producer of culture fisheries, followed by Kapuas Hulu Regency in the northeast. For details about West Kalimantan's fisheries industry, see chapter 19.

Figure 5.3. West Kalimantan Capture and Culture Fisheries, 2012–2016
(MT '000)



MT = metric ton.

Source: BPS-Statistics Indonesia. 2017. *Kalimantan Barat in Figures 2016*. BPS-Statistics of Kalimantan Barat.

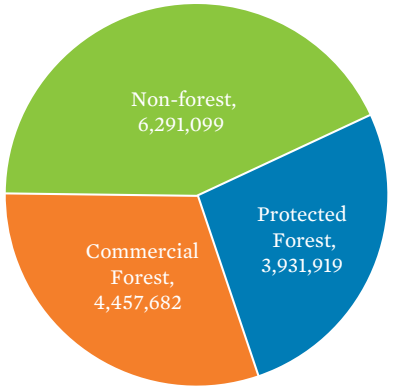
Forestry. Forested land cover 63% of West Kalimantan's territory, or 9 million hectares. Within that area, one-third is classified as tidal forest with mangroves, and two-thirds are classified as dense forest. The largest forest area is located in Kapuas Hulu Regency, followed by Ketapang Regency.[15] Of the total forest area, 47% is protected forest and 53% is commercial forest (Figure 5.4). About half

[15] BPS-Statistics Indonesia. 2017. *Kalimantan Barat in Figures 2016*. BPS-Statistics of Kalimantan Barat.

of the commercial production forest area is under active harvesting, while the other half has limited production activity to allow for regeneration of desired species. For details about West Kalimantan's fisheries industry, see chapter 14.

Mining. Most of the regencies bordering Sarawak are important mining centers in the province. The exception is Bengkayang Regency, which only has a small amount of land dedicated to mining activities. Elsewhere in the province, Kubu Raya Regency in the central coastal area, has the largest amount of land dedicated to mining activities. The mining sector employs over 51,000 people. West Kalimantan's major mineral exports are in the form of aluminum ores and concentrates. Nevertheless, their contribution to total provincial exports is less than 3% of the total. For details about West Kalimantan's alumina and bauxite industries, see chapter 19.

Figure 5.4. West Kalimantan Forest Area by Type, 2016 (hectares)



Source: BPS-Statistics Indonesia. 2017. *Kalimantan Barat in Figures 2016*. BPS-Statistics of Kalimantan Barat.

Tourism. West Kalimantan's major attractions include coastal and island resort facilities, marine and jungle ecotourism, natural reserves, historical sites, and cultural events (Map 5.4). There are numerous resort facilities around the city of Singkawang, including those in the northern regency of Sambas. The major marine reserves are at (i) Selimpah Beach, where turtles lay their eggs; (ii) Karimata Island's marine nature reserve, which covers an area of 77,000 km^2, and which contains many species of turtles and dugongs; and (iii) Kendawangan Nature Reserve, a large area of lowland swamp forests, situated on the province's southwest coast. Major national parks include Gunung Palung National Park in Ketapang Regency, Betung Kerihun National Park, Danau Sentarum National Park in Kapuas Hulu Regency, Bukit Raya-Bukit Baka National Park, and Baning National Park. For details about West Kalimantan's tourism industry, see chapter 22.

Map 5.4. West Kalimantan Tourist Map

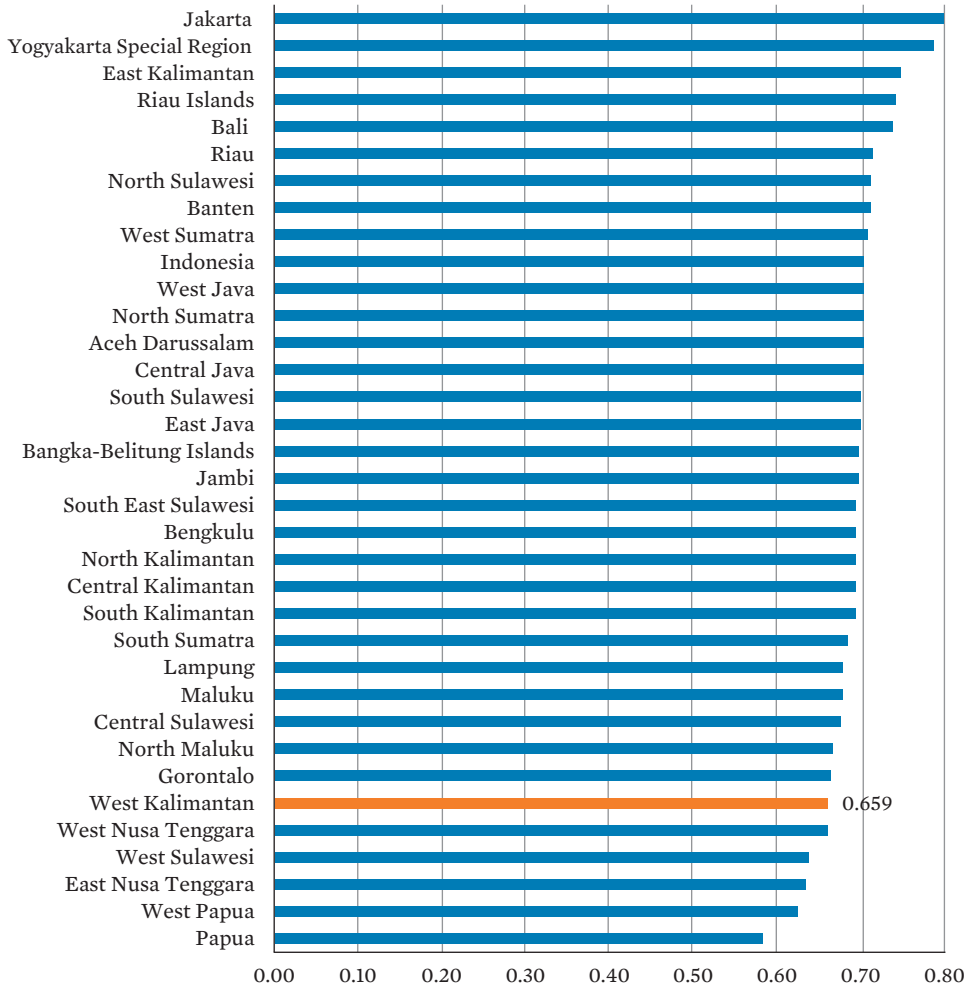
Source: IndonesiaTourism.com. West Kalimantan. http://www.indonesia-tourism.com/west-kalimantan/index.html (accessed 5 December 2017).

5.6 Economic Profile

Human Development Index. The Human Development Index measures three basic dimensions of human development: (i) health, (ii) access to knowledge, and (iii) standard of living. Health is measured by life expectancy at birth. Knowledge is measured by mean years of education among the adult population, and access to learning. The standard of living is measured by gross national income per capita expressed in constant international dollars converted using purchasing power parity conversion rates.

Among Indonesia's administrative divisions, West Kalimantan ranks 29th out of 34 administrative divisions in the country (Figure 5.5). The low ranking is largely due to its poor performance in education, especially that of basic education:

Figure 5.5. Human Development Index of Indonesia Administrative Divisions, 2016



Source: Central Bureau of Statistics. 2017. Statistics Indonesia. https://www.neliti.com/badan-pusat-statistik?province=kalbarandtype=datasetandlanguage=idandlanguage=enandyear_start=2016andper_page=100 (accessed 7 December 2017).

(i) In the education component, West Kalimantan ranks 25th in terms of expected years in school and a low 32nd in terms of mean years in school.
(ii) In the Human Development Index health component, the province ranks 15th in terms of life expectancy (70 years, versus 71 for all Indonesia).
(iii) In the standard of living component, it ranks 13th among all the administrative divisions.

Education. West Kalimantan's ranking in education is low relative to other Indonesian provinces. Its basic education falls short of the minimal service standards for implementation of good governance. In particular, schools in the province lack an adequate number of teacher work hours, an adequate number of education hours, availability of school curricula, lesson plans, the implementation of the program assessment, supervision by principals, and submission of evaluation results by teachers.[16] The dropout rate from senior secondary schools in the province is 7.2%, which is more than twice the national average of 3%.[17] Overall, one-fourth of the labor force lacks even the most basic primary school education.[18]

There are many higher-education institutions in the country. The following are the five leading universities in the province with their associated ranking in the country:[19] (i) Universitas Tanjungpura (rank: 63); (ii) Universitas Panca Bhakti (rank: 254); (iii) Universitas Muhammadiyah Pontianak (rank: 271); (iv) Universitas Kapuas Sintang (rank: 420); and (e) Universitas Nahdlatul Ulama Kalimantan Barat (rank: 494). All are in Pontianak, with the exception of Universitas Kapuas Sintang, which is located in Sintang. Universitas Tanjungpura is a large institution of over 25,000 students that offers several bachelor's degree programs. Universitas Panca Bhakti Universitas Muhammadiyah Pontianak also has a campus in Sintang and offers courses and programs leading to officially recognized higher education degrees such as bachelor's degrees in several areas of study. The remaining universities, namely, Universitas Panca Bhakti (under 250 students); Universitas Nahdlatul Ulama Kalimantan Barat (under 2,500 students); and Universitas Kapuas Sintang (under 4,500 students) are small institutions with higher education degree programs.

Income. The average monthly salary in West Kalimantan is in line with the national average (Table 5.2). However, average salaries differ substantially across provinces. Relative to the rest of the Kalimantan provinces in the island of Borneo, West Kalimantan's average salary is nearly 20% lower. This difference mainly reflects the much higher average salary in East Kalimantan, as well as above-average salaries in North Kalimantan and Central Kalimantan. Only South Kalimantan has an average salary like that of West Kalimantan. Elsewhere, Irian Jaya's provinces have an average salary that is nearly one-fourth higher than in West Kalimantan, which is mainly due to Papua's much higher average salary (over 40% higher). Only Jakarta has a higher average salary of nearly 1.5 times that of West Kalimantan.

[16] USAID. 2014. Good Governance on Minimum Service Standard for Basic Education at District Level: USAID-KINERJA Lessons Learned. Jakarta.
[17] ADB and Organisation for Economic Co-operation and Development. 2015. *Education in Indonesia: Rising to the Challenge.* Paris: OECD Publishing. http://www.oecd.org/publications/education-in-indonesia-9789264230750-en.htm (accessed 9 December 2017).
[18] BPS-Statistics Indonesia. 2017. *Kalimantan Barat in Figures 2016.* BPS-Statistics of Kalimantan Barat.
[19] Rankings from UniRank, an international higher education directory reviewing accredited Universities and Colleges in the world. For details, see UniRank. About Us. https://www.4icu.org/about/.

Table 5.2. West Kalimantan and Other Provinces by Region: Average Net Monthly Income by Main Industry, 2016 (Rp '000)

	Agriculture	Manufacture	Services	Total
West Kalimantan	**1,046**	**1,535**	**2,118**	**1,476**
Irian Jaya Region	1,322	1,405	2,320	1,827
Other Kalimantan Provinces	1,285	2,119	2,167	1,806
Java Region	808	1,122	1,636	1,542
Sumatra Region	1,141	1,356	1,746	1,455
Sulawesi Region	1,101	1,138	1,493	1,299
Maluccas Region	879	1,459	1,577	1,275
Lesser Sunda Islands	763	722	1,546	1,193
Indonesia	**981**	**1,186**	**1,616**	**1,410**

Rp = Indonesia rupiah.

Notes: Agriculture refers to agriculture, forestry, hunting, and fisheries. Manufacture refers to mining, manufacturing industry, electricity, gas, water, and construction. Services refer to wholesale trade, retail trade, restaurants and hotels, transportation, warehousing, communication, financing, insurance, real estate, business services, and public service.

Source: Central Bureau of Statistics. 2017. *Statistics Indonesia*. Jakarta. https://www.neliti.com/badan-pusat-statistik?province=kalbarandtype=datasetandlanguage=idandlanguage=enandyear_start=2016andper_page=100 (accessed 7 December 2017).

Within the province, agricultural sector salaries are, on average, 30% below the average for all salaries, while those of the service sector are 40% above the average. Manufacturing sector salaries are in line with the average for all sectors. In comparison to other provinces, West Kalimantan's service sector salaries are much higher than the average of any other region. Agricultural sector salaries are generally in line with the average of other regions, and those of the manufacturing sector are higher than the country's average for that sector.

Rural–Urban Distribution. The world's population is increasingly becoming urbanized. About half of the world's population lives in cities, and in Indonesia, the share equals 47%. Within Indonesia, 33% of the population in West Kalimantan lives in cities, which is the 7th lowest share among the country's 34 provinces for which data are available. However, the proportion of the total population living in urban areas has risen rapidly, from one-fourth, according to the 2010 census, to one-third, according to government estimates for 2015.[20]

Urbanization. If well managed, West Kalimantan's large cities of Pontianak and Singkawang offer important opportunities for economic development and for expanding access to basic services, including health care and education, for large numbers of people. It is more efficient to provide public transportation, housing, electricity, water, and sanitation for a densely settled urban population than to provide a similar level of services to a dispersed rural population. It is also less damaging to the environment. Pontianak is aiming to become a so-called smart city by 2019 under the government's 100 Smart City project, which aims to integrate information and communication technology (ICT), and various physical devices connected to the network (the Internet of Things or IoT) to optimize the efficiency of city operations and services and connect to citizens.

[20] BPS-Statistics Indonesia. 2017. *Kalimantan Barat in Figures 2016*. BPS-Statistics of Kalimantan Barat.

Table 5.3 summarizes the key socioeconomic indicators for West Kalimantan. As noted earlier, indicators for education generally fall short of the national average. Moreover, there is a low number of technical training high schools that can prepare students for employment as skilled labor in targeted industries operating in the province. The result is that economic indicators for the population are also low, compared with the national average. These indicators refer to per capita GDP, which is one-third below the national average; and average net wages for such professions as administrative and managerial workers (30% below national average), sales workers (16% below national average), services workers (26% below national average), and workers in agriculture, forestry, and fisheries (19% below national average).

Table 5.3. West Kalimantan Profile

Category	Item	West Kalimantan	Indonesia
A. Geography			
	Land Surface (km²)	146,807	
	Capital City	Pontianak	
	Administrative Divisions	Regencies of Bengkayang, Kapuas Hulu	
B. Population			
	Population (2014)	4,546,439	
	– % Urban	33.1	
	–% Rural	66.9	
	% Annual Population Growth (2010–2015)	16.6	1.38
	Population Density (persons/km²)	31	
	% Poverty (2012)	8.0	
	Human Development Index (2016)	65.9	
C. Demographics			
	Ethnic Groups	Dayak (35%), Malay (34%), Javanese (10%),	
	Major Languages Spoken	Indonesian (official), Malay (Pontianak Malay),	
	Religions	Islam (59%), Christian (34%), Buddhism (5%)	
D. Education			
	Number of Universities	47	
	– Private	4	
	– State	43	
	Numbered University Students	81,579	
	– Private	32,699	
	– State	48,880	
	Vocational High Schools		
	– Number of Schools	24	
	– Number of Teachers	735	
	– Number of Students	7,669	
	% Literacy Rate	95.0	97.4
	– Men	97.2	98.6
	– Women	92.9	96.2
	% Population that Uses Internet	10.0	
	– Urban	23.2	
	– Rural	4.2	

continued on next page

Table 5.3 *continued*

Category	Item	West Kalimantan	Indonesia
E. Economy			
	Gross Provincial Domestic Product ($ million in 2013)	1,489	912,500
	Per Capita GDP ($ in 2015)	2,357	3,570
	% Real GDP Growth (2000–2013)	4.9	5.2
	– Exports (fob value, $ million)	495.8	
	– Imports (cif value, $ million)	267.0	
	– Trade Balance ($ million)	228.8	
	Average of monthly expenditures per capita in urban areas, $/month (2015)	72.9	78.3
	– Food	34.5	33.3
	– Nonfood	38.4	45.0
	Average of monthly expenditures per capita in rural areas, $/month (2015)	44.0	48.1
	– Food	24.9	26.7
	– Nonfood	19.1	21.3
	Average of Net Wage or Salary, $/month (2016), of which:	153.4	159.0
	Professional technical and related workers	*198.4*	*207.6*
	Administrative and managerial workers	*262.8*	*373.8*
	Clerical and related workers	*202.8*	*196.2*
	Sales workers	*114.5*	*136.0*
	Services workers	*86.3*	*116.9*
	Agricultural, forestry, hunting, and fishermen workers	*114.7*	*96.2*

CIF = costs, insurance, and freight; FOB = free on board; GDP = gross domestic product; km² = square kilometer.

Sources: Badan Pusat Statistik (BPS-Statistics Indonesia) and BPS-Statistics Indonesia. 2010. *Population by Region and Religion in Indonesia*. https://sp2010.bps.go.id/index.php/site/tabel?tid=321&wid=0 (accessed 20 October 2019).

PART III

Government Policies

6

Sarawak Public Policies

6.1 National Development Policies

The Malaysian government's International Trade and Industry Ministry and the Economic Planning Unit (EPU) of the Prime Minister's Department promote the development of the country's areas bordering Indonesia and Thailand. Much of the work is being carried out under subregional programs such as BIMP-EAGA and the Indonesia–Malaysia–Thailand Growth Triangle (IMT-GT). At the center of these efforts is the concept and coverage of border economic areas spread over wide geographic areas. Instead of narrowly defined special economic zones (SEZs), the border economic areas cover the operation of a network of activities that encompasses clusters associated in varying degrees of collaboration with transnational productive activities to achieve well-defined goals selected from a broad spectrum of development objectives.

This strategy reflects Malaysia's most recent development plan, that is, the Eleventh Malaysian Plan, which builds on the so-called National Transformation Policy 2011–2020 and which itself focuses on the implementation of the New Economic Model (NEM). The NEM has seven strategic targets, two of which are central to Sabah's transformation. The first is the expansion of productivity as a means of expanding economic growth, and the second is the development of skilled labor. Productivity expansion involves shifting away from earlier government-driven initiatives to instead target actions across the public sector, industry players, and individual enterprises.[21] Skilled labor development will drive the acceleration in economic growth and better align knowledge and skills with industry requirements and enhanced TVET services. These broad-based actions are being complemented by the Sabah Development Corridor, which has six strategic development areas covering tourism, energy, livestock, research and development (R&D), marine resources, palm oil, and oil and gas. More recently, the Sabah Structure Plan 2033, launched in October 2016, contains a detailed strategy for development of air, road and rail connectivity in the state; sector strategies for industrial zones of manufacturing activities, agri-food processing, fisheries, general tourism and health tourism, as well as downstream activities for the palm oil, livestock, agriculture and aquaculture industries.[22]

The present program for the areas bordering Indonesia started with Sabah–North Kalimantan.[23] For the Government of Malaysia, the objective is to transform Sabah from its primary commodity export dependence into an economy driven by high-technology industries and service-based activities. For that transformation to occur within the medium

[21] Government of Malaysia. 2015. *Eleventh Malaysia Plan 2016–2020: Anchoring Growth on People.* Kuala Lumpur. http://www.epu.gov.my/sites/default/files/Chapter%201.pdf.
[22] Town and Regional Planning Department Sabah. 2016. *Sabah Structure Plan 2033.* Kota Kinabalu.
[23] ADB. 2018. *Pre-Feasibility Study of Sabah-North Kalimantan Cross-Border Value Chains.* Manila.

term, Sabah needs to access North Kalimantan's raw materials and open its markets to that province's rapidly growing population that currently has one of Indonesia's highest per capita income levels.

In the BIMP-EAGA context, implementation of the ASEAN Economic Community at the end of 2015 has enabled the state government of Sabah to promote its economic integration in the subregion in an effort to expand trade ties with neighboring countries. This initiative reflects government and private sector interests in diversifying the Sabah economy and developing complementary production activities that generate economies of scale and allow industries to move into high-value markets.

New infrastructure developments underway between Sabah and North Kalimantan will support those efforts and lay the groundwork for possible transboundary supply chains. Road connectivity between Sabah and North Kalimantan will be enhanced by a proposed road connecting Kalabakan in Sabah to Simenggaris in North Kalimantan.[24] ADB has provided technical support to the $160 million project with construction of the road infrastructure and a customs, immigration, quarantine, and security (CIQS) complex on the Sabah side. In power interconnection, North Kalimantan is set to become an efficient power center for the region, and there are plans to interconnect the province's transmission system with eastern Sabah.

For the area bordering Thailand, the Government of Malaysia has explored the possible development of special border economic zones (SBEZs).[25] The aims are (i) to attract foreign and domestic investment, along with the transfer of know-how and technology; (ii) to generate employment in the area and develop skills for the local population; (iii) to support cross-border trade and investment, especially along corridors; (iv) to enhance social and economic development in the border provinces in order to promote peace and harmony, and the well-being of the local population; and (v) to serve as a "demonstration area" and transition to wider subregional and regional integration. The SBEZs would support the Northern Corridor Economic Region development program, which is a government initiative to accelerate economic growth and raise income levels in northern Peninsular Malaysia.

6.2 State Development Plan

The State Planning Unit of Sarawak is the agency charged with mapping out the state's future socioeconomic direction. It has been instrumental in the implementation of the Sarawak Corridor of Renewable Energy (SCORE) plan, which was launched by the Government of Sarawak in 2008. SCORE is an ambitious regional development strategy that aims to develop the central part of Sarawak (Mukah, Tanjung Manis, Samalaju, Baram, and Tunoh) into an industrial area. Mukah is to be developed as a smart city that will serve as the main hub of the Sarawak Corridor. Tanjung Manis is to be developed into a port city with industrial areas. Samalaju is to become a heavy industry center, and Baram and Tunoh are to focus on tourism and resource-based industries. These new growth centers are expected to trigger the development of the entire Sarawak state.

[24] ADB. 2016. Consultation Mission to Malaysia: Proposed Kalabakan–Serudong Road. Back-to-office report. 14 December.

[25] M. Lord and P. Tangtrongita. 2014. *BIMP-EAGA Investment Corridor Profiling Study.* Manila: ADB (TA-6462).

For border area development, however, the state government has a fairly limited role. A recent study cites the defective decentralization caused by the absence of a legal framework; lack of coordination between subnational and central government institutions; and the limited authority given by the central government to the subnational government, limiting the scope for West Kalimantan to conduct cross-border cooperation with Sarawak.[26] Even though decentralization affords the West Kalimantan provincial government a greater role in initiating cross-border cooperation with their counterpart in Sarawak, the strategic decision on cross-border cooperation is still vested in the central government, as the management of border areas remains the central government's responsibility.

[26] M.F. Karin. 2015. Local-Central Dynamics and Limitations of Micro-Regionalism: Understanding West Kalimantan and Sarawak Cross-Border Cooperation. In M. Caballero-Anthony and R. Barichello, eds. *Balanced Growth for an Inclusive and Equitable ASEAN Community.* Singapore: S. Rajaratnam School of International Studies.

7

West Kalimantan Public Policies

7.1 National Border Area Development Program

In 2016, the Government of Indonesia introduced a new Integrated Border Area Development Program that aims to (i) lower poverty of the more disadvantaged border regions, where poverty rates are more than twice as high as in urban areas; (ii) bolster economic growth in those areas, whose expansion has been 20% lower than the country as a whole; and (iii) reverse the trend toward increasing congestion and agglomeration in major cities. President Joko Widodo has prioritized key areas bordering Malaysia, Papua New Guinea, and Timor-Leste. West Kalimantan has been included as one of the initial three provinces in the program.

The border area development program will achieve its goals through three channels:

(i) First, greater employment and more value-added activities will improve living standards, reduce poverty, and lower inequality in the targeted border areas.
(ii) Second, faster economic growth will be brought about by increased productivity associated with economies of scale and production complementarities with neighboring countries.
(iii) Third, accelerated border activity will reverse the negative investment effects from agglomeration of activities in the major urban centers of Jakarta, Surabaya, and Bandung, where population density is over 15,000 persons/km^2, compared with only 10 persons/km^2 in Papua and 32 persons/km^2 in West Kalimantan.

The Indonesian government's border area development initiative refers to the new economics of geography and its inclusive socioeconomic approach to border area advancements. It refers to a network of activities that seek to promote cross-border trade and investment and encourage economic and social development of areas along the border. Underlying this strategic goal are four channels through which border economic areas bolster socioeconomic well-being:

(i) Incoming investment transfers know-how and technology, and thereby helps the border areas move up the value chain, expand skilled labor requirements, and raise wages and salaries.
(ii) Balanced growth between border regions and urban centers promotes income equality and reduces welfare disparities.
(iii) Improved welfare and employment along the border ameliorates possible socio-political instability that can spill over from neighboring countries.
(iv) Cross-border cooperation opens opportunities for wider regional cooperation, especially along subregional economic corridors.

The government's border area development program is founded on the construction of seven state border crossing posts (*Pos Lintas Batas Negara*, or PLBN) in the provinces of West Kalimantan (Malaysia gateway); East Nusa Tenggara (Timor-Leste gateway); and Papua (Papua New Guinea gateway). Some of the PLBNs have already been inaugurated by President Joko Widodo, while others still await official inauguration.

Building on those PLBNs, the program seeks to integrate a cluster of industries and infrastructures that will deepen trade with neighboring countries. The characterization of this integrated border area development program is as follows:

(i) The *industries* are those that produce either traditional or newly emerging tradeable goods and services that can be spread across the entire province, or concentrated in certain regions.
(ii) The *infrastructures* refer to:
  (a) *Hard infrastructure* that consists of large physical networks necessary for the functioning of industries and the commercialization of their products; and
  (b) *Soft infrastructure* that consists of the institutions required to support the socioeconomic conditions needed for cross-border trade, including services associated with finance, education, health, public policies and the regulatory environment, and security and law enforcement.

The border development area therefore extends well beyond conventional SEZs that have narrow, physically defined, and often secured areas with a single management and administration. A border development area instead covers the operation of a network of activities spread over a wide geographic area. The extent of that area depends on the location and network systems of the clusters that make up the border area development program.

As such, we define the government's border development area program as a *cluster of activities that is associated in varying degrees of collaboration with cross-border networks of productive activities to achieve well-defined goals selected from a broad spectrum of development options.*

Those development goals need to be clearly delimited because there are a wide range of possible objectives that will determine the strategy and action plan for any particular area. The spectrum of possible goals for the border zone include, among others, economic growth of the target areas, alleviation of income inequality among geographic areas, attainment of political and social stability within an area, or the general improvement of well-being of households in the border region.

7.2 Provincial Development Plan

West Kalimantan provincial government's commitment to the central government's border area development program is motivated by the desire to transform the province's resource-based economy, currently driven by external demand for its raw materials, into more productive, high-value added industries, with widespread and enhanced investments, more technology-based industries, and a knowledge-based labor force. The present study supports that objective with the identification of specific projects making up a cluster of integrated activities that promote increased commerce between West Kalimantan and Sarawak, and ultimately help West Kalimantan's industries produce high-value and innovative goods and services at the technology frontier.

Since 2000, the Government of Indonesia has implemented a wide range of decentralization programs, reversing its previous system of centralized government and development planning. The programs cover health, primary and middle-level education, public works, environment, communication, transport, agriculture, manufacturing, and other sectors.

West Kalimantan's Medium-Term Development Plan (RPJMD) 2013–2018 has as its vision the achievement of a society that is religious, healthy, educated, safe, cultured, and prosperous.

The provincial government's plan is to diversify the economy to reduce its dependence on relatively few commodities like rubber and oil palm whose markets are subject to large price fluctuations. Special emphasis is to be given to agri-processing industries as one of the engines of growth. It requires development of downstream activities to expand value added and reduce dependence on primary processing activities. In infrastructure, special attention is to be given to connectivity along the West Borneo Economic Corridor and reliable power supplies to domestic industries and households. The challenge for the government is to integrate different sector and industry development projects into a cohesive strategic plan that is internally consistent and supportive of the border area development program.

Trade at the West Kalimantan–Sarawak border checkpoints remains modest because of regulations restricting trade. On the West Kalimantan side are the need to present to the Indonesian authorities with documents on standardization and certification of food and beverage products obtained from Malaysia's local authorities in Sarawak, regardless of the extent to which the products are processed. This restriction affects Indonesia's halal product imports from Sarawak. Regulatory guidelines for officials on both sides of the border remain unclear and businesses are anxiously awaiting government clarification to facilitate trade between the two territories.

8

Border Crossings and Inland Port

8.1 Border Crossings

There are two types of trade taking place along the border area between Sarawak and West Kalimantan. The first type of trade is the so-called border trade that refers to locally traded goods by people living in the area. The second type is cross-border commerce of internationally traded goods between Sarawak and West Kalimantan. It also covers transit trade. Our major interest is with the second type of trade since the former lacks any value-added gains from trade.

Regulatory Issues

Key bilateral trade issues between Indonesia and Malaysia are the 1970 BTA and trade restrictions on Tebedu-Entikong cross-border trade. The 1970 BTA regulates the amount of goods from Indonesia that can be sold between Indonesia and Malaysia along the border area. It is intended to regulate traditional movements through informal trading routes known as *jalan tikus*. The principal types of goods exported from West Kalimantan are agricultural produce like eggplant and pepper, while the principal types of goods imported from Sarawak are processed agricultural products like sugar and cooking oil.[27]

Under the 1970 BTA, a cross border identity card (*Pas Lintas Batas*) allows border area residents to import up to 600 Malaysian ringgit (RM) (about $150 or 2,025,900 Indonesian rupiah [Rp]) a month duty-free in Entikong. With this travel document, the border villagers are allowed entry either to Malaysia or Indonesia, but within a specified distance of 30 kilometers (km) in the border areas.[28]

Local traders have asked the Indonesian government to increase the duty-free limit to $1,500 a month. At the 5th Negotiation of BTA Review 1970, which took place on 2–3 November 2017, the Indonesian and Malaysian governments agreed to complete the Review of the 1970 BTA during the course of 2018. The key issues to be determined are the specific goods that will be allowed to be traded and the monthly limit on trade for people living on the Indonesia–Malaysia border.

[27] R. J. M. Jaleha. 2014. Informal Cross-Border Trade: Who Participates and What Is the Impact of Participation on Income? A Case Study in Entikong, Indonesia. The Hague, Netherlands: International Institute of Social Studies of Erasmus University. Masteral thesis.

[28] Sulenhan et al. 2013. *Development at the Margins: Livelihood and Sustainability of Communities at Malaysia–Indonesia Borders*. Zagreb, Croatia: Institute for Social Research.

Official Border Crossings

The main form of transportation between West Kalimantan and Sarawak is through land. There are three border crossing posts (Map 8.1):

(i) *Entikong (West Kalimantan)–Tebedu (Sarawak) Crossing.* The main land crossing point is at Entikong on the Indonesian side and Tebedu on the Malaysian side (Figure 8.1). The new Entikong immigration, customs, quarantine and security (ICQS) facility was inaugurated by President Joko Widodo in December 2016. Its 8-hectare area contains buildings, parking areas, commercial offices, employee housing, a mosque, and a thematic market. On the Malaysian side, the Tebedu facility is old and antiquated. The facility will be either upgraded or rebuilt, based on the recommendations of a task force created on 28 December 2017. There is also an inland port, which is described in the next section. Road transport infrastructure is being upgraded on both sides. On the Sarawak side, the upgrade will link to the Pan Borneo Highway (Map 8.2).

(ii) *Nanga Badau (West Kalimantan)–Lubok Antu (Sarawak) Crossing.* West Kalimantan's Nanga Badau CIQ is a facility that was inaugurated by President Joko Widodo on 17 March 2017 (Figure 8.2). The 1970 BTA covers five districts, namely, Badau, Empanang, Batang Lupar, Puring-Kencana and Embaloh-Hulu. People from these districts are issued a border pass that allows each person to trade up to RM600 a month tax-free. For international trade, the dominant export is palm oil currently shipped to Sarawak by the Kencana Group and the Sinar Mas Group. Imports are in the form of machinery used for the palm oil extraction industry and spiral pipes. On the Sarawak side, Lubok Antu is located in Sri Aman Division, which has a population of 10,644 people. Majority of people living in the area are small-scale farmers producing oil palm, rubber, rice and pepper. Nearby is the important Batang Ai National Park, which shares a border with West Kalimantan National Park.

(iii) *Aruk (West Kalimantan)–Lundu (Sarawak) Crossing.* West Kalimantan's Aruk CIQ was established in 2016 and is not yet operational (Figure 8.3). President Jokko Widodo also inaugurated the facility on 17 March 2017. Currently, there is only local trade under the 1970 BTA, and most of it is in the form of agricultural products, especially pepper.

Map 8.1. Sarawak–West Kalimantan Border Checkpoints

Source: Adopted from Google Maps.

Figure 8.1. Entikong (West Kalimantan)–Tebedu (Sarawak) Crossing

CIQ = customs, immigration, and quarantine.
Sources: Map by Google; photos by Alisa Lord.

Map 8.2. Pan Borneo Highway

Source: Map by Google modified by the authors.

Figure 8.2. Nanga Badau (West Kalimantan)–Lubok Antu (Sarawak) Crossing

CIQ = customs, immigration, and quarantine.
Sources: Map by Google; photos by Alisa Lord.

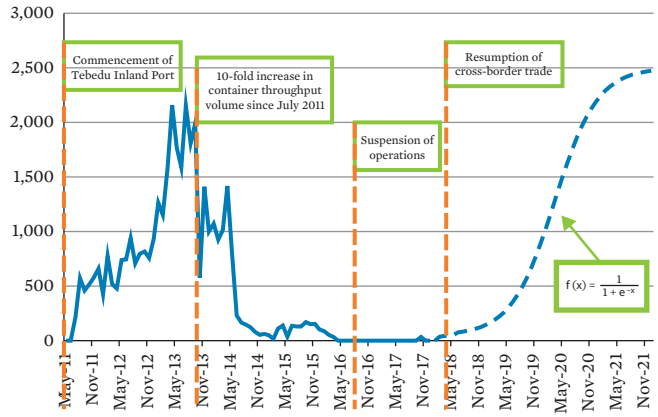
Figure 8.3. Aruk (West Kalimantan)–Lundu (Sarawak) Crossing

CIQ = customs, immigration, and quarantine.
Sources: Map by Google; photos by Alisa Lord.

8.2 Container Throughput at Tebedu Inland Port

The Entikong–Tebedu border crossing has been the main official crossing point for internationally traded goods. In the early part of the 2010s, strong growth in container throughput was the main driver of cross-border trade. That expansion was associated with the successful operations of the Tebedu Inland Port during the period. The following events highlight efforts that were needed to reach 2,250 twenty-foot equivalent units (TEUs) of containers within 2 years of starting operations (Figure 8.4).[29]

Figure 8.4. Tebedu Inland Port Container Throughput, Actual 2011–2017 and Projected 2018–2021
(20-foot equivalent unit containers)



Sources: Historical information from SM Inland Port; authors' estimates.

Commencement

Container operations commenced in May 2011 with the first users of the warehouse facilities. The port authorities confronted complaints about tariffs, processing delays, and resistance by truck operators to switch from informal trade routes to the Tebedu Inland Port route. As a result, affordable duties were applied to small traders, and customs officials began diverting cargo trucks weighing over 5 metric tons (MT) to the inland port. Furthermore, duties on transshipments were eliminated and special passes with special tariff rates were issued to small traders. Also, to reduce processing delays, a one-stop service center was created within the port area. By August 2011, the port was fully operational (Figure 8.5).

During the initial years of operation, the port authorities supported the establishment of an Entikong Dry Port on the West Kalimantan side of the border. In 2012, they discussed a possible joint venture with the Indonesian Chamber of Commerce and Industry (Kamar Dagang dan Industri, or KADIN) to create an Entikong Dry Port on 17 hectares of land on the West Kalimantan side of the border. It was to complement the Tebedu Inland Port and help improve living standards in the border area through increased economic activity, especially that associated with the establishment of local industries, and the development of a market place for tourists to buy local goods along a green lane linking Entikong with Tebedu that would form part of a free trade zone.

Figure 8.5. Aerial View of Tebedu Inland Port

Source: Photo by SM Inland Port.

[29] The material in this section draws from annual reports prepared by SM Inland Port Sdn Bhd, which operates and manages the Tebedu Inland Port.

Expansion Phase

The port's container throughput volume, which measures the amount of cargo tonnage handled, experienced a 10-fold increase between July 2011 and July 2013. These throughput statistics refer to the total volume of cargo discharged and loaded at the inland port, including breakbulk, liquid bulk, dry bulk, containerized cargo, transit cargo, and transshipments.

In early 2014 the Road Transportation Department of Malaysia (Jabatan Pengangkutan Jalan Malaysia, or JPJ Malaysia) ruled that Indonesian lorries could not go beyond the Tebedu Inland Port. The intent of this ruling was to support domestic transport and logistics companies.

Suspension of Operations

In early 2014, the Indonesian police and customs authorities tightened their enforcement on cargo being transported across the border. Then, in mid-May of the same year, the Indonesian government halted internationally traded goods. The government classified Entikong Customs as a C-status facility capable of only handling border trade. It limited trade to so-called border trade, as specified by the 1970 BTA. Under the agreement, border trade became limited to RM600 worth of cargo per person per month and those goods were to be used exclusively for local consumption by people living in the border area. The types of goods permitted were mainly agricultural products from the Indonesian side of the border and, on the Malaysian side, tools and equipment used for daily activities by the local population.

Border trade restrictions severely affected local businesses and household income and employment.

(i) On the Indonesian side, West Kalimantan traders held demonstrations in the second half of 2014 to request that the Government of Indonesia designate Entikong as an international point of entry and exit for cargo. They also demanded compensation for business losses resulting from the border closure to international trade, and the construction of an inland port in Entikong.
(ii) On the Malaysia side of the border, the SM Inland Port authorities attempted to resolve the difficulties through meetings from mid-2014 through the end of 2015 with various Indonesian authorities. They included the Governor of West Kalimantan, the Trade Attaché of the Embassy of Indonesia, the chairman of KADIN as well as customs officials in West Kalimantan, Indonesia's National Border Management Agency (Badan Nasional Pengelola Perbatasan [BNPP]), Ministry of Trade and Industry Indonesia, and the Consulate General of Indonesia in Kuching.

Despite these efforts, the Indonesian government determined that the Entikong customs facility was unable to operate as an international entry and exit point for imports and exports because it did not have the capacity to issue goods terminal numbering codes for the United Nations Code for Trade and Transport Location (UN/LOCODE).[30]

Trade Barrier Reductions

The ASEAN Economic Community (AEC) entered into force at the end of 2015. Each of the Indonesian and Malaysian governments pledged to strengthen trade ties with the other prior

[30] UN/LOCODE is a geographic coding scheme developed and maintained by the United Nations Economic Commission for Europe (UNECE), which assigns codes to locations used for trade and transport.

to the start of the AEC, and those pledges included explicit interest in the reactivation of Entikong–Tebedu trade.

The process will nevertheless be gradual, as trade barriers progressively addressed nontariff restrictions at the border and behind the border. Reflecting this approach, the ASEAN member states (AMS) adopted the AEC Blueprint 2025 at the 27th ASEAN Summit in November 2015. It mapped the work for ASEAN economic integration over a 10-year period between 2015 and 2025.[31] So far, ASEAN's greatest success has been in tariff reduction. On average, 96% of the AMS tariff lines are at 0%, and the share is expected to reach 98.7% by the end of 2018.

However, achievements in tariff liberalization have been offset by the rise in nontariff measures, which increased from 1,634 to 5,975 between 2000 and 2015. There are also challenges to tackling barriers to trade in services. AMS have more restrictive services policies in general than any other region in the world, except for the Gulf states. ASEAN members have also failed to fully address labor mobility issues to include unskilled labor. Mutual recognition agreements have been reached for eight professional qualifications, but these cover only 1.5% of ASEAN's total workforce. More importantly, behind-the-border reforms and policy harmonization have yet to be addressed. Uniformity in regulatory rules remains challenging, given the widely different levels of development and often differential national interests. The result has been delays in the implementation of specific initiatives, as well as the failure to ratify signed agreements and their alignment with national laws.

All these issues are relevant to Sarawak–West Kalimantan bilateral trade, and the AEC Blueprint 2025 addressed them through five distinct action areas: (i) reductions in nontariff barriers; (ii) simplification of rules of origin; (iii) implementation of trade facilitation measures; (iv) implementation of the ASEAN Trade in Services Agreement; and (v) harmonization of standards and regulatory convergence among member states.

Resumption of Operations

One of the PLBNs, the Entikong State Border Crossing Post, was officially opened by Indonesian President Joko Widodo on 21 December 2016, and in October 2017, Indonesian cargo shipments in the form of rice and goats occurred. The Indonesian government also announced the creation of an inland port by 2019. On the Sarawak side of the border, the Deputy Prime Minister of Malaysia and the Chief Minister of Sarawak visited Tebedu on 28 December 2017. The government established a task force to examine whether the CIQ complex will be upgraded or a new facility built.

A breakthrough in trade talks between Indonesia and Malaysia occurred on 22 November 2017 at the 12th annual consultation in Kuching, when Indonesian President Joko Widodo and Malaysian Prime Minister Najib Razak agreed to reopen trade at the Tebedu–Entikong border area. That decision implied the revival of activities by the Tebedu Inland Port. After signing the 1970 BTA and Border Cross Agreement between the two countries, the Malaysian Prime Minister said that, taking into consideration the potential of the Tebedu–Entikong border area, the federal government planned to create a commercial zone at the area, which would benefit residents of both countries.

[31] J. Menon and A. C. Melendez. 2017. Will 2025 be the Final Deadline for the AEC? https://blogs.adb.org/blog/will-2025-be-final-deadline-aec.

9

West Borneo Economic Corridor

9.1 Importance of the Corridor

Economic corridors have emerged as one of the main vehicles for BIMP-EAGA subregional development. The West Borneo Economic Corridor (WBEC), along with the Greater Sulu Sulawesi Corridor, was initially proposed in 2004 by ADB, which is the regional development advisor for BIMP-EAGA. They were subsequently endorsed in the 4th BIMP-EAGA Summit in Singapore in November 2007.[32] A follow-up ADB technical assistance (TA) assessed the viability of potential economic corridors based on existing and potential trade and tourism flows. That TA also identified potential public–private sector investments in transport infrastructure, trade, and logistics.[33]

The corridors were formally incorporated into the BIMP-EAGA strategy as leading drivers of cross-border collaboration under the *Implementation Blueprint* (2012–2016).[34] According to the blueprint, the BIMP-EAGA corridors form the basis for priority infrastructure projects that aim to activate and accelerate cross-border activities, promote access to markets, reduce trade and transport costs, and facilitate growth between neighboring production, export or consumption points. As economic instruments, those corridors aim to promote efficient cross-border movement of the factors of production and stimulate trade, investment, tourism, and other economic activities.

The WBEC represents a well-defined geographic area within the BIMP-EAGA subregion. It has economic nodes that provide connectivity and networking of production, distribution, and market functions within and outside the area. They represent important vehicles for subregional networking of activities.

[32] ADB. 2004. *Prioritizing Strategic Directions for BIMP-EAGA*. Manila. Available: http://books.google.co.th/books?id=Ni0WAQAAMAAJandsource=gbs_navlinks_s.

[33] ADB. 2007. *Efficiency Improvement and Connectivity Strengthening in Archipelagic Southeast Asia Project*. Manila (RETA 6441 cofinanced by the Regional Cooperation and Integration Fund under the Regional Cooperation and Integration Financing Partnership Facility). http://www.adb.org/projects/documents/efficiency-improvement-and-connectivity-strengthening-archipelagic-southeast-as-0.

[34] BIMP-EAGA. *BIMP-EAGA Implementation Blueprint (2012–2016)*. http://www.bigconnectivity.org/beta/sites/default/files/2017-03/BIMP-EAGA_ImplementationBlueprint.pdf.

The WBEC (Map 9.1) extends approximately 1,500 km and covers Brunei Darussalam, West Kalimantan in Indonesia, and Sarawak and Sabah in Malaysia. The BIMP-EAGA Blueprint does not explicitly include the Federal Territory of Labuan (Malaysia).

Map 9.1. West Borneo Economic Corridor

Source: Map by Google, modified by the authors.

9.2 Corridor Characteristics

The WBEC's notable features are as follows:

(i) *Commercial nodes.* The corridor links important *commercial nodes* in each area: (a) Pontianak in West Kalimantan, Indonesia; (b) Kuching (Sarawak, Malaysia); (c) Bandar Seri Begawan (Brunei Darussalam); (d) Federal Territory of Labuan (Malaysia); and (e) Kota Kinabalu (Sabah, Malaysia).

(ii) *Border nodes.* The corridor contains the *border nodes* of Entikong, Nanga Badau, and Aruk in West Kalimantan and Tebedu, Lubok Antu, and Lundu in Sarawak; Miri in Sarawak and Sungai Tujuh in southwest Brunei Darussalam; Limbang in Sarawak and Kuala Lurah in northeast Brunei Darussalam, Limbang in Sarawak and Bangar in Brunei Darussalam; and Temburong in Brunei Darussalam and Lawas in Sabah.

(iii) *Gateway nodes.* The corridor includes the *gateway nodes* of Pontianak in Indonesia and Kota Kinabalu and Sandakan in Malaysia as gateways to regional and international markets.

9.3 Corridor Development

Corridor Stages

The success of the WBEC depends on its ability to attract investment, which, in turn, depends on the establishment of appropriate infrastructure and facilitation policies. In effect, that means that at the early stages of development, policy makers need to concentrate on building connectivity in the first of what has often been described as the four stages of economic corridor development (Table 9.1).[35]

Stage 1 provides an efficient movement of cargo and people within the corridors. Stage 2 offers efficient movement of cargo and people within and outside the corridors. Stage 3 adds the efficient flow of knowledge and information as well as flow of funds. Stage 4 builds commercial, border and gateway nodes and develops townships and urban centers along the

[35] R. Banomyong. 2008. Benchmarking Economic Corridors Logistics Performance: A GMS Border Crossing Observation. *World Customs Journal*. 4(1).

Table 9.1. Stages of Corridor Development

Stage	Corridor Type	Definition
1	Transport	Corridor that physically links a well-defined geographic space.
2	Multimodal	Corridor that physically links an area through the integration of various modes of transport and extends those linkages to the subregional or broader global context.
3	Logistics	Corridor that not only physically links an area, but also harmonizes the corridor institutional framework to facilitate the efficient movement of goods and people.
4	Economic	Corridor that is able to attract investment and generate economic activities along its less-developed areas. As a prerequisite, physical linkages and logistics facilitation must be in place.

Source: Representation by the authors.

corridor to support cross-border supply or value chains that connect to subregional, regional, and global value chains.[36]

At times a fifth stage is added to cover the building of corridor-level institutions, including the coordination of policies and regulations. It also covers implementation of cross-border socioeconomic and environmental policies, programs, and institutional capacity building.[37]

West Kalimantan's Connectivity

Connectivity in the West Borneo Economic Corridor prioritizes both electricity and road infrastructure. ADB is helping West Kalimantan to build a cross-border high-voltage transmission line and substation linking the West Kalimantan grid with that of Sarawak, Malaysia. It also includes road construction from Pontianak to the town of Entikong at the border with Sarawak. Additionally, the project will construct a new distribution network to improve the reliability of power in West Kalimantan and supply more households with electricity.

The project is aligned with ADB's support to the BIMP-EAGA implementation blueprint, which made improving infrastructure facilities a priority and power interconnection a key strategic pillar. It is also part of a larger effort by ASEAN to develop the Power Grid Interconnection Development Project.

Through ADB financing, the so-called West Kalimantan Power Grid Strengthening Project is helping the Indonesian government build a transmission line from Bengkayang in West Kalimantan to the Malaysian border. To provide access to electricity in West Kalimantan, the project will also construct two 150 kV high-voltage transmission lines, from Bengkayang to

[36] A. Sze. 2011. NAFTA Economic Corridor Development. Paper presented at the 10th Ministerial Conference. 22–24 November 2011. Baku, Azerbaijan. http://www.carecprogram.org/uploads/events/2011/SOM-Nov/NAFTA-Economic-Corridor-Development.pdf.

[37] G. Mulenga. 2013. Developing Economic Corridors in Africa: Rationale for the Participation of the African Development Bank. Abidjan, Cote d'Ivoire: African Development Bank. https://www.afdb.org/en/documents/document/regional-integration-brief-developing-economic-corridors-in-africa-rationale-for-the-participation-of-the-afdb-32380.

Ngabang and from Ngabang to Tayan. Malaysia will finance the transmission line extension from the border to Mambong, Sarawak.

On the West Kalimantan side, the project includes new power transmission lines, distribution lines, and associated substations that will result in a 145-km distribution line, distribution feeder extensions, and a substation. An 83-km cross-border high-voltage transmission line and a substation will be part of the overall transmission link on the Indonesian side to connect the West Kalimantan power grid to the power grid of Sarawak, thus enabling power exchange of about 230 megawatts between the two systems. ADB is preparing part of the transmission link on the Malaysian side as a separate nonsovereign loan financed project for the state-owned power utility in Sarawak.[38]

The project is part of Indonesia's efforts to reduce the country's dependence on oil-fueled power plants and lower the cost of electricity production. Imported electricity from Sarawak will help West Kalimantan reduce the marginal cost of electricity production, from more than $0.25 per kilowatt-hour to about $0.18 per kilowatt-hour. Depending on oil prices, PLN potentially will save about $100 million and reduce its government subsidies.[39] On the Sarawak side, it will support the government's efforts to export power.

[38] ADB. 2017. *Proposed Loan and Administration of Loan and Grant Republic of Indonesia: West Kalimantan Power Grid Strengthening Project*. Manila (Project Number: 41074). https://www.adb.org/sites/default/files/project-documents/41074/41074-013-smr-en_1.pdf.

[39] S. Hasnie. 2016. Grid Unlocked: The Mechanics of Cross-Border Electricity Sharing. In *Development Asia*. Manila. http://development.asia/case-study/grid-unlocked-mechanics-cross-border-electricity-sharing (accessed 12 December 2017).

PART IV

Analysis of Trade

10

Sarawak Exports

10.1 Exports by Major Classification

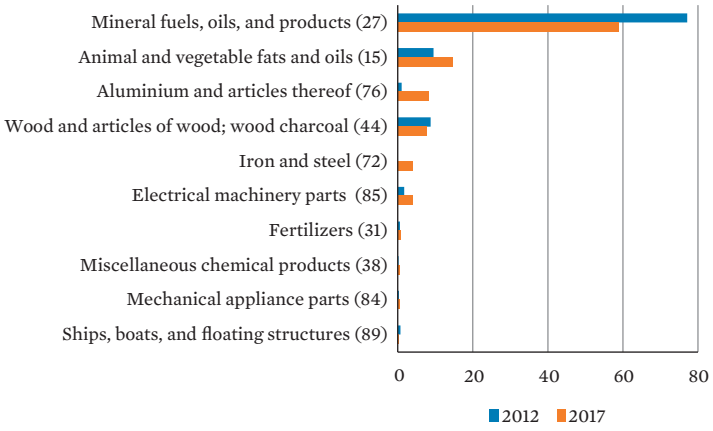
Figure 10.1 shows Sarawak's major export categories, defined by their 2-digit Harmonized System (HS) classification, known as HS Sections. There are 92 HS Sections and the figure shows those groupings of exports that contributed over 0.35% to total export earnings in 2017.

Gas and Oil. The largest export category (inorganic chemicals) is dominated by liquified natural gas (LNG) and crude petroleum oils. In 2017, foreign exchange earnings from this category contributed 58.4% of Sarawak's total revenue from goods exported. That large contribution was, nevertheless, down from over 77% in 2012. Within this category, LNG alone contributed 87.4% in 2017, down slightly from 88.6% in 2012. Crude petroleum oils accounted for 7.9%, also down slightly from 8.9% in 2012.

Palm Oil. In animal and vegetable fats and oils (HS 15), palm oil in its crude and processed forms accounted for 80.2% in 2017, down from 85% in 2012. Overall, the category represented 14.6% of the state's total export earnings in 2017, up from only 9.5% in 2012. Processed palm oil exports have been rising in importance. In 2012, they represented 9.6% and by 2017 their contribution had grown to 10.7% of the state's total foreign exchange earnings from this category.

Aluminum. Aluminum and articles thereof (HS 76) are the fastest rising export category of Sarawak. This category's contribution to the state's total exports of goods rose from only 1% in 2012 to 8.3% in 2017. Within the category, unwrought aluminum, not alloyed, contributed nearly 65% of total earnings in 2017, up from 57% in 2012. The importance of aluminum alloys grew sharply between 2012 and 2017, contributing only 9% in 2012 and, by 2017, nearly 26%. In contrast, articles made from aluminum have declined in importance, from nearly 33% of total export earnings in this category to less than 8% in 2017.

Figure 10.1. Sarawak's Major Export Categories, 2012 and 2017 (% of total exports)



Source: Authors' estimates derived from HS 6-digit trade data provided by Malaysia's Ministry of International Trade and Industry.

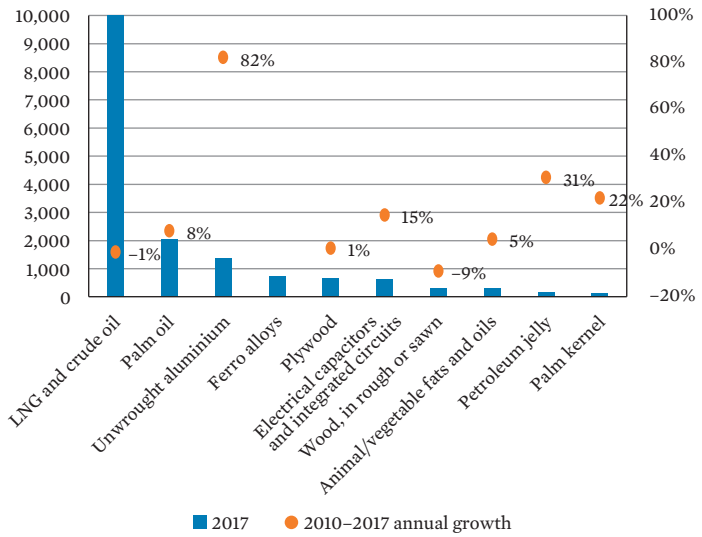
Wood and Its Products. Wood and wood product exports represented 7.7% of Sarawak's total export earnings in 2017, which was 1 percentage point below their contribution 5 years earlier. Within this category, plywood panels dominate exports, accounting for 45% of all exports within the group. Wood in the rough, whether stripped of bark or sapwood, or roughly squared, are also large, accounting for 11% of all exports in this category. However, their contribution has declined significantly from that in 2012.

Iron and Steel. Ferro-manganese and ferro-silicon have become important in recent years. Their combined contribution to the state's total export earnings in 2017 was 4%, in comparison to almost having no exports 5 years earlier. Ferro-manganese is used as a deoxidizer for steel. It combines powdered iron oxide and manganese oxide, which has the advantage of introducing manganese in controlled proportions during the production of steel. Ferro-silicon is an alloy of iron and silicon used in the production of steel and some types of iron. It is used as a source of silicon to reduce metals from their oxides and to deoxidize steel and other ferrous alloys. This process prevents the loss of carbon from the molten steel.

Electrical Machinery Parts. Electronic integrated circuits and diodes, transistors, and similar semiconductor devices have recently grown in importance for Sarawak's export earnings. The category accounted for nearly 4% of total exports in 2017, up from 1.7% in 2012.

Ships, Boats, and Other Floating Structures. Cruise ship and tug exports are becoming an increasingly important foreign exchange generator for Sarawak. Both types of vessels are equally important, accounting for 45%–50% of all earnings in this category. Together these two types of vessels represented 95% of all foreign exchange earnings from these types of exports in 2017. However, their trend growth is different. The importance of cruise ships has risen, from 8% in 2012 to 50% in 2017, while that of tugs has fallen, from 86% in 2012 to 45% in 2017.

Figure 10.2. Sarawak's Top 10 Export Products, 2017, and Growth Rates, 2010–2017 ($ million and percent)



Source: Derived from HS 6-digit trade data provided by Malaysia's Ministry of International Trade and Industry.

10.2 Major Product Exports

Figure 10.2 shows Sarawak's top-10 individual product exports in 2017, along with their average annual growth between 2010 and 2017. The following characterizations can be made about the major export products:

(i) *Crude oil and LNG* exports topped the list of major exports at the HS 6-digit product level. There has been a slight (1%) average annual pullback in exports since 2010, but they continue to dominate Sarawak's exports.

(ii) *Palm oil* has gained in importance, as foreign exchange earnings have risen at an average annual rate of 8% a year.

(iii) Exports of *unwrought aluminum* have become the third largest export product in the state, as exports have risen by an annual average rate of 82% between 2010 and 2017.

(iv) *Ferro alloys* have had an explosive growth. Sarawak began exporting ferro-manganese and ferro-silicon alloys in 2014 and, by 2017, they had become the state's fourth largest export.

(v) *Other top-10 exports* have risen modestly (1%–5% annually) in the case of plywood and animal and vegetable fats and oils; and robustly (15%–31% annually) in the case of electrical capacitors and integrated circuits, palm kernel, and petroleum jelly. Only wood in the rough or sawn has declined in importance, as the value of their exports fell by an average of 9% yearly between 2010 and 2017.

11

West Kalimantan Exports

11.1 Exports by Major Classification

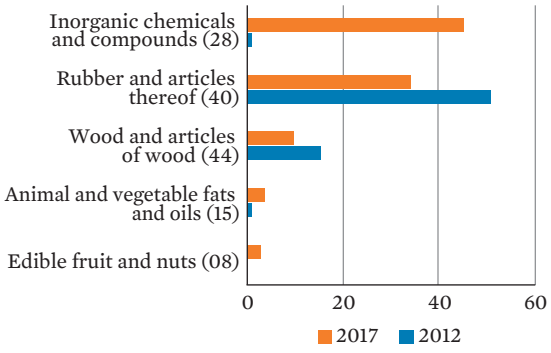
Figure 11.1 shows West Kalimantan's major export categories at the 2-digit HS level. The export groupings are those that contributed over 1% to total export earnings in 2017.

Alumina. The largest export category refers to inorganic chemicals and compounds (HS Section 28). It is composed entirely of aluminum oxide compound, commonly called alumina. Alumina's contribution to West Kalimantan's export earnings have risen greatly. Exports for the compound began in 2013, but did not become significant until 2014. By 2017, their contribution had expanded to 45% of total export earnings.

Alumina is derived from bauxite ore. Most aluminum oxide (90%) is used to produce aluminum. Aluminum itself has a low density and is resistant to corrosion. It is vital to the aerospace industry, as well as the transport and building industries.

Rubber. West Kalimantan's second largest export category is rubber (HS Section 40). Its contribution to total export earnings, however, has been declining. Rubber exports in 2012 represented over 50% of total export earnings, but by 2017, its contribution had declined to 34%.

Figure 11.1. West Kalimantan's Major Export Categories, 2012 and 2017
(% of total exports)



Source: Authors' estimates derived from HS 6-digit trade data provided by Ministry of Trade Indonesia.

Wood. Wood and its products have also declined in importance to the province's exports. Between 2012 and 2017, the contribution of this category (HS Section 44) fell by one-third, from 15% to 10% over the 5-year period.

Palm Oil. The category of animal and vegetable fats and oils (HS Section 15) includes West Kalimantan's rapidly growing palm oil exports, as well as coconut oil and edible preparations of those fats and oils. The value of palm oil exports in 2012 represented only $2.2 million. By 2017 they had expanded to $42.2 million, a 19-fold increase in earnings.

Coconut. The category of edible fruits and nuts (HS Section 08) is largely composed of coconut exports in various forms. This category's export earnings contribution has also expanded, from $1.4 million in 2012 to $36.8 million in 2017. Coconut exports are mainly shipped in their fresh or dried forms and in their inner shells.

11.2 Major Product Exports

Figure 11.2 shows the top-10 individual product exports from West Kalimantan in 2017, along with their average annual growth between 2012 and 2017. The following characterizations can be made about the major export products:

(i) As expected, *alumina* exports topped the list of major exports at the HS 6-digit product level. Since its emergence as a leading export did not occur until 2014, the average annual growth rate has only been calculated for the last 3 years. After the large expansion in 2014, exports have substantially fallen by an average of 15% a year.

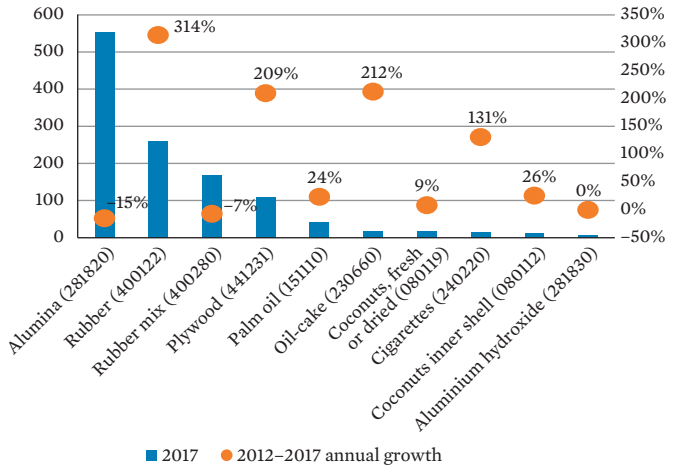
(ii) *Rubber* in its natural form and mixed with synthetic rubber are the second and third leading exports, followed by plywood exports.

(iii) Exports of *plywood* had a large surge in 2014, which explains the high average annual growth rate of exports. But its growth since then has been more modest.

(iv) *Palm oil* has had robust growth since 2012, the exception being in 2015 when there was a sharp drop in exports. But their level has since expanded by two-thirds what it was two years ago.

(v) Finally, *coconuts* in both their fresh or dried forms, or in their inner husks, have experienced an uneven growth, surging in 2015 but since then expanding at more modest rates.

Figure 11.2. West Kalimantan's Top 10 Export Products, 2017, and Growth Rates, 2012–2017
($ million and percent)



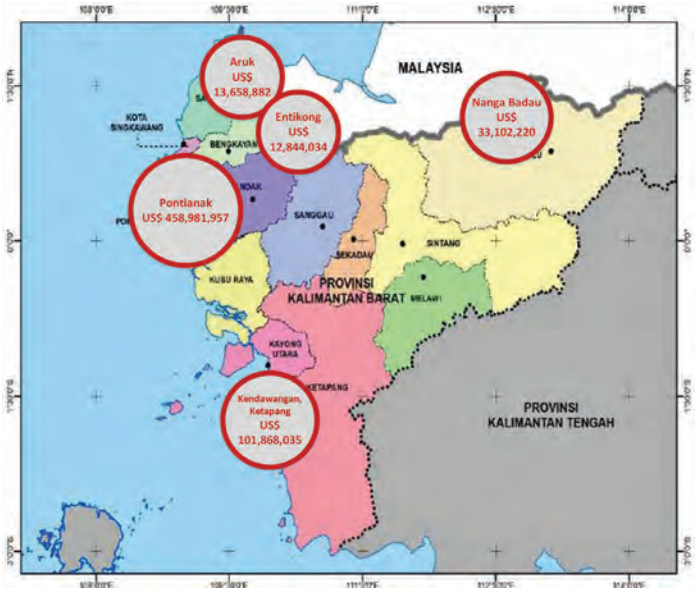
Source: Authors' estimates derived from HS 6-digit trade data provided by Ministry of Trade Indonesia.

11.3 Exports by Customs Port

Map 11.1 shows West Kalimantan's major customs ports and the 2017 value of exports through those ports. Nearly 75% of all exports are shipped from Pontianak, and another 16% leave from Kendawangan in the southern regency of Ketapang.

The next most important customs ports are those bordering Sarawak. In order of their magnitude of exports in 2017, they are Nanga Badau in Kapuas Hulu Regency ($33.1 million); Aruk in Sambas Regency ($13.6 million); and Entikong in Sanggau Regency ($12.8 million). Together these three CIQs process 10% of the province's total exports.

Map 11.1. West Kalimantan Value of Exports by Port of Exportation, 2017



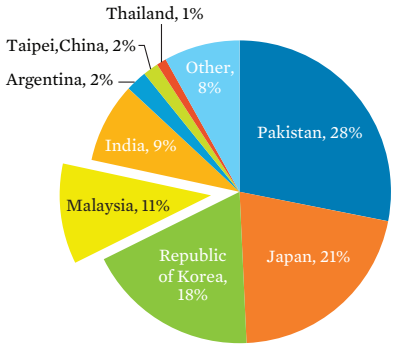
Source: Authors' estimates derived from HS 6-digit trade data provided by Ministry of Trade Indonesia.

11.4 Export Destination

West Kalimantan's exports are highly concentrated in three countries: Japan, the Republic of Korea, and Pakistan (Figure 11.3). Together these three countries absorb two-thirds of all the province's exports. Malaysia, the fourth most important export destination, absorbs 11% of all exports. The other important market is India. All other markets represent no more than 2% of exports.

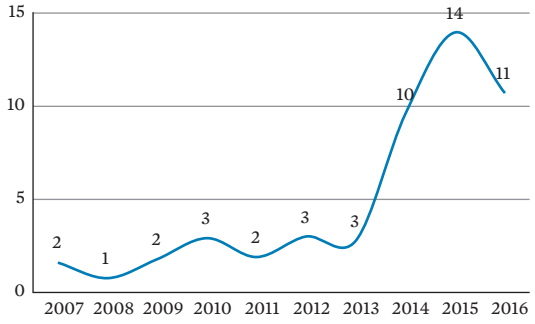
While Malaysia is a relatively small export market, its importance has been growing. Between 2007 and 2013, Malaysia's market share rose from 1% to 3%. In 2014 it absorbed 10% of West Kalimantan's exports because of a sharp increase in shipments of crude palm oil to that market. With the opening of the new ICQS facility in Nanga Badau in Kapuas Hulu Regency, palm oil exports to Malaysia are projected to expand significantly and increase that country's importance to the province's overall export levels in the coming years (Figure 11.4).

Figure 11.3. West Kalimantan Destination of Exports, 2017



Source: Authors' estimates derived from HS 6-digit trade data provided by Ministry of Trade Indonesia.

Figure 11.4. West Kalimantan Share of Exports to Malaysia, 2007–2016 (%)



Source: Authors' estimates derived from HS 6-digit trade data provided by Ministry of Trade Indonesia.

12

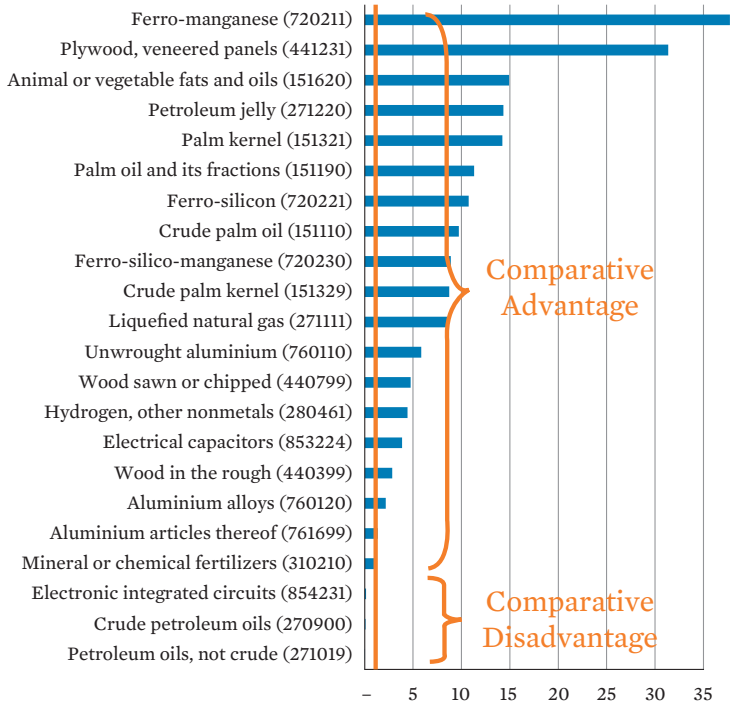
Competitive Advantages

12.1 Sarawak's Comparative Advantages

The nature of a country's exports and its specialization in the production and trade of products can be assessed from the revealed comparative advantage (RCA). The RCA measures a country's export intensity in each product relative to other countries in the world. The ratio of a product's export shares in the country relative to that in the world is taken as a measure of comparative advantage. If the index is greater than 1, it is indication that the country is internationally competitive in exporting the product being measured.

Figure 12.1 shows the RCA indices of Sarawak's top 20 products. Together these products account for 92% of all export earnings of the state.

Figure 12.1. Sarawak Revealed Comparative Advantage of Top 20 Products, 2017



Note: Figures in parentheses refer to HS product classification code.

Source: West Kalimantan export data provided by Ministry of Trade Indonesia. World export data from United Nations. COMTRADE Trade Statistics. Available: https://comtrade.un.org/data/ (accessed 19 December 2017).

Some of the noteworthy highlights are as follows:

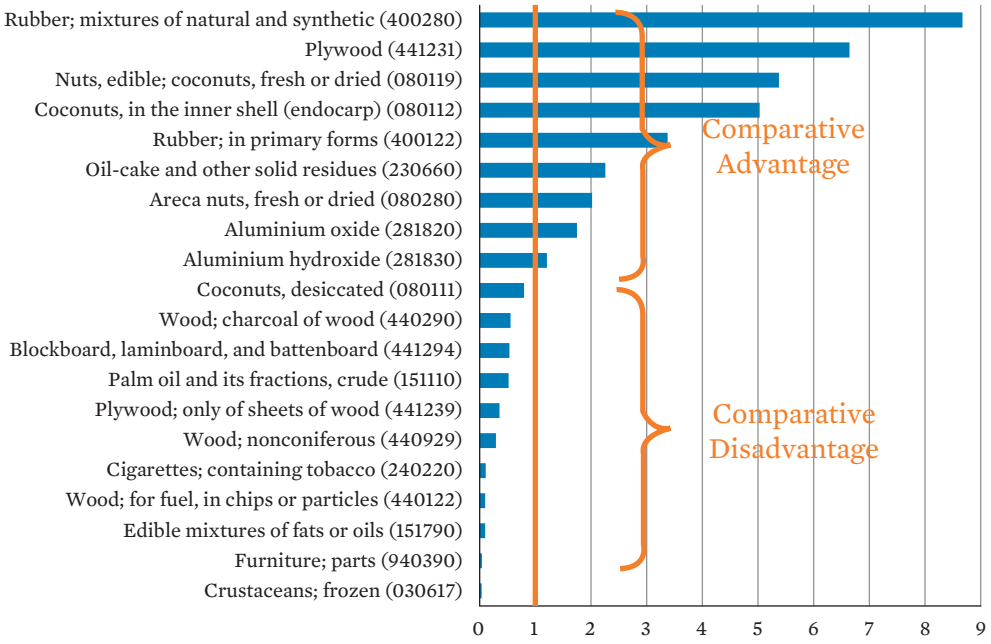
(i) Sarawak has a comparative advantage in the production and export of natural resource intensive and unskilled-labor intensive products.
(ii) Sarawak's comparative advantage is broadly concentrated in ferro-alloys, palm oil, petroleum and LNG, wood and wood products, and aluminum.
(iii) Seventeeen of the state's leading exports have a revealed comparative advantage, whereas only three have a comparative disadvantage.

12.2 West Kalimantan's Comparative Advantages

Figure 12.2 shows the RCA indices of West Kalimantan's top 20 products. Together these products account for 97% of all export earnings in the province. Some of the noteworthy highlights are as follows:

(i) West Kalimantan has a comparative advantage in the production and export of natural resource-intensive and unskilled-labor intensive products.
(ii) West Kalimantan's comparative advantage is narrowly concentrated in rubber, wood products, alumina, and coconuts and areca nuts.

Figure 12.2. West Kalimantan Revealed Comparative Advantage of Top 20 Products, 2017



Note: Figures in parentheses refer to HS product classification code.

Source: West Kalimantan export data provided by Ministry of Trade Indonesia. World export data from United Nations. COMTRADE Trade Statistics. Available: https://comtrade.un.org/data/ (accessed 19 December 2017).

(iii) Nine of the province's leading exports have a revealed comparative advantage: (a) rubber mixtures of natural and synthetic (400280); (b) plywood (441231); (c) coconuts, fresh or dried (080119); (d) coconuts, in the inner shell (080112); (e) rubber in primary forms (400122); (f) oil-cake and other solid residues (230660); (g) areca nuts, fresh or dried (080280); (h) aluminum oxide (281820); and (i) aluminum hydroxide (281830), where figures in parentheses refer to their HS product classification codes.

(iv) The remaining 11 top products have a comparative disadvantage in their production and exportation: (a) coconuts, desiccated (080111); (b) wood, charcoal of wood (440290); (c) block-board, laminboard, and battenboard (441294); (d) palm oil and its fractions, crude (151110); (e) plywood, only of sheets of wood (441239); (f) wood, non-coniferous (440929); (g) cigarettes, containing tobacco (240220); (h) wood, for fuel, in chips or particles (440122); (i) edible mixtures of fats or oils (151790); (j) furniture, parts (940390); and (k) crustaceans, frozen (030617).

12.3 Price Competitiveness

International price competitiveness is one of the major macroeconomic determinants of trade and cross-border investments. The SWOT analysis conducted for Sarawak and West Kalimantan underscores the concern of business leaders about price competitiveness being a critical factor affecting their ability to compete in foreign markets.

Price competitiveness is measured by the *real exchange rate*, which considers both general price movements in each country relative to that of each trading partner, and the *cross or bilateral exchange rate* between a country and each of its trading partners. When all trading partners are considered, then real bilateral exchange rates are weighted averages of the trading partners in each corresponding year and they measure the *real effective exchange rate*. The *index of competitiveness* is constructed as the inverse of the real bilateral or effective exchange rate.[40] A rise in the real effective exchange rate represents a decline in competitiveness because the country has relatively more expensive exports; and, conversely, a fall in the real effective exchange rate indicates a rise in competitiveness because the country's goods are becoming less expensive relative to that of its competitors.

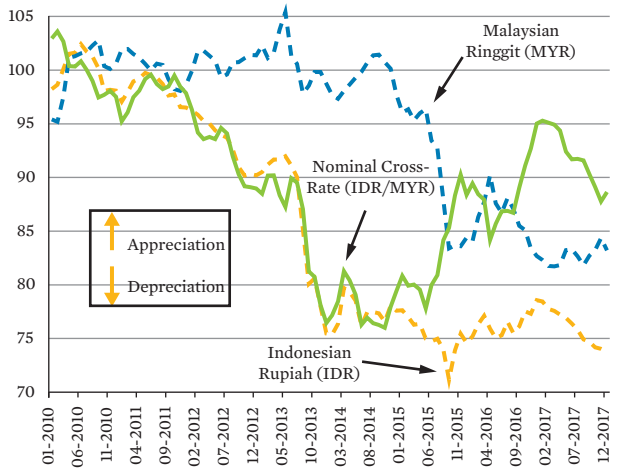
We begin by examining movements in the nominal exchange rate of Indonesia against the Malaysian ringgit, which is often the basis for perceptions about price competitiveness. Because the rupiah fell more than the ringgit against the United States (US) dollar in the early part of the 2010s, the nominal cross-rate of the ringgit against the Malaysian rupiah fell sharply during that period.

[40] The bilateral real exchange rate, R, of a country can be expressed as:

$$R_{ijt} = \frac{P_{it} E_{ijt}}{P^{*}_{jt}}$$

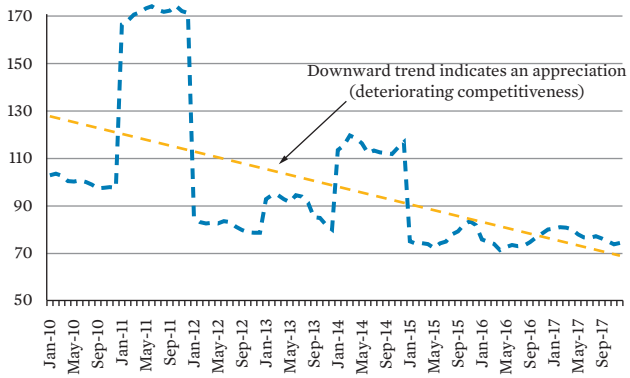
where P_i measures the domestic price level for country i; P^{*}_{j} the foreign price level in country j; and E_{ij} is the relevant nominal exchange rate (expressed as foreign currency per unit of domestic currency). Since this measure is used as an indicator of international competitiveness, a fall (depreciation) in the bilateral real exchange rate should result, *ceteris paribus*, in an increase in the demand for exports of a country in the foreign country. (Source: J. Gottschalk et al. 2016. The Real Exchange Rate: Assessment and Trade Impact in the Context of Fiji and Samoa. *IMF Working Paper.* No. WP/16/168. Washington, DC: International Monetary Fund.)

Figure 12.3. Nominal Cross-Rates of Indonesia and Malaysia (Indices, 2010=100)



Source: Bank of International Settlements. https://www.bis.org/statistics/eer.htm (accessed 21 December 2017).

Figure 12.4. Real Cross-Rate of Indonesian Rupiah against Malaysian Ringgit (2010=100)



Source: Based on data from Bank of International Settlements. Available: https://www.bis.org/statistics/eer.htm (accessed 21 December 2017).

However, since mid-2015, the ringgit has stabilized against the US dollar, while the ringgit fell against the dollar after early 2016 (Figure 12.3). Exchange rate movements after early 2014 reflect these changes: the rupiah exchange rate against the ringgit has risen and Indonesia's *nominal* competitiveness in goods and services against those of Malaysia has fallen.

However, notwithstanding these nominal exchange rate movements, Indonesia's competitiveness depends not only on relative exchange rate movements, but also relative domestic price movements, that is, domestic inflation and inflation in Malaysia. Hence, there exists the need to measure *bilateral real exchange rate* movements. Figure 12.4 shows the results of those calculations in terms of real cross-rate movements between Indonesia and Malaysia. It demonstrates that, between 2010 and 2014, Indonesia's rupiah has weakened somewhat against the ringgit in real terms. The result was an improvement in the competitiveness of West Kalimantan's exports to Sarawak and the rest of Malaysia. For Sarawak, the opposite occurred.

It is noteworthy that movements in the bilateral real exchange rate stabilized after early 2015. This change signaled a change in the medium- to long-term competitiveness of exports from West Kalimantan and Sarawak. In the near future, it is likely that the price competitiveness of West Kalimantan's exports relative to goods produced by Sarawak will remain unchanged. This projection is based on the International Monetary Fund's (IMF) forecast of relatively similar movements in inflation and exchange rate movements between Indonesia and Malaysia through the early 2020s.[41]

[41] International Monetary Fund (IMF). 2017. World Economic Outlook Database. Available: https://www.imf.org/external/pubs/ft/weo/2017/02/weodata/index.aspx (accessed 10 January 2019).

PART V

Trade Modeling and Forecasting

13

Modeling Trade

13.1 Demand Analysis in the Context of Cost–Benefit Analysis

The most important step in the calculation of project benefits is modeling and forecasting the demand for products of an industry. By their very nature, demand projections incorporate considerable uncertainty since they involve a long-term time horizon and large investments for projects. Hence, demand projections need to be accompanied by sensitivity analyses that test variations from the baseline projects. In fact, given the overwhelming importance of market demand in driving the expansion of cross-border value chains, it is essential to assess the sensitivity of the project's net benefits to changes in assumptions about economic expansion and relative price movements. Also, one of the major weaknesses of demand forecasts is their exclusion of the price effects on demand. In the present context, we explicitly consider relative price effects in all industry-specific demand forecasts based on the real cross-rate between the Indonesian–Malaysian exchange rates adjusted by relative price changes of domestic products. Cost–benefit analysis requires demand estimates and measurement of capital and operating costs. The demand analysis provides the justification for the project; guides the identification of the size, location, and design of the investment project; and provides the basis for the financial and economic assessment. In particular, it identifies the need for the investment by assessing current demand based on foreign market income and prices; and future demand based on reliable forecasting models that take into consideration macroeconomic forecasts using relevant price and income projections in the context of counterfactual evaluation.

Underlying the analysis is the understanding that demand shifts affect the ability or willingness of producers to provide the additional supplies of their goods and services. It assumes that import demand generates needed supplies from trading partners, which follows from Keynes' law that demand creates its own supply. In international trade, the importer's decision process is as follows: at the first decision level, the importer decides how much of a good or service is needed; then, at the second decision level, the importer decides from what foreign supply source the good or service will be purchased.[42] In the case of Sarawak imports of oil palm fruits, for example, the importer will first determine the overall amount of palm oil extraction needed and then whether to import them from West Kalimantan or another supplier based on price and nonprice competitive factors.

In the context of this decision tree, project demand reflected in cross-border trade between Sarawak and West Kalimantan is first assessed in the context of the industry's likely total

[42] M. Lord. 1991. Chapter 3: The Demand for Traded Commodities. In *Imperfect Competition in International Commodity Trade*. Oxford: Clarendon Press.

future demand from all domestic and foreign-sourced goods and services. Second, project demand is evaluated in the context of possible changes in export market shares from cross-border supplies in either Sarawak or West Kalimantan. These possible changes in market shares are evaluated over the forecast period in terms of price and nonprice factors like distance between suppliers and their markets. The most robust method of forecasting demand based on distance between suppliers and markets is with the use of gravity model regression analysis, or gravity models of international trade. This approach is used in the industry-based forecasts generated in the next chapter.

Following international best practices, (i) we use official national sources to analyze and project demand for each province; (ii) we separate demand into distinct industries relevant to each project appraisal; (iii) we use appropriate modeling tools to forecast demand; and (iv) we take into consideration current or planned policy measures and economic instruments that can influence projects.[43] Details of the technical aspects of the methodology are presented in Appendix 2 of this study.

13.2 Testing Trade Relationships

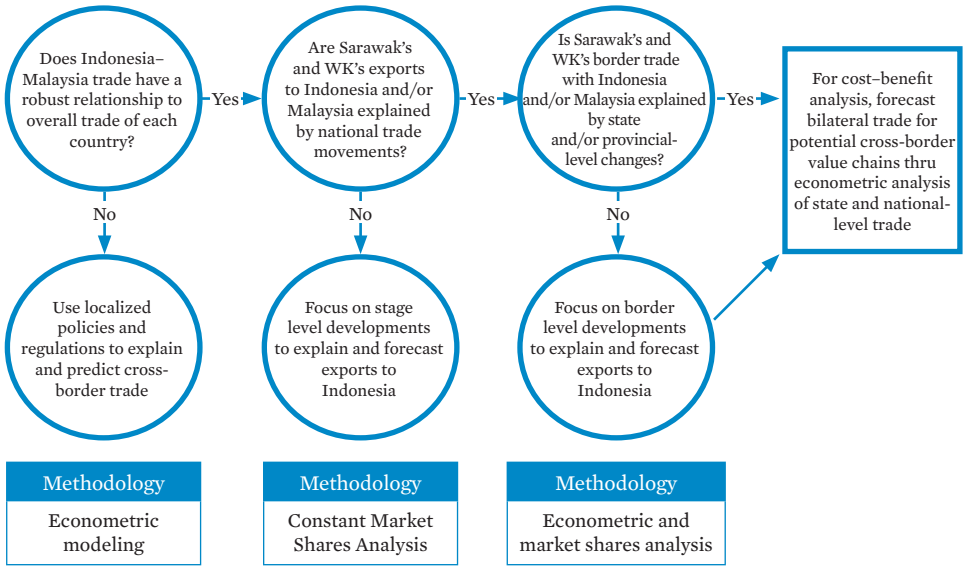
Modeling border-specific trade flows requires sufficiently long time-series data to estimate relationships between exports on one side of the border and foreign import demand on the other side, as well and competitiveness measures between the two sides. In the case of Sarawak and West Kalimantan, however, trade data have been limited. Only the Tebedu–Entikong border crossing has existed as an official crossing between Sarawak and West Kalimantan for a sufficiently long time to allow trade relationships to be estimated. However, international trade at that border crossing was closed in mid-2014 and has only recently begun to resume. Time-series data for that border crossing can therefore not be used to measure the *potential* future trade between the two territories.

In contrast, both provincial and national trade data of both countries are available in sufficient detail and over a long time period. Therefore, we need to test whether a stable relationship exists between border trade flows, provincial trade flows, and national trade flows that would allow us to estimate national and provincial bilateral trade relationships between the two countries and extend those results to Sarawak–West Kalimantan border trade.

The initial question is whether there is a stable and robust relationship of bilateral trade between Indonesia and Malaysia, which can be tested through theory-consistent econometric modeling techniques. If such a relationship is found to exist, then the next question is whether Sarawak's and West Kalimantan's export market shares of the bilateral markets for Indonesia's and Malaysia's imports have changed over time. If the relationship is found to be stable over time, then we can test whether Sarawak's and West Kalimantan's border exports to each other have been closely associated with the state's and province's overall exports to Indonesia and Malaysia, respectively. Once that association is found, then we can predict the potential demand for border exports of Sarawak and West Kalimantan based on our econometric forecasts of bilateral trade between Indonesia and Malaysia, and the anticipated shares of Sarawak and West Kalimantan in that trade.

[43] European Commission. 2015. *Guide to Cost–Benefit Analysis of Investment Projects.* Brussels: Directorate-General for Regional and Urban Policy.

Figure 13.1. Decision Tree for Testing Trade Relationships



WK = West Kalimantan.
Source: Representation by the authors.

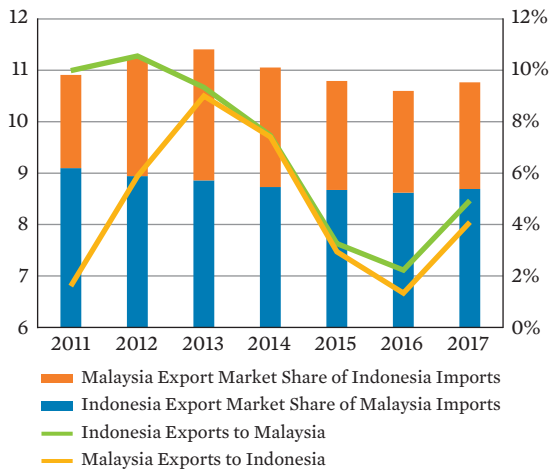
Figure 13.1 shows the decision tree. In the first stage, we determine whether a robust relationship exists between Indonesia–Malaysia bilateral trade and overall trade of each country. If such a relationship is found, then we proceed to the second stage to determine whether a robust relationship exists between Sarawak–West Kalimantan bilateral trade, and overall national trade of each country. In the third and final stage, we determine whether there is a relationship between Sarawak–West Kalimantan border trade, and overall provincial (state) trade. If the three relationships are robust, we can then forecast bilateral trade for potential cross-border trade using estimated forecasts of national bilateral trade and their relationship to provincial (state) trade. The methodologies used are a combination of econometric analysis and constant-market-shares analysis explained in the appendixes to this study.

13.3 Indonesia's and Malaysia's Bilateral Demand for Exports

Bilateral trade between Indonesia and Malaysia are important for both countries. For Indonesia, Malaysia is the seventh most important trading partner, and the second largest among ASEAN member countries. For Malaysia, Indonesia is the eighth largest trading partner and the third largest among the ASEAN countries. As a result, changes in the demand for Malaysia's exports by Indonesia, and those in the demand for Indonesia's exports by Malaysia, have important consequences on overall import movements by both countries.

In the present decade, bilateral export demand of both countries closely followed their cross-border movements (Figure 13.2). Malaysia's overall exports to Indonesia increased through 2013 but then contracted sharply. Similarly, Indonesia's exports to Malaysia decreased

Figure 13.2. Indonesia and Malaysia Imports and Bilateral Market Shares



Source: National statistical offices of Indonesia and Malaysia.

greatly after 2013. Together the market shares of both countries fell between 2014 and 2016, and in 2017 they recovered somewhat. Indonesia's export market share of Malaysia imports fell from 6.2% to 5.2% between 2011 and 2016, and Malaysia's export market share of Indonesia's imports also fell by 1 percentage point, from 5.1% in 2013 to 4.0% in 2016.

The export growth prospects of each country's bilateral trade are largely driven by the transmission of the trading partner's real GDP on exports. We measure the magnitude of foreign income changes on the demand for each country's exports using multiple regression analysis, as detailed in Appendix 2.

The specification of the estimated relationships is given by the error correction model, which provides the means by which the short-run observed behavior of variables is associated with their long-run equilibrium growth paths.

Changes in the demand for Indonesia's and Malaysia's exports are associated with international transmissions of changes in foreign income and exchange rates adjusted for relative domestic price changes of the trading partners. While the systematic determinants of global linkages are relatively stable and robust, we are also interested in capturing the dynamics underlying rapidly changing foreign income and competitive price variables to provide a relatively good explanation of recent developments and future demand changes likely to occur in the key industries with potential cross-border value chains between Sarawak and West Kalimantan.

Table 13.1. Trend Growth and Average Annual Deviations of Bilateral Exports and Real GDP
(%)

	2000–2017	2000–2009	2010–2017
Trend Growth			
Indonesia real GDP	5.5	5.3	5.2
Malaysia real GDP	4.8	4.9	5.1
Indonesia export volume to Malaysia	1.7	0.1	2.0
Malaysia export volume to Indonesia	2.1	3.6	3.8
Average Deviation[a]			
Indonesia real GDP	1.1	1.1	0.6
Malaysia real GDP	1.3	1.7	0.3
Indonesia export volume to Malaysia	3.8	3.7	1.6
Malaysia export volume to Indonesia	8.4	9.9	3.2

GDP =gross domestic product.

[a] Calculated from fitted trend.

Source: Authors' estimates based on national statistical data.

Table 13.1 shows that the bilateral trade–foreign income multiplier has been less than unitary during the 2000s. It means that for every 1% change in foreign market income, exports of the home country have increased by less than 1%. In particular, the multiplier for Indonesia's exports to Malaysia relative to Malaysia's real GDP equaled 0.3 in 2000–2017. Malaysia's equivalent multiplier was somewhat higher, but only 0.44 in the same period. These multipliers did, nonetheless, increase substantially in the present decade as Indonesia's multiplier rose to 0.4 and that of Malaysia rose to over 0.7.

In contrast, short-term variations around the trend growth rates of exports and foreign income have been relatively high. Year-to-year average variations in 2000–2017 averaged 3.8% for Indonesia's exports to Malaysia, while those of Malaysia to Indonesia averaged 8.4% in the same period. Those variations substantially exceeded annual variations in real GDP. Variations in Indonesia's exports to Malaysia were 3.6 times greater than Malaysia's annual income variations from the trend growth rate and, in the case of Malaysia, year-to-year variations in exports to Indonesia were 6.7 times greater than Indonesia's annual variations in real GDP from the trend growth rate.

Table 13.2. Income and Real Cross-Rate Elasticities of Indonesia's and Malaysia's Exports with Each Other

		Elasticity	
		Short Term	Long Term
Indonesia	Income	–	0.47
	Real cross-rate	−0.12	–
	g-coefficient	5.58	
Malaysia	Income	–	0.42
	Real cross-rate	−0.48	−0.11
	g-coefficient	26.42	

Note: – denotes not statistically significant.
Source: Authors' estimates based on national statistical data.

These bilateral trade trends and their associated short-term variations are more accurately reflected in the estimates of foreign income elasticities of export demand, as well as relative price changes that help to explain those movements. Table 13.2 summarizes the foreign income and real cross-rate elasticities of export demand of Indonesia's and Malaysia's exports to one another. Indonesia's long-term foreign income elasticity is 0.47, while that of Malaysia is 0.42 based on data for 2000–2017.

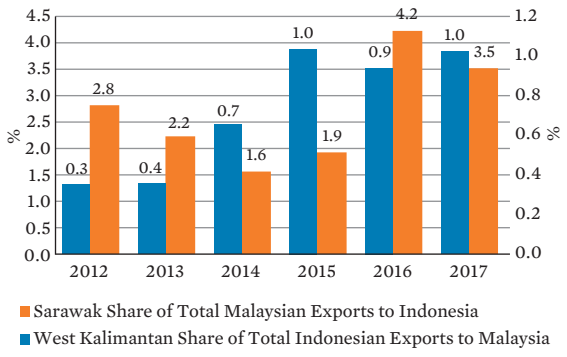
The real cross-rate of Indonesia relative to Malaysia was not found to be statistically significant in the long run. However, it did have a short-term impact on exports, albeit relatively small. In the case of Malaysia, the real cross-rate was found to be statistically significant in explaining exports to Indonesia in both the short and long run. A real exchange rate devaluation of the Malaysian ringgit relative to the Indonesian rupiah, adjusted for relative domestic price changes, would increase exports by nearly 0.5% in the short run and 0.11% in the long run. Hence, Indonesia's real cross-rate devaluation in the early part of the 2010s is likely to have negatively affected Malaysia's exports to that country.

13.4 Provincial Share of National Bilateral Trade

Sarawak's and West Kalimantan's shares of total Malaysian and Indonesian exports to the other country have varied greatly during the present decade. Figure 13.3 shows the changing provincial shares of national bilateral exports between Indonesia and Malaysia in 2012 and 2017.

Sarawak's share of Malaysian exports to Indonesia fell by over 1 percentage point, from 2.8% to 1.6% between 2012 and 2014. Afterward, the share expanded by nearly 3 percentage points to 4.2%

Figure 13.3. Sarawak's and West Kalimantan's Shares of Malaysian and Indonesian Bilateral Exports to One Another, 2012–2017 (%)



Source: National statistical offices.

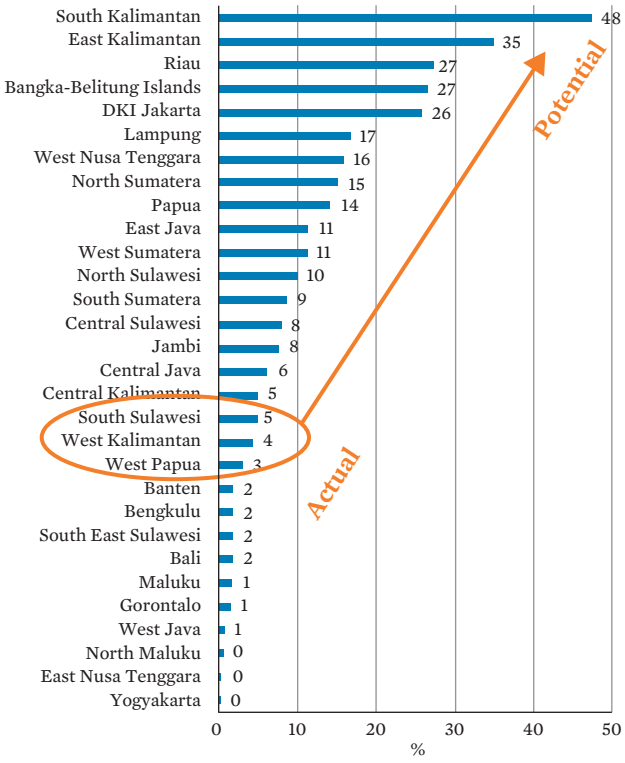
in 2016. In the subsequent year, however, it again contracted. Year-to-year variations have therefore been large and trendless.

West Kalimantan's share of Indonesian exports to Malaysia have been somewhat steadier. The share rose gradually from 0.3% to 1.0% between 2012 and 2015. That share has since remained at around 1.0%. The magnitude of the province's share of national exports to Malaysia has, however, been much lower than Sarawak's share of Malaysia's exports to Indonesia.

Clearly there is considerable scope for expanding the provincial export shares of both Sarawak and West Kalimantan. The question is, what would be a reasonable limit for expanding those shares over the long run? One approach is to associate the upper limit of exports with the maximum openness achieved by the Indonesian provincial economies, where openness is measured as the ratio of provincial exports to provincial GDP.

West Kalimantan has a relatively low degree of openness of its economy. It ranks 19th out of 30 provinces for which data are available in terms of the ratio of its exports to GDP (Figure 13.4). In contrast, provinces like South Kalimantan and East Kalimantan have ratios of between 35% and 48%. In effect that means that West Kalimantan's exports could expand 11-fold from its existing ratio of 4% to 48% of its provincial GDP to the same proportion as South Kalimantan. Even if it were only to increase its openness to that of East Kalimantan (35%), it would expand by eight times from its existing degree of openness. For purposes of forecasting exports, we use the more conservative upper-limit of East Kalimantan's openness indicator and limit West Kalimantan's potential export growth to 35% of provincial GDP projects over the 30-year forecast. GDP projections are based on (i) overall Indonesia GDP growth projections from the IMF's *World Economic Outlook* (April 2018) through 2023, and (ii) autoregressive integrated moving average (ARIMA) time-series forecasts from 2024 through 2047.

Figure 13.4. Ratio of Exports to GDP of Indonesia Provinces *(%)*



GDP = gross domestic product.

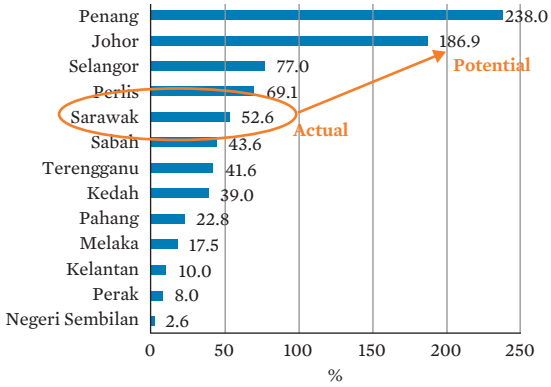
Sources: Provincial GDP data from Badan Pusat Statistik. 2010. Perkembangan Beberapa Indikator Utama Sosial-Ekonomi Indonesia Oktober 2009. Jakarta. http://jawa-barat.supiani.com/en3/724-614/Rp17-124-000_20010_unija_jawa-barat-supiani.html (accessed 20 October 2019). Provincial trade data from Ministry of Trade Republic of Indonesia. Statistics: Provincial Trade Balance. http://www.kemendag.go.id/en/economic-profile/indonesia-export-import/provincial-trade-balance?propinsi=13.

For Sarawak, the ratio of exports to GDP is nearly 53%, which is much greater than that of West Kalimantan and in line with those provinces in Indonesia having the highest indicators of openness (Figure 13.5). However, in comparison to other Malaysian states, Sarawak ranks 5th in terms of openness. Penang's and Johor's exports-to-GDP ratios are 4.5 and 3.5 greater than that of Sarawak, and Selangor is nearly 50% more open than Sarawak. Perlis, which borders

Thailand, has a ratio of exports to state GDP, which is nearly a third higher than Sarawak.

For purposes of forecasting exports, we use the more conservative upper-limit of Perlis' openness indicator and limit Sarawak's potential export growth to 35% of provincial GDP projects over the 30-year forecast. As in the case of West Kalimantan, Sarawak's GDP projections are based on overall Malaysia GDP growth projections from the International Monetary Fund's *World Economic Outlook* (April 2018) through 2023 and autoregressive integrated moving average (ARIMA) time-series forecasts from 2024 through 2050.

Figure 13.5. Ratio of Exports to GDP of Malaysia's Provinces (%)



GDP = gross domestic product.

Source: Provincial trade and GDP data from national statistical office.

13.5 Border Shares

Table 13.3 shows the value of trade at two of the three border crossings between Sarawak and West Kalimantan. Border trade at the third border crossings was limited to that permitted under the 1970 BTA for locally traded goods by people in the area.

Trade at the Entikong (West Kalimantan)–Tebedu (Sarawak) border crossing has been limited by regulatory constraints. As explained earlier, the Indonesian police and customs authorities tightened their enforcement of cargo being transported across the border in early 2014. Then, in the middle of that year, the Indonesian government halted internationally traded goods. It classified Entikong Customs as a C-status facility capable of only handling local trade, and limited trade to locally traded goods as defined by the 1970 BTA.

In contrast, the new Nanga Badau (West Kalimantan)–Lubok Antu (Sarawak) border has steadily expanded its trade because of contractual arrangements by the palm oil industries. Palm oil has been shipped from the West Kalimantan side to Sarawak by the Kencana Group and the Sinar Mas Group and, on the Sarawak side, exports to West Kalimantan have been largely in the form of machinery used for the palm oil extraction industry.

Table 13.3. Sarawak–West Kalimantan Cross-Border Trade, 2012–2017 ($)

	Entikong (WK)–Tebedu (SW) Trade		Nanga Badau (WK)–Lubok Antu (SW)		West Kalimantan–Total Border Trade	
	WK Exports	SW Exports	WK Exports	SW Exports	WK Exports	SW Exports
2012	1,557,450	532,928	8,580,928	–	10,138,378	532,928
2013	2,252,843	464,040	8,073,529	–	10,326,372	464,040
2014	31,409,329	3,299,170	11,195,595	–	42,604,924	3,299,170
2015	10,337,816	242,265	48,268,389	59,226	58,606,206	301,491
2016	12,844,025	311,135	46,761,103	146,250	59,605,128	457,385
2017	7,677,827	354,391	55,658,789	2,036,546	63,336,617	2,390,937

SW = Sarawak, WK = West Kalimantan.

Source: Ministry of International Trade and Industry of Malaysia and Ministry of Trade of the Republic of Indonesia.

These border-level developments that have targeted specific border crossings suggest the likelihood of a low correlation between border-crossing trade changes and those at the provincial and national level. Table 13.4 shows the correlation coefficients between border, regional, and national bilateral exports of Indonesia and Malaysia, Sarawak, and West Kalimantan, and the individual and combined border crossings between Sarawak and West Kalimantan. Notable features are as follows:

(i) Sarawak exports to Indonesia are positively correlated with Malaysian exports to Indonesia.
(ii) Tebedu exports to West Kalimantan are positively correlated with Malaysian exports to Indonesia.
(iii) Sarawak's combined exports to West Kalimantan are somewhat (positively) correlated with Malaysian exports to Indonesia.
(iv) Lubok Antu exports to West Kalimantan are positively correlated with Sarawak exports to Indonesia.
(v) West Kalimantan exports to Sarawak are closely (positively) correlated with West Kalimantan exports to Malaysia.
(vi) Entikong exports to Sarawak are positively correlated with West Kalimantan exports to Malaysia.
(vii) Entikong exports to Sarawak are positively correlated with West Kalimantan exports to Sarawak.
(viii) Tebedu exports to West Kalimantan are positively correlated with Sarawak's combined exports to West Kalimantan.
(ix) Indonesia is somewhat more likely to experience positive correlations with Malaysia at the border, provincial, and national levels than Malaysia's exports with Indonesia at the border, state, and national levels.

Table 13.4. Correlation between Exports at Border, Provincial, and National Levels

	IN–MY	MY–IN	SW–IN	WK–MY	WK–SW	SW–WK	EN–SW	TB–WK	NB–SW	LA–WK
IN–MY	1.00									
MY–IN	0.85	1.00								
SW–IN	(0.01)	0.67[a]	1.00							
WK–MY	(0.81)	(0.65)	(0.10)	1.00						
WK–SW	(0.92)	(0.76)	(0.04)	0.96	1.00					
SW–WK	0.07	0.27	(0.20)	0.36	0.28	1.00				
EN–SW	(0.24)	0.02	(0.55)	0.34	0.40	0.73	1.00			
TB–WK	0.25	0.45	(0.54)	(0.04)	(0.04)	0.78	0.88	1.00		
NB–SW	(0.89)	(0.84)	0.22	0.88	0.90	(0.05)	(0.05)	(0.47)	1.00	
LA–WK	(0.26)	(0.23)	0.48	0.63	0.49	0.42	(0.15)	(0.24)	0.61	1.00

EN-SW = Entikong (WK) exports; IN-MY =Indonesia exports to Malaysia; LA-WK = Lubok Antu (SW) exports to WK; MY-IN = Malaysia exports to Indonesia; NB-SW =Nanga Badau (WK) exports to SW; SW-IN = Sarawak exports to Indonesia; SW-WK =Sarawak exports to West Kalimantan; TB-WK = Tebedu (SW) exports; WK-MY = West Kalimantan exports to Malaysia; WK-SW =West Kalimantan exports to Sarawak.

[a] MY-IN has a 1-period lag to SW-IN.

Note: Numbers in parentheses are negative values.

Source: Authors' estimates.

14

Forecasting Trade Benefits

Our forecasts are based on gravity trade model explanatory variables, that is, economic activity of the trading partners and measures of transport cost differences and other explanatory factors. We do not attempt to measure turning points from either cyclical or random walk variations, which are in fact impossible to foresee. Several well-known studies have consistently shown that monkeys are better able to pick short-term market variations better than market experts like fund managers.[44] Nevertheless, long-term trends are predictable. For example, when a 3-year moving average is applied to the stock market, returns are predictable in the long run, and also over business cycles and stochastic trends.[45]

14.1 Industry-Level Export Demand Forecasts and Project Benefits

A gravity model at the industry level is implemented to estimate the potential and industrial distribution of trade between neighboring countries. The model is used to forecast the trade potential between nontrading border crossings between Sarawak and West Kalimantan and, more importantly, to identify potential industrial development on each side of the border. Forecasts are based on the actual trade flows of those provinces and the countries as a whole, where there exist detailed industry-based long-term time series. The analysis identifies demand for industry-based products associated with trade potential for the border areas based on revealed comparative advantages that are reflected in international trade patterns of the provinces.

An important determinant of trade potential is a product's transportation cost in trade between two countries. Since such information is generally lacking at the industry level, both average transport costs and distance between trading partners are used as proxies. Because border trade constitutes 30%–60% of most international trade between trading partners, distance between Sarawak and West Kalimantan should become important once trade between the two territories reaches normal levels.[46]

Underlying the analysis are two guiding principles, namely, trade creation based on potential trade, and trade diversion based on the substitution of current export destinations under existing discriminatory trade restrictions. Distance-sensitive products whose transportation

[44] *Financial Times*. 2013. Monkey Beats Man on Stock Market Picks. 31 March. https://www.ft.com/content/abd15744-9793-11e2-b7ef-00144feabdc0.

[45] C.-L. Chang et al. 2018. Long Run Returns Predictability and Volatility with Moving Averages. *Risks, MDPI, Open Access Journal*. Vol. 6 (4 September). pp. 1–18. https://econpapers.repec.org/article/gamjrisks/v_3a6_3ay_3a2018_3ai_3a4_3ap_3a105-_3ad_3a171554.htm.

[46] World Trade Organization (WTO). 2017. World Trade Statistical Review 2016. Geneva. https://www.wto.org/english/res_e/statis_e/wts2016_e/wts16_toc_e.htm.

costs are high because of weight, volume, or freshness are more likely to be affected than others. Border trade restrictions can give rise to trade barriers whose costs are greater than those created by tariffs.[47] Gravity models of industry-level product trade are therefore more accurate in their estimates than those of aggregate trade because they are able to differentiate between traded products, whose freight expenditures are high, and those with lower freight rates.

The present gravity model follows previous work on forecasting trade potential between former nontrading neighbors.[48] In particular, we apply a gravity model to determine the potential for trade in six industries between Sarawak and West Kalimantan. These industries are alumina, rubber, palm oil, wood products, fish and crustaceans, and ships. The underlying assumption is that potential trade under nondiscriminatory restrictions between the provinces will take place in the same proportion as country-level shares with trading partners.

Under these circumstances, industry-level import demand for a trading partner's product from the industry depends on (i) country size, reflected by GDP; (ii) transportation costs; (iii) economic distance, reflected in GDP difference between each trading partner; (iv) geographic distance between trading partners; (v) a proxy for whether the trading partners share a physical border; and (vi) a proxy for whether the trading partners partially share a common language.

We discuss each of these determinants below.

Country Size

The size of a country is normally measured by GDP and population variables. Mathematically, it is the same whether we express the explanatory variable as GDP and per capita GDP, or GDP and population. Population size is inversely related to trade: the larger the country, the less open it is likely to be. Singapore, for example, is highly trade-dependent because it lacks natural resources and the ability to exploit economies of scale in the domestic economy. In contrast, the US has more trade in absolute terms but engages in less trade relative to its GDP because it has a larger domestic market.

Transportation Costs

Transportation costs between trading partners are taken from the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) database and are available at the sector level.[49] They include all additional costs involved in trading goods internationally with a partner country relative to those of domestically traded goods. The series captures trade costs not only in terms of international transport costs and tariffs, but also those cost

[47] D. Hummels. 1999. Toward a Geography of Trade Costs. *GTAP Working Papers*. No. 1162. Indiana: Center for Global Trade Analysis, Department of Agricultural Economics, Purdue University. https://ideas.repec.org/p/gta/workpp/1162.html.

[48] N. Hashai. 2004. *Forecasting Trade Potential between Former Non-Trading Neighbors: The Israeli-Arab Case*. Jerusalem: Jerusalem School of Business Administration, The Hebrew University. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2315547.

[49] United Nations Economic Commission for Asia and the Pacific (UNESCAP). 2012. Trade Costs in Asia and the Pacific: Improved and Sectoral Estimates (December 2011; revised 15 January 2012). Bangkok. https://www.unescap.org/publications/trade-costs-asia-and-pacific-improved-and-sectoral-estimates-tiid-working-paper-series.

components associated with the use of different language and currencies. Direct and indirect costs associated with completing trade procedures or obtaining necessary information are also included.

Economic Distance

Economic distance is measured by the absolute differences in countries' per capita income. Its relationship to bilateral trade is expected to be inversely related since it reflects systematic intercountry differences in consumer tastes.[50] The data are from the IMF's World Economic Outlook database.[51]

Geographic Distance

Geographic distance between two countries is measured as the straight-line distance in kilometers between their respective capitals. It is inversely related to trade since the greater the distance, the greater the transportation cost and the smaller the amount of trade that would be expected. Geographic data are available from CEPII, which provides several measures of bilateral distances in kilometers for most country pairs across the world.[52]

Common Borders

Adjacency between countries is important as a separate variable because it allows for closer collaboration in supply or value chains. An example of this type of collaboration is the existence of *maquiladoras* along the Mexico–US border. It is an in-bond (*maquiladora*) program that allows duty-free importation of raw materials, components, and equipment needed for the assembly or manufacture of finished goods for subsequent export. The program originated from the need to industrialize northern Mexico and slow down migration to the US by creating jobs along the border.

Common Languages

This binary series identifies trading partners that share a common language based on the fact that at least 9% of each of the country speaks the same language. The data are from CEPII.[53]

Nominal versus real values. Valuation of the trade and economic activity variables is an important issue. This concerns trade and economic activity values expressed in nominal or real (volume) terms. UNESCAP's program in gravity trade model applications provides useful guidelines on the topic.[54] For panel data involving both cross-section and time-series data, the guideline is that trade flows should be in nominal, not real, terms. The reason is that exports are effectively deflated by the two multilateral resistance terms, which are special

[50] S. B. Linder. 1961. *An Essay on Trade and Transformation.* New York: John Wiley and Sons. https://ex.hhs.se/dissertations/221624-FULLTEXT01.pdf.

[51] International Monetary Fund (IMF). 2018. World Economic Outlook Database (April 2018). Available: https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx.

[52] CEPII. GeoDist. http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6.

[53] CEPII. Databases. http://www.cepii.fr; and ARTNeT. Databases. http://artnet.unescap.org/databases.html.

[54] B. Shepherd. 2016. The Gravity Model of International Trade (An Updated Version). United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), ARTNeT Gravity Modeling Initiative. https://www.unescap.org/resources/gravity-model-international-trade-user-guide-updated-version.

Table 14.1. Number of Trade Flows in Industry-Specific Gravity Model Equations

Aluminum	566
Fish and Crustaceans	608
Palm Oil	119
Rubber	433
Ships	284
Wood Products	675

Source: Authors' estimates.

price indices. Deflating exports using different price indices, such as the consumer price index or the GDP deflator, would not adequately capture the unobserved multilateral resistance terms, and could produce misleading results.

A similar rationale applies to the economic activity data used in the model: The series is effectively deflated by multilateral resistance terms, which are unobserved price indices. Deflating by some other factor, such as a readily observable price index, would be misleading. The GDP series should therefore be in nominal, not real, terms.

Appendix 2 presents the specification of the full gravity equation in our analysis and the regression estimates for each industry. In this chapter, we limit our discussion to the nontechnical summary of the analysis and findings.

Table 14.1 shows the sample size of the estimated equation for each industry, based on time series that extend from 1990 to 2017 and for each trading partner's trade in the industry's major 6-digit Harmonized System product. In aluminum, for example, the sample size is 566 observations. The reported numbers are for recorded trade and exclude nonzero observations where there were recorded transactions between trading partners in a given year.

14.2 Gravity Model Estimates

The central question facing the analysis of potential benefits from cross-border value chains between Sarawak and West Kalimantan is how the trade potential forecasts can be generated for former nontrading neighboring countries, and how those forecasts can be used to identify industrial distribution between the bordering territories. The previous section's empirical analysis of Indonesia's and Malaysia's bilateral trade at the national, provincial, and border levels demonstrated the close association in the behavior of these three trade hierarchies. Since border trade between Sarawak and West Kalimantan has been small or nonexistent, we invoke higher levels of trade (provincial and national) to estimate potential border trade and, ultimately, the benefits of cross-border value chains.

As a relatively large economy, Malaysia has developed trade relations with a large number of countries. As a result, importers are able to select products from a wide range of supplying countries from around the world. A gravity model was therefore estimated for pooled data of time series from 1990 to 2017 from the cross-section of trading partners for each of six representative products for Sarawak's major industries.

Representative products were selected based on three criteria. First, the import value of the HS 6-digit product represents one of the largest imports among all the products imported in the HS 2-digit category of the industry; second, the representative product was imported in sufficiently large quantities during the entire time period of the sample to reflect the industry's importance; and, third, the selected product is exported by Indonesia.

The gravity model was estimated by the ordinary least squares method. The significance level of the coefficient estimates varies across industries. Nevertheless, the explanatory values of the final equations are high in terms of the coefficient of multiple determination

Table 14.2. Elasticities Derived from Gravity Model Regression Estimates for Malaysia's Import Demand for Products from Key Sarawak Industries

	Alumina	Rubber	Palm Oil	Wood Products	Fish and Crustaceans	Ships
GDP of reporter (log)	0.45	1.52	0.98	0.70	1.33	1.12
GDP of partner (log)	1.17			0.39	0.27	
Economic Distance (log)		–1.61			–0.76	–0.13
Geographic Distance (log)		–0.35			–0.46	
Trade costs (log)	–1.48	–1.61	1.15	–0.70	–0.35	
Contiguity			16.03			
Language commonality				1.30	1.77	0.50

GDP = gross domestic product.
Source: Derived from Table A.3.

(R square). The full regression results are shown Appendix 2. Table 14.2 shows the associated elasticities of import demand with respect to the explanatory variables of the gravity model.

Most of the coefficient estimates are statistically significant. However, in some cases, the signs are contrary to expectations. The following is a summary of the results presented in Table 14.2:

(i) *Own income*. For Malaysia's own GDP, the average elasticity is somewhat over 1.0, which is consistent with the literature.[55] The elasticities range from a low of 0.45 for alumina to over 1.5 for rubber. Above-average elasticities are also found for fish and crustaceans and ships.

(ii) *Partner country income*. The import demand elasticity with respect to partner country income averages 0.6, ranging from lows of 0.3 for fish and crustaceans, to 0.4 for wood products; and to a high of 1.2 for alumina.

(iii) *Economic distance*. Economic distance, which is measured by the absolute differences in countries' per capita income, is expected to be negatively correlated with international trade as it reflects systematic intercountry differences in consumer tastes. The elasticity of import demand with respect to economic distance averages –0.8, and ranges from a low of –0.1 for ships to a high of –1.6 for rubber.

(iv) *Geographic distance*. The average elasticity of import demand with respect to geographic distance is –0.4. The coefficient estimates for representative products of the six industries are only significant and of the right sign in two products, namely, rubber (–0.4) and fish and crustaceans (–0.5). This variable is closely associated with trade costs, and collinearity with that variable is likely to account for the few number of coefficient estimates that are significant and of the expected negative sign on the coefficient estimates.

(v) *Trade costs*. Most coefficient estimates for this variable are significant and of the expected negative sign, since the greater the cost of transportation, the lower the demand for imports from a supplying partner country. The average import demand elasticity with respect to trade costs is –0.6, with relatively low elasticity estimates for fish and crustaceans and high estimates for rubber, alumina, and to a lesser extent, palm oil.

[55] H. Wu. 2015. *Re-visiting the Distance Coefficient in Gravity Model*. Cornell University Library. https://arxiv.org/abs/1503.05283.

(vi) *Contiguity.* Not surprisingly, there were few statistically significant coefficients estimates of the right sign for this variable. High regulatory constraints on Malaysian trade with Indonesia lowered transactions between these trade partners in the sample period and that situation was reflected in the lack of positive and statistically significant coefficient estimates for most of the industry-specific gravity model regression estimates. In the case of palm oil, the coefficient on the binary variable for a common border is 2.77. Since trade is specified in logarithmic form, the elasticity calculation of the coefficient on the binary variable is based on its exponent. Hence, two countries like Malaysia and Indonesia that share a border are estimated to engage in the exponent of 2.77, or 16.0. This finding is supported by the large amount of Sarawak's oil palm imports from West Kalimantan, relative to other supplying countries.

(vii) *Ethnic language commonality.* The greater number of statically significant coefficient estimates for this variable is likely to reflect the ethnic language commonality between the People's Republic of China and Hong Kong, China, rather than ethnic language commonalities between Sarawak and West Kalimantan because of trade restrictions between Indonesia and Malaysia in the sample period of the estimated regression.

Some coefficient estimates for contiguity of Malaysia with bordering countries like Indonesia and commonality of ethnic language are unexpectedly negative. This situation occurs, for example, in alumina. In such situations, it suggests that importers are not acting "rationally". The finding for alumina, for example, is contrary to that of the general findings in gravity models, which generally report a positive correlation between trade and contiguity of countries. When adjacency between countries is excluded from the gravity model, the estimated coefficient on the log of distance is about –0.75. The interpretation is that when distance between two countries is increased by 1%, trade between the two countries decreases by 0.75%.

14.3 Gravity Model Forecasts

Use of gravity model regression analysis allows us to estimate the importance of distance between suppliers and markets in addition to relative price effects between trading countries. The forecasts follow a so-called "constant-market-shares" approach in which changes in the demand for imports are associated, first, with changes in the economic activity of the home country and its trading partners; second, with changes in the geographic distribution of imports among the supplying countries.

The estimation and forecasting procedure is as follows:

(i) For economic activity of the home country and trading partners, we use available information from external sources for near-term forecasts and time-series forecasts for long-term forecasts of that variable. We also use that information to generate the "economic distance" forecasts that measure the absolute difference between per capita income of the home country and each of the partner trading countries.

(ii) We then compare the forecast results generated by the exogenously determined GDP predictions with those in which there occurs no change in the economic activity variables. These baseline solutions are the counterfactual outcomes had no change occurred in economic activities of the home country and its partner countries.

(iii) Finally, we determine the change in import demand that would occur if the home country shifted part of its imports from distant supplying countries to nearby countries that share a border with the home country. Based on the estimated elasticity estimates from the gravity model regression results (Appendix 2), the gains in trade are calculated as the sum of changes in the amount of imports from each supplying country resulting from lower transportation costs associated with deliveries from nearby supplying countries. Those lower costs shift the industry's supply curve to the right and allow companies to offer the product at a lower price to consumers. The change, in turn, results in an increase in the quantity demanded of the product from the home country, thereby causing a redistribution of product suppliers from different countries. It represents a gain in export market shares of the home country and a loss in market shares of competitors.

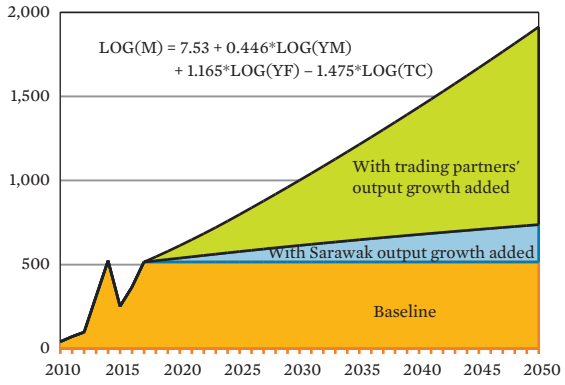
Forecasts for economic activity are based on the following sources of information:

(i) Foreign market real GDP short-term forecast through 2023 are taken from the International Monetary Fund's World Economic Outlook database (April 2018).
(ii) GDP long-run forecasts are based on autoregressive integrated moving average (ARIMA) projections. The time-series projections yield the following stead-state solution:
  (a) For Malaysia, 2.3% annual growth between 2024 and 2050.
  (b) For trading partners, the average annual GDP growth is 1.8% a year in the same period, with individual partner economy forecasts ranging from a low of 0.8% for Japan and Hong Kong, China; to a high of 2.6% for the PRC and 2.5% for India. The long-run GDP forecast for Indonesia is 2.4% a year.

The following summaries describe the import demand forecasts for six industries:

(i) *Alumina*. The major catalyst to Sarawak's demand for alumina imports originates in partner trading countries, whose projected expansion in alumina output leads to greater supply availability (Figure 14.1). Transport costs are especially important to Sarawak's demand for alumina imports from foreign suppliers because of weight and volume of the cargo. Shifts to nearby providers like West Kalimantan could therefore substantially lower costs and lead to an increase in the quantity of alumina imported. These potential shifts and their consequences are examined in the next section.
(ii) *Rubber.* Sarawak's rubber imports mainly consist of natural rubber, balata, gutta-percha, guayule, chicle and similar natural gums, in primary forms or in

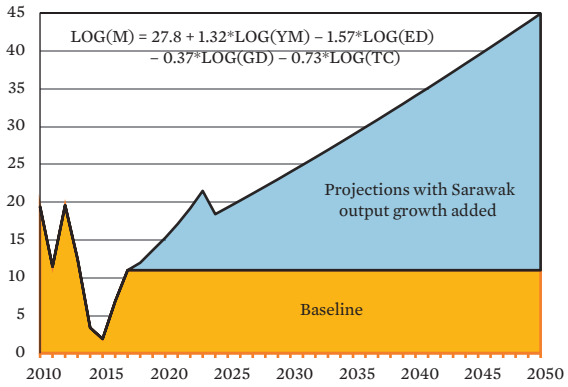
Figure 14.1. Alumina Import Demand Projects Associated with Output Growth Projections of Sarawak and Its Trading Partners



GDP = gross domestic product, M = import volume of Sarawak imports of alumina, TC = trade costs of Sarawak with trading partners, YF = trading partner *j*'s output of industry *I*, YM = real GDP of Sarawak.

Source: Authors' estimates based on gravity model regression results.

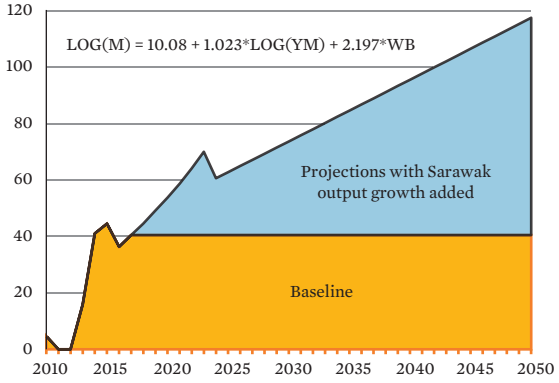
Figure 14.2. Natural Rubber Import Demand Associated with Output Growth Projections of Sarawak



ED = economic distance represented by the absolute differences between the per capita income of country *j* and country *k*, GD_k = geographic distance between country *j* and k, GDP = gross domestic product, M = import volume of Sarawak imports of natural rubber, YM = real GDP of Sarawak.

Source: Authors' estimates based on gravity model regression results.

Figure 14.3. Palm Oil Import Demand Associated with Output Growth Projections of Sarawak



M = import volume of Sarawak imports of palm oil, WB = binary variable indicating whether *j* and *k* are contiguous to one another, YM = real GDP of Sarawak.

Source: Authors' estimates based on gravity model regression results.

plates, sheets or strip (HS 400129). Other forms of imports are synthetic rubber and factice derived from oils, in primary forms or in plates, sheets or strip (HS 400219); natural rubber, balata, gutta-percha, guayule, chicle and similar natural gums, in primary forms or in plates, sheets or strip (HS 400122); and natural rubber, balata, gutta-percha, guayule, chicle and similar natural gums, in primary forms or in plates, sheets or strip (also HS 400121).

Domestic economic activity drives rubber import demand. For the forecast period, Sarawak's projected overall output growth is expected to expand import demand for rubber by a multiple of 3.5 times the annual 4.5% annual growth in GDP (Figure 14.2). Raw material supplies for the industry support production capacity for the state's seven leading rubber-based products:

(a) tubes, pipes, and hoses of vulcanized rubber;
(b) conveyor or transmission belts or belting of vulcanized rubber;
(c) pneumatic tires of rubber;
(d) retreaded or used pneumatic tires of rubber;
(e) inner tubes of rubber;
(f) hygienic or pharmaceutical gloves vulcanized rubber; and
(g) footwear with outer soles of rubber.

(iii) *Palm oil.* Sarawak imports are almost entirely in the form of palm oil and its fractions, whether or not refined, but not chemically modified (HS 151110). The forecast is for palm oil imports to expand strongly through 2023 at an average annual rate of nearly 10%, and then to decelerate over the longer term as production capacity reaches its limit in the state (Figure 14.3).

(iv) *Wood products.* Sarawak mainly imports (a) sheets for veneering for plywood or for similar laminated wood and other wood, sawn lengthwise, of a thickness not exceeding 6 millimeters (HS 440890, 440810 and 441239); (b) fiberboard of

wood or other ligneous materials (HS 441192); (c) packing cases, boxes, crates, drums and similar packings, of wood (HS 441520); (d) wood charcoal (HS 440290); (e) wood continuously shaped (HS 440929); and builders' joinery and carpentry of wood (HS 441820).

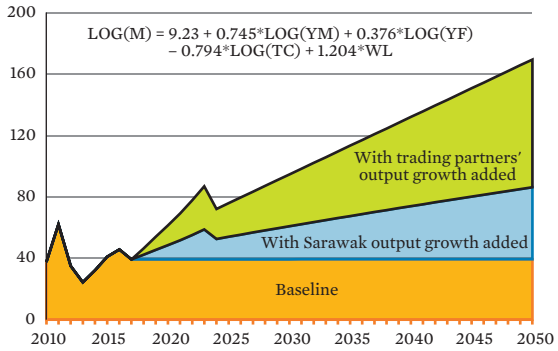
The combined expansion of imports in this decade has averaged nearly 7%, albeit with large year-to-year variations. In the near future (2018–2024), import demand growth is forecast to average 5.6%; and then to slow to under 3% a year as Sarawak diversifies to high-end manufactures that are less reliant on natural resources (Figure 14.4).

(v) *Fish and crustaceans.* Sarawak imports a large volume and wide variety of fish and crustaceans. Several product groupings defined at the 6-digit HS level exceeded $1.0 million for fish imports in 2017. They were (a) frozen fish, excluding fish fillets and other fish meat (HS 030389, 030354, 030359, 030743); (b) crustaceans, whether or not in shell, live, fresh, chilled, frozen, dried, salted or in brine (HS 030617); (c) mollusks, whether or not in shell (HS 030559); (d) fish, dried, salted or in brine; smoked fish (HS 030462); and (e) fish fillets and other fish meat (HS 030323).

Overall, the value of fish and crustacean imports expanded by 14% a year in 2010–2017. The near-term forecast is for a more modest growth of 11.5% a year in the next 6 years (2018–2023), with a gradual deceleration through 2050 (Figure 14.5).

(vi) *Vessels.* Sarawak imports a large variety of vessels. Among the top imports in 2017 were (a) tugs and pusher craft (HS 890400); (b) cruise ships, excursion boats, ferryboats, cargo ships, barges, and similar vessels for the transport of persons or goods (HS 890190); and (c) other floating structures (for example, rafts, tanks, coffer-dams, landing-stages, buoys and beacons) (HS 890710, 890790).

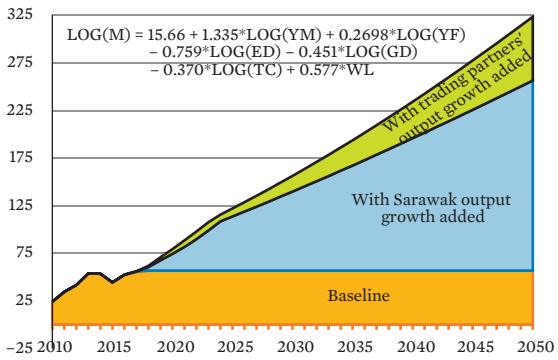
Figure 14.4. Wood Product Import Demand Associated with Output Growth Projections of Sarawak and Its Trading Partners



GDP = gross domestic product, M = import volume of Sarawak imports of wood and wood products, WL = binary variable indicating whether j and k share ethno-common language because at least 9% in each of the country speaks that language, YF = trading partner *j*'s output of industry *i*, YM = real GDP of Sarawak.

Source: Authors' estimates based on gravity model regression results.

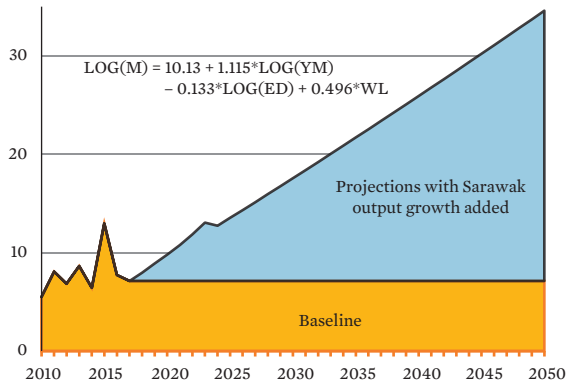
Figure 14.5. Fish and Crustacean Import Demand Associated with Output Growth Projections of Sarawak and Its Trading Partners



ED = economic distance represented by the absolute differences between the per capita income of country *j* and country *k*, GD_k = geographic distance between country *j* and *k*, GDP = gross domestic product, M = import volume of Sarawak imports of fish and crustaceans, TC = trade costs of Sarawak with trading partners, WL = binary variable indicating whether *j* and *k* share an ethno-common language because at least 9% in each of the country speaks that language, YF = trading partner *j*'s output of industry *i*, YM = real GDP of Sarawak.

Source: Authors' estimates based on gravity model regression results.

Figure 14.6. Vessel Import Demand Projects Associated with Output Growth Projections of Sarawak



ED = economic distance represented by the absolute differences between the per capita income of country *j* and country *k*, GDP = gross domestic product, M = import volume of Sarawak imports of wood and wood products, WL = binary variable indicating whether j and k share ethno-common language because at least 9% in each of the country speaks that language, YM = real GDP of Sarawak.

Source: Authors' estimates based on gravity model regression results.

In the past, year-to-year movements in vessels have varied greatly. In 2012, for example, imports were 5.5 times greater than in the previous year and, in the following year, their value was halved. In 2016 there was a large purchase of floating structures and in 2017, imports resumed their historically moderate growth trend.

Our forecasts for Sarawak's overall imports of vessels are based on the long-term historical pattern. In the near term (2018–2023), imports are projected to expand by nearly 11% a year, and thereafter grow at a conservative rate of 3.7% a year through 2050 (Figure 14.6).

14.4 Border Trade Projections

Two different types of trade adjustments are expected to occur because of possible cross-border collaboration in the production and trade in palm oil, natural rubber, modular wood furniture components, aluminum oxide, shipbuilding components, and organic fruits and vegetables. The first is the change in the volume of trade between Sarawak and West Kalimantan following resumption of cross-border trade; and the second is the shift in supplier sourcing for those industries as companies transfer from distant suppliers to cross-border suppliers to take advantage of lower transportation costs.

Adjustment to Border Trade Resumption

Cross-border trade is likely to reach normal levels within 2–3 years from start-up in late 2018, with the exact time line depending on the particular product being traded. As before, container throughput will undoubtedly be the main driver of cross-border trade. Our projections, shown earlier, suggest that most of the expansion will occur in 2019 and 2020, and then begin to level off in 2021.

Predictions based on this S-shaped pattern use a sigmoid function, which is a special case of the logistic function.[56] The projections reflect the idea that exporting firms in West Kalimantan face three different phases in their decision to ship goods through a border checkpoint.

[56] The sigmoid function is given by the following formula:

$$P_j^* S(x) = \frac{e^x}{e^x + 1} = \frac{1}{1 + e^{-x}}$$

For applications of a logistic function to error-correcting models of international trade, see Lord, M. 1991. *Imperfect Competition and International Commodity Trade*. Oxford: Clarendon Press. For applications to gravity models, see Wohl, I. and J. Kennedy. 2018. Neutral Network Analysis of International Trade. *Working Paper*. ID-049. Washington, DC: Office of Industries, US International Trade Commission.

(i) In the first phase, firms have sunk export costs in existing routes and transport modes. Border customs officials also have information limitations about trade regulations and trade classification systems such as the UN/LOCODE described earlier.
(ii) In the second phase, firms and customs officials overcome knowledge limitations as well as transportation and logistical challenges to redirect goods through more cost-efficient direct road routes rather than roundabout shipping channels.
(iii) In the third phase, logistics costs of firms and capacity limits of the inland port facilities surpass the benefits of the expansion in export intensity. At that point, capacity limitations impede further growth until new capital investment initiates a new expansion phase.

The S-shaped pattern is also useful as a forecasting method for estimating potential inland port throughput since there is a lower adaption rate in the period immediately following the opening of the border, and a saturation level in later years of the adaption until port capacity adapts to higher throughput volumes.

Supply Sourcing Shifts

The gravity model regression results (Appendix 2) for five of six industries covered in the analysis demonstrate the importance of distance and trade costs when companies source inputs from foreign suppliers. Collaboration between Sarawak and West Kalimantan companies in these industries is therefore expected to result in a shift away from distant suppliers to the bordering territory suppliers.

This approach follows a constant-market-shares analysis in which, for example, changes in imports of a company's imports of material inputs for the industry is separated into the following components:[57]

(i) the effects of a general increase in demand for imports;
(ii) geographic composition of imports; and
(iii) changes in competitiveness.

Our interest is with the second term, that is, the geographic composition of imports. Our estimates suggest that a shift from distant suppliers to nearby (bordering) suppliers will lead to an increase in the quantity demanded of imports as average costs shift down and importers move along the demand curve to purchase more goods at a lower price.

The question we therefore need to ask is how much of a shift is likely to occur in each of the industries that are of special interest to Sarawak–West Kalimantan trade. The answer to this question is addressed as part of the cost–benefit analysis for each industry in chapters 27–37.

[57] H. Ichikawa. 1996. *Constant-Market Share Analysis and Open Regionalism: Constant-Market Share Analysis and Open Regionalism*. Chiba: Institute of Developing Economies, Japan External Trade Organization. www.ide.go.jp/library/English/Publish/Download/Apec/pdf/1996_03.pdf.

PART VI

Cross-Border Value Chains

15

Aluminum

For video presentations on the Sarawak-West Kalimantan aluminum cross-border value chain, visit https://youtu.be/Drevk_PD25A

15.1 Rationale

Why a Cross-Border Value Chain Is Needed

Aluminum is the most widely used nonferrous metal in the world, and global production exceeds that of any other metal except iron. It is characterized by its resistance to corrosion, its strength and hardness, and its low density. Aluminum's main ore is bauxite, which contains 30%–60% of aluminum oxide, commonly known as alumina, and a mixture of silica, various iron oxides, and titanium dioxide. Bauxite is refined through the so-called Bayer process to extract aluminum oxide. The aluminum oxide is, in turn, refined through a smelter process to produce aluminum metal. Aluminum is used widely in the transportation sector because of its strength-to-weight ratio, the construction sector due to its resistance to corrosion, for electrical conductivity because of its low density in long-distance power lines, and in consumer goods due to its favorable appearance.

Smelters themselves cannot usually be located near raw material suppliers since they involve an electrolytic process. Aluminum smelters use large amounts of electricity and therefore tend to be located close to large power sources, often hydroelectric power plants, and near ports since they tend to use imported alumina. For that reason, raw materials for the industry are usually located in different geographic regions of the world. Bauxite and alumina reserves and mines are located in countries like Australia, Brazil, and Guinea; while the world's largest aluminum smelters are located in the Russian Federation, Canada, and India. Only Australia and the People's Republic of China (PRC) have smelters near their raw material sources.

Advantage of West Kalimantan–Sarawak Cross-Border Value Chain

West Kalimantan is an important producer of bauxite and alumina. In 2016, exports of bauxite and alumina reached $126.8 million. Exports are directed to East Asian markets (the PRC; Hong Kong, China; Japan; Taipei,China) and Latin American markets such as Mexico. There have been no exports to Malaysia, and in particular Sarawak, which has one of the world's largest smelter plants.

Given the high transport costs of alumina, it would make economic sense for West Kalimantan to ship its raw materials to nearby Sarawak. Alumina is a bulk commodity whose competitiveness is closely related to distance to markets and transport costs. The cost of transporting alumina from South America to aluminum smelters in the US represents about 15% of the total cost of producing aluminum.[58] New roads being built at the border point to the interest of West Kalimantan in promoting alumina exports to that Malaysian state.

15.2 West Kalimantan Alumina Production

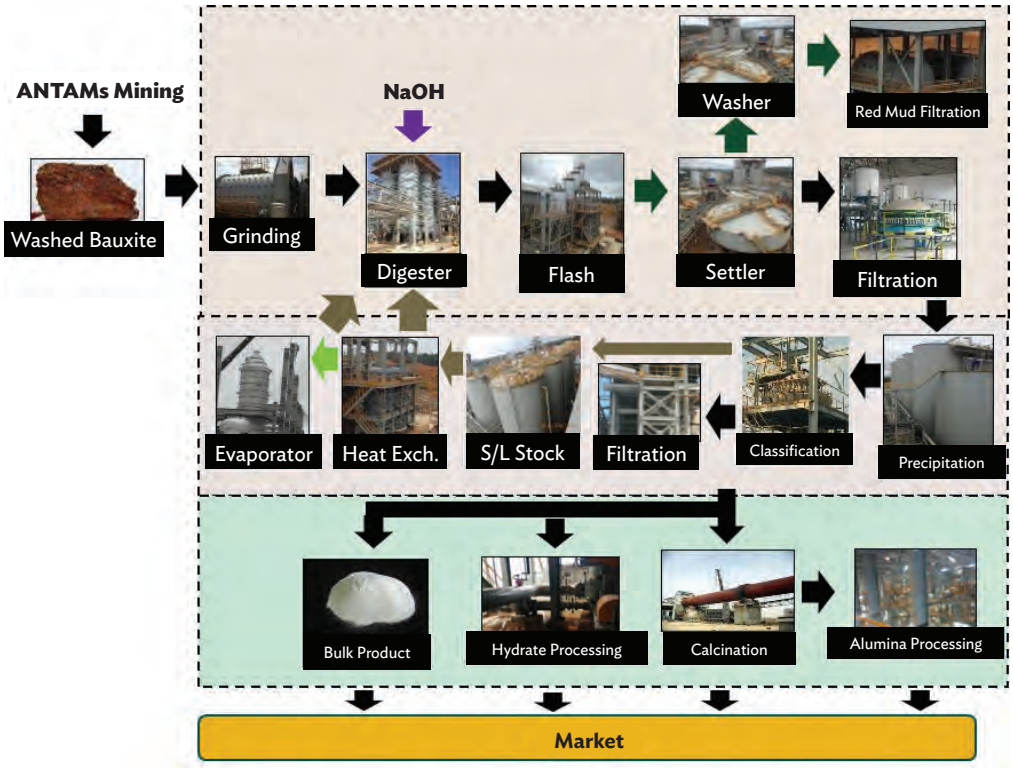
West Kalimantan currently has a chemical-grade alumina plant with a capacity of 300,000 metric ton (MT) a year of alumina. PT Indonesia Chemical Alumina began operation in 2014 and is in Tayan, Sanggau Regency. Ownership and control is shared by Indonesian state-owned metals and mining company PT Aneka Tambang, also known as PT Antam (80% ownership) and Showa Denko KK (20% ownership) of Japan. PT Antam also has bauxite mines in Tayan, which has Indonesia's largest bauxite reserves, estimated at nearly 116 million tons. Since September 2017, however, production in the plant has stopped as both PT Antam and Showa Denko KK are seeking to divest their holdings of the company to a third party. The source of the difficulty appears to be concerns over some obligations to vendors and suppliers that had failed to be met.

PT Indonesia Chemical Alumina applies the commonly used Bayer method to produce alumina and aluminum hydroxide from bauxite (Figure 15.1). In the Bayer process, bauxite ore is heated in a pressure vessel along with a sodium hydroxide solution. The extraction process converts the aluminum oxide in the ore to soluble sodium aluminate. The solution is clarified by filtering off the solid impurities, commonly with a rotary sand trap and with the aid of a flocculant such as starch, to remove the fine particles. Some of the aluminum hydroxide produced is used in the manufacture of water treatment chemicals such as aluminum sulfate, poly-aluminum chloride, or sodium aluminate (Figure 15.2). A significant amount is also used as a filler in rubber and plastics as a fire retardant. Some 90% of the gibbsite produced is converted into aluminum oxide by heating in rotary kilns or fluid flash calciners to a temperature of more than 1,000 degrees centigrade (°C). Once produced, aluminum oxide is used to make aluminum using the Hall–Héroult process.[59]

[58] *Bulletin of the Atomic Scientist*. 1947. https://books.google.co.th/books?id=-gsAAAAAMBAJ&pg=PA120&lpg=PA120&dq=alumina+importance+of+transportation+in+costs+in+aluminum+production+costs&source=bl&ots=1FsWoY1ads&sig=df3ibl9nOmJFddF1oFyHIBO1kDs&hl=en&sa=X&ved=0ahUKEwjF3P218ZrYAhWKrI8KHUrZAaIQ6AEIUDAH#v=onepage&q=alumina%20importance%20of%20transportation%20in%20costs%20in%20aluminum%20production%20costs&f=false (accessed 21 December 2017).

[59] A. R. Hind, S. K. Bhargava, and S. C. Grocott. 1999. The Surface Chemistry of Bayer Process Solids: A Review. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*. 146 (1–3): pp. 359–374.

Figure 15.1. Bayer Process Used by PT Indonesia Chemical Alumina



Source: PT Indonesia Chemical Alumina. Chemical Grade Alumina: Tayan, West Kalimantan, Indonesia.

PT Indonesia Chemical Alumina produces over 50 different types of aluminum hydroxide products and 80 alumina products. Its aluminum hydroxide products include standard aluminum hydroxide, fine and extra fine varieties, heat proof grade, high whiteness, and special treatment varieties of products. Alumina products cover standard and coarse particle size, fine to extra fine particle size, low and ultra-low-soda alumina, and thermally reactive alumina.

A second alumina factory, also owned by PT Antam, will be completed in 2019 in Mempawah Regency. It will have a 1.0 million MT annual production capacity in the first of its two-stage development process. Its smelter-grade alumina refinery capacity will be capable of processing 6.0 million MT of bauxite ore a year.

15.3 Sarawak Aluminum Production

In Sarawak, Press Metal Berhad has three aluminum smelters: (i) the Mukah-based smelter was constructed in 2007; (ii) the smelter plant in Samalaju Industrial Park, Bintulu, began operation in 2012 and has a production capacity of 320,000 tons a year; and (iii) a second-phase smelter in Samulaju was established in 2014.

Sarawak's total smelting capacity is currently 760,000 tons annually. Press Metal's operating capacity in Sarawak makes Malaysia the 12th largest aluminum producing company of the

Figure 15.2. Major Applications of Alumina and Alumina Hydrate

Source: Photos provided by PT Indonesia Chemical Alumina.

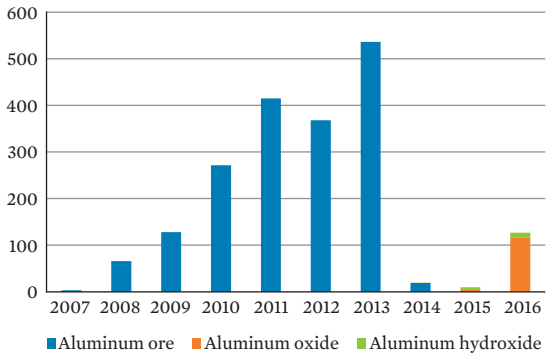
world. It produces primary and extrusion products and a variety of finished products such as aluminum ingots and billets, bronze color finish, fabrication, fluorocarbon, mill finish, natural anodized finish, polishing, powder coating, and wood grain.

15.4 West Kalimantan Exports

West Kalimantan Exports. West Kalimantan originally shipped aluminum ores, the most important of which is bauxite. In 2013, bauxite exports reached their peak of $536.2 million, after which those shipments virtually ended (Figure 15.3).

Instead, shipments began to occur in the forms of aluminum oxide (alumina) and aluminum hydroxide. By 2016, aluminum oxide exports were $116.9 million and aluminum hydroxide had reached $10 million. These products are expected to grow significantly in the coming years as plant capacity in the province expands. While aluminum oxide is the major raw material in aluminum smelters, aluminum hydroxide is the other major component of bauxite. It serves as a raw material in the production of fire retardants and smoke suppressants, as well as in the pharmaceutical industry to produce antacids and other medications like vaccines.

Figure 15.3. West Kalimantan Alumina Exports by Type, 2007–2016 ($ million)



Source: Based on data provided by Ministry of Trade Indonesia.

Geographic Markets. Bauxite exports are mainly destined for the PRC, which absorbs 97% of all West Kalimantan exports of that product. Other smaller markets include Japan (1.2% of all shipments); Mexico (1.1%); and Hong Kong, China (0.4%). Aluminum oxide is directed mainly to the PRC, which in 2016 bought 89% of all product exports from the province. Other markets are Japan (6.5%); the Republic of Korea (3.6%); and Taipei,China (0.9%). Aluminum hydroxide is mainly destined for Japan, which absorbs 89% of all provincial exports. Another important market is the Republic of Korea (8.8% of all exports). Smaller markets that buy between 0.4% and 0.8% of all aluminum hydroxide exports are the PRC; Hong Kong, China; Singapore; and Taipei,China. West Kalimantan ships a small amount of aluminum hydroxide to Malaysia (0.1% of all exports).

15.5 Project Profile for Cross-Border Value Chains

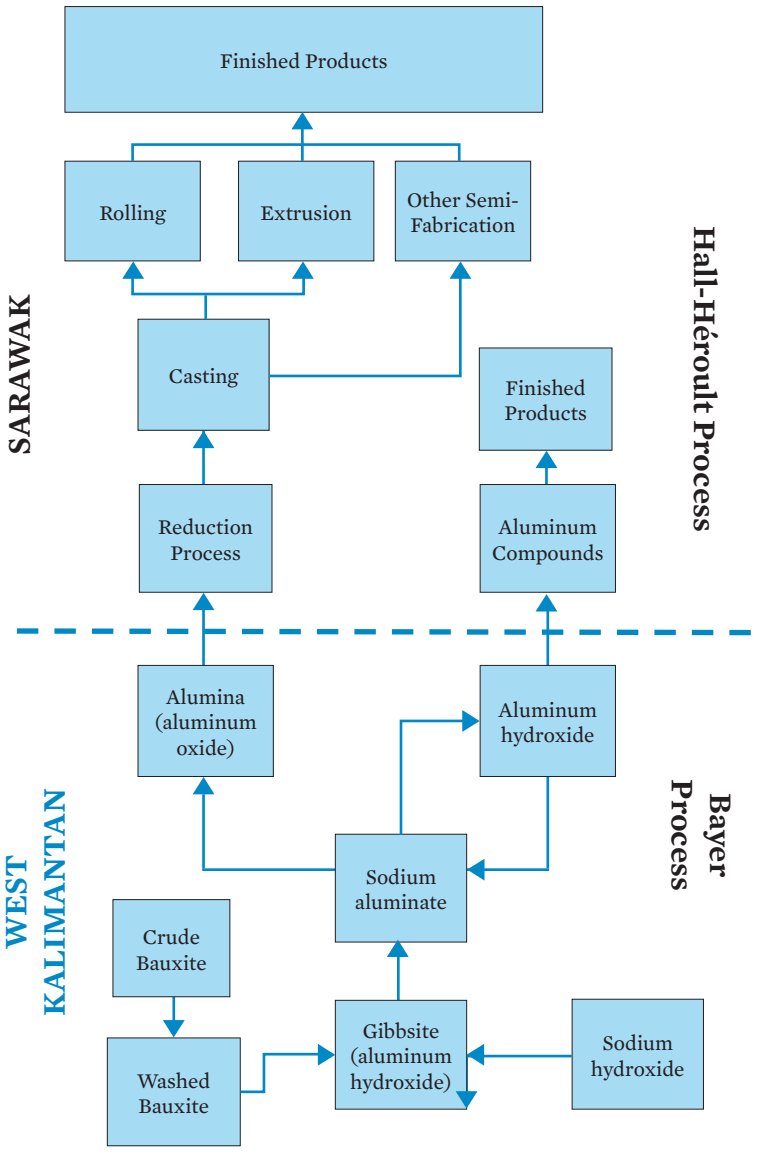
Figure 15.4 shows the potential division of the value chain for bauxite, alumina, and aluminum production between West Kalimantan and Sarawak. West Kalimantan has the potential to supply alumina and aluminum hydroxide from its existing Tayan and upcoming Mempawah plants to Press Metal aluminum smelters in Sarawak. They represent more cost-effective channels than other suppliers because of the near distance between the raw materials and smelters.

The following discussion is a summary of the production process involved in the proposed cross-border value chain.

West Kalimantan Primary Production of Aluminum Oxide and Aluminum Hydroxide

(i) *Aluminum Oxide.* The main product of Indonesia Chemical Alumina's Tayan plant and that planned for the one in Mempawah is aluminum oxide, which is the main raw material used to produce aluminum. It is extracted from bauxite, which itself contains between 30% and 60% aluminum oxide. The rest is a mixture of silica, various iron oxides, and titanium dioxide. As such, aluminum oxide must be purified before it can be refined into aluminum metal. The so-called Bayer process is the standard industrial method used to refine bauxite into aluminum oxide.

Figure 15.4. Cross-Border Value Chain of Aluminum Industry



Source: PT Indonesia Chemical Alumina. Chemical Grade Alumina: Tayan, West Kalimantan, Indonesia; and D. Bauer and S. Siddhaye. n.d. EBM Roadmap Summary. http://www.wtec.org/loyola/ebm/usws/ind_summary.htm (accessed 25 December 2017).

(ii) *Aluminum Hydroxide*. Indonesia Chemical Alumina also produces aluminum hydroxide, which is used as a feedstock for the manufacture of other aluminum compounds. Those compounds include specialty calcined alumina, aluminum sulfate, poly-aluminum chloride, aluminum chloride, zeolites, sodium aluminate, activated alumina, and aluminum nitrate. The term "feedstock" in this case refers to a raw material or unprocessed material used to make goods, finished products or intermediate materials. Aluminum hydroxide is used in fire retardants, pharmaceuticals, and other product applications.

Sarawak Production of Aluminum Metal

(i) *Aluminum Metal*. Press Metal in Sarawak uses the Hall–Héroult process to convert aluminum oxide into aluminum metal. At their aluminum smelters, the aluminum oxide is poured into special reduction cells with molten cryolite. Electric currents are then induced in the mixture and the current breaks the bond between the aluminum and oxygen atoms. The process causes the liquid aluminum to settle at the bottom of the reduction cell. Primary aluminum is then cast into ingots and shipped to customers or used in the production of aluminum alloys for various purposes. Those aluminum alloys are then shaped into their required forms to make aluminum products for mobile telephone bodies, airplane fuselages, and other applications.

Figure 15.5 shows the steps involved in alumina production by PT Indonesia Chemical Alumina in Tayan.

Figure 15.5. Steps in Alumina Factory Processing

Source: Photos provided by PT Indonesia Chemical Alumina.

16

Natural Rubber

For video presentations on the Sarawak-West Kalimantan natural rubber cross-border value chain, visit https://youtu.be/j06pkRWuohs

16.1 Background

Indonesia and Malaysia are the world's second and third largest natural rubber producing countries, respectively. Indonesia accounts for 27% of total world production, while Malaysia contributes 9% to the total. The focus of Indonesia's and Malaysia's activities is on the production and export of blocked rubber. They ship their raw materials to Europe and countries like the PRC, Japan, and the United States (US) to be processed into rubber products such as tires, industrial rubber goods, and consumer goods like footwear. The two countries have designed strategies to expand pre-export processing of their natural rubber to increase value-added activities. Malaysia is already the world's leading exporter of latex, and is a major producer of medical gloves and other rubber products.

In West Kalimantan, rubber was introduced into the province in the early 1900s and dominated agriculture during the 20th century. By 1924, the territory (then part of Dutch Borneo) had as much as 100,000 hectares.[60] Production growth responded to the surge in world rubber prices. Rubber trees mature in 5 to 7 years, and cultivation cannot be easily changed. Nevertheless, the trees can be tapped for a long time and require little maintenance. The decision to harvest, or tap, the tree can therefore be made on short notice. For that reason, output in the province has tended to align closely with the international market price of rubber relative to competing crops like copra and, more recently, oil palm.

[60] W. de Jong. 2001. The Impact of Rubber on the Forest Landscape in Borneo. In A. Angelsen and D. Kaimowitz, eds. *Agricultural Technologies and Tropical Deforestation*. pp. 367–381.

In the western part of the province, coastal Chinese and Malay farmers planted most of the rubber and shipped official supplies through Pontianak. In the eastern part of the province, the Dayak population cultivated rubber trees. Since road access to the capital was nonexistent, rubber was sent to Sarawak until the early 1980s. the subsequent construction of a road to the capital made rubber production more attractive and farmers substantially increased their plantings of rubber trees.

Dyak farmers in the east traditionally use a so-called swidden agricultural system. It involves an annual slash-and-burn process to plant rice, and possibly other crops or tree species. After harvesting the rice at the end of the year, they may plant manioc and fruit-tree species for 2 or 3 years. After the third year, however, they allow the field to grow into a secondary forest, Rubber trees can form part of the swidden stage, when farmers can plant rubber trees right before the rice plantings. They can then leave the rubber trees virtually unattended until they are ready to be tapped. This low labor-intensive method of rubber production allows the farmer to have a regular source of cash, especially since rubber can be stored and marketed when the cash is needed.[61] Until oil palm arrived in the 1990s, most villages practice swidden rice cultivation and had plots of rubber agroforests. Consequently, much of the land now dedicated to oil palm had previously been managed as rubber agroforests.[62]

In Sarawak, rubber was also introduced into the state in the early part of the 20th century. Although production expanded rapidly, it grew at a somewhat slower rate than in West Kalimantan. In 1930, there were 30,000 hectares under cultivation, and by 1961 that area had grown to nearly 150,000 hectares.[63] Afterward, rubber exports of Sarawak declined and replanting rates by farmers fell. By 1971, there were only 36,000 hectares under cultivation. Pepper cultivation expanded in its place and became an important cash crop. Farmers also use the same swidden system as those in West Kalimantan.

16.2 Industry Analysis

West Kalimantan's rubber trees are predominantly grown by small-size farmers. Production capacity at the farm level is low, as is productivity. Because of the dominance of small farmers, there is a highly fragmented supply chain. Multiple levels of middlemen link smallholder farmers to companies.

Rubber and rubber manufacturing contributes nearly 7% to total provincial manufacturing activities and over 1% of gross provincial domestic product (GPDP). Its contribution has been gradually declining, however (Figure 16.1). In 2012, rubber and its products contributed over 8% to manufacturing value added, and 1.4% to GPDP.

West Kalimantan's largest export market for natural rubber is the PRC, which absorbs 43% of all those exports (Figure 16.2). Other important markets are Japan (21%), the Republic of Korea (12%), Argentina (8%), and India (6%).

[61] W. de Jong. 2001. The Impact of Rubber on the Forest Landscape in Borneo. In A. Angelsen and D. Kaimowitz, eds. *Agricultural Technologies and Tropical Deforestation*. pp. 367–381.

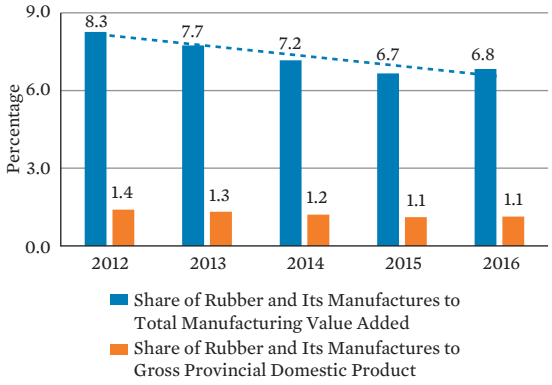
[62] J. D. Langston et al. 2017. Estate Crops More Attractive than Community Forests in West Kalimantan, Indonesia. *Center for International Forestry Research*. 8 February 2017. https://www.cifor.org/library/6389/estate-crops-more-attractive-than-community-forests-in-west-kalimantan-indonesia/ (accessed 27 December 2017).

[63] W. de Jong. 2001. The Impact of Rubber on the Forest Landscape in Borneo. In A. Angelsen and D. Kaimowitz, eds. *Agricultural Technologies and Tropical Deforestation*. pp. 367–381.

Sarawak's natural rubber-based product exports are predominantly manufactured items. Tire exports represent nearly 60% of all rubber-based exports, compared with a 20% contribution of natural rubber (Figure 16.3). Inner tubes and conveyor or transmission belts together contribute another 8%.

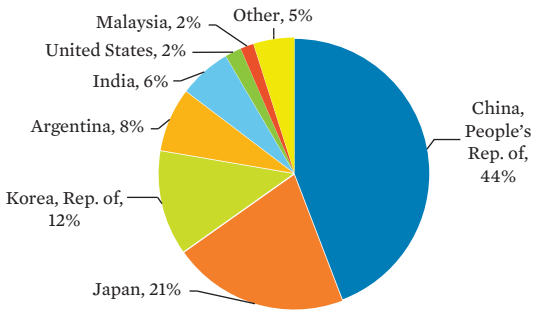
Those rubber-based manufactured exports of Sarawak are largely directed to members of the Association of Southeast Asian Nations (Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam), which together absorb 43% of all exports (Figure 16.4). Other important markets are Australia (17%), Papua New Guinea (16%), and Bangladesh (7%).

Figure 16.1. West Kalimantan—Percentage Contribution of Rubber and Rubber Manufactures to Total Manufacturing and Gross Regional Domestic Product (%)



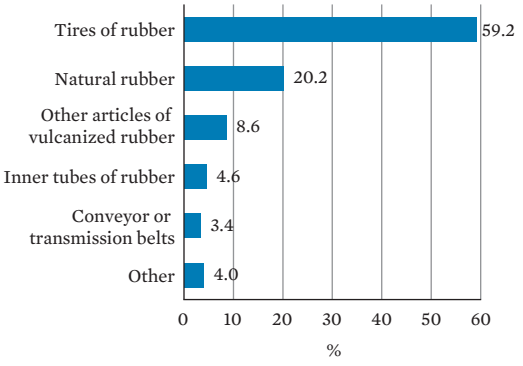
Source: BPS Provinsi Kalimantan Barat. Gross Regional Domestic Product of Kalimantan Barat by Industrial Origin, 2012–2016. Kalimantan Barat Province.

Figure 16.2. West Kalimantan—Percentage Distribution of Natural Rubber Exports, 2017



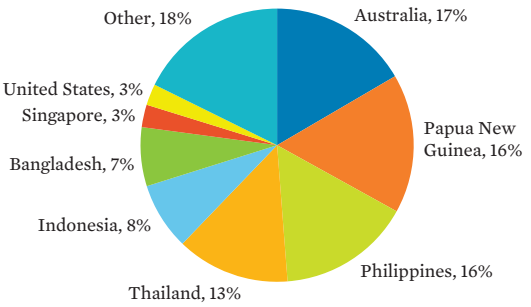
Source: Based on data provided by customs authorities.

Figure 16.3. Sarawak—Percentage Contribution of Major Types of Natural Rubber-Based Export



Source: Based on data provided by customs authorities.

Figure 16.4. Sarawak—Percentage Distribution of Rubber-Based Manufactured Exports, 2017



Source: Based on data provided by customs authorities.

16.3 Project Profile for Cross-Border Value Chains

Both West Kalimantan and Sarawak produce natural rubber and process it for manufacturing applications. However, only Sarawak currently has manufacturing operations in natural rubber products. The proposed cross-border value chain is therefore characterized by production and manufacturing activities being conducted in both territories, and manufacturing of natural rubber products taking place in Sarawak (Figure 16.5).

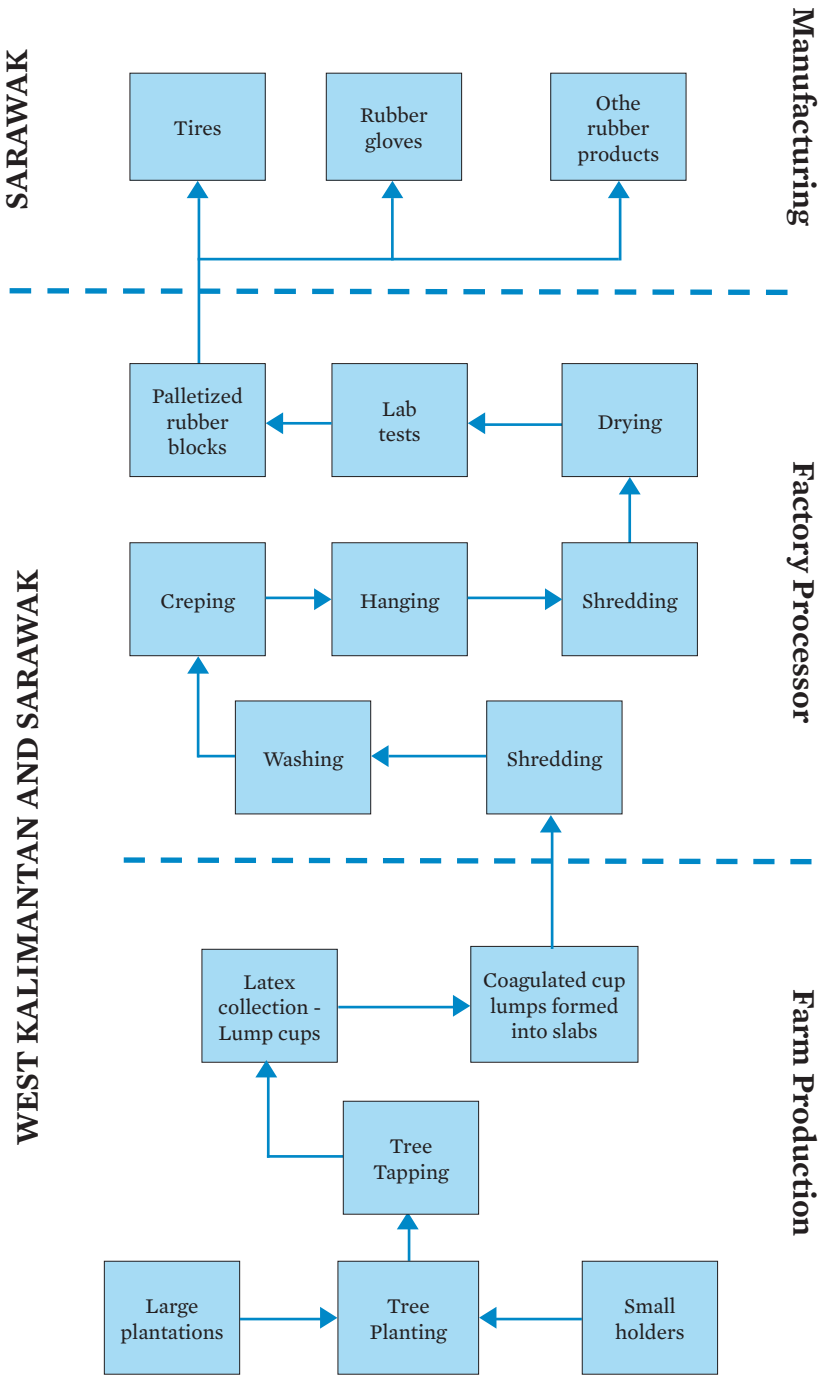
In both West Kalimantan and Sarawak, farm production and factory processing are similar. The value chain begins at the farm level with the tree plantings. Rubber trees require up to 7 years to be productive, and then have a 25-year productive phase. The latex in the trees is "tapped" by making incisions in the bark and collecting the fluid in vessels. The coagulated cup lumps are then formed into slabs for shipping to the factory. Latex is generally processed into either latex concentrate for manufacture of dipped goods or coagulated under controlled, clean conditions using formic acid. The coagulated latex can then be processed into the higher-grade, technically specified block rubbers.

At the factory processing stage, Figure 16.6 shows the steps involved in processing the latex into rubber blocks. The photos were taken at PT New Kalbar Processor in Kubu Raya Regency. The following is a description of the steps involved in the process:

(i) *Step 1:* The raw material arrives at the factory in slabs from a variety of sources, including the factory's own plantation, small independent plantations, and smallholders. In the case of PT New Kalbar Processor, the material is sourced from smallholders.
(ii) *Steps 2 to 4:* The process begins by shredding the rubber prior to its immersion in solvents because otherwise the material will not easily dissolve. After washing, the shredded rubber is blended and granulated (so-called crumbing). The resulting material is then flattened into a crepe shape. The wet blankets are then air dried in large sheds for several days before oven drying at elevated temperatures. The result is a product of consistent quality.
(iii) *Steps 5 to 9:* The cleaning process continues to remove contamination and prepares the material for the final stage of drying.
(iv) *Step 10:* Testing is carried out for dirt content, ash content, nitrogen content, volatile matter, initial Wallace plasticity value, and plasticity retention index.
(v) *Steps 11 and 12:* The crumbed rubber is transported to the compressor, which converts the material into rubber block shapes.
(vi) *Step 13:* Imperfections are removed from the rubber blocks.
(vii) *Steps 14 to 16:* The blocks are placed inside polyethylene bags and sealed, while those blocks found to have major imperfections are recycled.
(viii) *Steps 17 to 20:* The blocks are placed in bins and transported to warehousing facilities to await shipment to manufacturers of intermediate and final products such as tires and rubber gloves.

West Kalimantan rubber processing factories export nearly all their rubber to external markets. Indonesia absorbs between 15% and 20% of all rubber production. The main users within Indonesia are the multinational tire companies Bridgestone, Goodyear, Pirelli, Vredestein, and a local tire company named Gajah Tunggal. In contrast, Sarawak and Malaysia in general do have rubber product manufacturing and rubber wood industries, which add a great deal of value to their products. The state government is intent on promoting additional manufacturing activities in rubber-based industries.

Figure 16.5. Cross-Border Value Chain of Natural Rubber Industry



Source: B. Arifin. 2011. Supply-Chain of Natural Rubber in Indonesia. *Jurnal Manajemen and Agribisnis.* 2 (1). https://www.researchgate.net/publication/284072397_Supply_chain_of_natural_rubber_in_Indonesia (accessed 28 December 2017).

Figure 16.6. Steps in Natural Rubber Factory Processing

continued on next page

Figure 16.6 *continued*

continued on next page

Figure 16.6 *continued*

Source: Photos by Alisa Lord during visit to PT New Kalbar Processor in Kubu Raya Regency.

17

Palm Oil

For video presentations on the Sarawak-West Kalimantan palm oil cross-border value chain, visit https://youtu.be/yKlvRlgD6VI

17.1 Rationale

As the world's largest producer of palm oil, Indonesia accounts for over half of world supplies of the product. The 34.5 million tons of Indonesian palm oil that were produced in 2016 consisted of 31.5 million of crude palm oil (CPO) and 3 million tons of palm kernel oil (PKO). The islands of Borneo and Sumatra contribute over 95% of the country's total production. West Kalimantan ranks 5th in terms of top oil palm producing provinces. Within Borneo, West Kalimantan ranks 2nd in importance among oil palm production (after Central Kalimantan) and accounts for one-fourth of all Indonesian production in the island.

During interviews conducted for this study in October–November 2017, palm oil companies expressed an interest in developing downstream investment and vertical integration by partnering with processing and trading companies to develop refineries, storage terminals, and ports. However, they lack knowledge and expertise to be able to develop those industry dimensions. Some companies have already formed joint ventures with more experienced enterprises, as in the case of Kencana and Louis Dreyfus Company, as well as Astro Agri Lestari and KLK. Others have expressed interest in forming joint cross-border ventures with Sarawak-based companies involved in downstream activities.

Sarawak has succeeded in developing downstream activities for its palm oil industry. Yet the state's foundation for continued growth of manufactures such as oleochemical rests on the ability of plantation companies to ensure reliable flows of palm oil. Upstream activities are also challenged by aging palm plantations, which lower productivity and represent an opportunity cost for higher-yielding new trees. For Sarawak to sustain its growth of manufactures such

as oleochemical, local manufacturers are anxious to access oil palm fresh fruit bunches in nearby West Kalimantan, which like other provinces in Indonesia, is enlarging its plantings of oil palm. There are therefore potential synergies between West Kalimantan and Sarawak in further developing their palm oil industries.

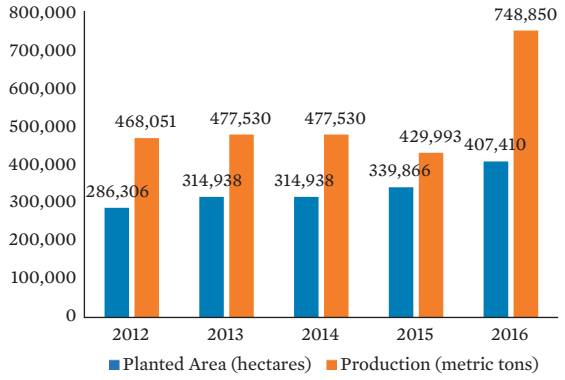
17.2 Industry Analysis

Production and Distribution

Production of West Kalimantan oil palm in 2015 was 2.1 million metric tons and that of palm oil in 2016 was 750,000 metric tons (*palm oil* is the vegetable oil derived from the masocarp (reddish pulp) of the fruit of the *oil palm*). Figure 17.1 shows the growth of the area planted of oil palm and production by smallholders in West Kalimantan. Since 2012, the area planted has expanded by 10% and production has grown by 5%.

Within West Kalimantan, five of the six top palm oil producing regencies are at or near the border with Sarawak (Figure 17.2). The largest area for planting and production in the province is Sanggeu Regency, in the north-central part and bordering Sarawak. Other border regencies with large oil palm production and areas of cultivation are Sintang (3rd largest producer, Landak (5th), and Sambas (6th). Sekadau (4th largest producer) is near the border with Sarawak. The second largest producer of oil palm is Ketapang in the southern part of the province.

Figure 17.1. West Kalimantan Oil Palm Area Planted and Production by Smallholders, 2012–2016



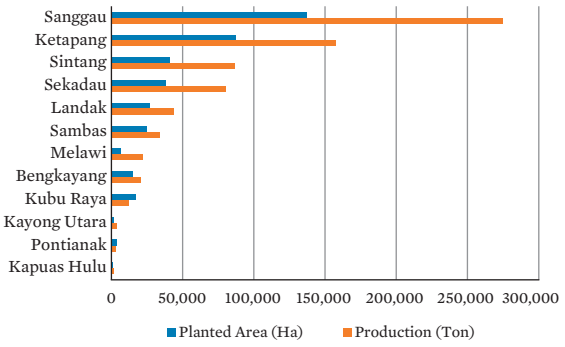
Source: BPS Provinsi Kalimantan Barat. Gross Regional Domestic Product of Kalimantan Barat by Industrial Origin, 2012–2016. Kalimantan Barat Province.

Border Oil Palm Mega-Project

The Indonesian Minister of Agriculture put forward a plan in 2005 to develop the world's largest oil palm plantation in a 5–10-kilometer band along the border of Indonesia with Malaysia. It covered West Kalimantan's and East Kalimantan's border with Sarawak, and West Kalimantan's border with Sarawak. However, the project's 1.8-million-hectare oil palm project was found to negatively impact primary forests of three national parks and threaten land rights of the indigenous Dayak communities in the border area.

Subsequent campaigns and lobbying by civil society, Indonesian media, and foreign entities supported a revision to the Indonesian government's mega-

Figure 17.2. West Kalimantan Distribution of Oil Palm Area Planted and Production by Regency, 2016



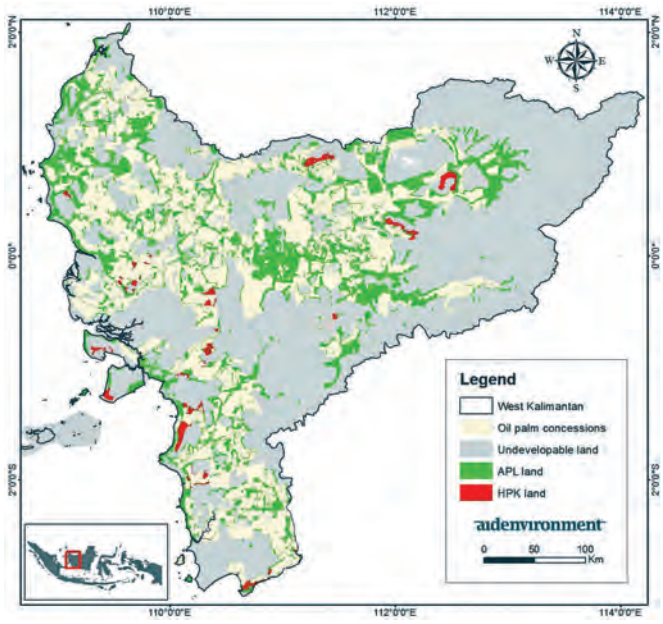
Source: BPS Provinsi Kalimantan Barat. Gross Regional Domestic Product of Kalimantan Barat by Industrial Origin, 2012–2016. Kalimantan Barat Province.

project. As a result, the Ministry of Forestry decided that it would not release protected forests in the border area; the Ministry of Agriculture found that over 90% of the affected area was unsuitable for oil palm cultivation; and the Indonesian government declared its support to the Heart of Borneo Initiative, an effort led by World Wildlife Fund (WWF) aiming to preserve the biological diversity and wildlife species in the border area of Kalimantan and Sarawak, and Sarawak and Brunei Darussalam.[64]

Expansion Limitation of Palm Oil Concessions

West Kalimantan's total land area is 15 million hectares, of which 4.2 million has been allocated to palm oil concessions. In April 2016, Indonesian President Joko Widodo declared his intention to impose a moratorium on new palm oil concessions. This moratorium followed a series of measures taken since 2009 to curb the environmental impacts of the industry, including a 2-year forest moratorium last extended in 2015. The Government of Indonesia recently amended the peatland moratorium and the Indonesian Sustainable Palm Oil certification system.

Map 17.1. West Kalimantan Distribution of Oil Palm Area Planted and Production, 2016



Source: BPS Provinsi Kalimantan Barat. Gross Regional Domestic Product of Kalimantan Barat by Industrial Origin, 2012–2016. Kalimantan Barat Province.

While the final text of the palm oil moratorium is being developed, a draft version has been circulated.[65] Until the moratorium comes into effect, licenses can legally be granted on land classified as Other Land Use (APL) and Convertible Production Forest (HPK). Land classified as APL or HPK totals 2.6 million hectares, of which 2.2 million hectares are suitable for palm oil concessions. Moratorium restrictions reduce available land to 142,000 hectares, or 2.6% of the 2.2 million hectares suitable for palm oil concessions (Map 17.1).

17.3 Project Profile for Cross-Border Value Chains

The palm oil cross-border value chain project aims to develop collaboration and an integrated industry between West Kalimantan and Sarawak in the palm oil industry. The proposed value

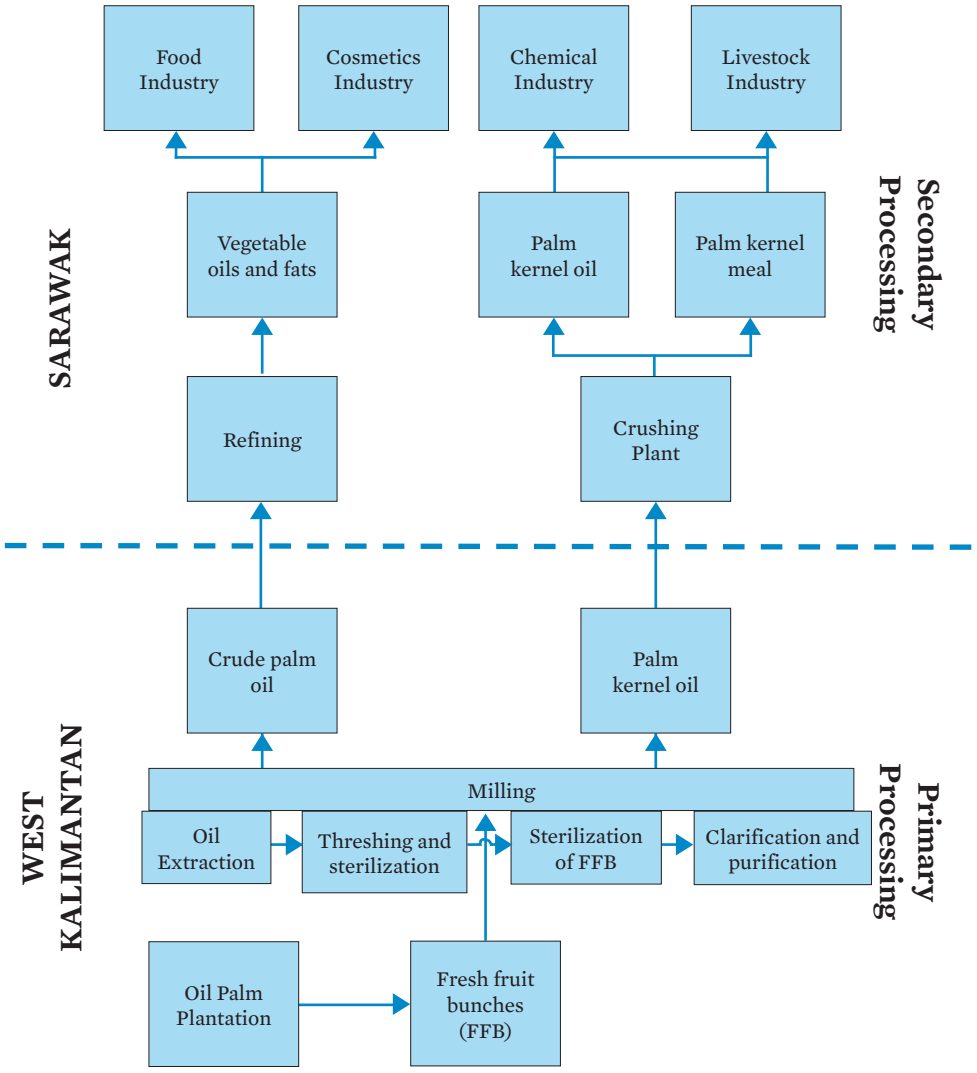
[64] E. Wakker. 2006. The Kalimantan Border Oil Palm Mega-project. Amsterdam: AIDEnvironment. https://inis.iaea.org/search/search.aspx?orig_q=RN:38044538 (accessed 12 December 2017).

[65] Aidenvironment Climate Advisers Profundo. 2017. Indonesia's Palm Oil Landbank Expansion Limited by proposed Moratorium and NDPE Policies. Washington, DC. https://chainreactionresearch.com/reports/indonesias-palm-oil-landbank-expansion-limited-by-proposed-moratorium-and-ndpe-policies/ (accessed 5 January 2018).

chain is shown in Figure 17.3. The primary processing, or upstream, stages of production begin at the plantation level and proceed to the milling stage, where the oil extraction, threshing and sterilization, and certification and purification processes take place. There are high margins in the upstream market, which explains the rapid expansion of oil palm plantations and milling processes in the Kalimantan provinces in recent years. Negative environmental consequences of the milling process can be converted in Sarawak's new biofuel facilities.

In the secondary processing, or upstream, stages of production, refining and crushing occur and there is production of vegetable oils, palm kernel oil, and palm kernel meal. The high value-added phases of secondary production occur at the higher stages of production in food and health-based industries, and the nonfood-based industry related to oleo chemicals and branded products.

Figure 17.3. Cross-Border Value Chain in Palm Oil Industry



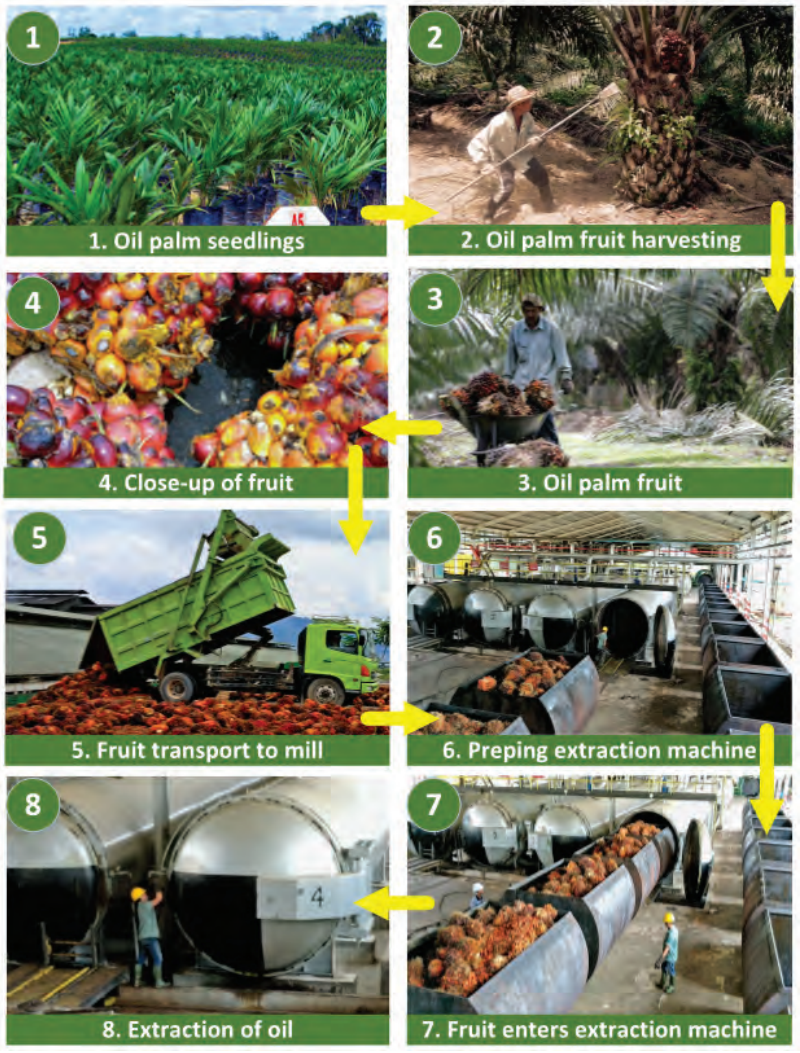
Source: Representation by the authors.

Figure 17.4 shows the steps involved in the transformation of the oil palm fruit into palm oil. Most of the photos are from the authors' field visit to PT Buana Tunas Sejahtera Seriang Mill and the Nanga Badau border crossing into Sarawak.

(i) In an oil palm plantation, there are three types of plants: (a) unproductive plants, which are not yet in their productive age; (b) productive plants, which are fruit-producing plants; and (c) old or damaged plants (OP/DP), which have passed their productive age or no longer produce fruits.[66]

(ii) At the palm oil mill, fresh fruit bunch (FFB) is processed into crude palm oil (CPO) and palm kernel oil (PKO). The processing of FFB into CPO involves cooking, threshing,

Figure 17.4. Steps in Oil Palm Processing



continued on next page

[66] E. Hambali and M. Rivai. 2017. The Potential of Palm Oil Waste Biomass in Indonesia in 2020 and 2030. *IOP Conference Series: Earth and Environmental Science*. 65 012050. http://iopscience.iop.org/article/10.1088/1755-1315/65/1/012050/meta (accessed 5 January 2018).

Figure 17.4 *continued*

Note: Oil palm seedlings photo by Yayan Indriatmoko for Center for International Forestry Research; harvesting photo from MY palm oil; Sarawak refinery photo from Sarawak Oil Palms Berhad Group of Companies; all other photos by Alisa Lord during visit to PT Buana Tunas Sejahtera Seriang Mill.

Sources: MY palm oil. 2009. Msia, Indonesia Reject Oil Palm Planting Curb at UN Summit. 21 December 2009; ABC News. 2011. Palm Oil is Produced All Across South-East Asia Because It is a Sustainable, High-Yield Product that Helps Small Farmers Lift Themselves out of Poverty. 4 May.

digestion, pressing, settling, purification, and drying. Pressing process results in a waste product (nut or fiber).

(iii) Further processing involves the separation of nut and fiber followed by drying, nut cracking, kernel or shell separation, drying, pressing, and filtering until PKO is produced. Byproducts obtained from this process include empty fruit bunches, fiber, shell, PKM, and effluent.

(iv) Crude palm oil production is largely absorbed by the oleo-chemicals and edible oil industries. There are two separate and distinct types of products made from palm oil and palm kernel oil. Both of these oils, which are mainly made up of triglycerides, are chemically and physically different from each other: palm oil is high in palmitic acid and palm kernel oil is high in lauric and myristic acids.

(a) *Palm Oil:* There are four main uses of palm oil in food products. They consist of cooking and frying oil, shortenings, and margarine and confectionary fats. These products are in the form of both solid and liquid fat products.

(b) *Palm Kernel Oil:* This oil is suitable for the manufacture of soaps, washing powders, and personal care products.

18

Wood Products

For video presentations on the Sarawak-West Kalimantan wood products cross-border value chain, visit https://youtu.be/3Dsby-jL-Zc

18.1 Rationale

Wood and wood-based articles are West Kalimantan's third largest export, contributing 10% of the province's total export earnings in 2017. Although its share of exports has declined in recent years as those of alumina, rubber, and crude palm oil, exports have risen. Innovation and diversification into new types of wood-based products have increased the value addition of pre-export processing. Nevertheless, the wood-based industry remains concentrated in four subsectors: (i) sawn timber; (ii) veneer and panel products, which include plywood and reconstituted panel products such as particleboard, chipboard, fiberboard, moldings, and builders' joinery; (iii) carpentry for doors and windows along with panels and flooring board or parquet; and (iv) furniture and furniture components.

In Sarawak, most of the country's larger sawmills and veneer and plywood mills are in that state, as well as that of Sarawak. The mills use tropical wood species to produce sawn timber, veneer, plywood, and other veneered panel products. More than 55% of the plywood mills and 45% of the moldings mills are in Sarawak and Sarawak.[67] Those mills are most often owned by Malaysians operating small and medium-sized enterprises (SMEs).

Malaysian furniture manufacturers produce a wide range of furniture from office, kitchen, bedroom, dining room, living room, upholstered furniture or sofa, outdoor and garden furniture. Furniture is made from not only wood, but also materials such as rattan, metal,

[67] Malaysian Investment Development Association. Food Technology and Sustainable Resources. http://www.mida.gov.my/home/food-technology-and-sustainable-resources/posts/.

Table 18.1. West Kalimantan Domestic Investment and Employment Generation in Manufacturing Sector in 2016

		Investments		Employees	
	No. of projects	Value ($ million)	Share of Total (%)	Persons	Share of Total (%)
Food	7	134.4	35	1,035	6
Chemical	17	111.5	29	10,070	54
Others	5	94.1	24	521	3
Woods	*20*	31.4	8	*6,761*	37
Nonmetal	2	12.3	3	107	1
Basic Metal	0	2.6	1	–	0
Paper	11	0.9	0	25	0
Total	**52**	**387.2**	**100**	**18,519**	**100**

– = not available.

Source: BPS Provinsi Kalimantan Barat. *Kalimantan Barat Province in Figures 2017*. Kalimantan Barat Province.

fabrics, plastic, glass, marble, and composite materials. Furniture manufacturers are located in Sarawak, along with Johor, Selangor, Perak, and Melaka.

West Kalimantan's wood processors have expressed interest in diversifying their production to include furniture manufacturing, like those in Sarawak. Development of cross-border clusters of downstream activities add value to their products. For collaboration to occur, however, West Kalimantan timber producers need to ensure that their logs have global certifications from either the Forest Stewardship Council (FSC) or the Programme for the Endorsement of Forest Certification (PEFC), similar to the certification held by most Sarawak companies. The advantage of the certification, in addition to offering cross-border collaborative opportunities, is that certified logs are valued by as much as 77% more than non-certified logs. Additionally, FSC certification adds a 100% premium on the price of timber.[68]

18.2 Industry Analysis

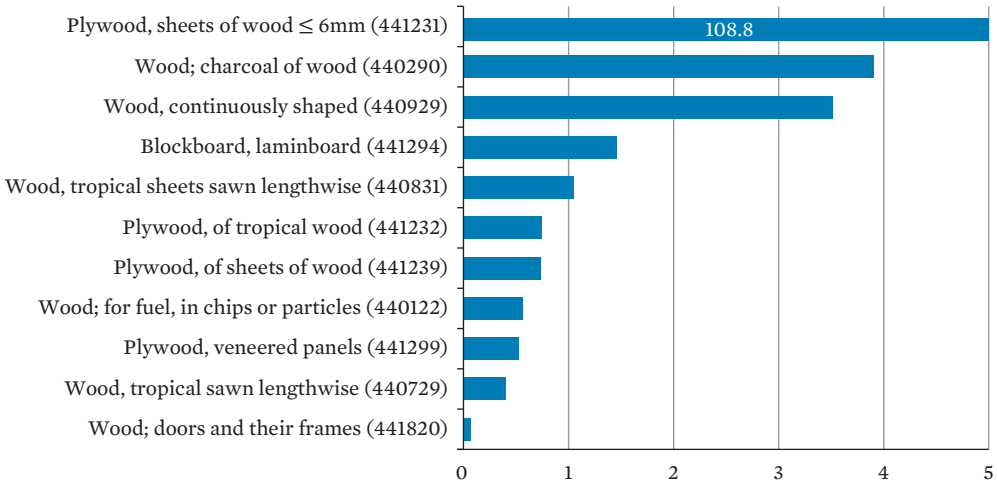
Production and Exports

The wood-based industry is an important source of domestic investment and employment in West Kalimantan. Figure 18.1 shows the 2017 amount of investment as of 31 December of the year for industries in the manufacturing sector, as well as the number of projects and employment generated by those investments in the province. While the importance of the wood-based industry has declined considerably and investments now account for only 8% of the total, the industry contributes considerably to employment generation. In 2016, new investment created 6,761 jobs, or 37% of total new employment, even though the industry accounted for less than 10% of new investment.

In exports, Figure 18.2 shows the composition of wood and wood product exports of West Kalimantan in 2017. Plywood is, by far, the largest type of wood product export, with $108.8 million of shipments in that year. Charcoal of wood is the second largest with a much

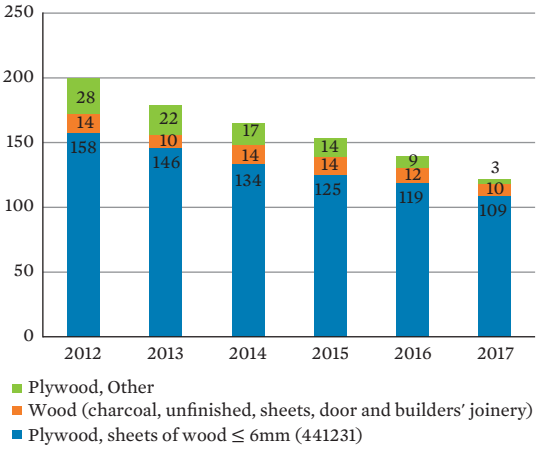
[68] W. Kollert and P. Lagan. 2007. Do Certified Tropical Logs Fetch a Market Premium?: A Comparative Price Analysis from Sabah, Malaysia. *Forest Policy and Economics*. 9 (7). pp. 862–868.

Figure 18.1. West Kalimantan Mayor Wood Product Exports, 2017



mm = millimeter.
Source: Based on data provided by Ministry of Trade Indonesia.

Figure 18.2. West Kalimantan Mayor Types of Wood Product Exports, 2012–2017
($ million)



mm = millimeter.
Source: Based on data provided by Ministry of Trade Indonesia.

lower export value of $3.9 million, while the value of the third most important export, continuously shaped wood planks, was $3.5 million. Other significant exports, albeit of a much lower export value, are blackboard, tropical wood sheets sawn lengthwise, other types of plywood, and doors and their frames.

Wood exports of all types have been declining in recent years. Plywood exports contracted from $158 million in 2012 to $109 million in 2017, a nearly one-third decline in 5 years. Figure 18.3 shows the value of the major type of plywood exported and other wood and plywood exports between 2012 and 2017. All other types of wood product exports have also declined by one-third in the last 5 years.

West Kalimantan's wood and wood-based exports are concentrated in two major markets, Japan (47% of all exports) and the Republic of Korea (36%) (Figure 18.3). Together these two export markets absorb 83% of all shipments from the province outside of the country. Other important markets are the PRC (6%); Taipei,China (3%); India (1%); and the US (1%).

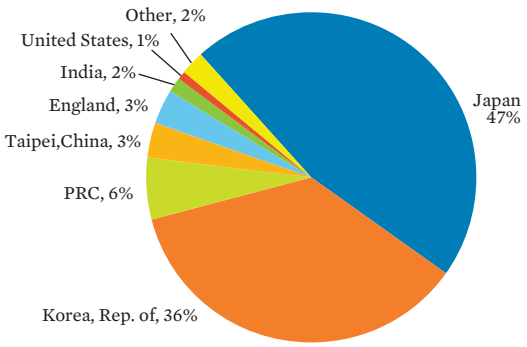
Sarawak's Need for Timber

Malaysian furniture manufacturers have given great emphasis to the finishing, design, and production of higher quality products with their own brand, mostly for the export

market. Some of these companies have moved from supplying ready-to-assemble furniture to manufacturing their own designed furniture.[69]

While forestry has declined in relative importance, Sarawak still exports massive quantities of unprocessed and semi-processed timber products. For several years now, however, Sarawak has experienced a shortage of log supplies in the wood-based industry. Since the implementation of the Sustainable Forest Management policy in the 1990s to conserve and protect the forest resources, the continuous shortage of raw material supplies is affecting the ability of the industry to implement downstream processing.

Figure 18.3. West Kalimantan Destination of Wood Product Exports, 2017
($ million)



Source: Based on data provided by Ministry of Trade Indonesia.

Not only are there local market shortages, but in the export markets producers must comply with requirements about the legality of timber. Japan, which is by far Sarawak's major export market for forestry products, enacted new legislation in May 2016 under the "Law Concerning the Promotion of Distribution and Use of Legally-Harvested Timber".[70] It is designed to promote the trade of legal timber, and it represents the beginning of Japan's effort to follow the growing trend of implementing measures to prevent imports of illegal timber. Other major markets focus on the elimination of illegal timber. For example, in Europe, producers need to comply with the 2013 EU Timber Regulation; in the US market, imports are subject to the Lacey Act; and, in Australia, imports must comply with the 2014 Illegal Logging Prohibition Act.

Expansion of Sarawak's wood-based products without further depleting forests can be accomplished by sourcing greater amounts of wood from West Kalimantan. The province has an abundance of raw materials that are shipped to markets with relatively limited processing. Plywood is one of the major industries and quality standards are high. Thus there is ample opportunity for expanding the wood product industry into premium furniture and linking those value-adding activities to Sarawak's large and growing wood-based industry.

18.3 Project Profile for Cross-Border Value Chains

Both West Kalimantan and Sarawak have well-established downstream activities in plywood, veneered panels, and blockboard, and many companies have long-term contracts with overseas markets for the delivery of those products. Company managers have expressed little or no interest in cross-border collaboration between similar industries from their neighboring territory. Instead, they have indicated that they would like to diversify and expand their downstream activities in high value furniture making.

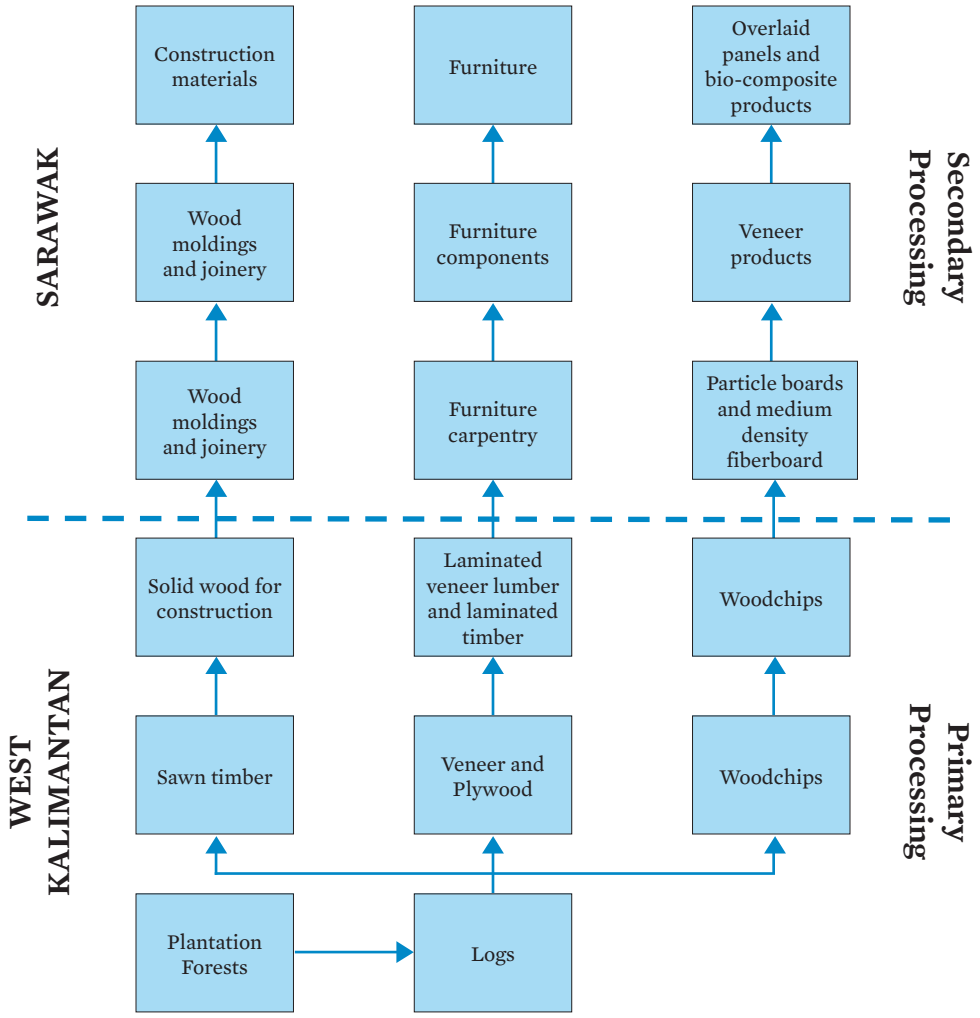
[69] Ministry of International Trade and Industry. Wood Based Industry. http://www.miti.gov.my/index.php/pages/view/2443.

[70] M. Momii. 2016. Japan's New Legal Timber Law. *Forestry Legality Initiative*. 5 December. http://www.forestlegality.org/blog/japan%E2%80%99s-new-legal-timber-law.

The project aims to develop a cross-border value chain between West Kalimantan and Sarawak in the wood processing industry. West Kalimantan has considerable plantation forests, has developed its primary wood processing industry, and needs wood for its furniture. Malaysia is the world's 8th largest exporter of furniture, with 80% of its exports in the form of wooden furniture. The top three export markets are the US (35% export market share), the European Union (11% of wood furniture exports), and Japan (9% of exports). It needs supplies of wood that are currently unavailable in the country. The Sarawak State Government and the Sarawak Furniture Industry Association actively support the furniture manufacturing industry by promoting its competitiveness in the global market.

Figure 18.4 shows a representation of a cross-border value chain in this industry. With the production of solid woods, laminated timber and veneer, and woodchips on the West Kalimantan side, the project will promote cross border clustering of company activities. In this way, the project will enable Sarawak's processing of wood moldings, furniture carpentry,

Figure 18.4. Cross-Border Value Chain in Wood Products Industry



Source: Representation by the authors.

and particleboards to continue growing to their full potential. It will also promote downstream activities in the areas of furniture, construction materials, and overlay panels and newer bio-composite products that could be directed to markets within Indonesia and Malaysia, and to premium markets in the Middle East, Europe, and the United States.

Figure 18.5 lists the steps involved in the manufacture of modular (knockdown) furniture. This type of furniture is made up of independent work surface and storage units with panels

Figure 18.5. Steps in Modular (Knockdown) Furniture Manufacturing

continued on next page

Figure 18.5 *continued*

Sources: Photos number 1 to 7 from Kitronik. Plywood: The Production Process. https://www.kitronik.co.uk/blog/plywood-production-process/ (accessed 9 January 2018); photo number 8 from Spotted Owl Timber. Hand Peeled Vigas. http://www.spottedowltimber.com/vigas.html (accessed 9 January 2018); and Kabjaks. The Cabinet Manufacturing Process.

used as space dividers. It includes all modular furniture components that collectively are required to complete a workstation. The following are the steps involved in the process:[71]

(i) *Forest Cultivation and Harvesting:* Raw logs must be sourced from legal and sustainable forest concessions. In West Kalimantan, it means compliance with wood sustainability certification under the central government, where there are several national policies that form the basis of Indonesia's forest governance regime. In Sarawak, it means compliance with the Malaysian Sustainable Forest Management, as well as the International Tropical Timber Organisation.

(ii) *Transportation to Mill and Storage:* Logs are transported from the forest concession to the mill to be processed and are stored in yards that use various methods to retain the moisture in the logs.

[71] Steps 1 to 3 from Kitronik. Plywood: The Production Process. https://www.kitronik.co.uk/blog/plywood-production-process/ (accessed 9 January 2018). Steps 4 to 9 from Spotted Owl Timber. Hand Peeled Vigas. http://www.spottedowltimber.com/vigas.html (accessed 9 January 2018).

(iii) *Debarking and Cutting of Logs:* Before the logs are cut and peeled, the bark must be removed. Mills use industrial machines to de-bark logs as they continue along the production line. De-barked logs then move on to be cut to size. The size that the logs are cut to is usually dependent on the production at the time of cutting; finished panel size and grain direction play a part in the cutting of logs. Logs are peeled using a rotary lathe. This peels the log in a manner like that of a pencil sharpener except the blade is completely parallel to the log at the time of cutting.

(iv) *Shipping to Manufacturers:* The peeled logs are shipped to the furniture manufacturer, where they are checked and measured to ensure sizes and moisture content is within requirements.

(v) *Cutting and Molding:* Each piece of timber is carefully cross cut into required lengths. Cut timber is then bundled on pallets, which is then processed at the molding section to achieve the shapes and sizes required.

(vi) *Component Fabrication:* Molded timber is processed by different machines depending on its shape and design to acquire its features. These components are then carefully sanded to round all sharp edges and smoothen out all surfaces.

(vii) *Assembly:* Each component is assembled to form the part of the intended furniture. Joints are glued together to form a strong bond. Assembled parts are then stacked together and labeled for traceability.

(viii) *Finishing and Packing:* Assembled parts are dipped in teak oil and wiped dry to achieve the brown or teak finishing. Teak oil acts as repellent of wood-destroying insects and as fungicide, and provides some weather and ultraviolet resistance to the wood. These parts are left for a time for the teak oil to cure and dry, and are then inspected again before being packed into carton boxes.

(ix) *Delivery:* Finished products are loaded into containers according to a customer's order. These containers are then shipped out to customers from all around the world.

19

Fisheries

For video presentations on the Sarawak-West Kalimantan fisheries cross-border value chain, visit https://youtu.be/gEDDE3fe-CM

19.1 Rationale

The fisheries, or seafood, industry includes all activities concerned with capturing, culturing, processing, preserving, storing, transporting, marketing, or selling fish or fish products. Enterprises in the industry carry out activities associated with wild-catch or aquaculture resources and the various transformations of those resources into products for sale. West Kalimantan's fisheries industry generated $3.8 million in 2017, down from $9.0 million in 2012. As a result, both the provincial and national governments have instituted several training and certification programs as well as numerous infrastructure projects to revitalize the industry.

An important subsector being promoted is the seaweed industry. Both Sarawak and West Kalimantan are expanding their production rapidly as global demand for dietary protein has risen. However, seaweed supplies are subject to large variations and buyers have been reluctant to commit to long-term arrangements with local producers.

West Kalimantan company owners are interested in higher-value processing activities. The challenge in developing supply or value chains between West Kalimantan and Sarawak companies will be in organizing producers and linking them with both upstream and downstream activities. While such cooperation is viable, it will require investment in clustering activities and a "champion" team to promote cross-border collaboration. The four product areas of potential collaboration are (i) crabs, other than frozen (HS 030624); (ii) prawns and shrimp, other than frozen (HS 030623); (iii) fresh or chilled whole fish (HS 030269); and (iv) fresh or dried seaweed (HS 121220). Section 18.2 of this report discusses clustering methods and requirements.

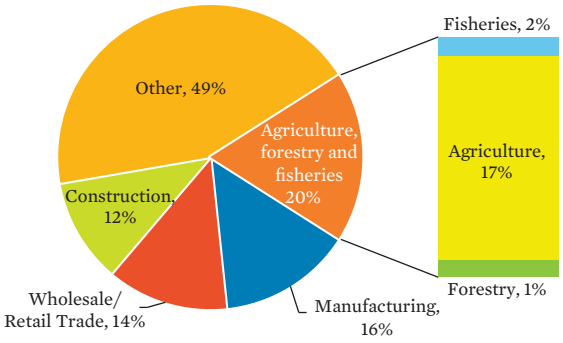
19.2 Industry Analysis

Indonesia is the second largest marine fishery producer and the third largest farmed fish producer in the world.

West Kalimantan. The fisheries industry is composed of the following five components: (i) capture fisheries, (ii) aquaculture, (iii) fish processing industry, (iv) ornamental fish industry, and (v) shipbuilding industry.

The fisheries industry only contributes 2% of West Kalimantan's gross provincial domestic product (Figure 19.1). Nevertheless, the national and provincial governments consider fisheries to be a high-priority growth industry with large, as-yet-untapped potential in the province. Within the subsector, the government's priority investment areas are shipbuilding, fish capture and cultivation, fish processing, and cold storage facilities.[72] The province's large and growing shipbuilding industry and the potential for cross-border collaboration with Sarawak is treated separately in the next chapter.

Figure 19.1. West Kalimantan Percentage Contribution of Fisheries and Other Sectors to Gross Provincial Domestic Product, 2016



Source: Based on data in BPS Provinsi Kalimantan Barat. Gross Regional Domestic Product of Kalimantan Barat Province by Industrial Origin, 2012–2016.

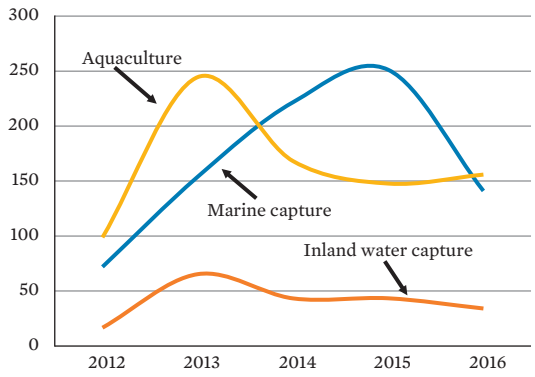
Government Policies. The Government's National Fisheries Industry Acceleration Program aims to bolster growth of the fisheries industry through sustainable fishing and aquaculture, zoning of fishing areas, and supporting regulations, institutions, and financing. West Kalimantan's fishing grounds are in the Natuna Sea, which is an extensive shallow sea located around Natuna Islands that extends south to Lingga and Tambelan Archipelago. The area has large sea capture opportunities and is the largest area designated by the government for fisheries management.

To take advantage of West Kalimantan's sea capture and cargo shipment opportunities, the government is developing Pontianak's seaport capacity. The plan includes revitalizing public shipyards, increasing local fishing vessel capacity, and skills training and certifications. In the regulatory environment, investment facilitating measures cover tax allowances, tax holidays, and import duty exemptions.

The following incentives are provided under Government Regulation No.18/2015: (i) 30% reduction in taxable net income from the investment, charged at 5% a year in a 6-year period; (ii) accelerated depreciation and amortization; (iii) compensation on losses that extend beyond 5 years; and (iv) 10% income tax on foreign tax dividends, or a lower rate under double taxation agreements with other countries. Tax holidays are offered to new investors, and pioneer investors, including those that build and operate fish processing facilities; and to investments of over $71 million.

[72] Ministry of Marine Affairs and Fisheries Republic of Indonesia. 2017. Indonesia Marine and Fisheries Business and Investment Opportunities. Jakarta.

Figure 19.2. West Kalimantan Value of Fish Production, 2012–2017 ($ million)

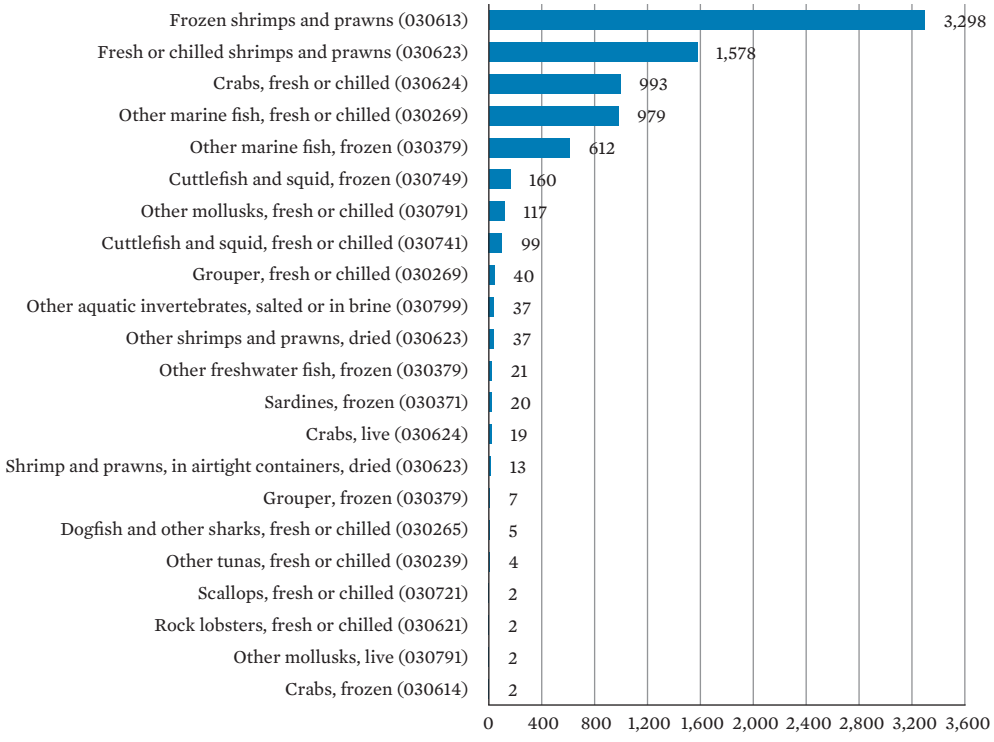


Source: Based on data in BPS Provinsi Kalimantan Barat. Gross Regional Domestic Product of Kalimantan Barat Province by Industrial Origin, 2012–2016.

Production and Exports. Fish and crustacean production in West Kalimantan is about equally divided between marine capture and aquaculture, while inland water capture represents about one-tenth of all fish production (Figure 19.2). Marine capture in the sea extend from small grazing species such as anchovy to large active predatory fish such as tuna, while aquaculture is the farming of fish, crustaceans, mollusks, aquatic plants, algae, and other aquatic organisms, and involves the cultivation of freshwater and saltwater populations under controlled conditions. Recent trends in these three sources of fish production indicate a stable level of inland water capture and considerable fluctuations in year-to-year marine capture and aquaculture production.

Over 60% of the province's total value of all fish and crustacean production derives from fresh, chilled and frozen shrimp and prawns (Figure 19.3). Another 12% of all earnings come from fresh and chilled crabs. The remaining 25% of fisheries production comes from a variety of sources that include fresh or chilled fish, mollusks, squid, grouper, tuna, scallops, and lobsters.

Figure 19.3. West Kalimantan Mayor Fisheries Product Exports, 2017

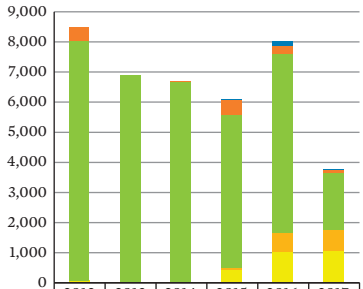


Source: Based on data provided by Ministry of Trade Indonesia.

In the last 5 years, crustaceans (shrimp, prawns and crabs) have dominated export earnings (Figure 19.4). In 2012, for example, 94% of all foreign exchange earnings from fisheries came from crustacean exports, and it was near 100% until 2014. More recently, other types of products have gained in importance, including fresh, chilled and frozen fish, as well as mollusks. Together these noncrustacean exports represented 25% of export earnings in 2016 and 50% in 2017.

Malaysia is the leading destination of West Kalimantan's fishery export (Figures 19.5 and 19.6). In 2017, Malaysia absorbed 77% of all fishery exports, while Singapore accounted for another 15%. Other markets, albeit of much lesser importance, are Japan; the PRC; and Taipei,China.

Figure 19.4. West Kalimantan Mayor Types of Fish and Crustacean Product Exports, 2012–2017 ($ '000)



	2012	2013	2014	2015	2016	2017
Other aquatic invertebrates (0308)	–	–	–	2	145	33
Molluscs (0307)	435	–	1	484	271	106
Crustaceans (0306)	7,983	6,908	6,669	5,113	5,939	1,893
Fish; frozen (0303)	–	1	–	60	639	702
Fish; fresh or chilled (0302)	78	1	1	422	1,024	1,056

Source: Based on data provided by Ministry of Trade Indonesia.

19.3 Ornamental Fish

West Kalimantan has in the past shipped ornamental freshwater fish to Malaysia, Singapore, and Thailand. It currently sells that type of live fish to Japan. All markets are for customers who prize high-quality ornamental fish and are willing to pay premium prices for them.

The industry comprises a wide range of producers, from household operators to large-scale commercial producers. The Asian arowana, also known as the dragon fish, is believed by the Chinese to bring good luck and prosperity due to its red color and coin-like scales. The Asian arowana is the world's most expensive aquarium fish. It is a tropical freshwater fish from Southeast Asia that grows 3 feet long in the wild. Today, only a few Asian arowana survive in the wild, deep in the jungles of Borneo. Most are raised on fish farms.

There already exists a Malaysian-Indonesian joint venture to breed the highly-prized arowana aquarium fish in Sarawak for the export market. The joint venture involves LTT Aquaculture Sdn Bhd, Malaysia's largest breeder of freshwater fish, and Pontianak-based Sun Heng Aquarium,

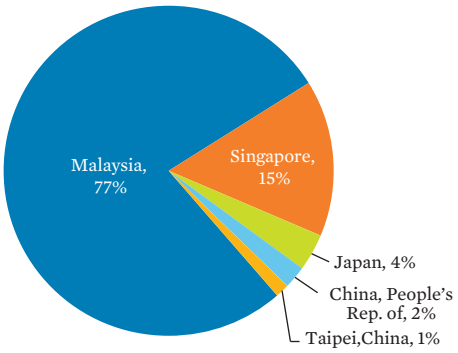
Figure 19.5. West Kalimantan Inland and Offshore Fishing Fleets

Inland water capture fleet in Kapuas Hulu Regency, near border with Sarawak

Marine capture fleet in Sambas river, of the regency by the same name

Source: Photos by Alisa Lord.

Figure 19.6. West Kalimantan Geographic Destination of Fish and Crustacean Product Exports, 2017 (%)



Source: Based on data provided by Ministry of Trade Indonesia.

an established arowana breeder and exporter. The project is breeding the super-red arowana, the most highly-prized variety of arowana. The green is the most common variety while others include silver and red-tailed golden arowana. Sun Heng's arowana fish ponds in Pontianak cover over 100 acres and provide broodstock, which are a group of mature individuals used in aquaculture for breeding purposes. They also allow for the transfer of breeding technology to Sarawak under the joint-venture project.

Export of arowana required a Convention on International Endangered Species of Wild Fauna and Flora (CITES) license. There are two companies in Sarawak currently holding licenses to export the ornamental fish.

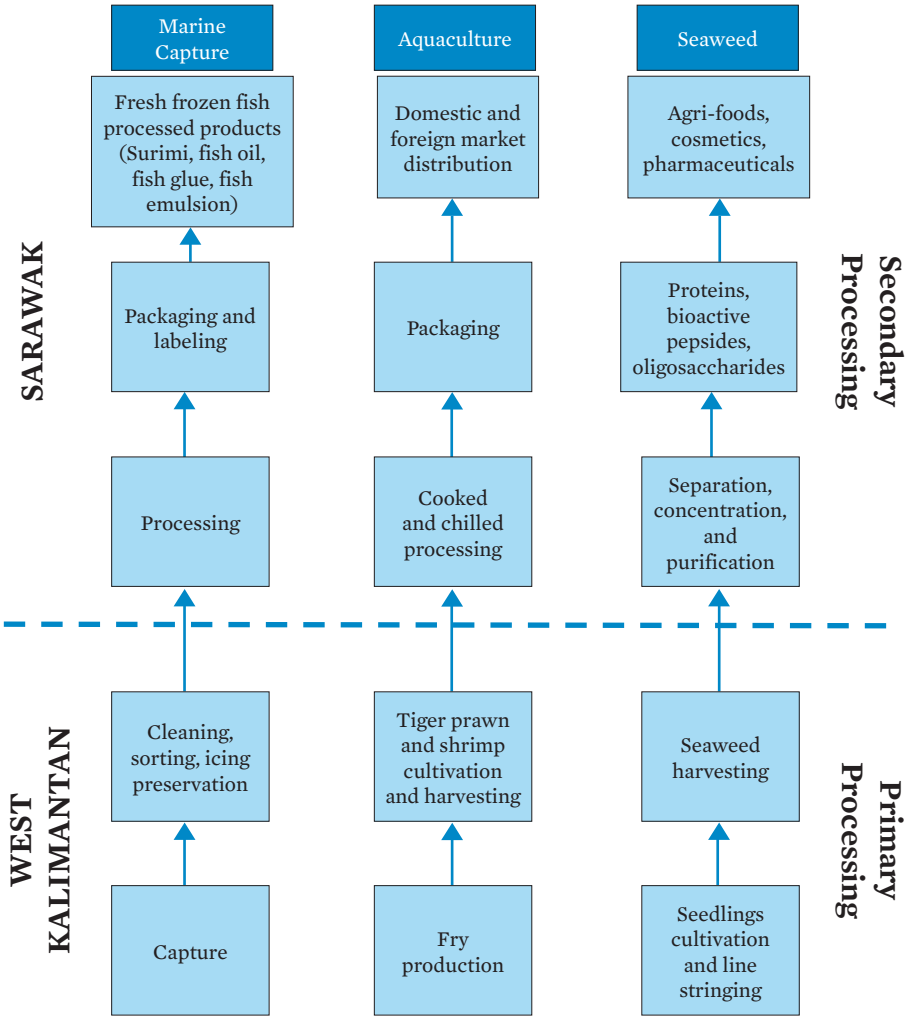
19.4 Project Profile for Cross-Border Value Chains

Figure 19.7 shows the proposed basic production and processing stages along the value chain for three of West Kalimantan's and Sarawak's major fisheries industry: marine capture, aquaculture, and seaweed production. The project will promote cross-border clustering of activities in fisheries products that are more value-added downstream products, especially those products that are processed and packaged under internationally accepted standards. The targeted types of products include semi-refined carrageenan from locally grown seaweeds, canned crab meat, surimi, and fish meal. Surimi or fish meat paste is a new local fisheries product and is used in the making of imitation crab and lobster meats, fish balls and cakes, and other convenient, ready-to-eat seafood products.

19.5 Ornamental Fish Production Stages

Figure 19.8 presents ornamental fish production in PT Arwana Lestari. Similar production facilities in West Kalimantan are already forming joint ventures with facilities in Sarawak to export and transfer technologies between the two territories. PT Arwana Lestari is located near Sentarum Lake and close to Putussibau City in the northeast regency of Kapuas Hulu. The farm produces many super-red arowanas, which originally came from Sentarum Lake. Arowana fries are now hatched and raised in controlled ponds or fish tanks. The farm has over 100 ponds, each of 12 x 50 meters in size, with 6 rooms each for reproduction. Feed is based on a combination of frogs, prawn, and chicken byproducts. The company is registered with CITES and there is a strong interest by the owner to expand exports to Malaysia and other markets.

Figure 19.7. Cross-Border Value Chains in Fisheries Industry



Source: Representation by the authors.

Figure 19.8. Ornamental Fish Production in PT Arwana Lestari

Source: Photos by Alisa Lord.

20

Shipbuilding

For video presentations on the Sarawak-West Kalimantan shipbuilding cross-border value chain, visit https://youtu.be/EL-f8tIrd5o

20.1 Rationale

Sarawak and West Kalimantan have strong complementarities in the shipbuilding industry that could serve to create much needed economies of scale with which to compete in the global market.

As an archipelago nation, Indonesia has over 1,800 ports catering to industries like petroleum, fertilizer, timber and wood products, cement, and mineral extraction industries. Of these, over 100 ports are designated as commercial. West Kalimantan's large number of rivers also makes ferry transport critical to connectivity for both people and goods (Figure 20.1) The need for a wide range of ships to transport cargo and passengers is therefore substantial.

Indonesian President Joko Widodo has prioritized development and expansion of Indonesia's domestic shipbuilding industry as part of a broader effort to strengthen the country's maritime capabilities

Figure 20.1. Ferry Transport in West Kalimantan

Source: Photo by Alisa Lord.

as well as to revolutionize its domestic defense industry.[73] To that end, the government has decreed that all government and state-owned companies must procure vessels that are built locally.

In West Kalimantan, shipbuilding has traditionally been one of the leading industries of the province. Steadfast Marine is in Pontianak and has helped advance Indonesia's maritime ambitions through transfer of technology during the complex built with the Damen Shipyards Group. Damen is a Netherlands-headquartered company with extensive experience in building vessels throughout the world. Damen is involved in ship construction as well as maintenance and repair activities. It has a wide product range, covering tugs, workboats, patrol craft, cargo vessels, dredgers, mega yachts, and fast ferries. Product design and engineering are carried out in-house and a broad range of designs is available. Moreover, West Kalimantan is one of 12 potential areas that has been identified by the Indonesian Investment Coordinating Board (BKPM) as having a high potential for shipyard investment.[74] Services include both vessel reparation and shipbuilding.

The emergence of the shipbuilding industry in Malaysia dates back to the establishment of Brooke Dockyard in Sarawak in 1912. Today, the state has 78 shipbuilders, specializing in building and repair of small to medium-sized vessels such as tugboats, offshore support vessels, barges, anchor handlers, and passenger boats. Of these, 36 are in the northern port of Miri, and another 10 are in Bintulu. The five major shipyards in the state are as follows:

(i) Brooke Dockyard & Engineering Works Corporation (Kuching, Sarawak);
(ii) Sapor Shipbuilding Industries Sdn Bhd (Sibu, Sarawak);
(iii) Tuong Aik Shipyard Sdn Bhd (Sibu, Sarawak);
(iv) Shin Yang Shipyard Sdn Bhd (Miri, Sarawak); and
(v) Nam Cheong Dockyard Sdn Bhd (Miri, Sarawak).

All shipyards limit production to small and medium-sized vessels. Large-sized vessels are no longer built because of the Malaysian Marine and Heavy Engineering strategy focuses only on repair and conversion. That strategy has left Boustead Naval Shipyard Sdn Bhd in Lumut, Perak state as the last large-sized vessel builder in all of Malaysia.

The following are the main reasons for the slowdown of shipbuilding activities in Sarawak:[75]

(i) The government's lack of commitment to promote local shipbuilding and ship repair as one of the nation's strategic industries.
(ii) The industry's inability to exploit the dynamic potential of export market and effectively compete globally.
(iii) The relatively small amount of local content in shipbuilding.
(iv) The industry's inability to apply modular building concept from the design stage onward, which has prevented companies from building large-sized vessels.
(v) The lack of infrastructure in local yards.

[73] P. Parameswaran. 2017. Indonesia: A New Shipbuilding "Magnet" from ASEAN to Africa?. 18 July. https://thediplomat.com/2017/07/indonesia-a-new-shipbuilding-magnet-from-asean-to-africa/ (accessed 20 January 2018).
[74] Nusantara. Shipyard Industry Needs Incentives. https://maritimenews.id/shipyard-industry-needs-incentives/ (accessed 21 January 2018).
[75] J. Koto and M. Ridho. 2018. *Issues & Challenges: Asian Shipbuilding Industries*. http://isomase.org/OCAri/Book/Asian%20Shipbuilding%20Industries/Challenges%20of%20ASIAN%20Shipbuilding%20Industries.pdf.

(vi) An excessive number of regulatory agencies involved in mapping out the shipbuilding industry, e.g., Marine Department, Ministries of Transport; International Trade and Industry; Human Resources, Malaysian Industrial Development Authority; Lembaga Kemajuan Ikan Malaysia; Royal Customs; Sarawak Inland Waterways; and others.
(vii) Stiff competition from more established foreign yards in the region, including those in West Kalimantan.

Collaboration with West Kalimantan's shipbuilding industry would help Sarawak to gain knowledge and technical expertise in high-tech designs for shipbuilding and its component products. The Malaysia Shipbuilding/Ship Repair Industry Strategic Plan (SBSR) 2020 establishes the framework for the country to become globally competitive in the shipbuilding and ship repair industry, especially for vessels under 120 meters. One of the SBSR strategic goals is the creation of a skilled workforce in shipbuilding and repair. West Kalimantan has well-established companies that are in a position to share their expertise with Sarawak companies that could provide the needed component products, which are currently being imported from other supplying countries.

20.2 Industry Analysis

National Production

Indonesia's shipbuilding industry remains relatively underdeveloped compared with those in Singapore, the Philippines, and Viet Nam. Yet, in the 1980s, Indonesia was a major shipbuilder in the world market, providing ships to both foreign and domestic customers. In the 1990s, the PRC began producing ships at a cost of $12,000 a ton, compared with $1,900 a ton in Indonesia, which undermined the Indonesian country's competitiveness and caused investment in the industry to stagnate. Efforts to protect the industry worsened the situation, and the competitiveness was further undermined by (i) unfavorable fiscal policies on the shipbuilding industry, including high import duties and corporate income taxes; (ii) lack of investment financing; (iii) reliance on imported parts and equipment; (iv) limited production capacity; and (v) need for more skilled workers with technical expertise.[76]

Indonesia's 2010 Law No. 17 on Shipping now requires all vessels operating in Indonesian waters to be Indonesian flagged.[77] Despite this cabotage law, the Indonesian shipbuilding industry has been unable to supply the various types of specialty ships required by industries. As a result, the Ministry of Transportation issued Regulation No. 22/2011, which allows certain classes of nontransportation vessels to be eligible for a 3-month renewable waiver from the domestic flagged vessel requirements when there is no suitable Indonesian-flagged vessel available. The problem nevertheless remains, as the 3-month waivers are often not long enough to cover the project duration.

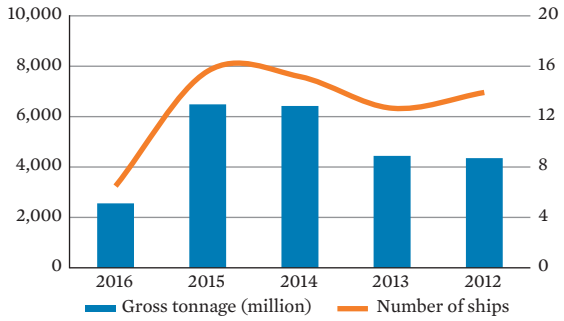
[76] E. K. Logam. 2017. Challenges and Opportunities in the Indonesian Shipbuilding and Maritime Sector. IPERINDO. German-Indonesian Chamber of Industry & Commerce (EKONID), German –Indonesian Forum on Shipbuilding and Maritime Technology Solutions. http://indonesien.ahk.de/fileadmin/ahk_indonesien/Business_Delegations/maritim/01_IPERINDO_Challenges_and_Opportunities_in_the_Indonesian_Shipbuilding_and_Maritime_Sector.pdf (accessed 21 January 2018).

[77] Global Security. Indonesian Shipbuilding Industry. https://www.globalsecurity.org/military/world/indonesia/industry-shipbuilding.htm (accessed 21 December 2018).

Figure 20.2. Pontianak Sea Port

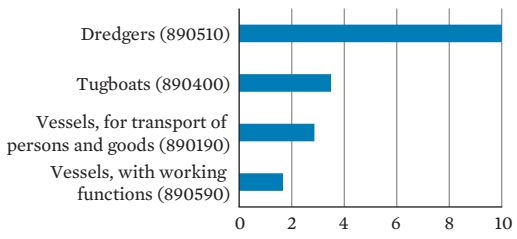
Source: Photo by Alisa Lord.

Figure 20.3. Pontianak Shipping Arrivals, 2012–2016
(number of ships and total tonnage)



Source: BPS Provinsi Kalimantan Barat. Kalimantan Barat Province in Figures 2017. Kalimantan Barat Province.

Figure 20.4. West Kalimantan Ships Exports, 2013–2017 Average ($ million)



Source: Based on data provided by Ministry of Trade Indonesia.

At present, Indonesia has over 250 shipbuilders, which are mostly located in Batam, Lampung, and East Java. The industry's output is currently 800,000 dead-weight tons for ship production, and 10 million dead-weight tons for ship repairs. Over one-half of these shipbuilders are in the Batam–Bintan–Karimun Free Trade Zone. Lack of any duties on imported parts and equipment for the shipbuilding industry has greatly increased the competitiveness of the industry located in that area.

West Kalimantan Shipping

West Kalimantan has several ports along its western coast bordering the Karimata Strait and Natuna Sea. They include those in Ketapang, Pemangkat, Sintete, and Singkawang. But Pontianak port dominates all others in terms of number of shipping arrivals. Figure 20.2 shows the size of Pontianak's seaport, while Figure 20.3 presents the growth of shipping movements in that port since 2012. However, the port has limited capacity for the increasing number of ship arrivals and container storage. The government recently announced the construction of a new port at Kijing, 95 kilometers north of Pontianak. The port will initially cover a land area of 50–100 hectares and have a depth of 12–15 meters.

PT Steadfast Marine was established in 2005 and its shipyard facility is in Batu Layang, Pontianak. It started building ships in 2007 and the following year became part of Damen Shipyard. Its operations are in an area of 56,000 square meters and are beside the Kapuas River. There are three launching skids and one slipway to support line operations. There are also four outdoor lifting supports, and all ships are designed with in-house software.

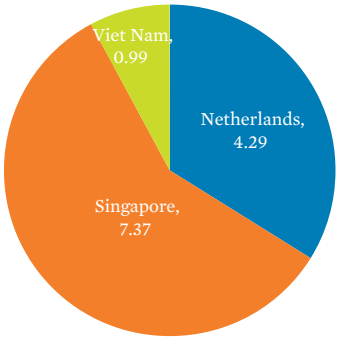
West Kalimantan Exports

While much of West Kalimantan's production of shipping vessels have been directed toward the domestic market, there has nonetheless been a large volume of exports to foreign markets. Figure 20.4 shows the average annual value of exports in 2013–2017. Of the $18.0 million annual exports of ships exported annually, 55% were dredgers and nearly 20% were tugboats. Vessels for transport

of persons and goods and those with working functions such as firefighting and floating cranes together represented 25% of all vessels directed to foreign markets.

There are three principal foreign export markets for West Kalimantan ships: Singapore, which absorbs 58% of all exports; the Netherlands, 34%; and Viet Nam, 8%. Malaysia was a market in the early part of this decade (Figure 20.5).

Figure 20.5. West Kalimantan Destination of Ships Exports, 2012–2016 Average
($ million)



Source: Based on data provided by Ministry of Trade Indonesia.

20.3 Project Profile for Cross-Border Value Chains

West Kalimantan has a well-established shipbuilding industry, as does Sarawak. However, Sarawak is interested in upgrading its industry to build larger ships with high-tech equipment. West Kalimantan companies like Steadfast Marine has the capability and interest to expand its operations in Sarawak and provide the needed technology and know-how for that state's industry. The project aims to develop a cross-border collaboration between West Kalimantan and Sarawak in the shipbuilding industry.

Figures 20.6 and 20.7 show a value chain for the shipbuilding industry, as represented by that of Steadfast Marine in West Kalimantan. The manufacturing process for steel or aluminum vessels is similar:[78]

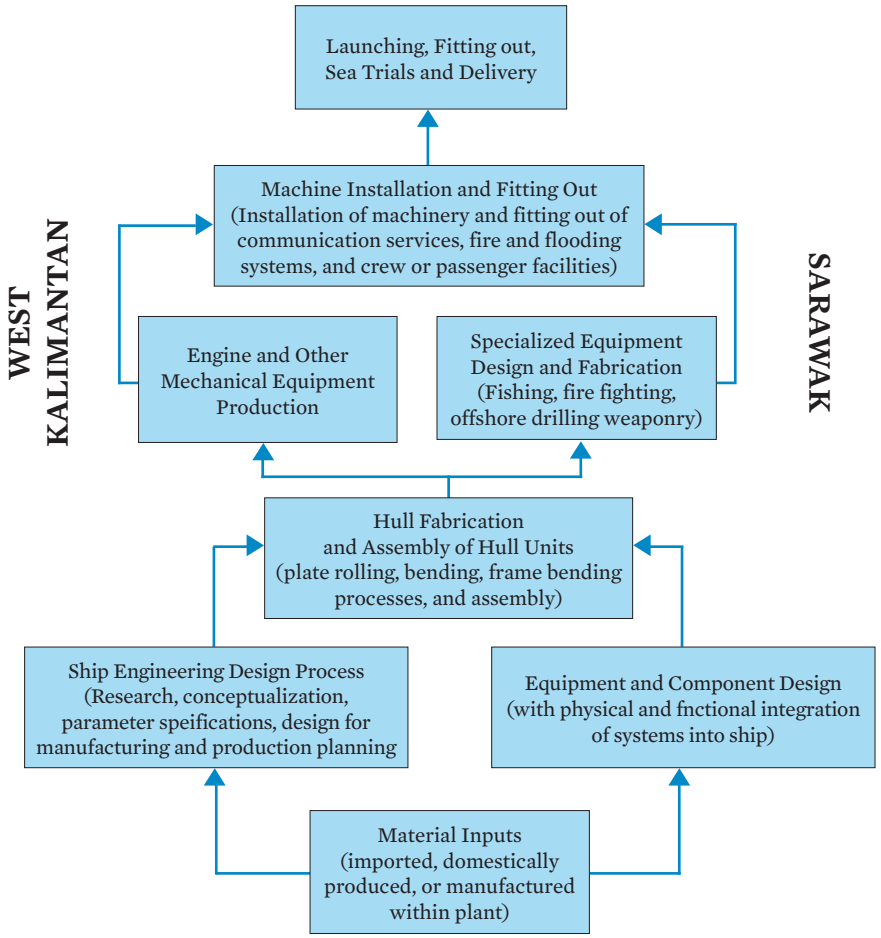
(i) The first stage involves consolidation of the material inputs for shipbuilding, including semi-worked products such as metal sheeting and sections, finished products like engines, and items for fitting-out, which vary according to the type of ship, such as petrol carrier, passenger ship, or cruise ship.
(ii) The design process is carried out within the plant and usually involves highly sophisticated and dedicated design software programs.
(iii) Hull fabrication takes place in the naval workshop, where sheet metal and sections are used for the construction of the hull. Mechanical cutting and related operations are followed by molding of semi-worked products used for new assembly of both small and large fabrications as well as stocks. Large-scale pre-fabrication can be done both in parallel or in series with small pre-fabrication. It involves the construction of semi-worked items. They make up elements in the base structure and plating, which can then be assembled into blocks that are then used to construct the ship.

[78] The material that follows is based on Provincia di Livorno Sviluppo. The New Technologies to Protect Life and Occupation. http://www.plis.it/tecnologie_a_tutela_della_vita_e_dell'_occupazione/manufact.htm#salta11 (accessed 25 January 2018).

(iv) Operations of loading and installing machinery and fitting-out can be carried out either on solid ground or after launching. These works include finishing operations and all other auxiliary services carried out with the aim of making the ship fit for navigation. Some of the most important of these are the services for dealing with flood or fire, crew or passenger facilities such as bunks and kitchens, navigational services, and services related to the distribution of electricity produced by the auxiliary generator.

(v) The last phase of the manufacturing cycle involves sea trials, which test the propulsion system, operability, and control equipment and safety systems for navigation. Once on-board equipment is loaded, the ship is ready for delivery.

Figure 20.6. Value Chains in Shipbuilding Industry



Source: Representation by the authors.

Figure 20.7. Steps in a Shipbuilding Process

continued on next page

Figure 20.7 *continued*

Source: Photos by Alisa Lord.

21

Organic Agriculture

21.1 Rationale

Agriculture is the most important sector of West Kalimantan's economy. The combined areas of agriculture, forestry, and fisheries account for 20% of regional gross domestic product and, of that share, food and horticultural crops represent one-fourth, while plantation crops account for one-half, with the remaining one-fourth divided between forestry and fishery activities.[79] Agriculture therefore adds 15% to the province's total economic activity. Only manufacturing has a somewhat greater contribution, equal to 16%.

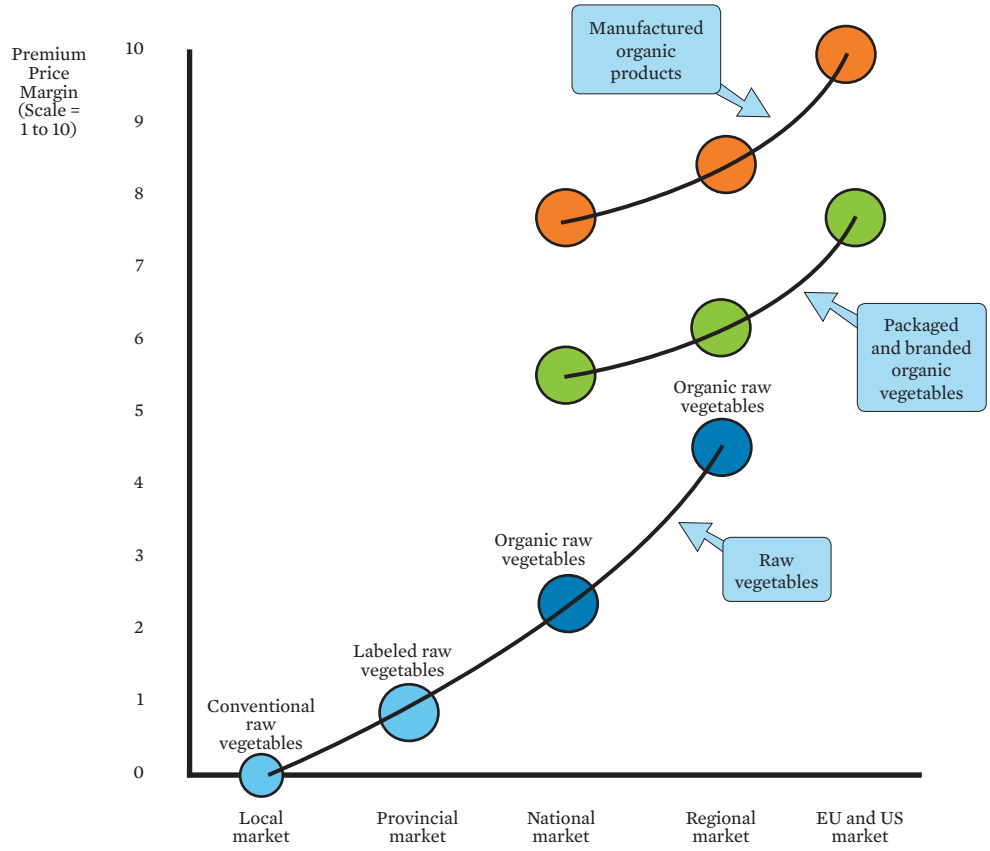
A dependency on subsistence agriculture using traditional farming methods that rely on expensive pesticides and herbicides has caused many of the province's households to be economically impoverished. Farmers often lack knowledge about alternative farming techniques that rely on less expensive inputs and farming techniques requiring timely interventions and weed control. At the same time, most households are unaware of market opportunities beyond their immediate surroundings, and have little or no knowledge about broader national or international market opportunities. There is also a lack of pricing information, technologies, certification, branding, networking and linkages along the value chain for processing, packaging, and marketing.

Notwithstanding their importance to household incomes in the province, those agricultural products are mainly directed toward domestic markets at relatively low prices of conventional products. Of those that are exported, most are in the form of nuts. There are virtually no exports of fruits and vegetables, and only a small volume of tea and spices is shipped abroad. As a result, less than 1% of all edible agricultural products produced in the province are directed to foreign markets.

One solution is to create an integrated approach to the organic vegetable industry that takes advantage of existing agricultural resource-based activities within the subregion. Organic fruits and vegetables are one of the fastest growing food industries, with premium prices that are more than double their conventional food product equivalents. Organic prices in the large North American and European markets are more than 135% higher than conventional produce and, in some products, organic varieties are 4 times higher than their equivalent conventional varieties. Figure 21.1 shows the premium price margins for organic foods, differentiated by organic raw vegetable prices, packaged and branded organic vegetables, and manufactured organic products.

[79] BPS Provinsi Kalimantan Barat. Gross Regional Domestic Product of Kalimantan Barat by Industrial Origin, 2012–2016. Kalimantan Barat Province.

Figure 21.1. Organic Vegetables and Manufactures: Premium Price Margins over Conventional Vegetables



Source: M. Lord and P. Tangtrongjita. 2011. *Organic Vegetable Clusters along the East-West Economic Corridor: Improving Livelihoods and Prosperity through Value-Added Agriculture*. Manila: ADB (RETA 7521).

Elsewhere in Southeast Asia, organic agriculture is growing rapidly because of people's increasing concerns about excessive use of herbicides and pesticides, and the rise in the incidences of cancer in the population of the region. Much of this industry's growth in Indonesia's and Malaysia's urban centers is being spurred by supermarket prices of organic vegetables that are much higher than those of conventional produce, thereby encouraging farmers to dedicate more land to those types of products.

Finally, ecotourism is closely related to organic agriculture. The sector is growing rapidly throughout Southeast Asia and has enormous potential for a West-Kalimantan–Sarawak partnership. The Greater Mekong Subregion (GMS) has already implemented a cross-border ecotourism program supported by ADB and can serve as a model program for a similar West-Kalimantan–Sarawak project. ADB's GMS ecotourism offerings can be viewed on the following website: www.mekongecotourism.org.[80]

[80] The website was developed and is being maintained by Montague Lord, one of the authors of this report.

There are 10 reasons why West Kalimantan should develop organic agriculture and extend those activities to cross-border trade and investment with Sarawak:[81]

(i) Many households are involved in small-scale agricultural activities and many of these households still live below the poverty line.
(ii) The global food market is robust, with prices for foods having risen by over one-third each year.
(iii) Global market prices for organic vegetables are, on average, nearly 2.5 times higher than their conventional counterparts.
(iv) Prices of organic vegetables tend to be more stable than those of conventional vegetables.
(v) Since organic farming is labor-intensive, West Kalimantan has a comparative advantage in the production of organic vegetables because of its low-cost labor relative to that of the more advanced countries.
(vi) Safe food concerns are driving the rapid growth in demand for organic vegetables, not only in international and national markets but in local markets as well.
(vii) Indonesia's and Malaysia's large deficit in existing production of organic products provides a ready market for any production taking place in West Kalimantan. As a result, both governments have a strong interest in developing organically certified products for the ASEAN region and markets in Europe and the US.
(viii) Both Indonesian and Malaysian governments support development of organic agriculture, and in many cases, local authorities, community leaders, and international development agencies are already involved in the promotion of different organic projects.
(ix) Sarawak could offer access to international organic certification for West Kalimantan producers.
(x) Widespread implementation of organic vegetable value chains between West Kalimantan and Sarawak could substantially improve living standards of large pockets of the local population and thereby contribute importantly to the transformation of the West Borneo Economic transport and logistics corridor into a full-fledged economic corridor.

21.2 Industry Analysis

Sarawak

Sarawak's organic foods are well organized. Malaysia offers the Malaysian Organic Scheme (MOS) certification, which is issued by the Department of Agriculture and is mandatory certification for farms practicing organic methods and selling the products as organic.

MyGAP and myOrganic certificates are recognized and issued to farmers that meet conditions related to land, water sources, and fertilizers used. Collaboration with West Kalimantan

[81] For details, see M. Lord. 2010. *Indonesia's Trade Access to the European Union: Opportunities and Challenges.* http://eeas.europa.eu/archives/delegations/indonesia/documents/press_corner/tradeaccess_report_en.pdf; and M. Lord. Organic Vegetable Value Chain: A Practitioner's Guide for the East–West Economic Corridor. http://www.montaguelord.com/downloads/reports-from-recent-consultancies/107-organic-vegetable-value-chains-brochure/download (accessed 27 January 2018).

farmer groups could help to bolster the supply of much-needed organic products for the Sarawak organic food packaging companies.

West Kalimantan

In West Kalimantan, there is an extensive variety of agricultural produce (Figure 21.2). However, organically produced vegetables and other types of agricultural products are limited. There is extensive interest in developing the province's organic agriculture, but those efforts are not well organized. As a result, organic products are recognized as having high value, but farmers lack adequate remuneration for any premium quality produce that they grow.[82]

Organic food producers in Indonesia need to comply with the government's Indonesian National Standard requirements to receive a certificate. The Ministry of Trade regulates the production, labeling, certification, and import of organic foods under regulation passed in 2010. At present, farmers in West Kalimantan are in the process of verification to receive the certification.

International development partners are actively supporting local clusters of farmers to produce organic vegetables. Alam Sehat Lestari, a nonprofit organization, is working in Sukadana, the capital city of Kayong Utara Regency, to train farmer groups and promote organic food production. Considerable work is needed to establish a sufficiently wide farmer base necessary to produce and export organic foods from the province.

21.3 Project Profile for Cross-Border Value Chains

Figure 21.3 and Table 21.1 map the production activities and distribution channels for organic vegetable. Figure 21.4 lists the steps involved in organic agriculture production and certification. The channels range from a simple *supply chain* where the products are simply transferred from the farm to the consumer without any value being added to the products, to sophisticated *value chains* where the products are transformed through grading, sorting, packaging, and cool storing along the various stages of production and distribution to add value to the product during the production and distribution to the consumer.

Table 21.1. Mapping Activities of Core Actors in Organic Vegetable Value Chain

Farmers	Collectors	Processors	Wholesalers/Trader	Retailer
Cultivation	Collect	Categorize	Quality Control	Storage
Growing	Categorize	Cleaning	Storage	Selling
Harvesting	Store	Drying	Transport	
Cutting	Transport	Cutting		
		Processing		
		Packaging		

Source: Representation by the authors.

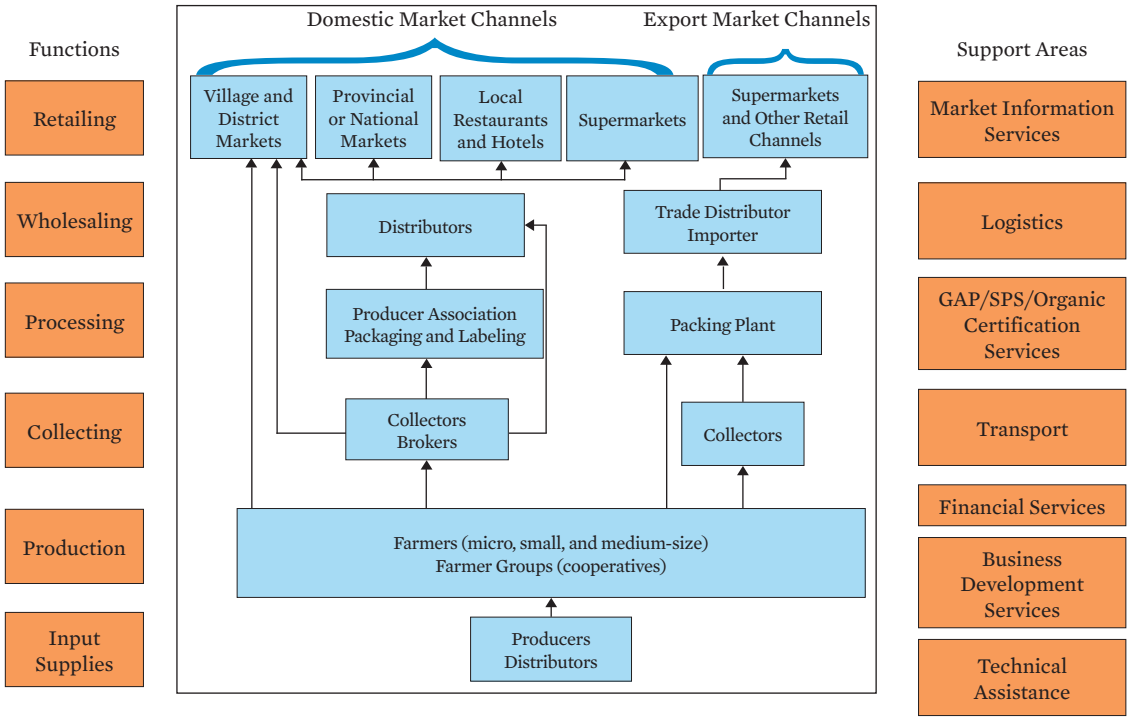
[82] A. S. Hidayat and T. Lesmana. The Development of Organic Rice Farming In Indonesia. Economic Research Center, Indonesian Institute of Sciences (LIPI). http://jurnalekonomi.lipi.go.id/index.php/riebs/issue/download/13/14 (accessed 27 January 2018).

Figure 21.2. Types of Vegetables Produced in Sarawak and West Kalimantan

Asparagus		Green lettuce	
Basil		Green chili	
Bitter melon		Mint	
Broccoli		Morning glory	
Cabbage		Mushrooms	
Carrots		Okra	
Chinese celery		Red chili	
Chinese Kale		Red lettuce	
Chinese Radish		Spring onion	
Choy sum		Spinach	

Source: Lord, M. 2011. *Mapping the Organic Vegetable Value Chain along the East West Economic Corridor.* Manila: ADB. Online: https://mpra.ub.uni-muenchen.de/41145/ (accessed 27 January 2018).

Figure 21.3. Value Chain of Organic Agriculture



Source: M. Lord. 2011. *Mapping the Organic Vegetable Value Chain along the East West Economic Corridor.* Manila: ADB. https://mpra.ub.uni-muenchen.de/41145/ (accessed 27 January 2018).

Input Supplies. At the initial stage of the process, the farm uses input supplies from either external sources or from within the farming process itself. For organic farming, the key external inputs are likely to be seeds and, in some cases, organic fertilizers. Often, the farm produces its own fertilizers through animal manure and the traditional methods of fermentation compost fertilization.

Production. Organic vegetables are mainly grown in small landholdings by individual households or by farm groups. The farm groups either operate under a common organic project in a cooperative structure or as contract grower groups for processing and packaging companies or supermarkets. In the most basic household-level model, the farmer either transports his or her produce to the local market or sells it to a collector, who resells it to a wholesaler or distributor or in the local market. There is no value added to the process because organic produce is normally sold alongside conventional produce, without any differentiation between the two. Prices received by the farmer therefore tend to be low and in line with those of nonorganic products. However, the profit margin for the farmer is higher than that of farmers who use the more costly chemical fertilizers, herbicides, and pesticides. Organic farming is more labor-intensive, but in West Kalimantan labor is inexpensive and relatively abundant. The only drawback is the willingness of farmers to invest more time and energy in farming practices.

Collection. Traditional collectors and brokers predominate throughout West Kalimantan. They pick up the farm produce and carry them to local or provincial markets, normally without refrigeration. The emergence of specialized and dedicated refrigeration systems has yet to emerge in the province, notwithstanding advances in the infrastructure and logistics.

Producer Groups. When farmers develop relationships with one another or with processors and distributors, they are more likely to add value to their products. The most common relationship found is in the form of producer associations. In local markets, producer associations have been able to add value to their products through safe-food certification and branding their produce. Farmers associations, operating as commercial organizations, are regular suppliers of supermarkets. The success of these associations is largely based on a combination of factors: (i) technical training on safe vegetable production; (ii) efficient sourcing of input supplies; (iii) collective marketing; (iv) quality control; (v) labeling and branding; and, in a limited number of cases, (vi) financing.

Processing. The processor normally works with preferred suppliers, either in the form of groups or through contracting farming. These arrangements ensure high-quality produce at low costs. Long-term arrangements support fair trade prices for farmers to ensure dedicated and stable supplies to the plant. The processing system is accompanied by certification services at the plant.

Wholesaling. Larger supermarkets rely on dedicated wholesalers, who provide certain products along a single supply chain. Like processors, supermarkets also tend to form long-term arrangements with farm groups or associations. It ensures that traceability along the value chain.

Retailing. The traditional vegetable outlets are village and urban markets, while modern retailing is divided into (i) supermarket and quality food stores, and (ii) restaurants and hotels. As distribution moves from domestic to foreign markets, controls over standards for quality and safety, along with "just in time" deliveries rise. Exported produce is primarily directed at supermarket chains. Reductions in trade barriers, improved transport and logistics systems, and increased capital mobility have all contributed to the growth in globalized value chains. Nevertheless, export markets tend to be concentrated in a relatively few supermarket chains.

Global Markets. There are a limited number of qualified organic vegetable producers along the East West Economic Corridor provinces who are able or willing to export to regional or global markets. Yet participation in global organic vegetable value chains offers the largest earnings potential for producers. As mentioned earlier, the average price of organic vegetables in the US is more than 140% that of conventional produce. The products commanding the highest organic price premiums are cabbage, lettuce, onions, broccoli, and mushrooms. Global food retailers, largely in the form of multinational supermarkets, often develop their own standards for outsourcing the production of their vegetable products. They rely on efficient and standardized procurement procedures. For those farmers and processors able to acquire the necessary certifications for their products and meet the standards of those global food retailers, it means the realization of large price differentials between their products and conventional vegetables. It also opens opportunities for expanding their markets across other regional or global food retailers.

Figure 21.4. Steps in Organic Agriculture Production and Certification

Source: Photos by Alisa Lord.

22

Tourism

For video presentations on the Sarawak-West Kalimantan multi-destination tourism cross-border value chain, visit https://youtu.be/I7v94jgfVm4

22.1 Rationale

The governments of Sarawak and West Kalimantan have designated cross-border tourism as one of their most promising growth areas.[83] The geographic proximity of the two territories places them in an enviable position. For West Kalimantan it also provides ready access to a high growth market since Malaysia is one of the leading sources of tourism for Indonesia.[84]

Tourism also reaches into other sectors, such as construction, manufacturing, and information and communication technology services, thereby producing a multiplier effect along the value chain. It is estimated that for every job in the core tourism sector there are about 1.5 additional or indirect jobs created in the tourism-related economy.[85]

The tourism industry is highly competitive, and both Sarawak and West Kalimantan business leaders and government officials therefore need innovative marketing strategies to ensure the long-term advancement of their aspirations for the tourism industry. It has long been recognized that bilateral and subregional cooperation in tourism marketing strategies is needed in the light of global market competitiveness, especially to attract long-distance

[83] *The Jakarta Post*. 2017. Ministry to Promote Pontianak for Cross-Border Tourism. 20 April. http://www.thejakartapost.com/travel/2017/04/20/ministry-to-promote-pontianak-for-cross-border-tourism.html (accessed 28 January 2018).

[84] S. Muazir and H-C Hsieh. 2014. Lagging Yet Strategic: Tourism and Regional Development Planning in a Lagging-Outermost-Forefront Area (borderland) in Indonesia. *Tourism*. 62 (4). pp. 361–376. UDC: 338.486.5 (594). http://www.iztzg.hr/en/publications/tourism/latest_issue/?clanakId=1021&brojId=81 (accessed 28 January 2018).

[85] World Economic Forum. 2017. *The Travel and Tourism Competitiveness Report 2017*. Geneva.

travelers.[86] Strategies covering cross-border marketing networks that promote neighboring territories as a single travel destination can greatly enhance their attractiveness.

The BIMP-EAGA Vision 2025 aims to deliver, as one of its major outcomes, a sustainable, well-developed, and connected *multi-country* tourism destination.[87] Similarly, the ASEAN Tourism Strategy Plan 2016–2025 is grounded on regional and subregional collaboration of private sector operators in packaging multi-country nature, cultural and community-based tourism products and technical expertise.[88] This approach is critical to development of sustainable and inclusive natural and cultural heritage products and related actions in an increasingly competitive global tourism environment.

In the case of the GMS, establishment of a cooperative mechanism has proven to be highly successful. The core strategic thrust of its Regional Tourism Sector Strategy is marketing and product development of multi-country tourism by stimulating demand from high-yield markets and products through joint promotional activities.[89] The approach is based on common human resources development activities and is being implemented throughout the subregion to improve capacities in the GMS tourism sector, as well as to develop common opportunities in areas such as travel to pristine forest areas, village communities, diving destinations, and historical sites.

West Kalimantan lacks technical expertise in tourism development as well as infrastructure to support the tourism industry. Likewise, Sarawak currently has a very modest tourism advertising and promotion budget and needs to increase those expenditures considerably if it is to attract visitors. A Sarawak–West Kalimantan tourism cooperation arrangement could help stakeholders in both territories to gain a competitive advantage and thus enhance sustainability if they package and market their various attractions more cohesively.

Development of multi-destination tourism between Sarawak and West Kalimantan would require collaboration between tourism promotion institutions and private tourism associations. There are numerous opportunities to position Sarawak and West Kalimantan as multi-destination travel locations. However, it requires a strong commitment on the part of both Sarawak and West Kalimantan government authorities to coordinate marketing, product development, and investment strategies, while continuing to develop their own unique attractions.

22.2 Industry Analysis

Tourism

The number of tourist arrivals in West Kalimantan has averaged somewhat over 30,000 persons a year. Growth has been modest, averaging 1.3% a year since 2011. In fact, average growth

[86] P. Theerapappisit. 2004. A Synthesis Paper of the Six Papers: Policy and Planning of Tourism Product Development in Asian Countries. Paper presented at the 6th ADRF General Meeting. Bangkok, Thailand.
[87] BIMP-EAGA Secretariat. *BIMP-EAGA Vision 2025.* https://www.adb.org/sites/default/files/related/72256/bimp-eaga-vision-2025.pdf (accessed 28 January 2019).
[88] ASEAN Secretariat. *ASEAN Tourism Strategic Plan 2016–2025.* Jakarta.
[89] ADB. 2008. *Evaluation Study: Tourism Sector in the Greater Mekong Subregion*. Manila: ADB (Reference Number: SAP: REG 2008-58. Sector Assistance Program Evaluation).

in 2011–2015 was negative (–1.4%), with a reversal in the trend in 2016 when tourism rose by over 12%.

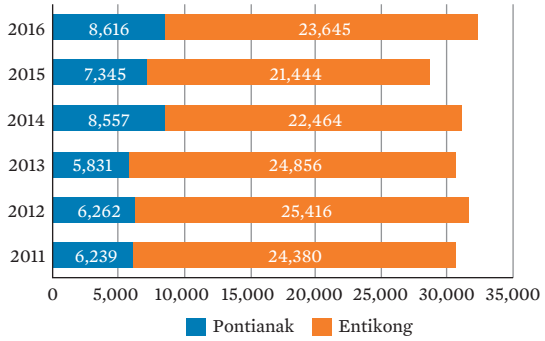
Arrivals from Sarawak through the Entikong border crossing represent 77% of all arrivals into the province. Arrivals into Pontianak account for the remaining 23% (Figure 22.1). Nevertheless, the share of Pontianak arrivals has been on the rise, with a gradual rise from 20% to 27% between 2011 and 2016.

Most tourists are from ASEAN countries, while European and American tourists are negligible. In 2016, 83% of arrivals were from ASEAN countries (Figure 22.2). Tourists from other non-ASEAN Asian countries and Africa each accounted for 7% of the total. European tourists represented 2% and those from America represented 0.5%.

There are only 31 star-rated hotels throughout the province.[90] Superior and luxury hotels are extremely limited. Only Pontianak and the regencies of Kubu Raya and Kota Singkawang have 4-star hotels, of which three are in Pontianak and one each in the two regencies. The same places also have 3-star hotels, and there is also one each in the regencies of Bengkayang and Ketapang.

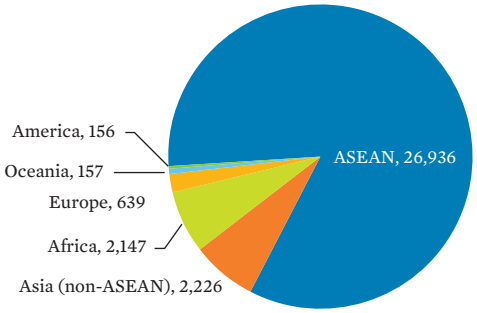
Overall, foreign tourists remain in hotels for less than 3 days, though they generally stay longer than 3 days. The reason is that travelers change hotels as they move around the province to visit different types of attractions.

Figure 22.1. West Kalimantan Tourism Arrivals by Entry Point, 2011–2016
(number of persons)



Source: BPS Provinsi Kalimantan Barat. *Kalimantan Barat Province in Figures 2017.* Kalimantan Barat Province.

Figure 22.2. West Kalimantan Tourism Arrivals by Origin, 2016
(number of persons)



Source: BPS Provinsi Kalimantan Barat. *Kalimantan Barat Province in Figures 2017.* Kalimantan Barat Province.

Tourist Activities in Sarawak

Sarawak's tourism sector also focuses on nature and culture-based tourism. In the south, there are five major national parks (Map 22.1):

(i) *Batang Ai National Park* is located in Lubok Antu, some 250 kilometers (km) east of Kuching. The park covers an area of 24 square kilometers (km^2). The park has become increasingly popular with locals and tourists despite the lack of facilities. Access is possible by chartering a boat, as water is the main method of transportation in the area. The lush forests are home to the orangutan, gibbons, and hornbills. The local inhabitants are mostly Iban, and local communities are actively involved in the park's management.

[90] BPS Provinsi Kalimantan Barat. *Kalimantan Barat Province in Figures 2017.* Kalimantan Barat Province.

Map 22.1. Southern Sarawak Tourism Map

Source: M. Lord. *Cross-Border Value Chains: What, Where and How*. https://www.youtube.com/c/CrossBorderValueChains.

(ii) *Kubah National Park* has massive sandstone ridge with three mountain peaks that are visible from the Kuching Waterfront. Situated only 22 km from Kuching, Kubah is one of the most accessible of Sarawak's National Parks. Almost a hundred different palm species can be found in an area of just over 22 km², making Kubah probably the richest palm habitat for its size anywhere in the world. It also has a rich selection of orchids and ferns, and there are crystal clear jungle streams, waterfalls, and bathing areas.

(iii) *Tanjun Datu National Park* is in the southwestern tip of Sarawak on the Datu Peninsula, This national park is relatively inaccessible, but its relative remoteness is one of its main attractions. The beaches are undisturbed, the corals offshore untouched, and the forest trails are virtually untrodden. Notable among the hundreds of bird species are at least three types of hornbill, as well as peacocks.

(iv) *Gudung Gading National Park* has the world's largest flower, the rafflesia, which can grow up to 1 meter in diameter. When in bloom the flower gives off an unpleasant smell that attracts flies and other insects. The rugged mountain peaks that make up the park provide a scenic backdrop to the nearby town of Lundu, nearby beaches, and challenging jungle treks.

(v) Kuching Wetlands National Park is located 30 km from Kuching and covering an area of 66 km². The park is composed of coastal, marine, and freshwater ecosystems. The predominantly saline and mangrove system includes an extensive network of marine waterways and tidal creeks, formed by the interconnecting rivers that bound the park.

22.3 Tourist Activities in West Kalimantan

West Kalimantan's tourism sector also focuses on nature and culture-based tourism (Map 22.2). There are three national parks in the province: Danau Sentarum, Betung Kerihun,

Figure 22.2. West Kalimantan Tourism Map

Sources: Map by Indonesia-Tourism.com; Betung Kerihaun National Park photo by icnesia,pilgrim; Danau Sentarum National Park photo by Forest and Plantation Office of Kapuas Hulu and German GIZ; and Gunung Palung National Park photo by Writing for Nature. https://writingfornature.wordpress.com/tag/gunung-palung-national-park/.

and Gunung Palung. Both Danau Sentarum and Betung Kerihun are in the northeast area of the province, near Sarawak.

(i) *Danau Sentarum National Park* protects one of the world's most biodiverse lake systems, located in Kapuas Hulu Regency. It is in the upper Kapuas River tectonic basin some 700 km upstream from the delta. The basin is a vast floodplain, consisting of about 20 seasonal lakes, freshwater swamp forest, and peat swamp forest. Approximately half of the 1,320 km^2 park consists of lakes, while the other half consists of freshwater swamp forest. There is a rich fish fauna with around 240 recorded species, including the Asian arowana and clown loach botia. There are also 237 bird species that have been recorded, including the Storm's stork and great argus. Of the 143 mammal species in the park, 23 are endemic to Borneo including the proboscis monkey. There is a relatively large population of endangered orangutans present in the park. The 26 reptile species include the false gharial and estuarine crocodile. The lakes support a large traditional fishing industry. The western part of the upper Kapuas floodplain is inhabited by almost 20,000 people, 88% of which are Malay fishermen. About 3,000 people live in about 20 village enclaves within the Park.

(ii) Betung Kerihun National Park is a national park covering 8,000 km^2 in Kapuas Hulu Regency, along the Malaysian border. There has been a proposal to form a World Heritage site named the Transborder Rainforest Heritage of Borneo in combination with the 2,000 km^2 Lanjak Entimau Wildlife Sanctuary in Malaysia. The park largely consists of two ecoregions, two-thirds of which is mountain rain forest, and the remaining one-third of which is lowland rain forest. In the lowland forests the dominant emergent trees are dipterocarp species and, in the higher altitude, they are oak and chestnut trees. There are 97 species of orchid and 49 species of palm that have been identified in the park. There are also 300 species of birds, 25 of which are endemic to Borneo; 162 fish species; and 54 mammals that have been identified. The park is home to the endangered Bornean orangutan and seven other primate species. Several Dayak tribes live in the park. There are 12 villages surrounding the park, 2 of which are located inside the park and 6 are adjacent to the park boundary. The village people live from hunting, collecting non-timber forest products, and subsistence farming based on a pattern of shifting cultivation.

(iii) Gunung Palung National Park is in the west-central regencies of Ketapang and Kayong Utara. The 900 km^2 park is notable for its diversity of habitat types, ranging from mangrove and freshwater swamp forest, to lowland alluvial forest, and to mountain forest. It has a diversity of wildlife that includes orangutans, Bekantan, and hornbills.

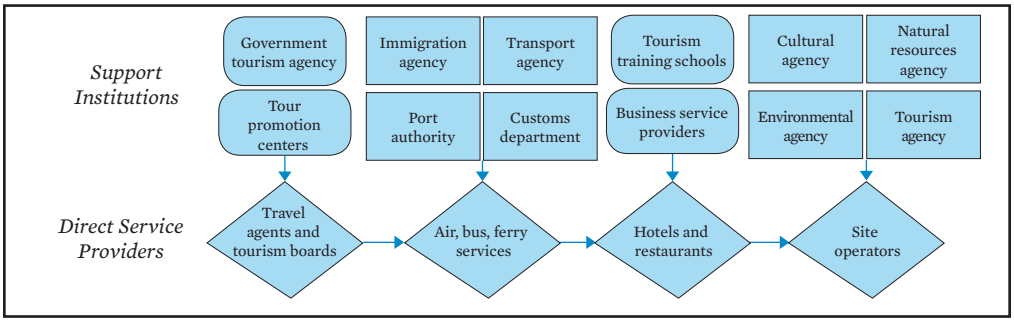
22.4 Project Profile for Cross-Border Value Chains

The project will provide technical assistance for the development of a cross-border value chain for the tourism industry. The aim of the project would be to develop two-way tourism between Sarawak and West Kalimantan is shown in Figure 22.3. It would bolster collaboration between the West Kalimantan Provincial Government and Sarawak State Government and create an enabling environment for the "support institutions" shown in the figure.

The project would support the operations of champion individuals or institutions to promote the clustering of activities on both sides of the border to initially support development of supply chain arrangements, and later the possible integration of company activities across borders in more formal value chain production and distribution activities.

Figure 22.3. Value Chain of Multi-Destination Tourism

West Kalimantan–Sarawak Common Activities



Source: Representation by the authors.

23

Medical Tourism

For video presentations on the Sarawak-West Kalimantan medical tourism cross-border value chain, visit https://youtu.be/j1KvleOIM6E

23.1 Coverage

Medical tourism refers to travel across international borders with the intention of receiving some form of medical treatment. It is broadly divided into two segments according to whether the treatment is essential or nonessential. Medical tourism is for nonessential treatment and covers travel for wellness, cosmetic, or other nonessential procedures; and medical travel is for essential treatment and indicates travel to receive treatment that is essential to maintain quality of life.[91]

Medical tourism differs from so-called wellness travel, which refers to travel for the purpose of promoting health and well-being through physical, psychological, or spiritual activities. Wellness tourists are proactive in seeking to improve or maintain health and quality of life. They focus on prevention, while medical tourists travel reactively to receive treatment for a diagnosed disease or condition. More broadly, the term "health tourism" is for travel that focus on both medical treatments and the use of health care services; it therefore covers a wide field of health-oriented tourism ranging from preventive and health-conductive treatment to rehabilitation and curative forms of travel; and it includes wellness tourism. In this report, we deal exclusively with medical tourism, and therefore exclude wellness tourism from the analysis.

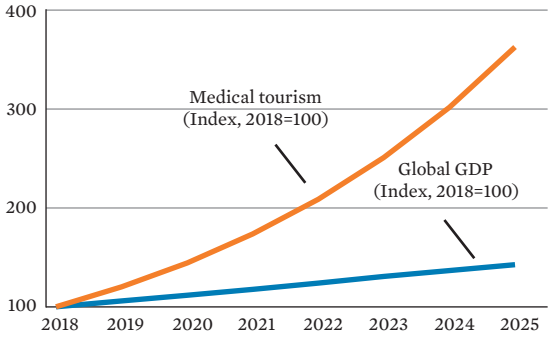
[91] N. Lunt et al. 2011. *Medical Tourism: Treatments, Markets and Health System Implications: A Scoping Review*. Paris: Organisation for Economic Co-operation and Development. http://bit.ly/1Fuf1NH.

23.2 Performance

The global medical tourism market is valued at approximately $15.5 billion (2017) and is expected to grow by 8.8% a year, nearly doubling its market value by 2025.[92] This growth compares favorably with a projected growth by the International Monetary Fund of 6% a year for global economic activity during the same period (Figure 23.1).[93]

Trusted international accreditations have become one of the biggest drivers in the growth of the medical tourism market. Responding to a global demand for accreditation standards, the US-based Joint Commission launched its international affiliate agency in 1999, the Joint Commission International (JCI). To be accredited by the JCI, an international hospital must meet the same set of standards as in the US set by the Joint Commission. At present, over 800 hospitals and clinical departments around the world have been awarded JCI accreditation and that number is growing by about 20% each year.[94]

Figure 23.1. Global Medical Tourism Growth Relative to Global GDP Growth, 2017–2025



GDP = gross domestic product.

Sources: ResearchAndMarkets.com. Medical Tourism Market Size, Share & Trends Analysis Report By Country (Costa Rica, Mexico, India, Thailand, Malaysia, and Singapore), Competitive Landscape, and Segment Forecasts, 2018 –2025. https://www.researchandmarkets.com/research/stndxz/medical_tourism?w=4; and International Monetary Fund. World Economic Outlook Database (April 2018). Washington, DC.

23.3 East Asia

East Asia has driven the market for medical tourism, which generally accounts for one-third of all private hospital revenue. Key hospitals in the region include Prince Court General Hospital (Malaysia); IHH Healthcare Berhad (Malaysia); KPJ Healthcare Berhad (Malaysia); Raffles Medical Group (Singapore); Bumrungrad Hospital Public Co. Ltd. (Thailand); Samitivej Sukhumvit (Thailand); Dusit Medical Services (Thailand); Fortis Healthcare (India); Asian Heart Institute (India); Apollo Hospitals Enterprise Limited (India); and Min-Sheng General Hospital (Taipei,China).

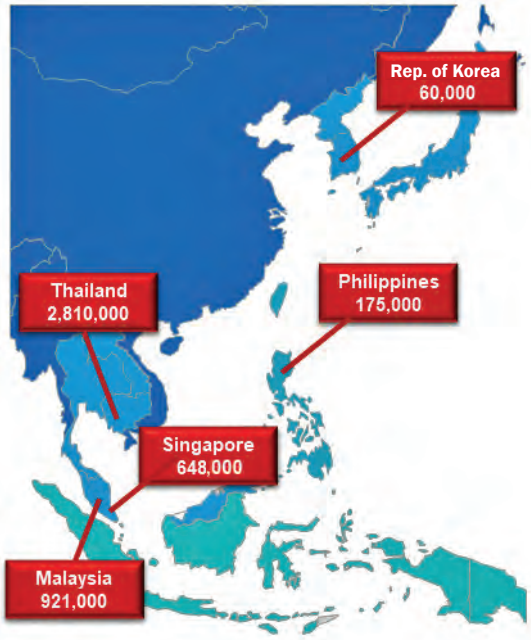
Within East Asia, Thailand dominates the market with over 60% of the regional market, followed by Malaysia, with 20% of the market; and Singapore, with 14% of the market. The Philippines and the Republic of Korea each have 4% and 1%, respectively, of the regional market (Figure 23.2). These figures are broad estimates since data for the industry is notoriously poor.

[92] Zion Market Research. Medical Tourism Market by Treatment Type (Cancer Treatment, Orthopedic Treatment, Fertility Treatment, Cardiovascular Treatment, Neurological Treatment, and Others): Global Industry Perspective, Comprehensive Analysis, and Forecast, 2017–2024. https://www.zionmarketresearch.com/sample/medical-tourism-market.

[93] International Monetary Fund. World Economic Outlook Database (April 2018). Available: https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx.

[94] The Joint Commissi1on. What Is Accreditation? https://www.jointcommission.org/accreditation/accreditation_main.aspx (accessed 22 October 2019).

Figure 23.2. East Asia Medical Tourism Arrivals (estimates for 2017)



Source: K. Ruggeri et al. 2015. Evidence on Global Medical Travel. *Bulletin of the World Health Organization.* (93) (11). pp. 785–789.

Savings

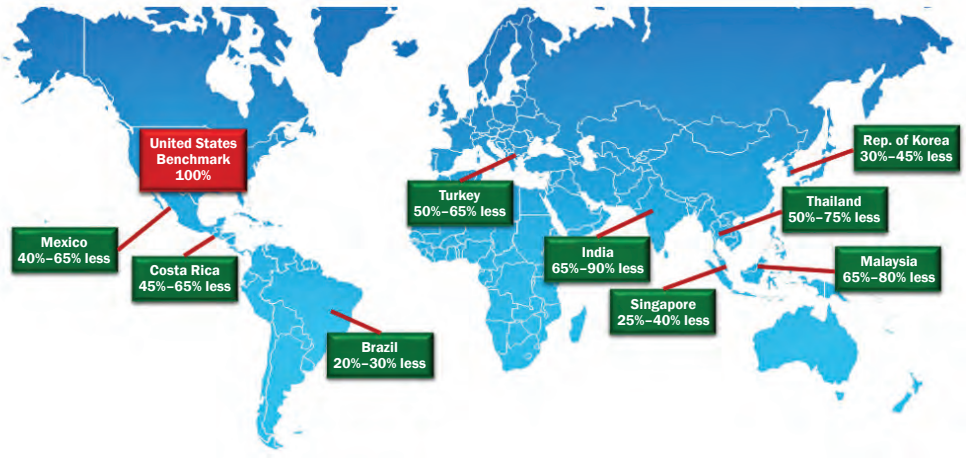
Medical cost savings from international travel to overseas hospitals and clinics can be substantial. In Malaysia, medical costs are 65%–80% less than the US benchmark; in Thailand, they are 50%–75% less; in Singapore, they are 25%–40% less; and in India, they are 65%–90% less.[95] Technical and service quality is generally excellent (Figure 23.3).

While being a dynamic market, medical tourism is sensitive to travel requirements, geopolitical situations, treatment costs, advertising practices, and treatment options. Moreover, the market is segmented by treatment types, specifically, those for cancer, cardiovascular, cosmetic, fertility, orthopedic, and neurological illnesses.

Sarawak and West Kalimantan

In Sarawak, foreign patients are sourced through three methods: (i) medical tourism promotion programs by MHTC or the Sarawak Tourism Board; (ii) hospital agents operating in countries like Indonesia where patients are located; and

Figure 23.3. Medical Tourism Cost Savings Relative to the United States Benchmark, by Country



Source: Patients Beyond Borders. Medical Tourism Statistics & Facts. https://patientsbeyondborders.com/medical-tourism-statistics-facts.

[95] Patients Beyond Borders. Medical Tourism Statistics & Facts. https://patientsbeyondborders.com/medical-tourism-statistics-facts.

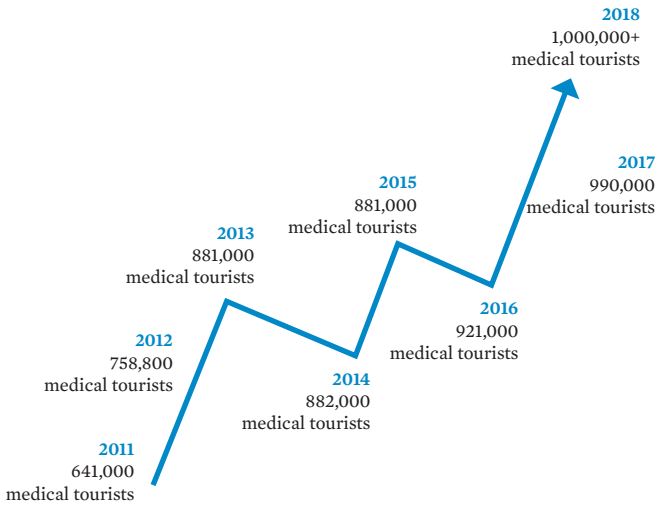
(iii) internet-based information about the services provided by the hospitals. Medical travel agents operating abroad often target self-insured or partially insured patients seeking medical treatment at a considerable discount over that offered in their home country, as well as high-end technical procedures and facilities often not available in the home country.

The Provincial Government of West Kalimantan is focusing on efforts to expand and improve basic medical services. While there are possible technological transfers from cooperative arrangements between West Kalimantan and Sarawak, it is recognized that the main interest of West Kalimantan population is the ability to access Sarawak's high-quality facilities for specialized medical facilities at reasonable and competitive costs.

23.4 Motivation

Malaysia is the second largest medical tourism destination in East Asia after Thailand. While Thailand's health care sector is well established, that of Malaysia is emerging rapidly and there are large investments taking place in high-tech hospitals with excellent service throughout the country (Figure 23.4).

Figure 23.4. Medical Tourism Arrivals in Malaysia, 2011–2017



Source: Data provided by Department of Statistics Malaysia.

Under the 11th Malaysia Plan, income from medical tourism is projected to grow 15% annually and generate RM2 billion (over $450 million) by 2020. In the government's 2018 budget, the action plan for the industry is as follows:[96]

(i) Promote Malaysia as the *Fertility and Cardiology Hubs of Asia*, which will be expanded with eVisa services and high-end medical tourism packages.
(ii) Introduce a *Flagship Medical Tourism Hospital Program* with special incentives.
(iii) Provide an investment tax allowance for private health care facilities promoting medical tourism extended through 2020.
(iv) Allow double tax deduction for accreditation expenses to be extended for ambulatory care centers and dental clinics.
(v) Expand the *exemption of income on value of increased export of health care services rate* from 50% to 100% for private health care from 2018 to 2020.

[96] *Straits Times*. 2018. 2018 Budget: Medical Tourism Set to Grow. 9 September. Online: https://www.nst.com.my/news/nation/2017/10/296023/2018-budget-medical-tourism-set-grow.

Sarawak

Sarawak is seeking to greatly expand its share of the medical tourism market. As such, the state government is seeking to promote expansion of wellness centers and health tourism. In particular, it is targeting well-designed health centers that incorporate all aspects of health care, including connectivity, quality excellence of medical specialists, high-tech health equipment, nurse and medical technician training, and tourism links to Sarawak's outstanding natural environment in the post-procedural medical services package.

West Kalimantan

West Kalimantan's market is potentially large. Medical facilities in West Kalimantan are limited due to lack of both infrastructure and medical personnel. The Indonesian public insurance system provides for nearly universal coverage of citizens, and West Kalimantan has several public hospitals. However, their facilities only provide for basic medical procedures are available. Specialized medical care must be sought outside the province and, to that end, Sarawak offers excellent facilities for West Kalimantan people needing advanced medical attention. Preliminary estimates suggest that most of the province's population has the financial capacity to access private medical treatment in neighboring Sarawak.

23.5 Cross-Border Value Chain

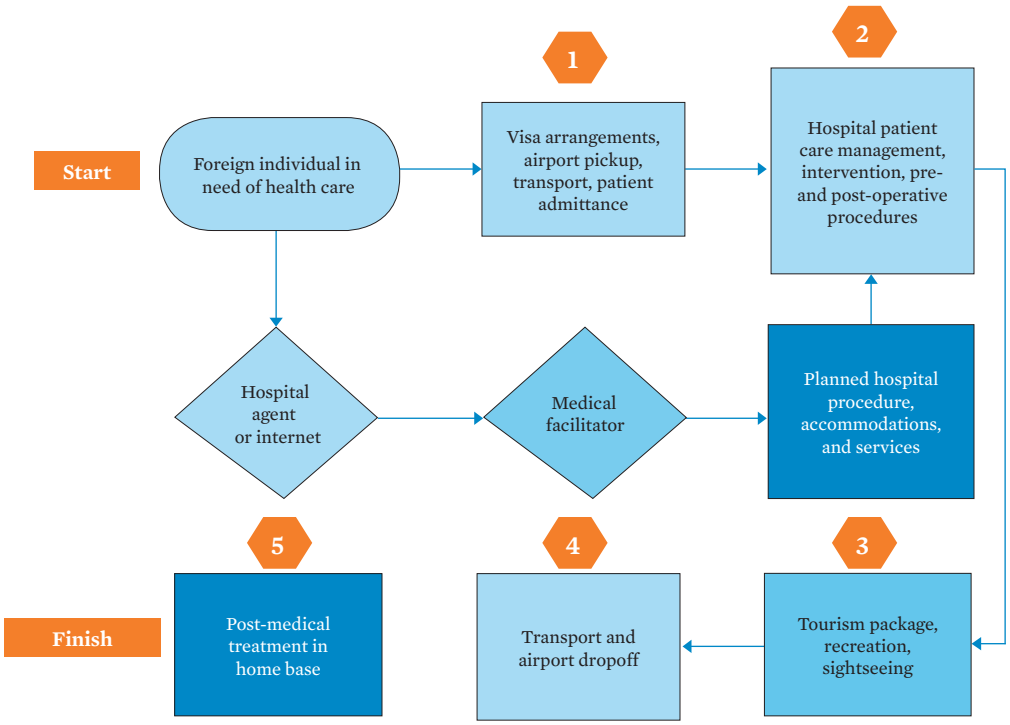
The medical tourism value chain is best viewed from the perspective of pre-procedural, procedural, and post-procedural stages (Figure 23.5). First, the pre-procedure stage in the value chain involves arrangements for patient logistics from home-base to hospital. It can involve visa processing requirements and transportation arrangements. This step can be carried out by the hospital or a medical travel facilitator who functions like an agent and associated service provider for the hospital.

Next, the procedure stage is the key component of the medical tourism value chain. It begins with the arrival of the patient at the destination country and possible pickup by the hospitals or service provider. Once in the country, counseling for treatment and medical examinations take place, followed by the actual procedure itself.

The immediate post-procedure stage includes doctors' visits and monitoring for complications, recuperation in hospital and physical therapy, medical supplies, meals, and post-operative recuperation in destination country but outside the hospital. Afterward, conditions of the patient permitting, recreation and tourism activities in the country may be organized. About 75% of patients use the hospital's vertically integrated facilitation department for touring arrangements.

Logistic arrangements are then made to return to the home country. Moreover, an important part of medical tourism is the follow-up care facilities long after tourists have left the country of treatment. There can be formal or informal coordination between the medical service providers and doctors in the customers' country who are responsible for follow-up on behalf of the service provider.

Figure 23.5. Medical Tourism Value Chain



Source: Adapted from Indian Institute of Tourism and Travel Management. 2011. A Study of Problems and Challenges Faced by Medical Tourists Visiting India. Delhi: Indian Institute of Tourism and Travel Management; originally conceptualized by G. R. Acharyulu and B. K. Reddy. 2004. Hospital Logistics Strategy for Medical Tourism. Paper presented in the Supply Chain Seminar: An International Conference on Logistics. Queensland University of Technology, Brisbane.

24 Higher Education and Technical and Vocational Education and Training

For video presentations on the Sarawak-West Kalimantan higher education and TVET cross-border value chain, visit https://youtu.be/P9w2dVpupvY

24.1 Rationale

Global Market

International higher education refers to the enrollment of students in countries other than their home base.[97] As such, the size of this sector is measured by the number of students having nonresident student visas to pursue a tertiary degree or higher.[98] Technical and vocational education and training (TVET) refers to acquisition of knowledge and skills for the workplace. As such, it focuses on aspects of the educational process involving the study of technologies and related sciences; and gaining practical skills, attitudes, understanding, and knowledge relating to specific occupations.

There are several reasons why students travel abroad for their education.[99] The most important one is the search for better-quality education than they could receive in their home country. Following closely behind is the desire to obtain exposure to an intercultural and globalized world. Next in importance is the desire to improve employment prospects.

[97] International higher education is also called transnational higher education, cross-border higher education, or borderless higher education. See J. D. Branch. 2017. A Praxiography of the Transnationalization of the Stockholm School of Economics. Dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education (Educational Leadership) at the University of Michigan-Dearborn.

[98] UNESCO. Facts and Figures, Mobility in Higher Education. http://en.unesco.org/node/252278.

[99] A. West et al. 2000. Reasons for Studying Abroad: A Survey of EU students Studying in the UK. Paper presented at the European Conference on Educational Research, Edinburgh, 20–23 September. http://www.nafsa.org/_/file/_/why_study_abroad_reasons.pdf.

At a lower level of importance are the likelihood of a better school environment, and preparation for work abroad.

International student mobility flows are evolving rapidly. Traditionally, North America and Western Europe have had the largest share of inbound students with 56% of the global market at present. In contrast, East Asia has the largest share of outbound students with 28% of the world total. But East Asia also is the second most important region for inbound students with 18% of the global market. There is therefore a large intraregional movement of students in East Asia. Elsewhere, Central and Eastern Europe has a net inbound balance, but the rest of the world's regions have net outbound balances.[100]

The major countries for outbound tertiary students are, in order of magnitude, the PRC, India, the Republic of Korea, Germany, Turkey, and France. The PRC and India alone contribute nearly 30% of all outbound tertiary students. For inbound tertiary students, the major countries are, in order of magnitude, the US, the United Kingdom (UK), Australia, France, Germany, the Russian Federation, Japan, and Canada. In East Asia, the countries that are emerging as leading destinations for international tertiary students are Malaysia and Singapore.[101] International student mobility flows are evolving rapidly. Traditionally, North America and Western Europe have had the largest share of inbound students with 56% of the global market. In contrast, East Asia has the largest share of outbound students with 28% of the world total. But East Asia also is the second most important region for inbound students with 18% of the global market. There is therefore a large intraregional movement of students in East Asia. Elsewhere, Central and Eastern Europe has a net inbound balance, but the rest of the world's regions have net outbound balances.[102]

Malaysia's Market

Malaysia is the fastest growing country with inbound students for higher education in East Asia. It hosts nearly 125,000 foreign students in higher education, which represents over 9% of the total tertiary enrollment in the country. Malaysia now ranks 9th in terms of UNESCO's International Student Mobility Survey for top destinations in higher education.[103] The main origins of its foreign students are Bangladesh, Nigeria, the PRC, Indonesia, and Yemen, which together account for 60% of all inbound students.[104]

There are several reasons why international students prefer Malaysia over other countries:

(i) English is the primary medium of instruction for all courses in private higher educational institutions; and, for those less proficient in the language, there are numerous basic English courses.

[100] J. Gacel-Ávila. 2018. Internationalization of Higher Education in Mexico: Progress and Challenges. *International Briefs for Higher Education Leaders*. No. 7. American Council on Education.

[101] British Council. *The Shape of Things to Come: Higher Education Global Trends and Emerging Opportunities to 2020*. https://www.britishcouncil.org/sites/default/files/the_shape_of_things_to_come_-_higher_education_global_trends_and_emerging_opportunities_to_2020.pdf.

[102] J. Gacel-Ávila. 2018. Internationalization of Higher Education in Mexico: Progress and Challenges. *International Briefs for Higher Education Leaders*. No. 7. American Council on Education.

[103] UNESCO. Global Flow of Tertiary-Level Students. http://uis.unesco.org/en/uis-student-flow.

[104] Bernama. Malaysia Ranks 9th Place among International Students for Tertiary Education. https://www.studymalaysia.com/education/top-stories/malaysia-ranks-9th-place-among-international-students-for-tertiary-education.

(ii) Tuition fees are reasonable and affordable, as is the cost of living, as normal living expenses in the country run about $3,300 a year.
(iii) Scholarships are available from the Malaysia International Scholarship) for International Students.
(iv) The Malaysian Qualification Agency assures that study programs are internationally recognized.
(v) The quality of educational institutions is monitored by government enforcement through legislation.
(vi) Malaysia's institutions of higher learning offer career-focused education that target industry requirements because those institutions work closely with the private sector.
(vii) Accredited degrees from Australia, Canada, New Zealand, the UK, and the US have twinning programs or branch campuses in Malaysia.
(viii) Malaysia's law allows holders of student permits to work while studying.
(ix) Malaysia is a multicultural society with ethnic diversities, which provides a global outlook and better understanding of different cultures, ethnic groups, and traditions.
(x) Malaysia is a politically stable country, free from natural disasters, with modern infrastructure and efficient transportation systems, making the country a safe and comfortable place to live and study.

Higher education as well as TVET are one of the six strategic drivers in Malaysia's Eleventh Plan to enhance human capital development. The plan's focus is on helping move the economy from labor-intensive production to knowledge- and innovation-based economic activities. That shift will require a much larger skilled labor force than the one that currently exists in Malaysia.

Moreover, the Eleventh Plan underscores the need to better align knowledge, skills, and attitudes with industry requirements; and to develop TVET services with (i) quality standards for both public and private TVET services; (ii) industry guidance with curriculum designs; (iii) delivery and job placements; (iv) ability to change attitudes on how TVET is viewed by secondary school graduates deciding on career paths; (v) ability to attract students with high academic qualifications to TVET; and (vi) increased access to innovative, industry-led training programs.

Several changes in the TVET system have already been put in place to achieve the following objectives: (i) a single qualification system; (ii) a single rating system for both public and private TVET institutions; (iii) industry-led designs and delivery of curricula for TVET institutions; (iv) centers of excellence in niche areas; (v) TVET promotion campaigns; and (vi) a productivity-linked wage system to ensure that wages are based on qualifications, skills, and productivity criteria.

Sarawak's Higher Education System

In Sarawak, international higher education and TVET are both at the infancy stage, but the state has a large and well-established education base from which to reach a take-off stage of development by 2020. What is lacking is the development of an integrated system to incorporate international students into higher-education institutions and especially TVET institutions.

The higher-education value chain extends the traditional model of value chains that focus on internal production and support activities, which is mainly oriented toward manufacturing processes, to *value deliverable networks* that emphasizes linkages between suppliers, integrators, and core value-adding activities to enhance both the production output of the economy and its general welfare.[105]

In its application to Sarawak's higher-education and TVET value chain delivery network, the learning processes are themselves the activity that generates value additions to the economy. Higher-education activities are therefore the core element of the value delivery network. The deliverables in the network are in the form of intangibles that derive from knowledge, and they account for the overall worth, or value, to Sarawak's economy.

The strategic core value chain integrators refer to the shared plan, implementation, and management of key stakeholders of the higher-education and TVET systems. They are made up of the federal and Sarawak state governments' strategy and implementation activities for higher-education and TVET, the inputs and guidelines provided by Sarawak's industries, and the educational community itself. The principal inputs are both the local and foreign students and the educators and administrators in the educational system.

For Sarawak, the focal sources for international students are West Kalimantan and the rest of the world. At present, international students in Sarawak are mainly enrolled in private TVET and higher education institutions, since the government limits enrollment of international students in public educational institutions. Among the top higher education universities and TVET institutions are University of Malaysia Sarawak, Swinburne University of Technology Sarawak Campus, Curtin University in Malaysia, and Sarawak Skills Development Centre.

University of Malaysia Sarawak

The University of Malaysia Sarawak (UNIMAS) is one of the top universities in East Asia. It is located in Kota Samarahan, Sarawak, Malaysia, which is about 25 km southeast of the state's capital of Kuching (Figure 24.1).

It has 8 faculties, 14,000 undergraduate students, and 1,400 postgraduate students. Undergraduate and postgraduate degrees include applied and creative arts, cognitive sciences and human development, computer science and information technology, economics and business, medicine and health sciences, resource science and technology, and social sciences. The university's particular strengths are in research areas of biodiversity and environmental conservation, emerging tropical infectious diseases, ICT development, renewable and green energy, and industrial design.

What sets UNIMAS apart from other academic institutions are its integration of environmental conservation programs related to the island of Borneo, the range of undergraduate and postgraduate studies in its eight faculties, the quality of its student living facilities, and the attractiveness of its campus.

[105] The concept of value networks has been proposed by M. Deise, C. Nowikow, P. King, and A. Wright. 2000. *Executive's Guide to E-Business: From Tactics to Strategy*. New York: Wiley.

Figure 24.1. University of Sarawak Malaysia

Source: University of Sarawak Malaysia.

Swinburne University

Malaysia is one of the countries that hosts the most foreign university branches, among which is Swinburne University, which is ranked in the top 3% of universities worldwide. It has a campus in the Malaysia state of Sarawak that focuses on technology (Figure 24.2). The Sarawak campus is the highest ranking international university in Borneo based on the

Figure 24.2. Swinburne University of Technology Sarawak Campus

Source: Swinburne University.

Asia-Pacific University Ranking by Times Higher Education. Also, Swinburne's Malaysian campus is rated Tier 5 for Excellence under the Malaysian Qualifications Agency's Rating System for Malaysian Higher Education Institutions.

The initiative behind the Sarawak campus is part of a long-term strategy by Swinburne Australia to globalize its operations and provide its students with international living, working, and learning opportunities. The campus is situated on 16.5 acres of land and surrounded by a hospital, three modern shopping malls, commercial and housing areas, and public amenities. Student life at Swinburne's Malaysian campus is conducive to studies, convenient, and safe.

The campus has a library that seats 700 and a large selection of leading, online resources and learning materials. There is 350-seat lecture theater, 44 computer and science laboratories including two 24-hour computer labs, 46 research and engineering workshops, and 93 lecture halls and tutorial rooms. The university maintains a close relationship with the private sector and industry, to pitch learning toward applications in the workplace. As a result, the university has achieved student placements of 100% in the job market.

Sarawak Skills Development Centre

Sarawak Skills Development Centre, or Pusat Pembangunan Kemahiran Sarawak (PPKS), was established in 1994 under the Societies Act 1966 to produce a well-trained, skillful, and competent workforce through practical and skills-based technical training in all professional areas (Figure 24.3). To broaden its reach, it has partnered with overseas and local training centers and institutions of higher learning to jointly conduct training courses

Figure 24.3. Sarawak Skills Development Centre

Source: Sarawak Skills Development Centre.

and offer programs that enhance and upgrade skills and competence of employees in the private sector.

PPKS has 11 learning centers, over 3,400 students, and over 400 staff. It has also partnered with overseas and local training centers and institutions of higher learning, including University Malaysia Sarawak (UNIMAS), to jointly conduct training courses and offer programs that enhance and upgrade skills and competence of employees in the private sector.

Its skills programs include information technology, plantation management, automobile repair, graphics design, fashion design, industrial electronics, hotel management, culinary arts, nursing, civil engineering, and mechanical engineering. In addition to certification programs, PPKS offers degrees in Bachelor of Business Administration (specializing in e-commerce) and bachelor's in software engineering.

West Kalimantan

There are limited higher education and TVET facilities in West Kalimantan and much of the interest is in accessing nearby facilities in Sarawak. The project therefore focuses on higher education and TVET development in Sarawak that is specifically aimed at West Kalimantan and other foreign students.

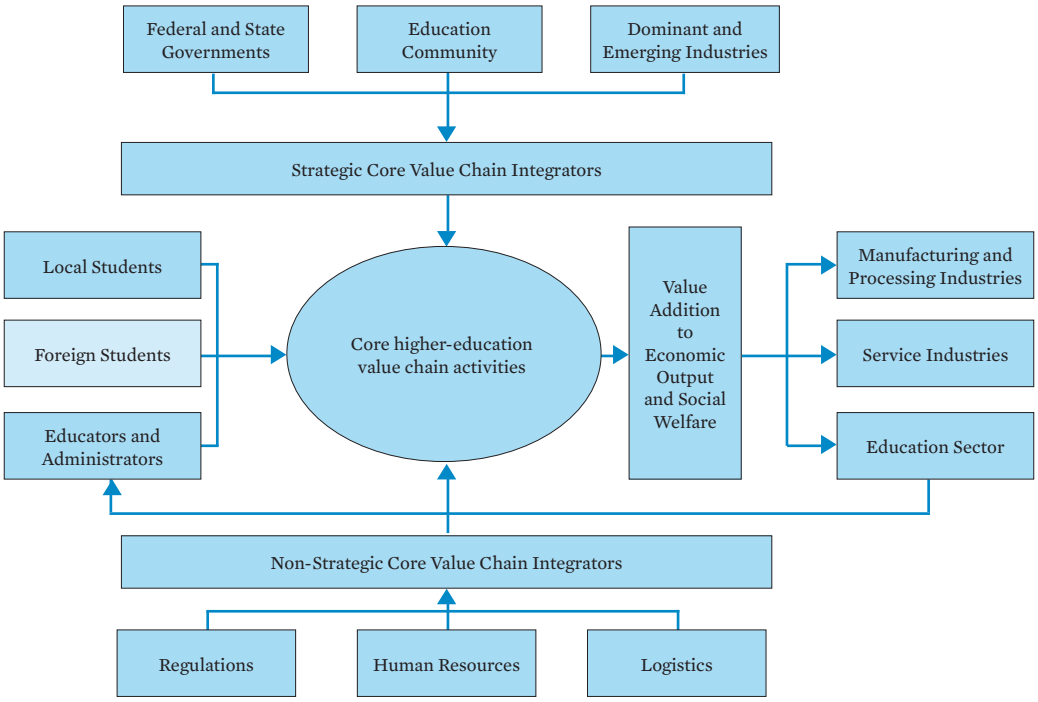
Mobility is well accepted in West Kalimantan. Sixty-one percent of Indonesian parents consider university education abroad for their children.[106] This percentage is one of the highest in the world. For Indonesians, the top overseas destinations are Malaysia, followed by Australia, Western Europe, and the United States.

24.2 Cross-Border Value Chain

Figure 24.4 shows the value chain for international higher-education and TVET. The core inputs are local and international students, and educators and administrators. There are two core value-chain integrators: strategic and nonstrategic. Strategic integrators are government, the educational community, and private sector-led industries. The emphasis in Sarawak is on industry guidance for curriculum development to make learning relevant to the needs of industries. The nonstrategic integrators are the regulatory environment, human resources, and logistics. The emphasis in this project is on the regulatory environment and how reforms can facilitate the growth and development of foreign student access to Sarawak's higher-education and TVET facilities. Examples include use of common overseas agents and advertising, online courses, housing facilities, program designs in line with industry needs. The technical assistance will also address the regulatory environment and explore ways to overcome the major constraints to the development of higher education and TVET institutions in Sarawak.

[106] HSBC. 2017. The Global Outlook for International Higher Education Strengthens. 6 December. https://www.hsbc.com/news-and-insight/media-resources/media-releases/2017/the-global-outlook-for-international-higher-education-strengthens.

Figure 24.4. Value Delivery Network of International Higher Education and Technical and Vocational Education and Training



Source: Adopted from D. Chaffey, F. Ellis-Chadwick, R. Mayer, and K. Johnston. 2006. *Internet Marketing: Strategy, Implementation and Practice*. 3rd ed. Prentice Hall for Financial Times.

PART VII

Cost–Benefit Analysis

25

Common Assumptions

25.1 Shadow Exchange Rate Factor

The shadow exchange rate (SER) is the rate of exchange calculated to exist in the absence of trade or other types of interventions. In the calculation of the net returns on a project, the shadow exchange rate, rather than the official exchange rate, is used in the valuation of traded inputs and outputs. It is generally calculated as SER = OER x SERF, where OER is the official exchange rate and SERF is the shadow exchange rate factor. By extension, the standard conversion factor (SCF) is the reciprocal of the shadow exchange rate factor, that is, SCF = 1/SERF.

The SERF is a country-wide phenomenon, not specific to any industry or project. Therefore, it is appropriate to apply the same SERF across projects.

(i) For Indonesia, we estimated the SERF to be 0.944, based on a nominal exchange rate of 14,825 Indonesian rupiah (IDR) per US dollar on 15 November 2018, and an equilibrium exchange rate of around IDR14,000 per US dollar.[107] This estimate is in line with Indonesia's central bank, Bank Indonesia, announcement about the rupiah's undervalued state.[108]

(ii) For Malaysia, the SERF is estimated at 0.911, based on a nominal exchange rate of 4.19 Malaysian ringgit (MYR) per US dollar on 15 November 2018, and an equilibrium exchange rate of approximately MYR3.82 per US dollar. The currency ranks as the 7th cheapest one among 31 currencies worldwide, based on estimates by Deutsche Bank, while the Indonesian rupiah ranks 20th.[109]

Finally, we assume that 35% of capital expenditures are tradables.

Discount Rate

The project needs to demonstrate a positive economic net present value (ENPV), using the minimum required economic internal rate of return (EIRR) as the discount rate. That is, the project should have an EIRR that is higher than the discount rate. In the case of all projects,

[107] Van der Schaar Investments B.V. 2018. Indonesian Investments. https://www.indonesia-investments.com/news/todays-headlines/currency-of-indonesia-rupiah-finding-a-new-equilibrium-rate/item8874?. See also *South China Morning Post*. 2018. Rupiah At Lowest Since Asian Financial Crisis, But Indonesia Keeps Calm And Carries On. 6 October. https://www.scmp.com/week-asia/economics/article/2167208/rupiah-lowest-asian-financial-crisis-indonesia-keeps-calm-and.

[108] *Strait Times*. 2018. Rupiah Undervalued Amid Market Irrationality: Bank Indonesia Chief. 16 October. https://www.straitstimes.com/asia/se-asia/rupiah-undervalued-amid-market-irrationality-bank-indonesia-chief.

[109] *Business Insider*. 2017. The Most Undervalued and Overvalued Currencies Around the World, in One Chart. 10 October. https://www.businessinsider.com.au/currency-valuations-september-deutsche-bank-2017-10.

we use a discount rate of 9% to calculate the economic net present value, and all project benefits are assumed to accrue through 2050.

25.2 Small Market Shares

For practical purposes, world prices are assumed to be unaffected by a single new project. As a result, company managers buy and sell outputs and inputs at given world prices. Even though Indonesia and Malaysia are among the largest supplies of palm oil and rubber, marginal output changes in Sarawak and West Kalimantan within these two countries are not significant enough to effect country-level changes in output.

25.3 Operating Costs

Operating and maintenance costs are spread evenly across the duration of project implementation. In contrast, capital investments occur at different times during the project implementation period in such a way as to ensure that operating capacity is available to meet output demand in the industry.

25.4 Shadow Prices

Economic prices are assumed to be reflected by financial prices. Economic prices, or so-called shadow prices, can in fact deviate from financial values because of price distortions caused by direct price interventions like taxes and subsidies, or by nonmarket factors like public projects that are not channeled through markets. Since all projects appraised in this study are private-sector-driven, it is reasonable to presuppose that markets are operational in the determination of financial values.

25.5 Sensitivity Analysis

We assume similar types of impact analysis to gauge the sensitivity of the results to cost or benefit estimates in the base solution. The base case uses the most likely forecast values of economic benefits and costs. Those for the economic benefits are derived from the point estimates of the gravity trade models for each industry in each country; those for economic costs are based on industry unit cost values for fixed and variable costs needed to meet capacity requirements during the project implementation period.

Sensitivity analysis assesses the effects of adverse changes in the forecast values of economic benefits and costs on the project ENPV and EIRR. There are five adverse changes that could affect the project investment decision:

(i) cost overrun by 10%,
(ii) benefits reduced by 10%,
(iii) combination of cost overrun and benefits reduced,
(iv) delay in program startup, and
(v) combination of cost overrun and program startup delay.

26

Palm Oil

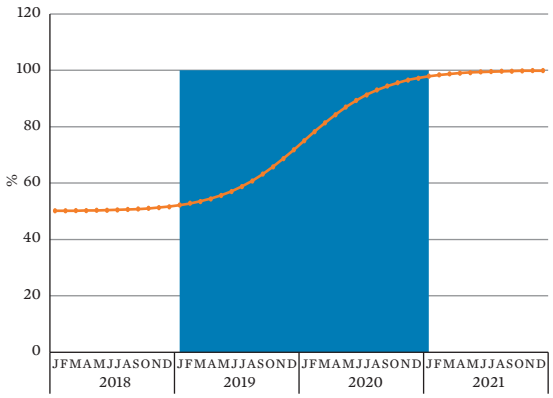
26.1 Market Analysis and Forecasting

West Kalimantan Exports to Sarawak. In the past, West Kalimantan exported palm oil from its five main ports of Pontianak, Nanga Badau, Entikong, Ketapang, and Sintete. In 2017, however, palm oil exports were only channeled through Nanga Badau, bordering Sarawak. The value of exports in that year from just that port reached a sizeable $41.0 million. Earlier, exports to Sarawak through Entikong had achieved a record $25.8 million in 2014, but they then fell sharply in the subsequent years and there were no shipments through Entikong in 2017.

Following the resumption of trade through Entikong in late 2018, palm oil exports through that port are now expected to regain earlier levels and soon exceed them within a relatively short period of time.

Under these circumstances, Figure 26.1 shows the expected expansion path of cross-border exports from Sarawak to West Kalimantan over the next 4 years. It shows that cross-border trade will move from its current 2018 amount of $41 million to $80 million by 2022.

Figure 26.1. Time Path of Palm Oil Cross-Border Trade between Sarawak and West Kalimantan, 2018–2022



Source: Adopted from R. Mundigl. 2017. S-Shaped Function in Microsoft Excel. http://www.clearlyandsimply.com/clearly_and_simply/2017/04/s-shaped-function-in-microsoft-excel.html.

Sarawak Palm Oil Production Limitations. Oil palm plantations cover 1.44 million hectares of Sarawak's 10-million-hectare total land area. That coverage represents 26% of Malaysia's total land under oil palm plantations. Production of crude palm oil (CPO) in the state is over 4 million metric tons (MT) a year, with production capacity estimated at around 6 million MT, which is considerably greater than West Kalimantan's CPO production of around 1.5 million MT a year. Yet Sarawak's plantations are located in the coastal areas and there is limited scope for further area cultivation.

Palm oil production is regulated at both the state and federal levels. Importantly, land tenure and ownership rights are governed by the state, but licensing takes place under the purview of the Malaysian Palm Oil Board (MPOB) and the Department of Environment at the national level. Comprehensive legislation exists to regulate business, labor, human rights, indigenous rights, and the environment. Because of major environmental threats and palm oil certification limitations by the Roundtable on Sustainable Palm Oil (RSPO) and the Malaysian Palm Oil Certification, palm oil supplies will

need to be increasingly sourced from foreign suppliers to sustain the growth of downstream activities in the industry.

Long-Term Import Prospects. Cross-border trade in crude palm oil between Sarawak and West Kalimantan will expand as a result of two factors: (i) the effects of a general increase in demand for Sarawak's overall palm oil imports; and (ii) the shift in the sourcing of crude palm oil supplies from within Sarawak to West Kalimantan.

The two effects are calculated as follows:

(i) *General increase in import demand.* Real GDP annual growth in Sarawak is expected to equal 5.6% between 2018 and 2023, according to the IMF *World Economic Outlook*. Thereafter, we project GDP growth using an autoregressive integrated moving average model. The result is a slight deceleration to 5.4% a year between 2024 and 2050. Since the import demand elasticity for palm oil with respect to real GDP is 0.98, palm oil imports will expand by 5.3% a year in 2024–2050.

(ii) *Shift in geographic composition of imports.* Sarawak already sources all of its foreign supplies of palm oil from West Kalimantan. However, with rising production of palm oil and palm kernel products in the state, there is likely to be a shift from domestic supply sources to foreign supply sources to relieve pressure on its coastal land area that already has extensive oil palm cultivation.

The following are the sources used for the model's exogenous variable forecasts as well as underlying assumptions:

(i) *Economic output of Sarawak*. In the medium term, real GDP growth of Sarawak is assumed to follow that of Malaysia as a whole. The forecasts for Malaysia's real GDP growth is taken from the *World Economic Outlook* database of the International Monetary Fund.[110] Over the long run, Sarawak's real GDP growth is projected to follow an autoregressive-integrated-moving average (ARIMA) model.

(ii) *Palm oil versus palm kernel oil.* The two types of oil are assumed to maintain their historical proportions in the future since palm kernel oil is derived from the kernel of the oil palm and palm oil is extracted from the pulp of the oil palm fruit.

(iii) *Shift from domestic to foreign supply sourcing.* In the base solution, future sourcing of palm oil supplies is assumed to derive from domestic and foreign suppliers according to historical proportions. In the alternative solution, companies are assumed to source 10% more from West Kalimantan over the long run to relieve pressure on coastal areas of the state.

(iv) *Cost of production.* Production cost of palm oil and palm kernel oil are taken from Syamsul Bahri's calculations reported in *Oil Palm by Product: How to Compute Its Cost of Production*.[111] The cost of production is in line with those of Neliti Pty. Ltd. The calculation by Neliti Pty. Ltd.[112] for Indonesia's cost of palm oil production is 57% that of the production revenue from palm oil. Our cost of production, based on those

[110] International Monetary Fund. World Economic Outlook (WEO) Database, July 2018. https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx (accessed 4 September 2018).

[111] S. Bahri. 2016. Oil Palm by Product: How to Compute Its Cost of Production. *IOSR Journal of Business and Management*. 18 (10). pp. 06–09. www.iosrjournals.org.

[112] Neliti Pty. Ltd. 2015. Value of Production and Cost of Production per Hectare of Oil Palm and Sugarcane Smallholders, 2014 (Indonesia). *Statistics Indonesia*. https://www.neliti.com/publications/52025/value-of-production-and-cost-of-production-per-hectare-of-oil-palm-and-sugarcane.

of Syamsul Bahri, is 54% at the beginning of the period of analysis, and 60% by the end of that period.

26.2 Economic Costs

Sarawak Capital and Operating Cost Forecasts

The following are the parameters used in the calculation of additional capital and operating costs needed to meet the projected increase in demand for palm oil production.

(i) Sarawak has a total of 1.51 million hectares of oil palm planted area, of which 1.27 million hectares are matured oil palm plantings and 0.17 million are immature plantings.[113] The yield from the fresh fruit bunch (FFB) equals 14.86 MT a hectare. Crude oil production in the state equals 3.7 million MT of crude palm oil a year, while annual palm kernel production is 0.74 million MT , and crude palm kernel oil production is 0.32 million MT. Palm oil per hectare of planted oil palm trees is 4.26.

(ii) Sarawak mills have an oil extraction rate (OER) of 19.9% as of June 2018.[114] The Malaysian Palm Oil Board (MPOB) guidelines for mills in (OER) and kernel extraction rate is 24.5%. Low productivity, combined with rising oil palm production, is limiting Sarawak's palm oil expansion potential.

(iii) Sarawak produced 4.13 million MT of crude palm oil in 2017.[115] As of December 2017, the state had 80 FFB mills with a production capacity of 21.6 million MT of palm oil a year; four palm kernel crushers with an annual production capacity of 697,200 tons a year; and six refineries with an annual production capacity of 3.12 million tons a year.[116] There are currently no producers of oleochemicals.

(iv) Capital expenditures for palm oil mills are taken from a variety of studies for the region. A new mill in Sarawak was recently installed for $14.5 million with a capacity of 90 MT an hour, while a $50 million mill has an installed capacity of 1,500 MT a day.[117] Another study for South Sumatra calculated that, for a $11 million investment in a palm oil processing mill, output was equal to 30 tons of FFB per hour.[118] A World Bank appraisal found that a mill producing 52,140 MT a year of crude palm oil and 9,480 MT of palm kernel oil a year required a total capital expenditure of $55 million,

[113] A. K. Din. *Malaysian Oil Palm Industry Performance 2016 and Prospects for 2017*. Malaysian Palm Oil Board (MPOB). Ministry of Plantation Industries & Commodities (MPIC). http://www.mpob.gov.my/images/stories/pdf/2017/2017_Dr.KushairiPALMEROS2017.pdf.

[114] Economics and Industry Development Division, Malaysian Palm Oil Board. OER Performance of Malaysian Oil Palm Mills – June 2018. http://bepi.mpob.gov.my/index.php/en/statistics/oil-extractionrate.html.

[115] Economic and Industrial Development Division, Malaysian Palm Oil Board. Production of Crude Palm Oil for the Month of December 2017, January–June 2016 & 2017 (Tonnes). http://bepi.mpob.gov.my/index.php/en/statistics/production/177-production-2017/792-production-of-crude-oil-palm-2017.html.

[116] Malaysian Palm Oil Board. Number and Capacities of Palm Oil Sectors in Operation as at December 2017 (Tonnes/Year). Economic and Industrial Development Division. http://bepi.mpob.gov.my/index.php/en/statistics/sectoral-status/179-sectoral-status-2017/803-number-a-capacities-of-palm-oil-sectors-2017.html.

[117] *Star Online*. Sarawak Oil Palms Commissions Refinery and Fractionation Plant. https://www.thestar.com.my/business/business-news/2012/06/27/sarawak-oil-palms-commissions-refinery-and-fractionation-plant/.

[118] S. Vidliana Gozali. 2010. *Optimal Palm Oil Processing Plant Size in South Sumatera*. California Polytechnic State University. Faculty of the Agribusiness Department. https://pdfs.semanticscholar.org/2fb9/cb64db9767db735827e60c4632425a014482.pdf.

adjusted to 2018 prices.[119] For smaller mills, capital expenditures have been estimated at $181,000 for 138 MT a year of crude palm oil and 84 MT of cracked kernel.[120]

West Kalimantan and Sarawak Capital and Operating Cost Forecasts

The following are the parameters used to calculate the additional capital and operating costs needed to meet the projected increase in palm oil exports from West Kalimantan to Sarawak:[121]

(i) *Extraction Rates*
  (a) Extraction rate to convert oil palm FFB to crude palm oil (CPO) is 21%, that is, it takes 100 kilograms (kg) of FFB to produce 21 kg of CPO.
  (b) Extraction rate to convert oil palm FFB to palm kernel oil (PKO) is 5%, that is, it takes 100 kg of FFB to produce 5 kg of PKO.

(ii) *Cost of Production*
  (a) Cost of production for crude palm oil (CPO) is RM1,580 a metric ton.
  (b) Cost of production for palm kernel oil (PKO) is RM324 a metric ton.

(iii) *Capacity Expansion*
  (i) West Kalimantan's installed capacity is estimated at 70,000 MT of palm oil a year.
  (ii) West Kalimantan will reach capacity output from its mills in 2020 to maintain its share of total Sarawak demand of crude palm oil. To expand capacity needed to meet demand through 2050, it will need to increase capacity by 170,000 MT of palm oil a year.
  (iii) To achieve the additional output needed to maintain a constant market share of Sarawak's total crude palm oil requirements through 2050, West Kalimantan capital investment in mill processing facilities will need to be $198 million. We assume that this investment will be spread over 2020–2022 in equal amounts.
  (iv) If Sarawak maintains a 10% market share of the state's projected total crude palm oil requirement, it will need to expand its mill processing capacity by over 220,000 MT over the project lifetime.
  (v) Sarawak's capital expenditures needed to expand its mill processing capacity to meet target production levels will need to be $233 million, which we assume will occur in 2020–2022.

26.3 Economic Benefits

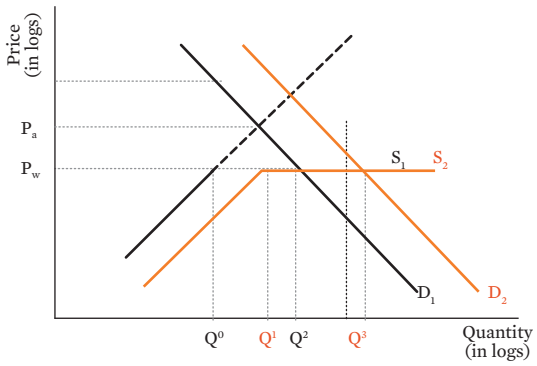
There are two direct benefits from cross-border trade in crude palm oil between Sarawak and West Kalimantan:

(i) an increase in the quantity demanded of crude oil palm by Sarawak because of expanded output; and
(ii) a shift from domestic supply sources to West Kalimantan suppliers of crude palm oil because of oil palm planting limitations in Sarawak.

[119] World Bank. Agro-Industry Profiles: Oil Palm. Washington, DC. http://documents.worldbank.org/curated/en/479851468182957759/Agro-industry-profiles-oil-palm.
[120] U. Essia. 2013. Feasibility Study for Establishing a Small-Scale Oil Palm Mill in ITU Local Government Area, Akwa Ibom State, Nigeria. http://www.paidafrica.org/paidwa/images/data/Small_cale_oil_palm_processing.pdf.
[121] Extraction rates and production costs are from S. Bahri. 2016. Oil Palm by Product: How to Compute Its Cost of Production. *IOSR Journal of Business and Management*. 18 (10).

The two effects are illustrated in Figure 26.2 for the Sarawak market. The domestic equilibrium price is P_a under autarky (that is, in a closed economy without trade). With trade, the domestic price is equal to that of the world price, P_w.

Figure 26.2. Change in Sarawak's Quantity Demanded of Crude Palm Oil and Supplies from Domestic and West Kalimantan Suppliers



Source: Representation by the authors.

At the lower world market price, Sarawak plantations offer Q^0 supplies to processors, which is an amount that is lower than under autarky. At the lower price, the quantity demand of crude palm oil is Q^0. The difference between the quantity demanded by the refineries, Q^2, and the quantity supplied by domestic plantation, Q^0, is the amount imported from West Kalimantan ($Q^2 - Q^0$).

Estimates of the price elasticity of demand for imports from the palm oil sector vary greatly.[122] While several authors have estimated price-inelastic demand curves for Indonesia's exports, other estimates have calculated the price elasticity of import demand for the palm oil sector, some as high as –2.28.[123] In the present report, we use the –1.66 averages of the estimates.

On the supply side, scholars have suggested that the long gestation period of the oil palm gives rise to a highly price inelastic supply curve, both in the short and long run. However, in West Kalimantan, the plantations visited by the authors of this study indicated their ability to bring in new supplies within a relatively brief period because of their large tracts of unplanted lands and stocks of seedlings. Indeed, one study has found the own-price elasticity of supply of palm oil to be 1.65 (footnote 123). In the present study, the slope of the supply curve is inconsequential to the results. The same results hold, whether the supply of crude palm oil is completely price-inelastic or not.

Demand Increase Due to Output Expansion

An expansion over time in the quantity demanded by refineries shifts the demand curve from D_1 to D_2. The new quantity demanded is Q^3. Without any expansion in domestic production over time, imports from West Kalimantan would increase from ($Q^2 - Q^0$) to ($Q^3 - Q^0$). Domestic revenue to crude palm oil mills is P_wQ^0, which is the same as before the demand expansion by refineries. In contrast, revenue for West Kalimantan suppliers of crude palm oil increases from ($P_wQ^1 - P_wQ^0$) to ($P_wQ^3 - P_wQ^0$), which creates a net revenue gain of ($P_wQ^3 - P_wQ^1$).

Larger Share of Exports Channeled to West Kalimantan

The second benefit derives from an increase in the share of crude palm oil by West Kalimantan relative to that of Sarawak producers. Over time, Sarawak plantations will increase their

[122] For a review, see A. Abdullah. 2012. The Economic and Environmental Analysis of Palm Oil Expansion in Indonesia: Export Demand Approach and EIRSAM Model. Submitted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy in International Development, Graduate School of International Development, Nagoya University.

[123] S. Hirankitrangsee. 1987. Demand and Supply Analysis of Palm Oil in Thailand. Master's thesis. Bangkok: Kasetsart University.

supplies of crude palm oil to refineries, shifting the domestic supply curve from S_1 to S_2. If domestic regulatory restrictions prevents a proportional response in supply to that of demand, then West Kalimantan's market share will rise. In that case, the increase in domestic supplies will be less than proportional to that of the increase in imports from West Kalimantan, that is, $(Q^1 - Q^0)/(Q^3 - Q^0) < (Q^3 - Q^1)/(Q^3 - Q^0)$. The amount of the shift from domestic supplies to foreign supplies is, in fact, equal to $(Q^2 - Q^1)$.

26.4 Economic Internal Rate of Return

West Kalimantan

The EIRR calculation for West Kalimantan's palm oil industry is presented in Table 26.1.[124] The EIRR of 18.6% is high but below that of other studies because conservative assumptions were used in the present analysis. One study of RSPO certification calculated an IRR of 34.9% for a CPO and PKO produced in a palm oil plantation in Papua.[125] Another one for small producers in Indonesia calculated an IRR of 24%–37% (using a discount rate of 13%) for under an adoption program of the introduction of Indonesian Sustainable Palm Oil standards.[126]

The net present value, which is calculated as the difference between the present value of cash inflows and outflows, discounted at 9%, is equal to just over $250 million measured in 2018 prices over the period of analysis.

Table 26.1. Summary of Economic Internal Rate of Return and Sensitivity Analysis for West Kalimantan's Crude Palm Oil Industry

	Economic Internal Rate of Return (%)	Economic Net Present Value at 9% ($ million)	Economic Benefit–Cost Ratio
Base estimate	18.6	250.2	2.21
Costs overrun of 20%	17.2	229.6	2.01
Benefits reduced by 10%	17.0	204.6	1.99
Costs increased by 20% and benefits reduced by 10%	15.7	183.9	1.81
One-year delay in program start-up, with benefits delayed by 1 year	15.6	158.6	1.76
Cost overrun by 20% and benefits delayed by 1 year	15.1	180.0	1.79

Source: Authors' estimates.

[124] The internal rate of return on an investment or project is the "annualized effective compounded return rate" or rate of return that sets the net present value of all cash flows (both positive and negative) from the investment equal to zero. When externalities and price distortion are allowed for in the cost and benefit stream, the social criteria are the same, i.e., net present value and internal rate of return, generally called economic internal rate of return to distinguish it from financial internal rate of return.

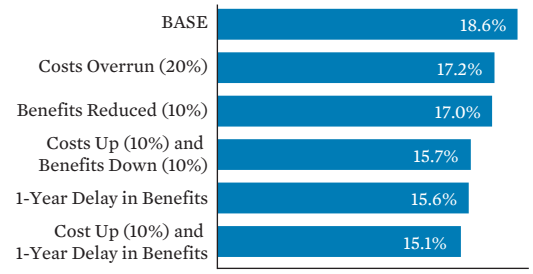
[125] F. Salman, M. Najib, and S. Djohar. 2017. Cost and Benefit Analysis of RSPO Certification (Case Study in PT Border Cross Agreement Oil Palm Plantation in Papua). *Indonesian Journal of Business and Entrepreneurship.* 3 (3, September). http://journal.ipb.ac.id/index.php/ijbe/article/view/16765.

[126] Ernah. 2015. Cost–Benefit Analysis of the Introduction of the Indonesian Sustainable Palm Oil: A Case Study in Jambi Province, Sumatra, Indonesia. http://www.eepseapartners.org/post-2536/.

The economic benefit–cost ratio (BCR) is the ratio of the benefits relative to their monetary costs. Since the general rule-of-thumb is that benefits that exceed costs indicate a worthwhile investment, the 2.2 ratio suggests a robust investment for the industry in general.

Table 26.1 also presents the results of the sensitivity analysis tested for the effects of negative changes in key parameters. The analysis shows that West Kalimantan's palm oil industry trade and investments following the road construction generally remain economically viable in the face of various project shortfalls during the period of analysis (Figure 26.3).

Figure 26.3. West Kalimantan Economic Internal Rate of Return for Crude Palm Oil Industry under Alternative Scenarios



Source: Authors' estimates.

These calculations are intended as indicative only and are representative of the identified investment. Their application to specific situations or other situations elsewhere may cause the calculations to vary considerably. Nevertheless, the profitability of the investment is likely to be underestimated because Sarawak is limited in its ability to expand domestic CPO production by the amount needed to safisfy the domestic industry. As a result, West Kalimantan is likely to incease its share of Sarawak's market by significantly more than 10% over the period of analysis.

Sarawak

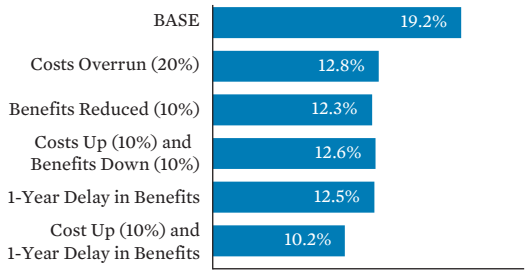
Common assumptions are the same as those for West Kalimantan. The base-case EIRR calculation for Sarawak's palm oil industry is presented in Table 26.2. The EIRR for the palm oil industry in Sarawak is computed at under 19%. This return reflects a conservative estimate because the 10% shift in market shares of total Sarawak production to West Kalimantan suppliers is likely to be much higher. The net present value (i.e., the difference between the present value of cash inflows and outflows, discounted at 9%) is equal to $62 million measured in 2018 prices over the period of analysis. The economic BCR is the ratio of the benefits relative to their monetary costs. Since the general rule-of-thumb is that benefits that

Table 26.2. Summary of Economic Internal Rate of Return and Sensitivity Analysis for West Kalimantan's Palm Oil Industry

	Economic Internal Rate of Return (%)	Economic Net Present Value at 9% ($ million)	Economic Benefit–Cost Ratio
Base estimate	19.2	47.8	1.20
Costs overrun of 20%	12.8	23.5	1.09
Benefits reduced by 10%	12.3	18.7	1.08
Costs increased by 20% and benefits reduced by 10%	12.6	21.1	1.08
1-year delay in program start-up, with benefits delayed by 1 year	12.5	18.4	1.08
Cost overrun by 20% and benefits delayed by 1 year	10.2	10.0	1.04

Source: Authors' estimates.

Figure 26.4. West Kalimantan Economic Internal Rate of Return for Plywood Industry under Alternative Scenarios



Source: Authors' estimates.

exceed costs indicate a worthwhile investment, the 1.4 ratio suggests a robust investment for the industry in general.

The calculations are indicative of a modest growth in the refinery industry. It is important to emphasize that the Malaysian state of Sarawak is committing to the preservation of 80% of its land area as primary and secondary forest, according to the Sarawak Chief Minister.[127] Concession boundaries for oil palm and other kinds of tree plantations already cover one-third of the state's land area, which suggests that if the government is to fulfill its commitment to preserve much of the land as primary and secondary forest, then it would need to reverse nearly 30% of the existing concessions. Whether it implements those changes, it is clear that expanded CPO production in the state will be limited over the long run and that greater reliance will need to be placed on West Kalimantan suppliers.

Table 26.2 also presents the results of the sensitivity analysis tested for the effects of negative changes in key parameters. The analysis shows that Sarawak's palm oil industry benefits generally remain economically viable in the face of various shortfalls in the project's implementation during the period of analysis (Figure 26.4).

26.5 Project-Related Technical Assistance

Technical assistance needs are estimated at $1.0–$2.0 million. Capacity development will focus on the following components:

(i) Support the operations of champion individuals or institutions to promote the clustering of companies on both sides of the border to initially support development of supply chain arrangements
(ii) Possibly integrate company activities across borders in more formal value chain production and distribution activities.

[127] M. Erickson-Davis. 2018. Sarawak Makes 80% Forest Preservation Commitment, but Some Have Doubts. Mongabay. https://news.mongabay.com/2018/03/sarawak-makes-80-forest-preservation-commitment-but-some-have-doubts/.

27

Natural Rubber

27.1 Market Analysis and Forecasting

The rubber industry in West Kalimantan is focused on the production and distribution of technically specified rubber ($203 million a year) and rubber latex ($38.2 million), while Sarawak's industries are concentrated in downstream activities like natural rubber plates or sheets ($22.7 million), new pneumatic tires as well as retreaded tires ($4.75), and other types of volcanized rubber ($0.9 million).[128] There is also production of hygienic or pharmaceutical gloves of vulcanized rubber, conveyor or transmission belts or belting, of vulcanized rubber, and footwear with outer soles of rubber.

To support these industries, Sarawak imports $11 million a year of natural rubber in its primary form, which is also known as latex. Sarawak also imports $0.8 million annually of volcanized rubber.[129] Imports of natural rubber products are valued at $42.2 million annually and mainly consist of new tires (70% of the total) as well as rubber gaskets and washers, conveyor and transmission belts, and pharmaceutical products like latex gloves.

On the West Kalimantan side, natural rubber exports are valued at $203.3 million (2017). Only 1.5% of all shipments in this product category are shipped to Sarawak, with the bulk of exports (74%) directed at the People's Republic of China (PRC) (34%), Japan (25%), and the Republic of Korea (15%).

While Sarawak has the technology needed to be competitive in both the global markets for tires as well as rubber gloves, West Kalimantan lacks that technological knowhow and capital. For that reason, the Indonesian Rubber Association has called on the Government of Indonesia to encourage the introduction of downstream activities in the rubber industry of West Kalimantan to add value to the industry.[130]

Sarawak's need for natural rubber latex and West Kalimantan's need for technological know-how in downstream industries offer the basis for collaboration and possibly development of a

[128] All data are for 2017.

[129] Vulcanization is a chemical process that enhances the properties of most elastomers including natural and synthetic rubber products. It is considered as the most revolutionized invention in the polymer industry. Vulcanization was first discovered by Charles Goodyear. However, it was Thomas Hancock who first patented a commercial method for vulcanization. The rubbers that have not undergone the process of vulcanization are called unvulcanized rubbers. The main difference between vulcanized and unvulcanized rubber is that vulcanized rubber retracts to its original shape even after applying a large mechanical stress. Source: Yashoda. 2016. Difference Between Vulcanized and Unvulcanized Rubber. Epedia. http://pediaa.com/difference-between-vulcanized-and-unvulcanized-rubber/.

[130] RambuEnergy. 2014. Indonesia Rubber Association Says West Kalimantan Needs Rubber Manufacturers. https://www.rambuenergy.com/2014/11/indonesia-rubber-association-says-west-kalimantan-needs-rubber-manufacturers/ (accessed 27 December 2017).

cross-border value chain. The project proposes to shift Sarawak rubber latex imports to more cost-effective suppliers in West Kalimantan, which considerably reduces distance and transportation costs to producers of tires, latex gloves, and other natural rubber products.

Collaboration between West Kalimantan and Sarawak is proposed in the form of complementary production activities, joint international marketing, and knowledge-sharing and know-how. Both territories would both benefit from the transfer of skills through either cross-border investment or support to business development centers within each territory. Also, collaboration in marketing of processed rubber products could provide scale economies for the industries in each territory and improve their ability to compete in the global market.

27.2 Appraisal Methodology for Benefits Calculations

Following our gravity trade model results, we assume that Sarawak companies will prefer to source their rubber from West Kalimantan rather than distant countries. The forecast assumes, first, that there is a successful resumption of normal trade levels between Sarawak and West Kalimantan after the opening of trade in 2017; and, second, that Sarawak companies recognize that sourcing supplies from West Kalimantan will reduce trade costs and offer substantial advantages to their international competitiveness.

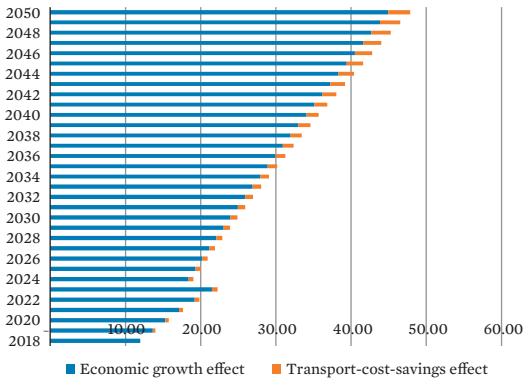
Sarawak Rubber Imports

There are three underlying drivers for our projections (see Figure 27.1).

(i) *Economic growth effect*. The main driver for Sarawak's long-term expansion of its rubber industry is economic activity within the state. Based on our gravity trade model estimates in chapter 14, in the near future (2018–2024), economic activity will generate an import demand growth of over 8% a year in US dollar terms; and then slow to 3.5% a year (2025–2050) as Sarawak diversifies to higher-end manufactures that are less reliant on natural resources. The economic growth effect on Sarawak's rubber imports is shown in the dark blue portion of the bar chart in Figure 27.1.

(ii) *Shift to lower transportation-cost supplies:* There are considerable cost savings to be had from shifting imports of natural rubber imports from distant suppliers to nearby West Kalimantan providers. Transport costs are generally high for distant suppliers. Reported costs vary considerably and range from a high of 20% of the total trade cost for distant suppliers to as low as 2%–4% for nearby suppliers.[131] For purposes of illustrating the

Figure 27.1. Projected Rubber Imports of Sarawak, 2018–2050
($ million)



Source: Representation by the authors.

[131] Rubber Research Institute of India. Market Structure, Marketing Efficiency and Price Spread. http://shodhganga.inflibnet.ac.in/bitstream/10603/60996/11/11_chapter%206.pdf; and World Bank. 2015. Assessment of Technical and Financial Viability of Nairit Chemical Plant Operation. Prepared by Jacobs Consultancy Ltd. for World Bank. http://documents.worldbank.org/curated/en/568331468179353299/Assessment-of-technical-and-financial-viability-of-Nairit-chemical-plant-operation.

quantitative effect of shifting part of Sarawak's latex rubber imports from distant suppliers to neighboring West Kalimantan, we use an estimated transportation cost of 20% of the import value of latex rubber for Sarawak manufacturers of rubber products from distant suppliers and 4% for imports from West Kalimantan.

(iii) Over the longer run, we assume rational behavior on the part of rubber-based manufacturers in Sarawak, with much greater raw material supplies being sourced from nearby providers now that trade with West Kalimantan is being revitalized. The contribution of import demand from partner country sources is reasonably projected to expand to 66%, or two-thirds of overall import demand growth for rubber products, with domestic economic growth contributing the remaining one-third of the import demand growth.

West Kalimantan Rubber Exports

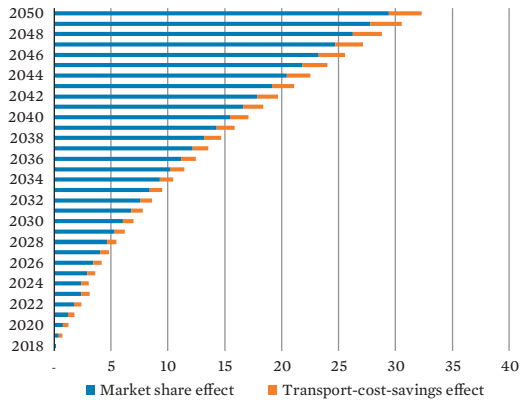
There are two effects from the Sarawak's increased volume of rubber from West Kalimantan:

(i) *Direct Effect*. The increase in Sarawak imports resulting from the resumption in cross-border trade and recognition by Sarawak-based companies that they will be able to obtain rubber at a lower cost due to the lower transportation cost.

(ii) *Indirect Effect*. The increase the quantity demanded by international customers due to lower prices being charged by Sarawak companies in response to the lower production costs.

Figure 27.2 shows the breakdown of Sarawak imports from West Kalimantan associated with these effects. The market share effect is dynamic and grows over time, while the transport cost savings effect is a one-time effect for the incremental shift in supply sources.

Figure 27.2. Projected Rubber Exports of West Kalimantan, 2018–2050
($ million)



Source: Representation by the authors.

27.3 Economic Costs

Sarawak's capacity expansion requirements for natural latex processing facilities assume that domestic producers will continue to supply the same proportion of natural latex to rubber-based manufacturing companies in the future as in the past. That proportion is equal to one-third of the total volume of natural latex absorbed by the rubber-based manufacturing industries in the state.[132]

The following is a breakdown of capital and operating costs for natural latex used in the projected capacity expansion needed to meet natural latex inputs for the production of rubber-based products in Sarawak:

[132] Based on data from Department of Statistics of Malaysia for production of natural rubber in Sarawak; Customs Department of Malaysia data for natural rubber imports of Malaysia; and World Bank prices of natural latex in Malaysia.

(i) *Capital costs.* The benchmark capital costs for building natural rubber processing facilities is taken from a study on large-scale investment in natural rubber primary processing factories, using the baseline investment amount of $2.87 million needed to produce 1,000 tons annually of technically specified natural rubber.[133]

(ii) *Raw material expenses.* The cost of producing, harvesting, and transporting natural latex to processing plants has been studied extensively in major rubber producing countries. In Thailand, the total cost for harvesting and transporting natural latex to processing plants has been calculated at $353 a metric ton.[134] For farmers, 80% of their costs are for tapping the rubber tree; for local buying sites, 70% of costs are for transferring, weighting, and measuring the dry rubber contents of natural latex; and, for regional buying middlemen, 55% of costs are labor costs.

(iii) *Processing plant operating costs.* In addition to raw material expenses, plant operating cots consist of equipment maintenance, salaries and wages, licenses and fees, real estate expenses, public utilities, fuel costs, equipment depreciation, and taxes. We estimate these expenses to equal 15% of capital costs.

27.4 Economic Internal Rate of Return for Sarawak

The EIRR calculation for Sarawak's natural rubber industry is presented in Table 27.1. The EIRR is computed at nearly 16%. This return reflects a large shift in foreign supply sourcing by Sarawak to West Kalimantan providers as a result of the renewal of trade between the two territories, from only 1.5% in 2017 to 66% by 2050. That shift will significantly lower transportation costs of raw material inputs and therefore lead to an increase in the quantity supplied of natural latex to rubber-based manufacturing industries. That increase in production will, in turn, lead to greater output from manufacturing industries and give rise to increased demand for domestically sourced natural latex as well. The increase in domestically sourced natural latex is expected to

Table 27.1. Summary of Economic Internal Rate of Return and Sensitivity Analysis for Sarawak's Natural Rubber Industry

	Economic Internal Rate of Return (%)	Economic Net Present Value at 9% ($ million)	Economic Benefit–Cost Ratio
Base estimate	15.6	70.8	1.27
Costs overrun of 20%	12.8	44.2	1.15
Benefits reduced by 10%	12.5	37.1	1.14
Costs increased by 20% and benefits reduced by 10%	9.9	10.5	1.04
1-year delay in program start-up, with benefits delayed by 1 year	9.7	6.5	1.02
Cost overrun by 20% and benefits delayed by 1 year	9.8	10.7	1.04

Source: Authors' estimates.

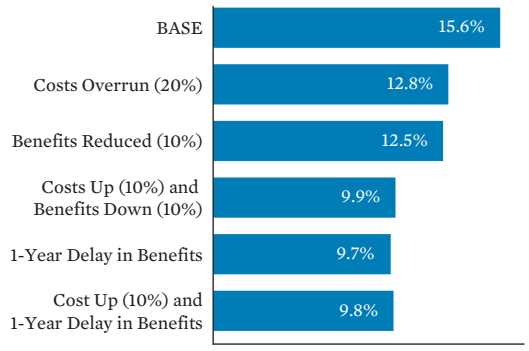
[133] N. Hirohata and K. Fukoyo. 2011. Comparative Study of Large-scale Investment in Plantation in Least Developed Countries Applying the Investment Profitability Analysis Model. *International Journal of Engineering Innovation and Management*. http://web.cc.yamaguchi-u.ac.jp/~eimanage/vol1issue1/hirohata-35-40.pdf.

[134] S. Srisawad et al. 2013. *Cost and Benefit Analysis for Rubber Product Transportation*. Proceedings of the 4th International Conference on Engineering, Project, and Production Management (EPPM 2013). http://www.ppml.url.tw/EPPM/conferences/2013/download/SESSION5/5-11_Cost%20and%20Benefit%20Analysis%20for%20Rubber%20Product%20Transportation.pdf.

require capital and operating expenses in additional processing facilities capable of supplying $48 million by 2050. Capital investment is expected to take place in 2020, 2030, and 2050 in amounts necessary to cover additional processing requirements for the next 10 years after the investment.

The net present value (i.e., the difference between the present value of cash inflows and outflows, discounted at 9%) is equal to just over $105 million measured in 2018 prices over the period of analysis. The economic BCR is the ratio of the benefits relative to their monetary costs. Since the general rule-of-thumb is that benefits that exceed costs indicate a worthwhile investment, the 1.45 ratio suggests a favorable investment return.

Figure 27.3. Sarawak Economic Internal Rate of Return for Natural Rubber Industry under Alternative Scenarios



Source: Authors' estimates.

Table 27.1 also presents the results of the sensitivity analysis tested for the effects of negative changes in key parameters. The analysis shows that Sarawak's natural rubber industry benefits generally remains economically viable in the face of various shortfalls in the project's implementation during the period of analysis (Figure 27.3).

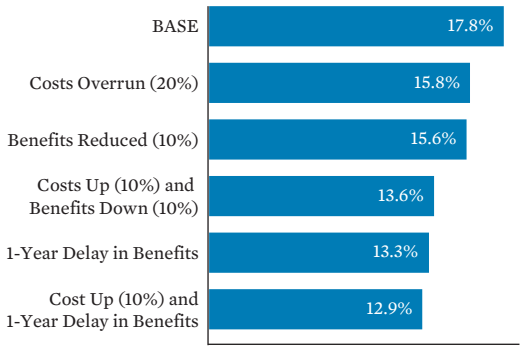
27.5 Economic Internal Rate of Return for West Kalimantan

The EIRR calculation for West Kalimantan's natural rubber industry is presented in Table 27.1. The EIRR is nearly 18%. The net present value, which is calculated as the difference between the present value of cash inflows and outflows, discounted at 9%, is equal to just over $38 million measured in 2018 prices over the period of analysis.

The economic BCR is the ratio of the benefits relative to their monetary costs. Since the general rule-of-thumb is that benefits that exceed costs indicate a worthwhile investment, the 1.40 ratio suggests a favorable investment for the industry in general.

Table 27.2 also presents the results of the sensitivity analysis tested for the effects of negative changes in key parameters. The analysis shows that West Kalimantan's natural rubber industry trade and investments following the resumption of trade remain economically viable in the face of various project shortfalls during the period of analysis (Figure 27.4).

Figure 27.4 West Kalimantan Economic Internal Rate of Return for Natural Rubber Industry under Alternative Scenarios



Source: Authors' estimates.

Table 27.2. Summary of Economic Internal Rate of Return and Sensitivity Analysis for West Kalimantan's Crude Natural Rubber Industry

	Economic Internal Rate of Return (%)	Economic Net Present Value at 9% ($ million)	Economic Benefit–Cost Ratio
Base Estimate	17.8	55.6	1.54
Costs overrun of 20%	15.8	45.3	1.40
Benefits reduced by 10%	15.6	39.8	1.39
Costs increased by 20% and benefits reduced by 10%	13.6	29.5	1.26
1-year delay in program start-up, with benefits delayed by 1 year	13.3	23.6	1.23
Cost overrun by 20% and benefits delayed by 1 year	12.9	27.6	1.24

Source: Authors' estimates.

27.6 Project-Related Technical Assistance

Technical assistance needs are estimated at $1.5 million. Capacity development will focus on the following components:

(i) Support the operations of champion individuals or institutions to promote the clustering of companies on both sides of the border to initially support development of supply chain arrangements.
(ii) Possibly integrate company activities across borders in more formal value chain production and distribution activities.

28

Wood Products

28.1 Market Analysis

West Kalimantan. Wood and wood-based semifinished products are West Kalimantan's third largest export, contributing 10% of the province's total export earnings in 2017. Although its share of exports has declined in recent years as those of alumina, rubber, and crude palm oil, exports have risen, pre-export processing is rising as companies seek to innovate and diversify into higher value-added activities. Nevertheless, the wood-based industry remains concentrated in four subsectors:

(i) sawn timber;
(ii) veneer and panel products, which include plywood and reconstituted panel products such as particleboard, chipboard, fiberboard, moldings, and builders' joinery;
(iii) carpentry for doors and windows along with panels and flooring board or parquet; and
(iv) furniture and furniture components.

Sarawak. In Malaysia, most of the country's larger sawmills and veneer and plywood mills are in Sarawak, as well as Sabah. The mills use tropical wood species to produce sawn timber, veneer, plywood, and other veneered panel products. More than 55% of the plywood mills and 45% of the moldings mills are in those two states, where the mills are most often owned by Malaysians operating small and medium-sized enterprises (SMEs).[135]

Illegal Logging. Although the so-called goldrush of uncontrolled timber logging was partially curtailed a decade ago, networks of illegal loggers remain operational and have moved deeper into the West Kalimantan interior to avoid detection. Only 4 of the 300 timber concessions currently logging in West Kalimantan are explicitly applying sustainability methods and only 16% of the world's timber goes through members of the WWF Global Forest and Trade Network.

Impact. Borneo's forested area is estimated to have declined from 76% of the total area in 1973 to considerably less than 30% in 2010.[136] According to the forest director of the Heart of Borneo initiative, despite ongoing efforts to protect 22 million hectares of rainforest across Borneo, illegal cutting continues in those areas by both local households and companies.[137] Formal timber tracking is not working because companies use existing permits to legalize

[135] Malaysian Investment Development Association. Food Technology and Sustainable Resources. http://www.mida.gov.my/home/food-technology-and-sustainable-resources/posts/.
[136] D.L.A. Gaveau et al. 2014. Four Decades of Forest Persistence, Clearance and Logging on Borneo. https://dx.doi.org/10.1371%2Fjournal.pone.0101654.
[137] *The Observer.* 2010. Borneo's Majestic Rainforest is Being Killed by the Timber Mafia. https://www.theguardian.com/world/2010/oct/24/borneo-indonesia-rainforest-illegal-logging.

logs, and the only way to prevent that practice is to track from stump to the entry of timber into the market.

A common example is the massive logs that are transported by boats daily at Lanjak in Kapuas Hulu Regency. Lanjak cooperatives receive commissions for the wood cut in their forests that range from IDR25,000 per ton ($2.52 per cubic meter) to MYR20 per ton ($4.46 per cubic meter), depending on distance to the border.[138]

Continued Deforestation. In Sarawak, nearly all of the timber is derived from natural forests, and the state's production accounts for about 60% of Malaysia's forest production. According to a Chatham House assessment, about 70% of the country's plywood is produced in Sarawak, and Japan is the most important export market. Of the total imported from Malaysia, half of Japan's plywood comes from Sarawak. Adding to the problem is the Malaysian government's plan to expand the country's oil palm plantations to 5.6 million hectares by 2020, and most of the expansion is to take place in Sarawak.[139]

There are, nevertheless, positive signs. In the export markets, producers must increasingly comply with requirements about the legality of timber. In May 2016, Japan enacted new legislation under the Law Concerning the Promotion of Distribution and Use of Legally-Harvested Timber.[140] The law is designed to ensure trade in legal timber, and it represents the beginning of Japan's effort to follow the growing trend of implementing measures to prevent imports of illegal timber.

Other major markets focus on the elimination of illegal timber. For example, in Europe, producers must comply with the 2013 EU Timber Regulation; in the US, exports are subject to the Lacey Act, which prohibits illegally sourced wood and wood products; and in Australia, exports must comply with the 2014 Illegal Logging Prohibition Act, which extends the 2012 ban on imports of illegally sourced wood and wood products, requiring importers to exercise due diligence by collecting information about the origin of timber products to minimize the risk of illegal material in their supply chains.

28.2 Appraisal Methodology for Benefits Calculations

Timber transport costs constitute a sizeable part of the wood-product companies' raw material costs and have a major influence on the industry's overall competitiveness. In fact, depending on fuel costs and haul distance, the transportation of wood from harvest site to processing facility can account for as much as 50% of total harvest cost.[141] Developing a cost-effective timber transport system is therefore essential to the continued success of companies. As such, the proposed project quantitatively assesses two effects on the continued viability of the industries in Sarawak and West Kalimantan.

[138] R. L. Wadley. 2006. Community Cooperatives, "Illegal" Logging and Regional Autonomy in the Borderlands of West Kalimantan. In F. M. Cooke, ed. *State, Communities and Forests In Contemporary Borneo. Asia-Pacific Environment Monograph 1*. Australian National University.

[139] T. W. Lim. 2013. Malaysia: Illegalities in Forest Clearance for Large-Scale Commercial Plantations. Washington, DC: Forest Trends. https://www.forest-trends.org/publications/malaysia-illegalities-in-forest-clearance-for-large-scale-commercial-plantations/.

[140] M. Momii. 2016. Japan's New Legal Timber Law. Forestry Legality Initiative. http://www.forestlegality.org/blog/japan%E2%80%99s-new-legal-timber-law.

[141] T. P. McDonald et al. 2001. Information Needs for Increasing Log Transport Efficiency. Paper presented in the Precision Forestry Symposium. 17–20 June 2001. University of Washington, Seattle.

The proposed project is based on Sarawak's shift to more cost-effective imports from West Kalimantan that reduce distance and transportation costs. Sarawak's combined expansion of all types of lumber and semiprocessed wood imports in this decade has averaged nearly 7%, albeit with large year-to-year variations.

Sarawak Wood Imports

According to our gravity trade model estimates in Chapter 14, wood import demand growth is forecast to average 5.6% in the near future (2018–2024); and then to slow to under 3% a year (2025–2050) as Sarawak diversifies to higher-end manufactures that are less reliant on natural resources.

There are three underlying features in the projections:

(i) The two main drivers for Sarawak's long-term expansion of its wood industry are economic activity within the state and in that of its trading partners. In 2018–2024 the state's general economic activity expansion will contribute 3.9 percentage points to wood import growth, and partner countries' economic activity will contribute another 1.7 percentage points to that import growth.
(ii) Because of the size of the contribution to import demand from partner country sources, the foreign-sourced export demand will account for 60% of Sarawak's demand for wood imports, while domestic economic growth will contribute the remaining 40% of overall growth in wood imports.
(iii) Over the longer run, the contribution of import demand from partner country sources will expand to 66%, or two-thirds of overall import demand growth for wood products; and domestic economic growth will contribute the remaining one-third of the import demand growth.

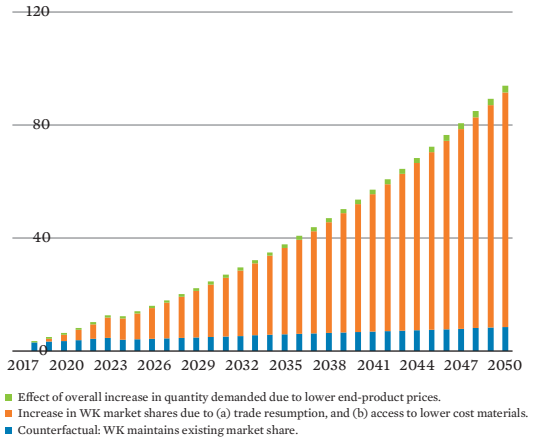
West Kalimantan Wood Exports

Counterfactual Alternative. Following our gravity trade model results, we assume that Sarawak companies will prefer to source their wood from West Kalimantan rather than distant countries. The forecast assumes, first, that there is a successful resumption of normal trade levels between Sarawak and West Kalimantan after the opening of trade in 2017; and, second, that Sarawak companies recognize that sourcing supplies from West Kalimantan will reduce trade costs and offer substantial advantages to their international competitiveness. In particular, we assume that Sarawak companies will expand existing market shares from 4.7% to 50% by 2050, and that the shift will take place gradually over the 32-year period.

There are two effects from Sarawak's increased volume of lumber and semifinished wood product from West Kalimantan:

(i) *Direct effect*. The increase in Sarawak imports resulting from the resumption in cross-border trade and recognition by Sarawak-based companies that they will be able to obtain wood at a lower cost due to the lower transportation cost.
(ii) *Indirect effect*. The increase in the quantity demanded by international customers due to lower prices being charged by Sarawak companies in response to the lower production costs.

Figure 28.1. Projected West Kalimantan Timber and Semi-Processed Wood Product Exports to Sarawak, 2018–2050
($ million)



WK = West Kalimantan .
Source: Authors' estimates.

Figure 28.1 shows the breakdown of Sarawak imports from West Kalimantan associated with these effects. The resulting expansion in demand for wood from West Kalimantan plantations and mills from these two effects will require a significant expansion in capital and operating costs.

Important Note: *Although the expansion in wood exports by 2050 to Sarawak may seem large, the volume is only two-thirds of West Kalimantan's total wood exports to Sarawak in the early part of this decade. Therefore, it can be considered a trade-diversion effect (to Sarawak and away from distant, expensive transport markets) rather than a trade-creation effect.*

For Malaysia, this shift requires no additional capital investment. It only represents a reduction in operating costs since transportation expenses are reduced.

Counterfactual Projections. The counterfactual scenario to our policy-based forecasts is that West Kalimantan's exports to Sarawak assume a constant-market-share of that geographic market's overall import growth, that is, 5.6% in 2018–2024 and then decelerating to under 3% in the longer term. For West Kalimantan, this growth applies to the 4.6% market share of the projected growth of Sarawak's imports of wood and wood products in semiprocessed form.

28.3 Economic Costs

Capital expenditures needed to produce the additional timber and semiprocessed wood products for export to Sarawak over the long term are calculated from the trade-weighted average of the major types of wood-based exports of West Kalimantan. As mentioned earlier, 98.7% of these exports are in the form of plywood. Therefore, we concentrate our investment requirement calculations on this industry.

Production Capacity Requirements (Volume). The following are the steps used in our calculations of capital investment requirements for West Kalimantan.

(i) *Inputs:* For lumber input requirements of the plywood industry, we note that conventional harvesting equipment is expensive and can constitute as much as 40% of the delivered cost of wood.[142] Equipment costs for mechanized conventional systems capable of handling the harvest and recovery of woody biomass need to be combined with operation and maintenance costs, and highly variable transportation costs that are determined based on haul distance, fuel prices, and other factors.[143]

[142] Logging unit costs are estimated by dividing machine rates by the production rates for the various logging activities. Logging components normally considered are felling, bucking, skidding, loading, and transport.
[143] eXtension. 2014. Cost Factors in Harvesting and Transporting Woody Biomass. http://articles.extension.org/pages/70339/cost-factors-in-harvesting-and-transporting-woody-biomass.

In pricing these factor inputs, we use the average cost of tropical high forest harvesting and delivery in Indonesia of $113.5 a cubic meter, valued in 2016 US dollars.[144] For mixed heavy hardwood, logs in Malaysia's sawmills are priced at $227 a ton for the average of reporting sawmills in January 2017.[145]

(ii) *Output prices.* For plywood prices, we use the average of Chinese and Indian production cost of $300–$400 a cubic meter or approximately $700 a metric ton in 2018 prices.[146]

(iii) *Capacity requirements.* Based on an average production cost of $700 a metric ton and a maximum estimated trade-creation effect on West Kalimantan exports to Sarawak of $123.85 million, the additional production capacity is calculated to be 176,925 MT a year.

Capital and Operating Costs. We use highly conservative estimates of the capital outlay requirements needed to achieve the additional output requirements (trade creation) resulting from Sarawak's shift to less-expensive sourcing of plywood from West Kalimantan. These estimates are based on two feasibility studies of plywood in the United States.

(i) The first is a feasibility study for plywood in the state of Georgia.[147] It calculated the capital investment needed of all equipment, land, and buildings (excluding working capital) needed to produce 50 million square-feet of sheathing-grade plywood of 3/8-inch thickness. Applying the equivalent metric ton capacity requirements for West Kalimantan of 176,925 MT, we derive a total capital investment of $103 million in 2017 dollars.

(ii) The second is a feasibility study for plywood in the state of California.[148] It calculated the capital investment needed for 475 million square feet (3/8" basis) of oriented strand board. Again, applying the equivalent metric ton capacity requirements for West Kalimantan of 176,925 MT, we derive a total capital investment of $125 million in 2017 dollars.

(iii) We used the average capital investment requirements, excluding working capital, of $115 million.

(iv) Sixty percent (60%) of the expenditures are assumed to occur early in the forecast period (2019), and the remaining 40% in 2030.

(v) Operating expenses are estimated to be approximately 5% of capital costs annually.

[144] See also FAO. Cost Control in Forest Harvesting and Road Construction. Rome. http://www.fao.org/sustainable-forest-management/toolbox/tools/tool-detail/en/c/232649/; FAO. Estimating Logging Unit Costs. http://www.fao.org/docrep/T0579E/t0579e07.htm; Baker et al. *Regional Cost Analysis and Indices for Conventional Timber Harvesting Operations.* Final Report. Wood Supply Research Institute, University of Georgia. http://wsri.org/resources/media/RegCostAnalFinalRpt.pdf.

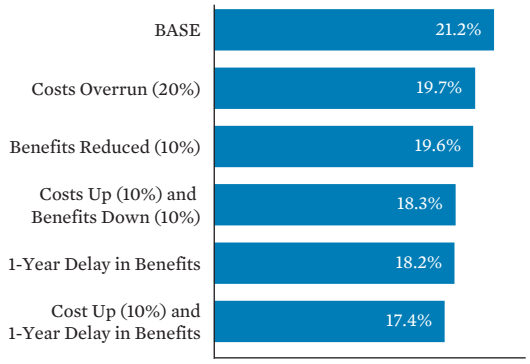
[145] Malaysian Timber Industry Board. Timber Prices. http://www.mtib.gov.my/index.php?option=com_content&view=article&id=87&Itemid=88&lang=en.

[146] J. Lu. 2012. *Increasing Value-Added Hardwood Lumber Product Exports to India Through Informed Purchase Decisions.* Wisconsin Department of Agriculture, Trade and Consumer Protection.

[147] T.I. Chiang. 1963. *Feasibility of Producing Southern Pine Plywood in Georgia.* https://smartech.gatech.edu/bitstream/handle/1853/45631/e-233-24b_126121.pdf.

[148] The Beck Group. 2015. *California Assessment of Wood Business Innovation Opportunities and Markets (CAWBIOM).* Prepared for the National Forest Foundation. https://www.nationalforests.org/assets/pdfs/California-Assessment-Wood-Biomass-Innovation-Interim-Report-June-2015.pdf.

Figure 28.2. Projected West Kalimantan Timber and Semi-Processed Wood Product Exports to Sarawak, 2018–2050



Source: Representation by the authors.

28.4 Economic Internal Rate of Return

The EIRR for the plywood industry in Sarawak is computed at 21%. This estimate is based on an assumed trade-creation effect from the resumption of trade between Sarawak and West Kalimantan, and the shift of Sarawak companies to more cost-efficient sources of plywood from West Kalimantan rather than distant suppliers.

The net present value, which is calculated as the difference between the present value of cash inflows and outflows, discounted at 9%, is equal to just over $106 million measured in 2018 prices over the period of analysis, while the economic BCR is 2.3.

Figure 28.2 and Table 28.1 present the results of the sensitivity analysis tested for the effects of negative changes in key parameters. The analysis shows that West Kalimantan's plywood industry remains economically viable in the face of various project shortfalls during the period of analysis.

28.5 Project-Related Technical Assistance

Technical assistance is directed at the diversification of the Sarawak–West Kalimantan wood products industry into the high-value added modular wood furniture industry. The project is discussed in chapter 32.

Table 28.1. Summary of Economic Internal Rate of Return and Sensitivity Analysis for West Kalimantan's Plywood Industry

	Economic Internal Rate of Return (%)	Economic Net Present Value at 9% ($ million)	Economic Benefit–Cost Ratio
Base estimate	21.2	105.8	2.83
Costs overrun of 20%	19.7	100.0	2.57
Benefits reduced by 10%	19.6	89.4	2.54
Costs increased by 20% and benefits reduced by 10%	18.3	83.6	2.31
1-year delay in program start-up, with benefits delayed by 1 year	18.2	73.1	2.25
Cost overrun by 20% and benefits delayed by 1 year	17.4	82.3	2.29

Source: Authors' estimates.

29

Medical Tourism

29.1 Market Analysis and Forecasting

Sarawak's medical tourism is almost entirely made up of West Kalimantan visitors seeking middle-class medical services traveling from the cities of Pontianak and Singkawang. West Kalimantan's proximity to the state's leading medical centers in Kuching and the reasonable fees for their services attracts many short-term visitors from West Kalimantan.

The number of persons who travel from West Kalimantan to Kuching for purposes of medical treatment, however, is not known. Border officials do not register the visitors to Sarawak according to the purpose of their entry, so hospital records are the primary source of information about foreign patients. However, estimates reported by officials range from 20% to 60% for the same hospital. Our estimates therefore use the mean average of reported foreign patients in the hospitals surveyed by the authors of this report. That implies roughly 30,000 patients a year who originate from West Kalimantan.

A large proportion of Indonesians received outpatient care, which represents a smaller average level of earnings from each patient than in major medical centers like those in Penang and Melaka. Nevertheless, those Indonesian medical travelers spend about twice as much as Indonesian leisure travelers, which means that large investors are more likely to invest in hospitals and other types of medical facilities than leisure-oriented activities.

The forecast for growth of domestic and foreign demand for hospital services in Sarawak is based on three determinants: (i) domestic patient projections associated with Sarawak's population growth, which is estimated at 1.06% through 2050; (ii) West Kalimantan's visitor growth associated with that province's population growth of 0.99%; and (iii) migration from densely populated island of Java to West Kalimantan and other sparsely populated provinces, which is projected to add 0.15 percentage points to the province's long-term population growth.

These project population growth rates of Sarawak and West Kalimantan are applied to a base rate of 35% for domestic-to-foreign patient usage of existing medical facilities. The result is an average annual growth rate of 1.18% for demand of Sarawak's medical facilities over the forecast period. That rate of expansion means that between 2018 and 2050, the overall demand for medical facilities will increase by 46%, and the proportion of foreign patients will expand from 35% to 37.5% of total demand for medical services.

The increase in demand for medical facilities and services in Sarawak covers several components. Facilities include offices for medical and administrative staff, patient beds, operating theaters, intensive care units, treatment centers for radiotherapy, chemotherapy, and other treatments. Services include diagnostic and therapeutic services. Because agents play a critical role in organizing and directing Indonesians traveling to Kuching, the number

of agents will need to be considerably expanded. Agents provide much-needed information to Indonesian patients about specialists and logistic details. At present, each of the four private hospitals in Kuching have agents in Pontianak that schedule their consultations and testing and provide the hospitals with their medical records and issues to be addressed during their visit. They also facilitate payments and transport between Pontianak and Kuching. In addition to hospital associated agents, there are commission-based agents and informal agents that transport patients between the two cities at lower rates than hospital-associated or commission-based agents.

Expectations for the medical tourism industry in Sarawak are muted, notwithstanding government aims to develop the state as a center for medical tourism. While the government's policy is to attract more medical tourists into Sarawak and six new private hospitals are being built to add to existing ones, the state is highly dependent on middle-income Indonesia from West Kalimantan, and severe shortages of medical specialists are likely to continue. Until that situation is changed, our forecasts are necessarily conservative.

Cost Estimates

Current facilities of Sarawak's private hospitals are estimated to be near full capacity, with a possible 15% additional capacity before saturation levels are reached. To meet the anticipated near 50% expansion in capacity needed to absorb additional demand over the medium to long term, capacity will need to increase by 20%, with capital investment starting to come onstream in 2020. That additional investment will be accompanied by greater operating costs, equivalent to 10% a year of capital expenditures.

In developing Sarawak's medical tourism value chain, the project will focus on the expansion of services by private hospitals in all stages of the pre- and post-medical intervention stage of the value chain. That includes expanding hospital agents abroad, offering services from the patient's place of origin through all steps involved in their medical care, and returning them to their place of origin, with follow-up care. The project will also support capacity building for development of medical facilitator units, which coordinate medical tourism programs. The services provided include a single-window facility for medical tourism, especially in the pre- and post-medical procedure stages, as well as the medical procedures themselves, along with logistics, travel, and tourism arrangements.

Benefits Analysis

For demand, the information provided by Sarawak's hospitals to the authors covers services to all patients, including day visitors from West Kalimantan and longer-term patients mainly from Indonesia and the PRC. As indicated earlier, our forecasts of demand are limited to population growth estimates of Sarawak and West Kalimantan, plus immigration into West Kalimantan from the island of Java under the Indonesian government's program to promote movement to provinces with low population density. West Kalimantan is expected to focus its medical services on basic needs of rural and urban areas and, as a result, Indonesian citizens will likely continue to travel to Sarawak for general and specialized medical needs. Sarawak's medical tourism benefits can be measured using three alternative methods, which reflects the commonly used approaches to building regional and national income and production accounts. At the outset of the analysis, it is important to establish the method to be used and apply it uniformly across the cost–benefit analysis for medical tourism to avoid what is

often double or triple counting of potential project benefits and thereby overestimating those benefits. The first method is the income approach to measuring incremental flow of factor incomes. The second method is the product approach, which calculates the incremental real value of production, or productivity, from medical tourism. The third method is the expenditure approach used to measure the incremental demand for goods and services generated by medical tourism. In the present case, the benefits from medical tourism follow the expenditure approach. When benefits involve tradables, export demand is assumed to be perfectly elastic and world prices are therefore appropriate measures of traded outputs. As with cost estimates, the shadow exchange rate factor (SERF) conversion factor used to derive economic values for benefits produced by medical tourism from their financial values is 1.09 and this ratio is assumed constant over the period of analysis.[149]

29.2 Internal Rate of Return

The base-case EIRR calculation for medical tourism is presented in Table 29.1. The EIRR for the medical tourism industry in Sarawak is computed at 22%. The calculation is relatively conservative for this otherwise dynamic industry because medical tourism is likely to remain concentrated in arrivals from West Kalimantan, and capital investment estimates are for capacity expansion based on the industry average for each additional patient. Moreover, qualitative benefits are excluded from the analysis.

Table 29.1. Summary of Economic Internal Rate of Return and Sensitivity Analysis for Sarawak's Medical Tourism Industry

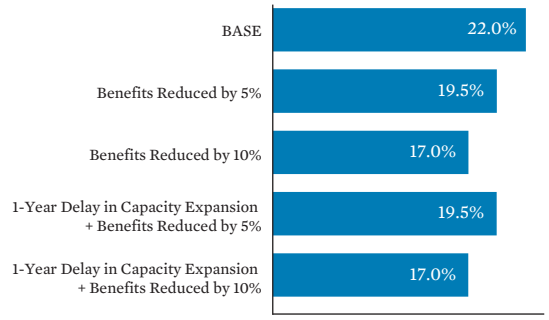
	Economic Internal Rate of Return (%)	Economic Net Present Value at 9% ($ million)	Economic Benefit–Cost Ratio
Base estimate	22.0	182.6	1.26
Benefits reduced by 5%	19.5	148.1	1.19
Benefits reduced by 10%	17.0	113.6	1.13
1-year delay in no capacity expansion + benefits reduced by 5%	19.5	132.5	1.19
1-year delay in no capacity expansion + benefits reduced by 5%	17.0	101.3	1.13

Source: Authors' estimates.

The net present value, which is calculated as the difference between the present value of cash inflows and outflows, discounted at 9%, is equal to just over $183 million measured in 2018 prices over the period of analysis. The EBCR is the ratio of the industry's medical tourism benefits relative to its monetary costs. Since the general rule-of-thumb is that benefits that exceed costs indicate a worthwhile investment, the 1.4 ratio suggests a robust investment for the industry in general.

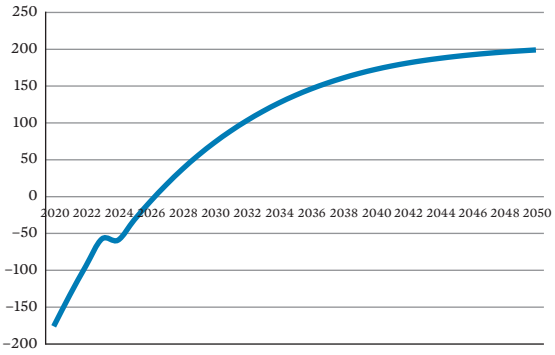
[149] The same SERF was applied as in ADB. 2013. *Guangxi Nanning Vocational Education Development Project*. Manila. The SERF is derived by calculating the reciprocal value of the standard conversion factor estimated for the PRC of 0.93, that is, 1/0.93 = 1.08.

Figure 29.1. Sarawak Economic Internal Rate of Return for Medical Tourism Industry under Alternative Scenarios



Source: Authors' estimates.

Figure 29.2. Sarawak Medical Tourism Payback Schedule and Breakeven Point
($ million)



Source: Authors' estimates.

Table 29.1 and Figure 29.1 also present the results of the sensitivity analysis tested for the effects of negative changes in key parameters. The analysis shows that medical tourism remains economically viable in the face of various shortfalls in the growth of medical tourism during the period of analysis, as well as the lack of additional capacity expansion currently planned for 2020.

Figure 29.2 shows the payback schedule of the capital investment over the project lifetime. The breakeven point occurs in 2026.

29.3 Capacity Building

Technical assistance will support the operations of champion individuals or an institution that will help private hospitals in Sarawak to cluster the common pre- and post-medical intervention areas. Examples include use of common overseas agents and advertising, transport services, and leisure activity programs following medical interventions. The technical assistance will also address the regulatory environment and explore ways to overcome the major constraints and threats to the medical tourism industry in Sarawak.

Technical assistance needs are estimated at $1.0–$1.5 million. Capacity development will focus on the following components:

(i) support development of Sarawak's full range of activities in the medical tourism value chain;
(ii) implement remedial solutions to major external and internal weaknesses and threats to the industry identified in the strengths, weaknesses, opportunities, and threats (SWOT) analysis; and
(iii) address regulatory constraints to the industry, as identified by the Malaysia Productivity Corporation.

30 Higher Education and Technical and Vocational Education and Training

30.1 Project Analysis and Objectives

Project analysis for higher education and technical and vocational education and training (TVET) is based on the identification of the cost of educational facilities associated with a minimum (non-negative) economic internal rate of return (EIRR) for the anticipated demand for skilled labor. This approach is necessary because of the lack of information about project cost estimates for educational facilities that would be needed to develop the near-future skilled labor required in Sarawak. Hence, we cannot directly calculate alternative actions that represent the least-cost option alternative that produces an economic internal rate of return that is higher than the opportunity cost of capital. Instead, we calculate the investment needed to generate a minimum EIRR that is consistent with projected skilled labor demand.

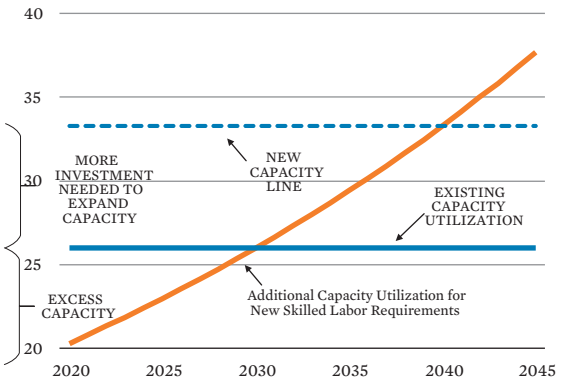
This approach is consistent with the Malaysian Education Program 2025, which aims to match supply with demand of skilled workers in all leading industries. Like the Eleventh Plan, the Malaysian Education Program anticipates that 60% of new jobs will require TVET-related skills. For Sarawak to achieve that goal, both TVET and higher-education centers will need to be significantly expanded in the state.

The project aims to first, support development of Sarawak's full range of activities in international higher-education and TVET offerings. Second, the project will help remedy the major external and internal weaknesses and threats to the industry identified in the strengths, weaknesses, opportunities, and threats (SWOT) analysis. The SWOT analysis will be related to the implementation of the single qualification system and a single rating system; development of industry-led designs and delivery of curricula for TVET institutions; creation of centers of excellence in niche areas; TVET promotion campaigns; and a productivity-linked wage system to ensure that wages are based on qualifications, skills, and productivity criteria.

Regulatory issues to be addressed include the following reforms:[150] (i) reduce delays in issuing visas and passes for international students; (ii) minimize the requirements for international academic staff who have already been accredited in their home country; (iii) reduce delays for the approval of academic programs; (iv) consult with private higher education institutions before introducing new requirements; and (v) reduce the number of agencies involved in approving student visas, international staff working permits, and the introduction of programs by private higher education institutions.

[150] Malaysia Productivity Corporation. 2015. Reducing Unnecessary Regulatory Burden on Business: Private Higher Education.

Figure 30.1. Gap Analysis of Sarawak's TVET Institutions
('000)



TVET = technical and vocational education and training.
Source: Authors' estimates.

30.2 Gap Analysis

Figure 30.1 shows the projected additional investment in higher education and TVET facilities needed to meet the increased demand for students having skills required by Sarawak's leading industries. The 2018 labor force is estimated at 1.3 million, out of a population of 2.8 million. The projected population growth is low at 1.06% a year over the next 25 years. With real GDP projected to expand by 5.5% under the Eleventh Plan and a labor–output coefficient of 0.00002393, total labor requirements are expected to grow by 2% a year.[151] Assuming existing educational capacity can meet the skilled labor requirements for Sarawak through 2030, we estimate that significantly new investment will need to be in place by that year to meet the additional skilled labor requirements for the state needed for the following 10-year period. Capital investment to expand capacity of educational institutions would need to expand by the amount needed to meet skilled labor requirements in 2040.

Note that with limited population growth of near 1% a year, foreign labor requirements will need to increase from the estimated 275,000 current number of foreign workers to nearly 400,000 by 2030 and 530,000 by 2040. Of these, 60% will need to be skilled or semiskilled workers.

30.3 Benefits Analysis

Incremental benefits to higher education and TVET graduates can be measured by their employment and the earnings potential, as compared with the employment and earnings of workers with a lower education or training level.[152] The anticipated demand for skilled labor is based on the government's Eleventh Plan expectation of 5%–6% real GDP growth through 2025. If Sarawak's economic growth matches the country's overall growth rate, then the demand for the state's skilled labor force will be 35% higher in 2030 than in 2018, and over 70% higher by 2040.[153] This expansion assumes labor productivity rates ("labor coefficients")

[151] The labor-output coefficient is derived from the GDP to labor force employed in 2017, based on data in Department of Statistics Malaysia. Sarawak. https://www.dosm.gov.my/v1/index.php?r=column/cone&menu_id=clJnWTlTbWFHdmUwbmtSTE1EQStFZz09.

[152] An alternative method is to measure the impact of additional years of education on earnings based on survey data and statistical models. However, the results are subject to an elevated level of uncertainty, and the former method is usually preferred. For details, see ADB. 2017. *Guidelines for the Economic Analysis of Projects*. Mandaluyong City. http://dx.doi.org/10.22617/TIM178607-2.

[153] Note that these estimates are about six times greater than the estimates for skilled labor jobs created during 2016–2020, according to the study by PricewaterhouseCoopers. Forthcoming. *Study on the Demand and Supply of Human Capital Requirements on Technical Vocational Education and Training (TVET)*. In part, the difference reflects the current study's estimate for all skilled labor in Sarawak, while the PricewaterhouseCoopers study is limited to public TVET institutions.

of Sarawak similar to those of Malaysia as a whole, as well as the Eleventh Plan's expectations that 60% of increased labor demand will be for skilled workers.

Salary benefits are calculated from the Human Resources Ministry's guidebook entitled *Salary Guide, Starting Salaries for 160 Selected Skill-Based Jobs*.[154] From the guidebook, we use the average wage rate of Malaysian Skills Diploma, which is $1,830 a month; and Malaysian Advanced Diploma, which is RM2,270 a month, compared with the minimum wage rate for Malaysia, which is $1,050 a month for Sarawak, effective 1 January 2019. Unemployment rate in Sarawak is 3.3%, which is below the national average of 3.5%.[155]

Finally, benefits are measured using the income approach, which measures incremental flow of factor incomes.[156] These estimates are the *direct benefits* and do not include the indirect benefits resulting from higher income levels and the multiplier effect on the Sarawak economy from other income sources because of the larger pool of skilled labor. If we include the indirect effects, then the multiplier for the benefits from increased education would be 1.25.[157] Hence, total benefits are calculated in the next section based on the direct and indirect effects of higher education and TVET.

30.4 Internal Rate of Return

Given the importance and priority of higher education and TVET to the government's Eleventh Plan, the focus of the present economic and financial analysis is on the expansion of educational facilities needed to meet Sarawak's anticipated rapid expansion in real GDP. The analysis covers both private and public TVET, with private TVET absorbing foreign students since there are limits to their absorption into public institutions.

Yet foreign skilled and professional, or very highly skilled, workers will become an increasingly important part of Sarawak's overall economy since industrial expansion will outpace population growth and therefore the entry of the native population into the workforce. We anticipate that greater access to higher education and TVET will allow part of the domestic workforce to shift from unskilled to skilled and highly skilled activities, thereby outsourcing unskilled labor activities to foreign workers.

The base-case EIRR calculation for TVET is presented in Table 30.1. With total capital expenditures in 2020–2021 and in 2030–2031 of $10 million each year and annual operating costs averaging 15% of capital expenditures, the EIRR for higher education and TVET in

[154] Human Resources Ministry. 2016. *Salary Guide, Starting Salaries for 160 Selected Skill-Based Jobs*. Kuala Lumpur. http://www.mohr.gov.my/pdf/MPGN%20Eng.pdf.

[155] Malaymail. 2018. Unemployment Rate in Sarawak Lower than National Average, Says Masing. 17 March. https://www.malaymail.com/s/1601027/unemployment-rate-in-sarawak-lower-than-national-average-says-masing.

[156] As indicated earlier, it is important to avoid double or triple counting of potential project benefits and thereby overestimating those benefits by using only one of three commonly used methods for measuring benefits. The first method is the income approach to measuring incremental flow of factor incomes. The second is the product approach, which calculates the incremental real value of production, or productivity, from TVET. The third method is the expenditure approach used to measure the incremental demand for goods and services generated by higher earnings of skilled workers over those of unskilled workers. All three methods yield the same valuation of benefits, so the preferred choice should be based on data availability.

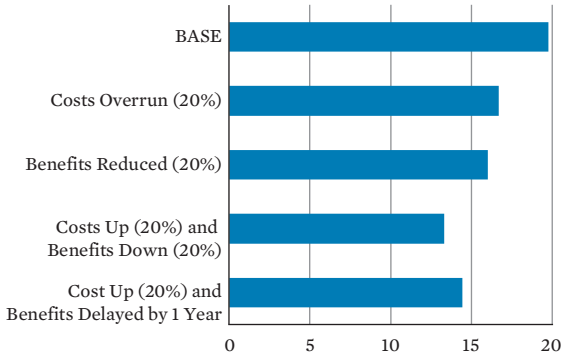
[157] The multiplier refers to Type II multiplier estimate for the education sector of Malaysia in 2000, as calculated by H. A. Bekhet. 2011. Output, Income and Employment Multipliers in Malaysian Economy: Input–Output Approach. *International Business Research*. 4 (1). http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.662.6188&rep=rep1&type=pdf.

Table 30.1. Summary of Economic Internal Rate of Return and Sensitivity Analysis for Sarawak's Higher Education and Technical and Vocational Education and Training

	Economic Internal Rate of Return (%)	Economic Net Present Value at 9% ($ million)	Economic Benefit–Cost Ratio
Base estimate	19.8	82.5	2.08
Costs increased by 20%	16.7	67.2	1.37
Benefits reduced by 20%	16.0	50.7	1.32
Costs increased by 20% and benefits reduced by 20%	13.3	35.4	1.10
1-year delay in program start-up, with benefits delayed by 1 year	13.1	29.8	1.10
Cost overrun by 20% and benefits delayed by 1 year	14.4	50.6	1.21

TVET = technical and vocational education and training.
Source: Authors' estimates.

Figure 30.2. Economic Internal Rate of Return for Higher Education and Technical and Vocational Education and Training under Alternative Scenarios



TVET = technical and vocational education and training.
Source: Authors' estimates.

Sarawak is computed as 19.8%. The net present value, which is calculated as the difference between the present value of cash inflows and outflows, discounted at 9%, is equal to just over $82.5 million measured in 2018 prices over the period of analysis.

The EBCR is the ratio of the higher education and TVET benefits relative to monetary costs. Since the general rule-of-thumb is that benefits that exceed costs indicate a worthwhile investment, the 2.1 ratio suggests a robust investment for the education industry in general. With investment spread over the period, payback occurs in the years immediately following the capital investments.

Table 30.1 and Figure 30.2 present the results of the sensitivity analysis tested for the effects of negative changes in key parameters. The analysis shows that higher education and TVET investments generally remain economically viable in the face of various shortfalls in capital cost estimates during the period of analysis.

30.5 Capacity Building

Development of the higher-education and TVET value chain will require that technical assistance be provided to producers on both sides of the border. Technical assistance will support the operations of champion individuals or an institution that will help higher-education and TVET institutions in Sarawak to cluster shared areas of interest. Examples include use of common overseas agents and advertising, online courses, housing facilities, and program designs in line with industry needs. The technical assistance will also address the regulatory environment and explore ways to overcome the major constraints to the development of higher education and TVET institutions in Sarawak.

The project will be managed by a Public Service Commission (PSC) for Higher Education and TVETs. Technical assistance for the development of the value chain and improvements in the regulatory environment will take place in Sarawak, since West Kalimantan is simply a market for higher education and TVET services. The EPU will be the focal agency. In addition to guiding project implementation, the PSC will also be responsible for monitoring and evaluating the project. In addition to capital and operational expenses for the project, technical assistance needs are estimated at $1.0–$2.0 million.

Capacity development will focus on the following components:

(i) Support development of Sarawak's full range of activities in international higher-education and TVET offerings to promote Sarawak's educational facilities in targeted overseas countries and international education conferences.
(ii) Support the full range of value chain activities for foreign student entry, core educational activities, and job placements.
(iii) Address major external and internal weaknesses and threats to the industry identified in the SWOT analysis.
(iv) Help to remedy regulatory issues identified by the Malaysia Productivity Corporation, which included the following reforms:[158] (a) reduce delays in issuing visas and passes for international students; (b) minimize the requirements for international academic staff who have already been accredited in their home country; (c) reduce delays for the approval of academic programs; (d) consult with private higher education institutions before introducing new requirements; and (e) reduce the number of agencies involved in approving student visas, international staff working permit, and introduction of programs by private higher education institutions.

[158] Malaysia Productivity Corporation. 2015. *Reducing Unnecessary Regulatory Burden on Business: Private Higher Education.*

PART VIII

Cost-Effectiveness Analysis for Technical Assistance

31

Approach and Summary Results

31.1 Methodology

Several of the industry-based value-chain projects require capacity-building technical assistance rather than capital investments. These are the stand-alone technical assistance projects that do not involve capital investments. For those projects, we use cost-effectiveness analysis to determine the costs and outcomes of cross-border collaboration between Sarawak and West Kalimantan.

Cost-effectiveness analysis focuses on immediate or final outputs and outcomes rather than project impact. Generally, project effectiveness examines the causal chain from project inputs to outputs to outcomes; and measuring the contribution to impacts of individual components of program design. In such cases, *output* refers to the particular goods or services provided by an intervention (for example, greater coordination of cross-border tourism activities); *outcome* is usefully thought of as benefits of that particular good or service to the target population (such as improved tourist numbers visiting both Sarawak and West Kalimantan); and *impact* refers to evidence on whether outcomes are actually changing beneficiary behavior or longer-term conditions of interest (for example, improved living standards, and well-being of local population along the border area involved in tourism-related activities).

Outcomes are not necessarily associated with capital investments or benefits may not be easily quantified since there can be socioeconomic consequences of interest to different stakeholders. The focus is therefore on the cost of institutional and capacity-building technical assistance that is needed to carry out the project aimed at developing a cross-border value chain in the industry.

The key is to distinguish between the provision of goods and services (involving supply-side activities) and the utilization of those goods and services (referring to the demand-side response). The results support decision-making and guide the choices to be made in the allocation of technical assistance for collaboration between Sarawak and West Kalimantan in industries. As such, the process highlights the preference ordering of groups representing different categories of stakeholders involved in the areas where intervention is planned.

The common goals of the capacity-building technical assistance are as follows:

(i) *Output*. Greater coordination of cross-border activities between Sarawak and West Kalimantan.
(ii) *Outcome*. Increased cross-border activity of goods or services.
(iii) *Impact*. Improved living standards and well-being of households in the broadly defined border areas of Sarawak and West Kalimantan.

31.2 Summary Results

Figure 31.1 and Table 31.1 rank the calculated cost-effectiveness ratios for the projects. The following are some salient observations about the findings:

(i) *Fisheries and aluminum.* Fisheries and aluminum have modest returns. While the potential gains for collaboration in fisheries could be large, there is considerable distrust among small and medium-sized fisheries within and between the two territories. The amount of capacity building would therefore be high in terms of scope and time involved in building trust and collaboration. In aluminum, Sarawak smelters are closed to outside influence and their long-term contracts for supplies of aluminum oxide with distant suppliers would make it challenging to alter. Yet success could bring enormous gains to the industry and large competitive gains in the global aluminum market. The effort needed to bring about these gains would nonetheless be large in terms of scope of capacity development and time involved in the implementation of needed changes.

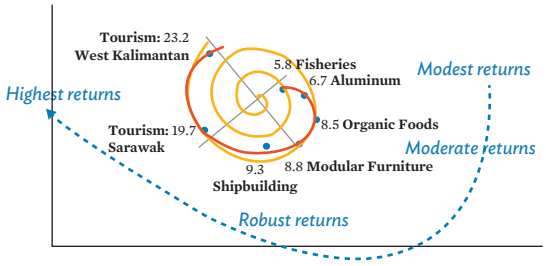
Table 31.1. Summary of Cost-Effectiveness Analysis for Joint Sarawak–West Kalimantan Projects

Industry	Project	Cost of Intervention ($ million)	Effect of Intervention	Cost-Effectiveness Ratio
Aluminum	Reducing Alumina Transport Costs to Smelters	2.0	Over $10 million savings *plus* $8 million equivalent volume increase in import demand of aluminum oxide from lower-cost sourcing	6. 7
Wood	Introduction to Modular Furniture	2.0	Net export revenue of $17.5 million generated from shifting skilled labor and capital to high-value added activities	8.8
Fisheries	Reducing Transport Costs	1.5	$7.8 million more imports by Sarawak from West Kalimantan because of lower transport costs, *plus* $0.95 million more imports from lower trade costs	5.8
Shipbuilding	Upgrading Technologies across Borders	2.0	$18.5 million revenue expansion from Sarawak regaining previous vessel export levels, West Kalimantan expanding production for both private sector and military complexes, and growth in cross-border trade in vessel parts and equipment	9.3
Organic Foods and Ecotourism	Introduction of High-Value Agriculture and Ecotourism Linkages	2.0	Net revenue gain of $17 million in organic fruits and vegetable production and ecotourism visitors	8.5
Tourism	Multi-Destination Travel	2.0	For Sarawak, raising the share of long-distance to the same proportion as Sabah would generate $39 million more revenue; for West Kalimantan, raising the contribution of the tourism sector to just 5% of what it is in Sarawak would generate $47 million more revenue	19.7 (Sarawak); 23.2 (West Kalimantan)

Source: Authors' estimates.

(ii) *Organic foods and modular wood furniture.* These are two potentially huge businesses for Sarawak and West Kalimantan. The global markets for products from both industries are among the largest and fastest growing of all international trade. They are both relatively new activities for the two territories and start-up efforts would therefore be considerable, despite the enormous rewards. The potential gains for organic fruits and vegetables would directly impact on subsistence and low-income households and therefore should be given serious consideration, since the impact from quadrupling earnings in moving from conventional to organic fruits and vegetables would greatly improve household incomes and welfare of families living along the broadly defined border area between the two territories.

Figure 31.1. Cost-Effectiveness Analysis of Joint Sarawak-West Kalimantan Projects



Source: Authors' estimates.

(iii) *Shipbuilding.* Shipbuilding has robust returns likely to emerge from a project promoting cross-border collaboration and development of a value chain between shipbuilders in the two territories. In the recent past, Sarawak earned $126 million in foreign exchange revenue from exports of shipping vessels, but earnings are now only half that amount. Revitalization of the industry means overcoming the industry's inability to apply the modular building concept from the design stage onward, which has prevented companies from building large-size vessels, which has prevented the industry from becoming internationally competitive and expanding its exports. West Kalimantan's more advanced technologies and know-how could benefit Sarawak companies while, at the same time, developing much-needed economies of scale through a cross-border value chain that would broaden its exports from only extra-provincial Indonesian buyers to the much wider global market.

(iv) *Multi-destination tourism.* This has the highest returns among all projects because of the richness of the two territories' natural and cultural heritage products. The reason for the very high returns is due to the extremely low number of tourists who currently visit the sites, especially those from distant markets like Europe and North America. For Sarawak, bringing those distant-market shares to the same proportion of total visitors as Sabah would double tourism revenue from those travelers. For West Kalimantan, bringing its currently paltry share of tourism revenue in gross provincial product to just 5% of Sarawak's would more than treble tourism earnings for the province.

32

Aluminum: Reducing Transport Costs

32.1 Motivation

Alumina, or aluminum oxide, is a bulk commodity whose competitiveness is closely related to distance to market. For example, the cost of transporting alumina from South America to the US aluminum smelters represents about 15% of the total cost of producing aluminum ingots. Our gravity trade model estimates for Sarawak alumina imports from all supplying countries to the state indicates that a 1% reduction in the distance to suppliers leads to a 1.4% increase in the quantity of alumina demanded by smelters. The increase is caused by the lower cost of imports, which in turn translates into the ability of smelters to sell aluminum at a more internationally competitive price.

Distance to suppliers therefore plays a huge role in the success of smelters in Sarawak. Unfortunately, those smelters tend to enter into long-term agreements with foreign suppliers and those arrangements become personal and long-lasting. There is less of a tendency to source supplies through competitive tendering processes like in Western countries.

Because PT Indonesia Chemical Alumina in West Kalimantan Tayan is in Sanggau Regency, it is near the border with Sarawak. Also, there are new roads to the border and modern CIQ facilities at Entikong. The resumption of trade between Sarawak and West Kalimantan offers new opportunities for cross-border collaboration to export aluminum oxide from West Kalimantan to Sarawak's smelter facilities.

32.2 Project Costs

Technical assistance needs are estimated at $2.0 million. Capacity development will focus on the following components:

(i) Establish intergovernmental authority working group able to transcend the largely closed operating environment of the smelter industry in Sarawak.
(ii) Create champion group to explore cost savings to Sarawak smelter companies from sourcing aluminum oxide from West Kalimantan.
(iii) Determine whether there exist regulatory and administrative obstacles to cross-border movement of aluminum oxide to smelter companies.
(iv) Study consequences of integrated company activities across borders in more formal value-chain production and distribution activities.

32.3 Cost-Effectiveness

Target outcomes of the project are (i) transport cost savings from shifting the sourcing of aluminum oxide from distant suppliers to nearby sources; and (ii) an increase in the quantity of aluminum oxide imports demanded because of lower transport expenditures.

Transport cost savings. Sarawak smelters source less than 2% of their aluminum oxide from West Kalimantan. It is reasonable to assume that transport costs for aluminum oxide from distant markets represents 15% of total import costs, while those from West Kalimantan would only represent 5% of import costs. If Sarawak smelters sourced an additional 20% of their aluminum oxide requirements from West Kalimantan, they would save $5.15 million, or 5.0% of the cost of those imports (Table 32.1).

Increase in Demand for Quantity of Imports. A 20% shift in sourcing imports from distant suppliers of aluminum oxide to West Kalimantan suppliers would lead to an increase in the volume of imports demanded of aluminum oxide equal to 24,241 MT (Table 32.1).

Cost-Effectiveness Ratio. An intervention cost of $2.0 million for the technical assistance could produce over $5 million savings in import costs, and lead to more than 24,241 MT more imports by smelter companies resulting from the lower trade cost, which is equivalent to $8.2 million using the 2017-based unit import price of aluminum oxide.

Table 32.1. Cost-Effectiveness of 20% Shift in Sarawak Smelter Sourcing of Aluminum Oxide from Distant Suppliers to West Kalimantan Suppliers

A. Input			
$2.0 million of technical assistance for capacity building			
B. Output			
1	Intergovernmental authority working group working closely with smelter group		
2	Champions to promote sourcing aluminum oxide from West Kalimantan		
3	Eliminate administrative and regulatory obstacles to cross-border trade		
4	Detailed quantitative study of consequences of cross-border integrated activities		
C. Outcome			
1	**Transport Cost Savings ($)**		
	$	515,208,939	Total imports (2017)
	$	9,606,185	Currently from West Kalimantan
	$	103,041,788	Additional from West Kalimantan
	$	15,456,268	Transport costs from Distant Markets
	$	5,152,089	Transport costs from West Kalimantan
	$	10,304,179	Transport cost saving from sourcing aluminum oxide from West Kalimantan
	$	5,152,089	Cost savings from sourcing 20% m ore of overall im ports from West Kalimantan
		5.0%	Percent savings on imports from West Kalimantan
2	**Increase in Quantity of Imports Demanded (metric tons)**		
		1,515,076	Total import volume
		303,015	Change in import volume sourced from neighboring country
		20%	% Change in imports sourced from neighboring country
		8%	% Increase in import demand
		24,241	Volume increase in import demand
	$	8,243,343	Equivalent US dollar import value of increase in quantity demanded
3	**Cost-Effectiveness Ratio ($ million)**		
	$	2.0	Cost of Intervention
	$	13.4	Effect of Intervention
		6.7	Cost-Effectiveness Ratio

Note: Imports refer to the international harmonized system (HS) commodity classification code for aluminum oxide; aluminum hydroxide (HS 281820).

Source: Authors' estimates.

33

Wood: High-Value Modular Furniture

33.1 Motivation

Sarawak's and West Kalimantan's wood processors have expressed interest in diversifying their production to include furniture manufacturing in modular furniture. It refers to ready-to-assemble furniture, also known as knock-down furniture, flat pack furniture or kit furniture, all of which requires customer assembly of furniture.[159] Development of cross-border clusters of downstream activities adds value to these types of furniture products.

Both territories produce handcrafted furniture but little, if any, modular furniture. Malaysian manufacturers produce a wide range of furniture from office, kitchen, bedroom, dining room, living room, upholstered furniture, and outdoor and garden furniture. Furniture is made from not only wood, but also materials such as rattan, metal, fabrics, plastic, glass, marble, and composite materials. The major furniture manufacturers are in Sarawak, along with Johor, Selangor, Perak, and Melaka.

Modular furniture has flourished through mass merchandise chain stores such as IKEA, as well as sales through online catalogs such as Belle Maison in Japan. This type of furniture has reduced the bulkiness of furniture transportation and led to significant cost reduction in furniture production and distribution. The result has been its globalization of supply management, which in turn has promoted the globalization of its value chain network.

For a new specialization to develop within the broad furniture industry, firm groupings in a common location need to take place to ensure technological spillover effects. This type of agglomeration through localized concentrations of modular furniture producers is conducive to the development of a competitive advantage for the firm groupings.

But for collaboration to occur in the modular furniture industry, Sarawak and West Kalimantan producers would need to ensure that their lumber as global certifications from either the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC). The advantage of this certification, in addition to offering cross-border collaborative opportunities, is that certified logs are valued by as much as 77% more than noncertified logs. Additionally, FSC certification adds a 100% premium on the price of timber.[160]

[159] For details, see C-C Huang. 2000. Overview of Modular Product Development. *Proceedings of the National Science Council*. 24 (3). pp. 149–165. https://pdfs.semanticscholar.org/c9ee/6209a2de26aa01c90fa03fa1f6f99533c4a3.pdf.

[160] W. Kollert and P. Lagan. 2007. Do Certified Tropical Logs Fetch a Market Premium?: A Comparative Price Analysis from Sabah, Malaysia. *Forest Policy and Economics*. 9 (7). pp. 862–868. http://www.deramakot.sabah.gov.my/pdf/iufro-kollert-lagan.pdf.

33.2 Project Costs

Technical assistance needs are estimated at $2.0 million. Capacity development will focus on the following components.

(i) Survey comparative levels of skills, techniques, and quality control practices required to construct medium-to-large ready-to-assemble furniture in Sarawak and West Kalimantan.
(ii) Identify skilled labor requirements for production personnel, by area of fabrication.
(iii) Explore knowledge transfer possibilities between companies for joint production processes that would create much-needed economies of scale for the production, marketing, and distribution of ready-to-assemble furniture.
(iv) Specify needed requirements for collaboration of that which are critical to the production process, create a feasible operating system companies to reduce costs, and expand operations of medium-to-large scale companies.

33.3 Cost-Effectiveness

Target outcomes of the project are to (i) create a new sustainable industry for ready-to-assemble furniture in both Sarawak and West Kalimantan; and (ii) skilled labor and capital from handcrafted furniture-making with low labor productivity and narrow returns to high value-added knock-down furniture-making.

The international harmonized system (HS) of trade classification does not distinguish modular furniture from other types of wood furniture at the maximum level of disaggregation, that is, the 6-digit HS classification. But national trade data for countries like Indonesia and Malaysia do extend the HS classification system to 9 digits that can break out modular furniture. For that reason, while comparative international trade data does not permit cross-country rankings of modular furniture trade, we can establish outcome measures that rely on information about the experience of large modular furniture producers like the PRC and India, and emerging producers such as Colombia.

Trade Creation. We establish the target outcome for the intervention to be 15% of the combined total value of wood and wood product exports of Sarawak ($59.5 million in 2017) and West Kalimantan ($115.8 in 2017).

Trade Diversion. Based on the PRC's experiences in developing their modular wood furniture sectors, we estimated that the shift of skilled labor and capital from traditional wood-related activities to modular furniture activities will lead to a 5% reduction in traditional wood and wood product exports (Table 33.1).[161]

Cost-Effectiveness Ratio. An intervention cost of $2.0 million for capacity development could produce a combined net export expansion of over $17.5 million for Sarawak and West Kalimantan, resulting in a robust 8.8 cost-effectiveness ratio.

[161] Y. Zhenghui and L Zhi. 2012/2013. Study on Current Situation, Challenges and Feasible Marketing Strategies of China's Mass Furniture Market. *Politecnico Di Milano*. https://www.politesi.polimi.it/bitstream/10589/82381/1/2013_10_Li_Yang.pdf.

Table 33.1. Cost-Effectiveness of Modular Furniture Sector Development in Sarawak and West Kalimantan

A. Input			
$2,000,000 technical assistance for capacity building			
B. Output			
1	Survey skills, techniques, quality control practices needed for ready-to-assemble furniture		
2	Identify skilled labor requirements to production personnel, by area of fabrication		
3	Explore knowledge transfer possibilities between companies for joint production processes		
4	Collaboration needs critical to the production process and to feasible operating system		
C. Outcome			
1	**Trade Creation ($)**		
	$	59,501,117	Sarawak: Total wood and wood products (2017)
	$	115,843,167	West Kalimantan: Total wood and wood product exports (2017)
	$	175,344,284	Combined exports of wood and wood product exports
		15.0%	Target incremental expansion in modular furniture exports
	$	26,301,643	Target combined modular furniture exports targeted
2	**Trade Diversion ($)**		
		5%	Percent shift of skilled labor and capital (traditional to modular)
		8,767,214	US dollar value of shift in skilled labor and capital to modular furniture
3	**Cost-Effectiveness Ratio ($ million)**		
	$	2,000,000	Cost of Intervention
	$	17,534,428	Effect of Intervention
		8.8	Cost-Effectiveness Ratio

Source: Authors' estimates.

34

Fisheries: Reducing Trade Costs

34.1 Motivation

The project aims to develop a cross-border value chain between Sarawak and West Kalimantan in the fisheries industry. For Sarawak, it is in line with the Eleventh Malaysian Plan. For West Kalimantan, extensive activities in the primary stages of the fisheries industry offers an opportunity to offset Sarawak's depleted local fish stocks.

The project will promote cross-border clustering of activities in fisheries products that focus on value-added downstream products, especially those products that are processed and packaged under internationally accepted standards. The targeted types of products include semirefined carrageenan from locally grown seaweeds, canned crab meat, surimi, and fish meal. Surimi or fish meat paste is a new local fisheries product and is used in the making of imitation crab and lobster meats, fish balls and cakes, and other convenient, ready-to-eat seafood products.

34.2 Project Costs

Technical assistance needs are estimated at $1.5 million. Capacity development will focus on the following components:

(i) Support activities of champion individuals or institutions to create, disseminate, and promote the clustering of companies on both sides of the border to build supply chain arrangements.
(ii) Integrate company activities across borders in more formal value chain production and distribution activities.
(iii) Create cross-border clustering of activities in fisheries products that generate more value-added downstream products, especially products that are processed and packaged under internationally accepted standards.
(iv) Target products that include semirefined carrageenan from locally grown seaweeds, canned crab meat, surimi, and fish meal.
(v) Support production of surimi or fish meat paste used in making imitation crab and lobster meats, fish balls and cakes, and other convenient, ready-to-eat seafood products.
(vi) Explore ways to motivate fishermen and wholesalers to formalize trading arrangements.

Table 34.1. Cost-Effectiveness of 20% Shift in Sarawak Smelter Sourcing of Aluminum Oxide from Distant Suppliers to West Kalimantan Suppliers

A. Input			
	$1.5 million technical assistance for capacity building		
B. Output			
1	Support activities of champion individuals or institutions to create, disseminate and promote the clustering of companies		
2	Integrate company activities across borders in more formal value chain production and distribution activities		
3	Create cross-border clustering of activities in fisheries products that generate more value-added downstream products		
4	Target products that include semirefined carrageenan from locally grown seaweeds, canned crab meat, surimi, and fish meal		
5	Support production of surimi or fish meat paste, and other convenient, ready-to-eat seafood products		
6	Explore ways to motivate fishermen and wholesalers to formalize trading arrangements		
C. Outcome			
1	**Transport Cost Savings ($)**		
	$	51,874,499	Total imports by Sarawak (2017)
	$	44,747, 772	of which, fresh, frozen and chilled
	$	7,126,727	of which, prepared or preserved
	$	2,581,644	Currently from West Kalimantan
	$	2,520,734	of which, fresh, frozen and chilled
	$	60,910	of which, prepared or preserved
	$	7,793,256	Additional from West Kalimantan
	$	6,428,821	of which, fresh, frozen and chilled
	$	1,364,435	of which, prepared or preserved
	$	1,168,988	Transport costs from distant markets
	$	389,663	Transport costs from West Kalimantan
	$	779,326	Transport cost saving from West Kalimantan sourcing
		10%	Percent savings on imports from West Kalimantan
2	**Sarawak Increase in Quantity of Imports Demanded from West Kalimantan (metric tons and $)**		
		25,018	Total import volume
		3,759	Change in import volume sourced from neighboring country
		15%	% Change in imports demand (MD) sourced from neighboring country
		12%	Additional % increase import demand (– geographic distance elasticity + trade cost elasticity) × % change MD)
		457	Volume increased in import demand
	$	948,351	Equivalent US dollar import value of increase in quantity demanded
3	**Cost-Effectiveness Ratio ($ million)**		
	$	1,500,000	Cost of Intervention
	$	8,741,606	Effect of Intervention
		5.8	Cost-Effectiveness Ratio

Source: Authors' estimates.

34.3 Cost-Effectiveness

Target outcomes of the project are (i) transport cost savings from shifting the sourcing of fish imports from distant suppliers to nearby sources; and (ii) increase the quantity of fish imports demanded because of lower transport expenditures.

Transport Cost Savings. Sarawak importers source less than 5% of their supplies from West Kalimantan. It is reasonable to assume that transport costs for fish from distant markets represents 15% of total import costs, while those from West Kalimantan would only represent 5% of import costs. If Sarawak fish importers sourced an additional 20% of their supplies from West Kalimantan, they would save 10% of the cost of those imports (Table 34.1).

Increase in Demand for Quantity of Imports. A 20% shift in sourcing imports from distant suppliers to West Kalimantan suppliers would lead to an increase in the volume of fish imports demanded equal to 457 MT (Table 34.1).

Cost-Effectiveness Ratio. An intervention cost of $1.5 million for the technical assistance could produce nearly $7.8 million more imports of Sarawak from West Kalimantan, and lead to 457 MT more Sarawak imports resulting from the lower trade cost, which is equivalent to nearly $0.95 million. The result would be a cost-effectiveness ratio of 5.8.

35

Shipbuilding: Upgrading Technologies

35.1 Motivation

In West Kalimantan, shipbuilding has traditionally been one of the leading industries of the province. The Government of Indonesia has prioritized development and expansion of the country's domestic shipbuilding industry as part of a broader effort to strengthen the country's maritime capabilities. In contrast, Sarawak's shipbuilding is at an infant industry stage of development and the government wants the state to become one of the leading growth centers for the industry. The state has 78 shipbuilders, specializing in building and repair of small to medium-sized vessels such as tugboats, offshore support vessels, barges, anchor handlers, and passenger boats.

West Kalimantan is strategically located and has well-established companies that are in a position to share their expertise with Sarawak companies, and they could provide the needed component products to Sarawak shipbuilders that are currently dependent on distant suppliers.

Sarawak's collaboration with West Kalimantan's shipbuilding industry would help Sarawak to gain knowledge and technical expertise in high-tech designs for shipbuilding and its component products. The Malaysia Shipbuilding and Ship Repair Industry Strategic Plan (SBSR) for 2020 establishes the framework for the country to become globally competitive in the shipbuilding and ship repair industry, especially for vessels under 120 meters. One of the SBSR's strategic goals is the creation of a skilled workforce in shipbuilding and repair.

The cross-border value chain therefore aims to exploit complementariness between Sarawak with West Kalimantan, share valuable expertise, develop scale economies and, in that way, increase the competitiveness of both territories.

35.2 Project Costs

Technical assistance needs are estimated at $1.5 million. Capacity development will focus on the following components:

(i) Survey comparative levels of skills, techniques, and quality control practices required to construct medium- to large-scale ships in Sarawak and West Kalimantan.
(ii) Identify knowledge transfer requirements for production personnel (welders, shipfitters, machinists, and the like).
(iii) Identify knowledge transfer requirements of the design and engineering personnel.
(iv) Explore knowledge transfer possibilities between companies in terms of joint production processes that would create much-needed economies of scale for the production, marketing, and distribution of commercial vessels.

(v) Specify needed requirements for collaboration among naval architects, marine engineers, systems engineers, and systems integration activities that are critical to the production process; likewise, create a feasible operating system for companies to reduce costs and expand operations of medium- to large-scale commercial ships.
(vi) Establish champion organizations to coordinate cross-border collaboration in knowledge transfer and promote cross-border trade in parts and equipment.

35.3 Cost-Effectiveness

Target outcomes of the project are (i) revitalization of Sarawak's shipbuilding industry to earlier export levels by expanding foreign sales by $9.8 million annually within 2 years of project start-up; (ii) promoting cross-border trade in vessel parts and equipment to reach $3.0 million annually within 1 year of project start-up; and (iii) expanding West Kalimantan production of cruising vessels and tugs to both private sector and military complex to reach $4.7 million growth annually within 2 years of project start-up.

Cost-Effectiveness Ratio. An intervention cost of $2.0 million for the technical assistance could produce a net revenue gain of $17.5 million annually, resulting in a cost-effectiveness ratio of 8.8.

Table 35.1. Cost-Effectiveness of Shipbuilding Expansion in Sarawak and West Kalimantan

A. Input			
$2,000,000 technical assistance for capacity building			
B. Output			
1	Survey comparative levels of skills, techniques, and quality control practices required to construct medium- to large-scale ships in Sarawak and West Kalimantan		
2	Identify knowledge transfer requirements for production personnel		
3	Identify knowledge transfer requirements of the design and engineering personnel		
4	Explore common technology usage between companies in terms of joint production processes that would create much needed economies of scale for the production, marketing, and distribution of commercial vessels		
5	Specify needed requirements for collaboration among naval architects, marine engineers, systems engineers, and systems integration activities that are critical to the production process; and create a feasible operating system for companies to reduce costs and expand operations of medium- to large-scale commercial ships		
6	Establish a champion organization to coordinate cross-border collaboration in knowledge transfer and promote cross-border trade in parts and equipment		
C. Outcome			
1	**Sarawak Regains Export Levels ($)**		
	$	129,915,029	2011 Exports of Vessels
	$	67,021,511	2017 Exports of Vessels
	$	9,815,586	Annual expansion in export valueto be regained
2	**Target Cross-Border Trade in Parts and Equipment of Vessels ($)**		
	$	4,000,000	Annual expansion in parts and equipment
2	**West Kalimantan Expansion in Production ($)**		
	$	2,220,000	Annual expansion in private-sector cruise ships and tugs
	$	2,500,000	Annual expansion in government military contracts
	$	4,700,000	Total annual increase in production
3	**Cost-Effectiveness Ratio ($ million)**		
	$	2,000,000	Cost of Intervention
	$	18,515,586	Net Effect of Intervention
		9.3	Cost-Effectiveness Ratio

Source: Authors' estimates.

36

Organic Foods: High Value-Added Agriculture

36.1 Motivation

Organic vegetable production is no longer a marginal activity targeting niche markets. Worldwide, organic food consumption has grown at double-digit rates in the last decade, and organic foods are now a mainstream industry in Europe and North America. Countries like Australia also have huge markets and currently import 60% of their total consumption.

In Indonesia and Malaysia, the market for organic food is large and fast-growing. Much of the motivation for consumption of organic products comes from concerns about "food safety", pesticides usage, environmental degradation, and the spread of chronic diseases. There are therefore enormous cross-border trade opportunities for Sarawak and West Kalimantan farmers, who are well positioned to tackle the enormous trade potential in organic vegetables. Labor is abundant and inexpensive, and the West Borneo Economic Corridor is dramatically lowering the time and cost of moving goods across long distances. An integrated approach to the organic vegetable industry along the WBEC could take advantage of existing agricultural resource-based activities and transform the corridor into a major supply source in this fast growing market.

At the farm level, individual farmers complain about the lack of information being provided to them on how to grow organic vegetables; farms lack communities of organic farmers and associations; business development services are seldom accessible to small and subsistence farmers; and market information services about both pricing and regional or global markets are minimal or nonexistent. The project therefore aims to address these needs to create a full-fledged cross-border value chain between Sarawak and West Kalimantan in the organic foods industry, along with the ecotourism sector.

36.2 Project Costs

Technical assistance needs are estimated at $2.0 million. Capacity development will focus on the following seven activities:

(i) Survey existing local, domestic, and international markets for key organic products.
(ii) Explore opportunities for clustering of organic producers.
(iii) Organize training workshops for producers on requirements for national and international organic certifications.
(iv) Identify distribution systems for domestic supermarkets and international wholesalers.
(v) Help to link clusters with packaging companies.
(vi) Identify champions who can advance the organic foods movement across Sarawak and West Kalimantan borders.
(vii) Develop ecotourism linkages and cooperative arrangements across borders.

36.3 Cost-Effectiveness

Target outcomes of the project are (i) establishment of six clusters each in Sarawak and West Kalimantan, each capable of generating $1.0 million within 3–4 years of cluster creation; (ii) linkages of ecotourism facilities to organic fruits and vegetables clusters, with incremental revenue from the linkage valued at $6.0 million over base year revenue; and (iii) creation of organic certification centers in Sarawak and West Kalimantan for different levels of certification, valued at $1.0 million.

Cross-border collaboration will need to occur in the certification process as testing laboratories are established on both sides of the borders and farmers begin to use them. Depending on the level of organic certification (national, regional, international), farmers will need to use different types of testing laboratories that range from simple testing at the market level to dedicated laboratories.

Cost-Effectiveness Ratio. An intervention cost of $2.0 million for the technical assistance could produce a net revenue gain of $17 million in organic fruits and vegetables production and ecotourism visitors in Sarawak and West Kalimantan. The resulting cost-effectiveness ratio would be 8.5.

Table 36.1. Cost-Effectiveness of Organic Fruits and Vegetables as High Value-Added Activity for Smallholder Farms

A. Input		
$2,000,000 technical assistance for capacity building		
B. Output		
1	Develop multi-destination tourism for Sarawak and West Kalimantan by supporting collaboration between the Sarawak State Government and the West Kalimantan Provincial Government	
2	Support the operations of champion individuals or institutions to promote the clustering of activities on both sides of the border to strengthen development of supply chain arrangements	
3	Explore possible integration of company activities across borders in more formal value chain production end distribution activities	
C. Outcome		
1	**Sarawak: Target Tourism Arrivals to be Same as Sabah**	
	$ 1,000,000	Sarawak: Combined output value of each of 6 clusters
	$ 1,000,000	West Kalimantan: Combined output value of each of 6 clusters
	$ 12,000,000	Combined output value of 12 clusters
2	**Revenue Expansion of Ecotourism Facilities ($)**	
	$ 6,000,000	Incremental revenue relative to base-year revenue of ecotourism facilities
3	**Laboratory Certification Centers ($)**	
	$ 500,000	Sarawak: Capital and operating expenditures on certification centers
	$ 500,000	West Kalimantan: Capital and operating expenditures on certification centers
	$ 1,000,000	Combined capital and operating expenditures of certification centers
4	**Cost-Effectiveness Ratio ($ million)**	
	$ 2,000,000	Cost of Intervention
	$ 17,000,000	Net Effect of Intervention
	8.5	Cost-Effectiveness Ratio

Source: Authors' estimates.

37

Tourism: Multi-Destination Travel

37.1 Motivation

The project will provide technical assistance for the development of multi-destination tourism. The aim of the project is to develop joint tourism activities in Sarawak and West Kalimantan. Capacity building will bolster collaboration between the West Kalimantan provincial government and Sarawak state government and create an enabling environment for the support institutions in the tourism industry.

Technical assistance will promote operations of champion individuals or institutions to promote the clustering of activities on both sides of the border. It will initially support development of supply chain arrangements, and later the possible integration of company activities across borders in more formal value chain marketing and promotion activities.

Development of this project needs technical assistance to support champion individuals and institutions that will develop the project. It does not require capital expenditures and therefore cost-effectiveness analysis is used to evaluate the project.

37.2 Project Costs

Technical assistance needs are estimated at $2.0 million. Capacity development will focus on the following components:

(i) Develop multi-destination tourism for Sarawak and West Kalimantan by supporting collaboration between the Sarawak State Government and the West Kalimantan Provincial Government and create an enabling environment for tourism-related institutions.
(ii) Support the operations of champion individuals or institutions to promote the clustering of activities on both sides of the border to strengthen development of supply chain arrangements.
(iii) Explore possible integration of company activities across borders in more formal value chain production and distribution activities.

37.3 Cost-Effectiveness

The potential gains from multi-destination tourism for both Sarawak and West Kalimantan are enormous, but for different reasons. So, the cost-effectiveness calculations for each are presented separately.

Sarawak

Sarawak's tourism arrivals are concentrated in visitors from the ASEAN+6 countries (ASEAN plus the PRC, India, Japan, the Republic of Korea, with Australia and New Zealand), all together accounting for 94% of all arrivals. Long-distance tourists from North America and Europe account for a paltry sum of 3.6% of the total, while Sabah's share of those tourists is nearly double at 7.1%. Today, long-distance travelers that need to pay high air travel fees are opting to visit multiple destinations to maximize their exposure to distant cultures and wilderness adventures. Since West Kalimantan has complementary cultural and wilderness dimensions to those of Sarawak, it makes sense to combine the attractions of these two nearby but different territories.

The project aim is to raise the share of distance travelers from North America and Europe to the same proportion as Sabah. By increasing the share of arrivals from those two areas to the same as Sabah, Sarawak would gain an additional 93,149 visitors and generate $39.4 million in revenue (Table 37.1).[162] The result would be a cost-effectiveness ratio of nearly 20, based on a project cost of $2.0 million.

West Kalimantan

Tourism is in its infancy in West Kalimantan. Its contribution to gross regional product is barely noticeable at 0.1%. Yet the province contains a rich diversity of cultures (Dayak, Malay, Javanese, Chinese, Madurese, Bugis, Sunda, and Batak); and national parks (defined by rivers, wetlands, and rainforest areas such as Gunung Palung National Park, which is a mountainous sanctuary known for its population of wild orangutans) that rival those of any other part of Borneo.

The project therefore aims to raise the contribution of tourism to levels that could eventually bring the sector's contribution in line with that of Sarawak and Sabah. Yet we recognize that it will take time to achieve a take-off stage of development for the sector. Instead, the project aims for a target growth of the sector that would equal 5% of Sarawak's existing sector contribution to GRP. The resulting tourism revenue expansion, even under that modest target, would generate $46.4 million in additional earnings for the sector and produce a cost-effectiveness ratio of 23 for the project.

[162] Revenue data based on information provided by Borneo Post Online. 2018. Higher Visitor Arrivals in 2017, over RM8 Billion Earned — Minister. http://www.theborneopost.com/2018/07/17/higher-visitor-arrivals-in-2017-over-rm8-billion-earned-minister/.

Table 37.1. Cost-Effectiveness of Multi-Destination Tourism in Sarawak and West Kalimantan

A. Input			
$2,000,000 technical assistance for capacity building			
B. Output			
1	Develop multi-destination tourism for Sarawak and West Kalimantan by supporting collaboration between the Sarawak State Government and the West Kalimantan Provincial Government		
2	Support the operations of champion individuals or institutions to promote the clustering of activities on both sides of the border to strengthen development of supply chain arrangements		
3	Explore possible integration of company activities across borders in more formal value chain production end distribution activities		
C. Outcome			
1	**Sarawak: Target European and North American Tourism Arrivals to be Same Share as Sabah**		
	$	94,257	European and North American tourism arrivals (2017)
		3.6%	Share of total foreign arrivals (2017)
		7.1%	Sabah: Share of total foreign arrivals (2017)
		93,149	Sarawak tourism arrivals gap with Sabah
	$	423	Estimated annual revenue from each tourist
	$	39,870,711	Actual tourism earnings each year (2017)
	$	79,272,764	Target tourism earnings each year (2017)
	$	39,402,053	Additional annual tourism earningstargeted.
2	**West Kalimantan: Target Tourism Arrivals at Half that of Potential Sarawak Tourism**		
	$	13,710,925	Estimated tourism revenue (2017)
		0.1%	Share of total tourism revenue in GDP (2017)
		7.1%	Sarawak: Share of total tourism revenue in GDP (20180
	$	927,257,737	West Kalimantan tourism revenue gap with Sarawak
	$	46,362,887	Targeted tourism arrivals at 5% of that of Sarawak tourism GDP share
3	**Cost-Effectiveness Ratio ($ million)**		
	$	2,000,000	Cost of Intervention
	$	39,402,053	Sarawak: Net Effect of Intervention
	$	46,362,887	West Kalimantan: Net Effect of Intervention
		19.7	Sarawak: Cost-Effectiveness Ratio
		23.2	West Kalimantan: Cost-Effectiveness Ratio

GDP = gross domestic product.

Source: Authors' estimates.

PART IX

Program Design

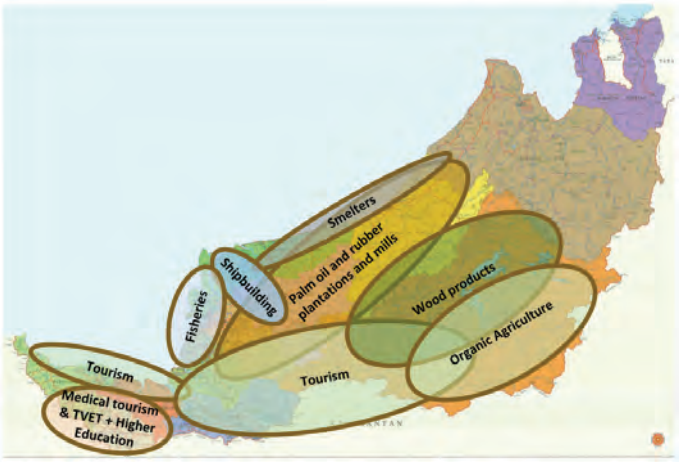
38

Design

38.1 Geographic Coverage

Map 38.1 and Figure 38.1 show the geographic areas in Sarawak and West Kalimantan covered by the border economic area between the two territories. It extends well beyond the regencies and provinces bordering one another, or those where the border crossings are located. The reason is the relatively large number of industries located in the areas where there exist opportunities for one-way (traditional) and two-way (intra-industry) trade that are located throughout the two territories. Only in Sarawak's most northern divisions of Miri and Limbang, and West Kalimantan's most southern regency of Ketapang have businesses not developed sufficiently close relationships with those in the neighboring territories of West Kalimantan and Sarawak, respectively, to warrant trade and other cross-border relationships.

Map 38.1. Geographic Coverage of Sarawak Integrated Border Economic Area



Sources: Map from eTawau, and representation by the authors.

38.2 Industry Drivers

The earlier analysis in this report indicates that there are 10 leading industries with strong potential for expansion of cross-border exports to Sarawak. Whether they are economically viable is a question that will be addressed in the next part of this pre-feasibility study. The present list is based on the province's economic analysis, government programs and priorities, and the comparative advantage and competitiveness of exports.

The industry coverage is the major determinant of the border economic area's geographic delineation. In most industries, the establishment of cross-border value-chains is the motivation for collaboration between the two territories. This type of production sharing arises from efforts to exploit either differences in factor endowments or possible scale economies of production activities. In the Sarawak–West Kalimantan context, the spatial concentration of industries along the border region combines the traditional growth area model of trade and investment, based on comparative advantage and complementarities, with one based on scale economies from clustering of production activities.

Figure 38.1. Geographic Coverage of West Kalimantan Integrated Border Economic Area

Sources: Representation by the authors, and photos by Alisa Lord.

Clustering of industries across the neighboring territories therefore allows producers to bypass the need to handle the entire production process, and instead concentrate on processing stages. Segmentation of production activities permits the exploitation of differences in factors of production between Sarawak and West Kalimantan, and they generate economies of scale and "cross-hauling" or two-way trade between the neighboring territories, thereby increasing the competitiveness of border industries in regional and global markets.

Under the Sarawak–West Kalimantan integrated border area program, transnational company alliances in complementary upstream or downstream activities will allow Sarawak companies to expand their access to much-needed raw materials, while West Kalimantan companies will gain access to much-needed technologies with which to add value to their products.

Hence, the potential benefits from strategic alliances between Sarawak and West Kalimantan industries are compelling: they can expedite entry into new markets, expand access to skills, technologies, and product diversity, and help to share fixed costs and resources.

In one industry, tourism, the driver for collaboration is based on horizontal integration of markets and cost-savings from joint promotion of services offered jointly by both Sarawak and West Kalimantan. This model has proven successful throughout the world. It involves collaboration in (i) cross-border travel facilitation; (ii) air, ground, and water transportation connectivity; (iii) positioning and branding to reach major tourist-generating markets; and (iv) development of innovative tourism products, including joint tourism fairs and collaborative marketing operations. The more advanced the integration system is, the more opportunities will be generated for tourism.

Figure 38.2. Geographic Coverage of West Kalimantan Integrated Border Economic Area

Industry		*Project Profile*
Bauxite & Alumina		A cross-border value chain would take advantage of West Kalimantan's locations closeness of its bauxite and alumina supplies for Sarawak's smelter refineries, and promote knowledge sharing and technical expertise to improve West Kalimantan's production efficiency and international competitiveness.
Rubber		The proposed cross-border value chain would create economies of scale, provide Sarawak's rubber manufacturing operations with much-needed rubber supplies, and promote cross-border investment opportunities for West Kalimantan in rubber manufactures.
Palm Oil		A cross-border value chain would develop collaboration and an integrated industry in the palm oil industry, provide Sarawak's palm oil manufacturers with needed oil palm supplies, and provide knowledge-sharing and technologies to potential palm oil manufacturing investors in West Kalimantan.
Wood Products		The project aims to develop a cross-border value chain in the wood processing industry to take advantage of West Kalimantan's locational advantage of its plantation timber for Sarawak's wood furniture industry, and promote investment in West Kalimantan's downstream activities.
Fisheries		A cross-border value chain would create economies of scale and direct West Kalimantan's extensive activities in primary stages of the fisheries industry towards helping to offset Sarawak's depleted fish stocks, while promote downstream activities in marine capture, aquaculture and seaweed production.
Ship Building		The project aims to establish a cross-border value chain in the shipbuilding industry to create scale economies, promote cross-border investments, and help Sarawak ship builders to construct large ships through shared knowledge and technologies with West Kalimantan ship builders.
Organic Fruits & Vegetables		The project aims to develop a cross-border value chain between West Kalimantan and Sarawak in the organic foods industry, along with the eco-tourism sector, promote clustering of small producers, provide West Kalimantan with international organic certification, and link producer clusters with packaging companies.
Tourism		The project aims to develop two-way tourism between West Kalimantan and Sarawak, encourage joint promotion of that culture and wilderness-based tourism for international travelers to the region to improve competitiveness through reduced advertising costs and promotion of multi-destination tourism.

Sources: Photos by Alisa Lord, except photo of rubber trees and worker from Verité. https://www.verite.org/project/rubber/.

38.3 Key Components

The Sarawak–West Kalimantan border economic area needs hard and soft infrastructure to support the cluster of production activities (Figure 38.3):

(i) *Industrial parks.* As a core component of the border economic area, industrial parks are able to attract business and manufacturing activity by providing integrated infrastructure in one location. They concentrate dedicated infrastructure in a delimited area to reduce the per-business expense of that infrastructure. That infrastructure includes roadways, high-power electric supplies, high-end communication cables, large-volume water supplies, and high-volume gas lines. Special incentives and a tax-friendly environment are usually given to companies located within the parks.

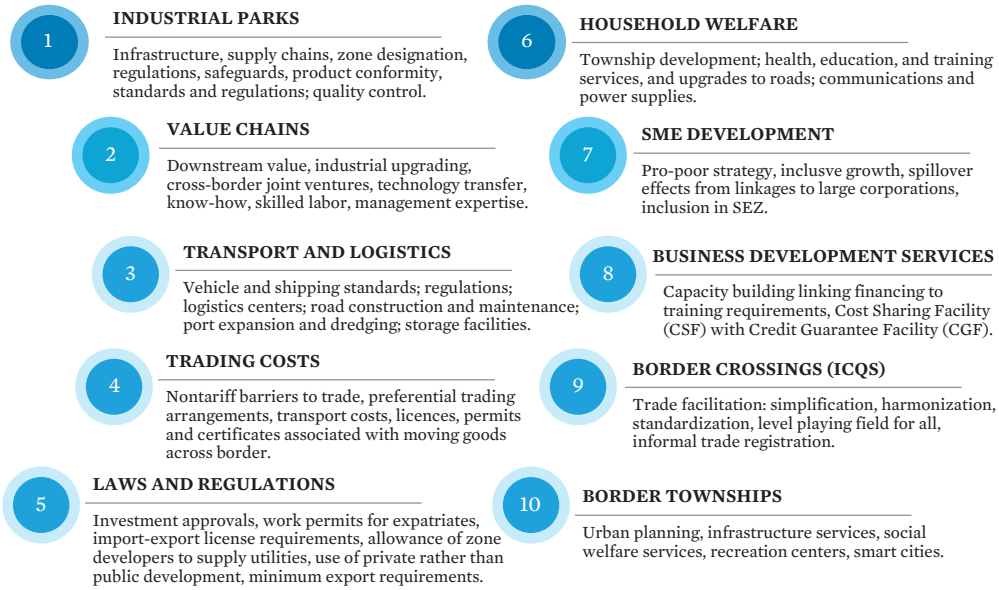
(ii) *Cross-border value chains.* The introduction of value chains in the border area provide opportunities for industrial upgrading. Companies operating in the area can increase their participation in regional and global value chains both by expanding the import content of their products (foreign value added) and by generating more downstream value through goods and services for intermediate use in exports to neighboring territories. Upstream and downstream links in the value chain also serve to build local area capacity and generate positive results for the local economy by growing local infrastructure and supporting socioeconomic service for workers and their families.

(iii) *Transport and logistics.* By its very nature, the border economic area represents an integral part of subregional integration schemes, namely, the West Borneo Economic Corridor and the greater BIMP-EAGA area. Transport and logistics is an important determinant of the systems' competitive environment and is largely affected by infrastructure, the institutional framework, service providers, and shippers and consignees. The performance of these four dimensions in the systems is often measured by time and cost of transporting goods and people relative to other transport channels and routes.[163]

(iv) *Trading costs.* The costs of moving goods and people along the corridor system are an integral part of the ability and willingness of companies to locate in the border area. Those costs are no longer dominated by tariffs since the Common Effective Preferential Tariff, ASEAN Free Trade Area, and other multilateral and regional preferential arrangements greatly reduced their incidence. In fact, tariffs generally account for no more than 10% of direct and indirect costs associated with factors other than transportation. In contrast, nontariff measures (NTMs) now account for as much as 90% of trading costs. Those NTM costs include the costs of complying with a myriad of licenses, permits, and certificates associated with moving goods across border. They affect not only the international competitiveness of businesses in the border area, but also the ability of enterprises to understand the complexity of those measures and participate in regional and global value chains. For that reason, factors affecting trade and transport costs at the Sarawak–West Kalimantan border crossings have large implications for the ability to attract investors, and the types of industries that can be drawn to the area.

[163] For performance measures of IMT-GT transport and logistics corridors relative to those of the GMS corridors, see R. Banomyong. 2008. Logistics Development Study of the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT). Bangkok, Thailand: Centre for Logistics Research Faculty of Commerce & Accountancy Thammasat University.

Figure 38.3. Soft and Hard Infrastructure for Sarawak and West Kalimantan Integrated Border Economic Area



ICQS = international customs, immigration, and quarantine; SME = small and medium-sized enterprise.
Source: Representation by the authors.

(v) *Legal and regulatory framework*. An important part of the attraction to the border economic area is the simplification of the regulatory regime that usually accompanies the establishment of designated area. Streamlining the regulatory process covers the investment approval process, work permits for expatriates, import and export license requirements, provisions for services such as commercial and professional activities, allowance of zone developers to supply utilities to the zone, use of private rather than public development or a public–private partnership for development, and the relaxation of minimum export requirements.

(vi) *Household welfare*. What differentiates the border economic area from other types of economic zones is its strategic integration into the development of the surrounding area. Along with improvements in social and economic conditions, local development incorporates township development; health, education, and training services, and upgrades to roads, communications, and power supplies.

(vii) *Development of small and medium-sized enterprises*. A pro-poor strategy for inclusive growth in the border area will require a degree of government intervention to cultivate growth of SMEs. Typically, large businesses are given preferential treatment in investment incentive schemes. But those types of businesses require backward supply linkages and subcontracting relationships with support services that can be provided by local SMEs. Those relationships can create knowledge spillovers and financing opportunities that are mutually beneficial to both large and small enterprises. For these opportunities to occur, however, local and national government authorities need to ensure that there exists a level playing field for local SMEs and large businesses, for example, in the ability to access goods from international suppliers on a tax or duty-free basis, or their ability to supply large businesses at the same competitive terms as foreign suppliers. Additionally, SMEs are usually located

outside the physical industrial hub, and regulations and procedures may restrict purchases by large businesses located in the zone of locally produced items outside the zone. Duty-drawback schemes can be extended to SMEs outside the zone to enable direct and indirect exporters based outside the zones to access production inputs on a duty-free basis.

(viii) *Business development services.* The role of the private sector in the development of the border area will progress rapidly when increased spatial interaction takes place among enterprises. There are three stages in the process.

(a) At the first stage, efforts focus on enterprises located in the dedicated industrial zone. Those efforts should extend beyond the management and administration of incentive programs and policies and provide capacity building in areas that form part of specific value chains identified in the area's development strategy.

(b) At the second stage, business development service (BDS) centers are established to provide skills and expertise in basic business practices and core areas of expertise for the targeted value chains. Services provided by the BDS center cover *trade-related technical assistance* for commercial development activities supporting trade finance, business support services, e-commerce, and public-private sector networking; and *trade-related capacity building* to increase productive capacity through business development and activities aimed at improving the business climate, privatization, and assistance to key sectors and subsectors.

(c) At the third stage, development of subregional business development services takes place through a Cost Sharing Facility (CSF) with Credit Guarantee Facility (CGF).[164] The CSF is a fund normally managed by the BDS center that provides matching grants to businesses using their services. To overcome resistance by small businesses to pay for the services, the business portion of the cost is taken from part of a loan offered to the businesses. Those loans are supported through a CGF that selectively backs loan applications by SMEs to commercial banks. The financial guarantee agency is normally represented by a commercial insurance company acting as a guarantor to the borrowers. Under this mechanism, a direct relationship is created between the guarantor and the borrower since the former needs to assess loan applications and selects the ones to be guaranteed. This process reduces the probability of moral hazard on the part of the commercial bank during the screening process.

(ix) *Border Crossings*

(a) On the Sarawak side, the three ICQ facilities are at Lubok Antu in the Sri Aman Division, Lundu in the Kuching Division, and Tebedu in the Serian division.

(b) On the West Kalimantan side, the ICQ facilities are at Nanga Badau in Kapuas Hulu Regency; Aruk in Sambas Regency; and Entikong in Sanggau Regency.

(x) *Border Towns (West Kalimantan)*

(a) *Kapuas Hulu Regency.* Putussibau is on the Kapuas River and has a population of about 12,500 people. It is the seat and economic center of the regency. It is located near the Malaysia border and is 300 km from the Sarawak capital, Kuching. Putussibau is a market town serving the sparsely-populated region, with the West Putussibau sub-district covering 4,122 km^2 and having only

[164] ADB. 2010. *Strategy and Action Plan for Greater Mekong Subregion East-West Economic Corridor*. Manila. http://www.adb.org/publications/strategy-and-action-plan-greater-mekong-subregion-east-west-economic-corridor (accessed 2 February 2018).

31,000 inhabitants. Its proximity to Danau Sentarum and Betung Kerihun national parks makes it a local center of ecotourism.

(b) *Sintang Regency.* The town of Sintang is the seat of the regency and it also lies on the Kapuas River. Places of interest include Kelam Hill (Dark Hill), Baning Forest, Bukit Baka and Bukit Raya National Park, and Dara Juanti Museum (Sintang Palace). It is about 395 km from Pontianak, and it can be reached either overland (by bus) about 8 hours, or through Kapuas River (by boat) in 20–48 hours.

(c) *Sanggau Regency.* The town of Sanggau is the capital of the regency and is 142 km from Pontianak.

(d) *Bengkayang Regency.* The town of Bengkayang is the seat of the regency and it is located 225 km from Pontianak. Most of the population is indigenous Dayaks.

(e) *Sambas Regency.* The town of Sambas is the capital of the regency. Much of the population in Sambas is of Melayu Puak, Melayu Sambas, Chinese, or Dayak origin. There are many traditions and customs that the Melayu community maintains.

38.4 Representation for Sarawak and West Kalimantan

Figure 38.5 brings together the industries and soft and hard infrastructure components for the Sarawak–West Kalimantan border economic area.

Figure 38.5. Representation of Sarawak and West Kalimantan Border Economic Area

Source: Representation by the authors.

39

Implementation

39.1 Concept and Objectives

The Sarawak–West Kalimantan Integrated Border Economic Area reflects the principles and objectives laid out in Indonesia's multi-border development program.[165] Its design concept, summarized in Table 39.1, underscores the need to take a broad approach to its infrastructure components and geographic coverage, and a sequenced approach to its implementation strategy and level of cross-border collaboration.

The border economic area consists of a network of activities that seek to promote cross-border trade and investment and encourage the economic and social development of a relatively large area near the border. What will determine the border economic area's success is its

Table 39.1. Synthesis of Parameters for the Sarawak–West Kalimantan Integrated Border Area Development Program

Border Economic Area Concept	Objectives	Components
(i) *Clusters of activities* covering the operation of network of interconnected businesses and associated institutions spread over a wide geographic area (ii) *Varying degrees of collaboration across borders*, either operating independently or together through quasi-formal or formal mechanisms (iii) *Cross-border networks of productive activities* to produce goods and services in specific industries (iv) *Well-defined goals selected from a broad spectrum of development options*, with clearly delimited goals (v) *No one size fits all*, since each area has diverse needs and socioeconomic characteristics	(i) *Alleviate poverty* and improve well-being of households in border area (ii) *Lower income inequality* of Sarawak and West Kalimantan province with that of others in Indonesia (iii) *Accelerate economic growth* of the target area (iv) *Exploit complementarities* with neighboring foreign territory of Sarawak state and promote cross-border value chains, trade, and investment (v) *Attract population into border regions* to reverse agglomeration trends and congestion in Indonesia's major urban centers	(i) Industrial estates and SEZs (ii) Transport and logistics (iii) Trade and transport facilitation (iv) CIQS facilities (v) Border townships (vi) Business Development Service centers (vii) Health and education (viii) Public utilities (ix) Regulatory framework (x) Border and behind-the-border trading costs

CIQS = customs, immigration, quarantine, and security; SEZs = special economic zones.

Sources: Authors' adaptation of Indonesia's Multi-Integrated Border Area Development Program to West Kalimantan, and Sarawak state government sources.

[165] ADB. 2017. Indonesia's New Border Economic Area Program. Manila.

proximity to upstream activities, relevance to the specific context in which it is introduced, the effectiveness of the program design and implementation, and its ongoing management. Experience shows that the long-term, sustainable success of border economic areas has been associated with their integration into the strategic development plans of bordering countries, along with improvements in local and regional social and environmental conditions; and the provision of capacity building and training of the workforce as a means of attracting high value-added service and manufacturing activities into the area.[166]

39.2 Forming Clusters

The Sarawak–West Kalimantan's integrated border area development program relies on value chains that build on collaborative networks of business activities, which are often referred to as clusters. To succeed, those clusters must accommodate local business styles and practices. Much of the technical assistance needed for the program must be directed toward cultivating business relationships in the context of Asian interests in building professional trust and mutually beneficial cost-sharing activities leading to common goals. This style of doing business contrasts sharply with the Western model of competitive tendering, formal procedures, and contracts. It is based on informal relationship-based business practices. For that to occur, personal interactions over time are necessary. The role of cluster leaders then becomes one of organizing those interactions and creating a growing trust among participants.

Building clusters within Sarawak and West Kalimantan is important. But for cross-border value chains to succeed, those clusters need to extend across territorial boundaries. In cases such as bauxite, alumina, and aluminum production, joint ventures between companies can readily occur because the number of participants is relatively low. In the case of fisheries, organic vegetables, and other activities involving large numbers of producers, the establishment of clusters across time will take dedication and focus on the part of cluster leaders. The process cannot be rushed.

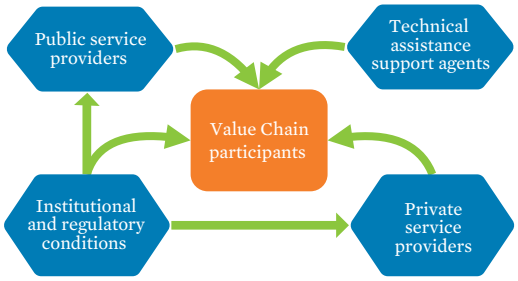
There are three key elements in the cluster. First, there must be *spatial or geographic proximity* of producers in the cluster. Second, the *size* of the production group must be sufficiently large for it to have adequate resources or operating capacities. Third, there must be a *formal institutional structure* that provides a sustainable and cohesive networking arrangement between the cluster members. If these two elements operate effectively, then the *competitiveness* achieved from collaboration and business networking will be greater than if the participants operated separately and independently of one another.

Cluster Types. There is a general lack of standardization of definitions and coverage of clusters. While geographic *clusters* refer to locational groupings, *sector clusters* are associated with businesses operating in the same commercial area. There are also *horizontal clusters* that group businesses sharing the same knowledge, financial or physical resources, and *vertical clusters* where participants operate along the same supply chain.

Terminology. The term business cluster is often used interchangeably with economic cluster, competitive cluster, and industry cluster. The economic rationale dates to the early 1900s

[166] T. Farole 2011. *Special Economic Zones in Africa: Comparing Performance and Learning from Global Experiences*. Washington, DC: The World Bank. https://openknowledge.worldbank.org/bitstream/handle/10986/2268/600590PUB0ID181onomic09780821386385.pdf?sequence=1.

Figure 39.1. Key Cluster Relationships in Value Chains



Source: M. Lord and P. Tangtrongjita. 2011. *Organic Vegetable Clusters along the East-West Economic Corridor: Improving Livelihoods and Prosperity through Value-Added Agriculture*. Manila: ADB (RETA 7521).

when the term "agglomeration" was used to describe the localization of firms in the same area.

Cluster Components. Key relationships of a business cluster are shown in Figure 39.1.

(i) *Value chain participants.* The individuals and businesses that directly deal with the products by engaging in production, processing, and distribution.
(ii) *Public and private service providers.* The individuals and entities that support the functioning of the chain by providing transportation, packing and handling, certification, and financial support.
(iii) *Technical assistance support agents.* Government institutions, nongovernment organizations (NGOs), and international development organizations that undertake support activities and interventions to foster value chain development by providing capacity strengthening, market information, advisor services like business planning or the creation of partnering arrangements.
(iv) *Institutional framework*. The institutional and regulatory conditions impacting on the development of value chains.

Example of Application to Sarawak and West Kalimantan's Organic Food Development. The application of business clusters to Sarawak and West Kalimantan organic vegetables value chains is intended to achieve the following three objectives:

(i) Foster the conversion of conventional agricultural farming to organic production, and thereby enable the generation of *high value-added activities*.
(ii) Promote linkages among micro and small-scale producers, and thereby improve their *competitive position within the value chain*.
(iii) Spur the development of agricultural activities affecting the majority of Sarawak's and West Kalimantan's population either directly or indirectly, and thereby enable the transformation of the West Borneo Economic Corridor transport and logistics corridor into a *full-fledged economic corridor*.

What Makes a Cluster Successful?

Businesses that have common challenges and opportunities can collaborate to overcome problems, achieve efficiencies, and penetrate markets that would otherwise be outside the reach of individuals.

A comprehensive review of cluster-based approaches identified the following 10 characteristics in a successful cluster:[167]

[167] M. Lord et al. An Assessment of Cluster-Based Approaches. *Promoting Competitiveness in Practice*. USAID. www.value-chains.org/dyn/bds/docs/254/USAID-Mitchell-Clusters.pdf.

(i) identification of the value chain,
(ii) geographic proximity of producers,
(iii) critical mass of knowledge and productive resources,
(iv) shared interests and common drives,
(v) clear vision and mission,
(vi) organizational framework,
(vii) broad representation of cluster members,
(viii) strong leadership,
(ix) regular meetings, and
(x) productive projects and programs.

These characteristics underscore the paramount importance of collaboration. It follows then that people are crucial to that collaboration. Successful clusters are those that have key individuals performing the following functions:

(i) *Champion.* Critical to the success of a cluster is the individual that promotes the group by spending a great deal of time in the field getting to know individual participants, identifying collaborative projects, mobilizing the relevant stakeholders, and organizing networking events. The champion can be a leader from the producing community, buyer, or government agency.
(ii) *Cluster Steering Committee.* Composed of individuals who are responsible for establishing the cluster and creating the business plan, the cluster steering committee is responsible for implementing its strategy and action plan and ensuring that the actions of the cluster are directed toward meeting its objectives and goals.
(iii) *Cluster Production Leader.* Knowledge transfer by a production leader having expertise in production methods, supply chains, and marketing and distribution channels is central to the success of the production group. The resulting intra-business learning process allows individual members of the group to add value to their production and access premium markets.

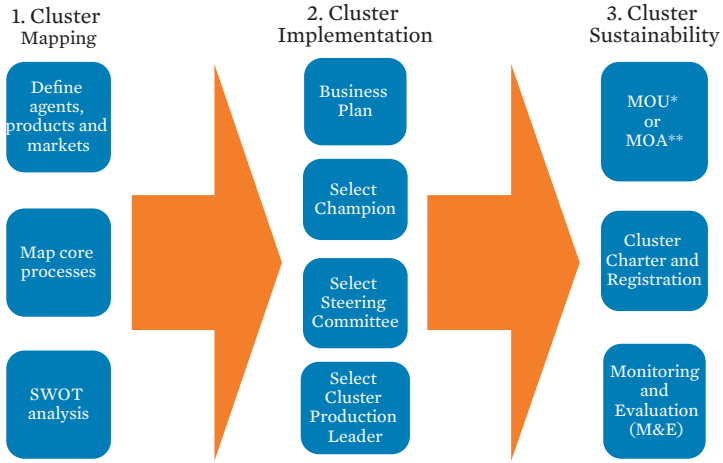
Steps in Forming a Cluster

There is a sequence of steps involved in the design and implementation of a business cluster having the successful characteristics mentioned in the previous section. These steps are summarized in Figure 39.2 and described below.

Step 1: Cluster Mapping. In the case of Sarawak and West Kalimantan, production activities of the cluster should take place along the *geographic area* traversed by the corridor. Agriculture-related activities (e.g., organic foods, rubber, oil palm) is the most appropriate *sector* to target as a means of transforming Sarawak and West Kalimantan into an economic corridor because most of the population in the area is directly or indirectly involved in activities related to that sector.

The process of gathering information about the cluster is similar to the mapping of the value chain, but with a focus on the interrelationships among cluster members. At this stage it is useful to conduct some form of SWOT (strengths, weaknesses, opportunities, and threats) analysis or benchmark analysis of the cluster's interrelated branches along the value chain. That information focuses attention on important issues that need to be addressed. It is also

Figure 39.2. Timeline of Cluster Formation Process



* Memorandum of Understanding.

** Memorandum of Agreement.

Source: M. Lord and P. Tangtrongjita. 2011. *Organic Vegetable Clusters along the East-West Economic Corridor: Improving Livelihoods and Prosperity through Value-Added Agriculture*. Manila: ADB (RETA 7521).

useful for the design of the business plan (step 3) and for monitoring and evaluating the cluster's performance and sustainability.

The selection of a cluster is largely based on four factors: (i) the interest and willingness of producers to work together toward a common goal; (ii) a sufficiently large knowledge and production resource base; (iii) actual or potential linkages with downstream value-added activities; and (iv) strong public or private support services. It is also useful to identify factors that drive success in a business cluster. These cluster drivers are used as reference points in the assessment of the cluster's competitive position.

Value Chain Analysis. One of the most important parts of cluster building is the mapping of downstream suppliers of inputs and upstream customers, along with supporting services for organic vegetables in Sarawak and West Kalimantan. Part V of this study provided a detailed mapping of the core production and distributions processes, agents, and products involved in those processes, support services, and markets and associate pricing structures.[168]

Step 2: Design Implementation. The cluster must have a clearly defined vision and strategy and action plan to achieve that vision. Relationships must also be clearly laid out and management and organizational matters well specified. A business plan is therefore a useful tool to consolidate information about the cluster. Guidelines for the business plan are as follows:

(i) *Cluster vision*. It is important to develop a consensus view or *vision* for the cluster to keep key cluster individuals and groupings focused on their ultimate objectives.

[168] M. Lord and P. Tangtrongjita. 2011. Mapping the Organic Vegetable Value Chain along the East West Economic Corridor. Prepared under the project supervision of Rattanatay Luanglatbandith, Regional Cooperation Economist, Thailand Resident Mission, Asian Development Bank.

(ii) *Products and services.* Consolidation of planting activities by cluster members is critical to the achievement of a mass of products for delivery to targeted markets. In the initial stages of the cluster design it will be useful to map out the types of products and services provided over time.

(iii) *Target activities.* A set of achievable activities over clearly defined time periods will provide the basis for annual planning and programming activities, as well as for ongoing monitoring and evaluation activities.

(iv) *Implementation action plan.* At the onset, it is useful to identify specific roles and responsibilities of cluster members in the context of the cluster organization and management, marketing strategy, financial management, relationships with private and public support and other services, monitoring the cluster's progress, and ensuring completion of tasks assigned.

(v) *Key individuals and groupings.* Critical to the success of the cluster are the people who will help to drive the cluster and implement the action plan.

  (a) *Champions* are responsible for promoting the cluster and organizing networking events. There can be a single champion for the producer group, or different champions for producer and buyer groups; and government, academic, and donor support groups. Champions can also provide help to collect production and market information and engage in consultations with public and private support groups, along with NGOs and other development partners.

  (b) *Cluster Production Leaders* provide expertise in production methods, supply chains, and marketing and distribution channels. Their role is central to the success of the production group. Cluster production leaders can also help to provide targeted technical assistance for training,

  (c) *Cluster Steering Committee* is responsible for implementing the strategy and action plan. The committee should be formally structured and convened on a regular basis to map out the production and distribution activities. Its members should include value chain representatives and public and private supporting agencies.

Step 3: Cluster Sustainability. It is important to build on the momentum after the initial policy dialogue takes place to formalize the cluster and establish regular performance reviews. Formalization of the cluster normally takes place through a memorandum of understanding or a memorandum of agreement. That document sets out the objectives of the cluster, its goals, the constitution and management of the cluster, financial matters supporting cluster activities, and reporting responsibilities by members. The cluster should also have a charter and be registered with the public authorities to ensure that it benefits from public sector support and operates as a registered business. Finally, it is important to monitor the cluster's progress as a means of determining whether it is operating as a profitable business concern that meets the goals and objectives of its members.

40

Strategic Framework

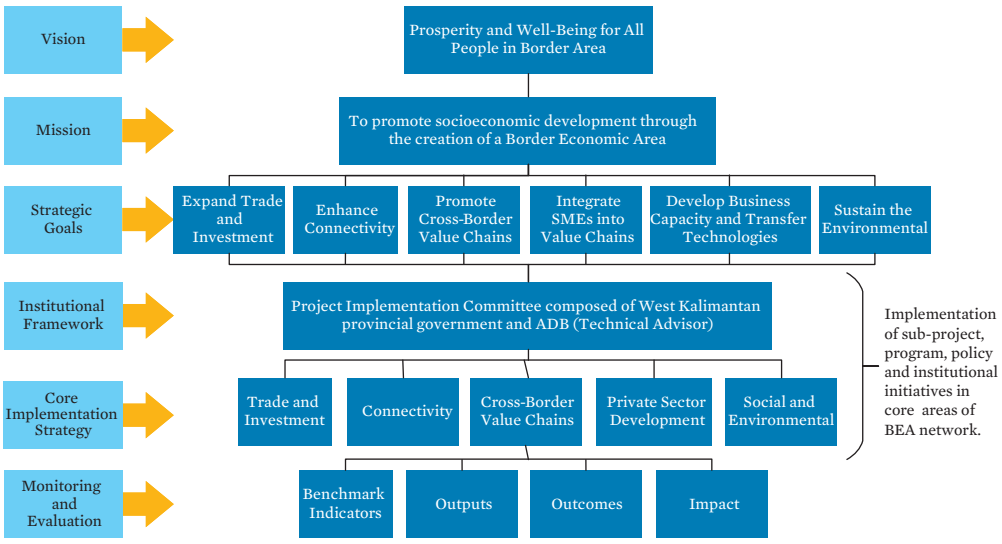
40.1 Blueprint

The blueprints for the Sarawak–West Kalimantan Integrated Border Area Development Program provide clear articulation of strategic priorities and goals with action plans and assessment measures. Figure 40.1 provides a visual representation of the strategic plan. It follows the same structure as the North Kalimantan–Sabah Integrated Border Area Development Program to provide consistency and across the Indonesian and Malaysian border territories, as well as the basis for comparative analysis across the programs.[169]

Vision and Mission Statement

What the program seeks to accomplish (*Vision*) is holistic socioeconomic development that brings widespread prosperity to the border area. How it will reach that overarching goal (*Mission*) is to give explicit recognition to the interconnectedness of cross-border trade and

Figure 40.1. Blueprint for Sarawak–West Kalimantan Integrated Border Area Development Program



ADB = Asian Development Bank, BEA = border economic area.
Source: Authors' adaptation.

[169] ADB. 2018. Pre-Feasibility Study Of Sabah-North Kalimantan Cross-Border Value Chains. Manila. https://www.researchgate.net/profile/Montague_Lord/publication/322369209/inline/jsViewer/5a5662dfa6fdcc30f86d5331?inViewer=1&pdfJsDownload=1&origin=publication_detail&previewAsPdf=false.

investment with other socioeconomic components that achieve their welfare-enhancing goals only by reference to the whole interconnected development of the border economic area.

Strategic Priorities. Because of the close interconnectedness of program components, the *Strategic Goals* of the program give equal weight to the cluster of activities to expand trade and investment, enhance connectivity, promote cross-border value chains, integrate SMEs into those value chains, develop business capacity, transfer technologies across borders, and ensure environmental sustainability. In specific applications, however, the weights assigned to each of these components may change, based on the preference ordering of different stakeholders.

Institutional Framework. Program implementation arrangements establish a hierarchy of responsibility for distinct management functions to ensure that overall project implementation proceeds seamlessly and promptly. The provincial government of West Kalimantan should act as the secretariat for the project, while ADB would provide technical advice and support when requested. The government should also seek to collaborate with the Sarawak state government when necessary. The West Kalimantan provincial government should be responsible for managing the operational aspects of the project and carry out day-to-day oversight. To facilitate communication among the different agencies within the provincial government, a project implementation committee or task force should be created.

Monitoring and Evaluation. The monitoring and evaluation (M&E) system developed to track border economic area progress and performance should adopt standard procedures such as the logical framework or a results framework, based on recommendations of the project implementation committee. As a minimum, the M&E system should contain benchmark indicators that identify conditions at the start of the border economic area implementation process, and appropriate indicators for outputs, outcomes, and impact. Those indicators should be comprehensive, insofar as they cover all the project components, and they should be based on quantitative and qualitative information that reflects current or existing conditions in each component and the overall project.

40.2 Master Plan

The master plan provides an action-oriented strategy that guides the transformation of West Kalimantan's trade and investment with Sarawak into one of the main driving forces for its economy (Figure 40.2). To achieve this transformation, an integrated approach that encompasses both core and supporting soft and hard infrastructure is a necessary but not sufficient condition. Infrastructure is needed to promote commercial activities. But it must be accompanied by a new mindset for both public and private stakeholders; one that shifts from an inward-looking development strategy to one that (a) facilitates collaboration between government officials across borders, and (b) promotes openness and transparency between industry-wide businesspersons to help forge alliances across borders.

In line with Indonesia's overall interests and West Kalimantan's specific concerns, the targets of the border area development program are as follows:

(i) add value to resource-based activities by moving production into high-value activities;
(ii) expand productivity;
(iii) achieve greater economies of scale from clustering;
(iv) attract technologically capable firms;

(v) target emerging regional markets in Asia as well as the Middle East; and
(vi) promote skilled labor.

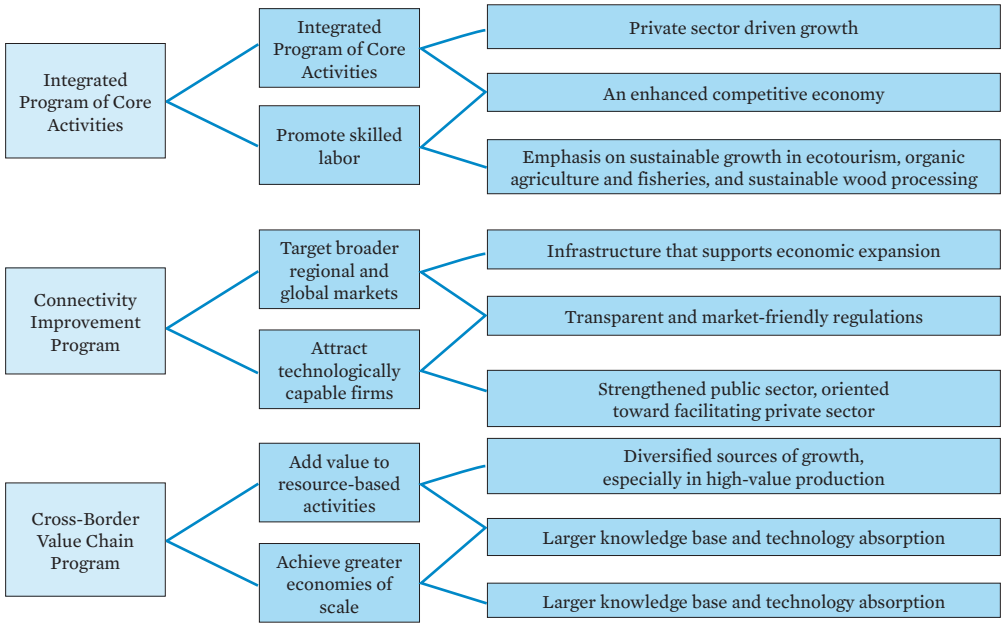
These targets are to be achieved through the following channels:

(i) private sector driven growth;
(ii) an enhanced competitive economy;
(iii) strengthened public sector, oriented toward facilitating private sector activity;
(iv) infrastructure that supports economic expansion;
(v) transparent and market-friendly regulations;
(vi) knowledge and technology absorption;
(vii) promotion of training for a high-skilled workforce;
(viii) diversified sources of growth, especially in high-value production and service-oriented activities; and
(ix) emphasis on sustainable growth in ecotourism, organic agriculture and fisheries, and sustainable wood processing.

Implementation of the plan includes three main programs that contain core projects. The programs are as follows:

(i) *Integrated program* of core activities;
(ii) *Connectivity improvement program* facilitating two-way trade and cross-border value chains; and
(iii) *Value-chain development program* promoting upstream and downstream collaboration along the supply chains of key industries.

Figure 40.2. Master Plan for Sarawak-West Kalimantan Integrated Border Economic Area



Source: Authors' adaptation.

PART X

Overall Monetized Appraisal

41

Program Viability

41.1 Common Assumptions

For the Border Area Development Program to be economically viable, its project components must generate net economic benefits that are sustained during their economic life. Since the program consists of several interrelated projects, their mix needs to be jointly evaluated.[170] One reason is the possible existence of economies of scale, which arise when operational synergies or efficiencies produce more benefits or output with fewer costs. Those scale economies are created because average cost decline when projects share one or more factor inputs. In the case of the current Sarawak–West Kalimantan program, economies of scale occur because of shared nonfactor input in the form of road and CIQ facilities shared by projects in palm oil, rubber, wood products, tourism, medical tourism, and TVET and higher education.

Common assumptions underlying the program's economic analysis are similar to those for the individual projects: (i) operating and maintenance costs are spread evenly across the duration of project implementation, unless otherwise noted; (ii) the proportion of tradables inputs in capital and operating expenditures is 35% of the total; (iii) a standard conversion factor of 1.08 is applied to tradables; (iv) project benefits accrue over a 33-year period to ensure the full realization of economic benefits; and (v) a discount rate of 9% is used to calculate the ENPV and EBCR.

41.2 Sarawak

The base-case EIRR calculations for the subprojects and entire program are presented in Tables 41.1 and 41.2.[171] The overall EIRR is computed at 19.6% for the program. Shared road and CIQ facilities infrastructure costs for natural rubber and medical tourism generate economies of scale, which expand net benefits. For subprojects, the returns are 22% for medical tourism, 19.8% for TVET and higher education, 19.2% for palm oil, and nearly 15.6% for natural rubber.

Tables 41.1 and 41.2 also present the results of the sensitivity analysis that tested for the effects of changes in key parameters. The findings show that the program remains economically viable in the face of a 10% cost overrun (15.2%), a 10% benefits reduction (15.5%), and both a 10% cost reduction and cost overrun (11.8%).

[170] ADB. 2017. *Guidelines for the Economic Analysis of Projects*. Manila. http://dx.doi.org/10.22617/TIM178607-2.
[171] The results refer to the monetized project appraisal.

Table 41.1. Summary of Sarawak's Economic Internal Rate of Return and Sensitivity Analysis

Item		EIRR (%)	ENPV at 9% ($ million)	EBCR (ratio)
Subprojects				
No.	**Description**			
1	Medical Tourism	22.0	183	1.4
2	TVET and Higher Education	19.8	83	2.1
3	Palm Oil	19.2	62	1.4
4	Natural Rubber	15.6	71	1.3
Whole Project				
(a) Base Estimate		19.6	397	1.34
(b) Benefits Reduced by 10%		15.2	241	1.10
(c) Costs Overrun of 10%		15.5	281	1.22
(d) 10% Cost Increase and Benefits Reduction		11.8	124	1.10

EBCR = economic benefit–cost ratio, EIRR = economic internal rate of return, ENPV = economic net present value at 9%, , TVET = technical and vocational education and training.

Source: Calculations by the authors.

The economic net present value, discounted at 9%, is equal to $397 million. Among the individual projects, medical tourism has the largest ENPV, followed by TVET and higher education.

41.3 West Kalimantan

The base-case EIRR calculations for West Kalimantan's subprojects and the entire program are presented in Tables 41.3 and 41.4. The EIRR is computed at 19.5% for the overall project. For subprojects, the returns are 21.2% for wood products, 18.6% for palm oil, and 17.8% for natural rubber. The program's economic net present value, discounted at 9%, is equal to $444 million, and its economic benefit–cost ratio is 2.2, which suggests a robust net return on the program. Among the individual projects, palm oil has the largest ENPV, followed by wood products and natural rubber. The program remains economically viable in the face of a 10% benefits reduction (17.8%), a 10% cost overrun (18%), and a combination of 10% cost increase and benefits reduction (16.4%).

41.4 Comparison with North Kalimantan–Sabah Program

Since the present pre-feasibility study follows the pilot project for North Kalimantan–Sabah, it is useful to compare the present results with those for that project. Tables 41.5 and 41.6 show the project appraisal results for the two border areas.

For the Malaysian side of the borders, the average economic internal rate of return, or EIRR, for Sarawak (19.2%) is higher than that for Sabah (16.8%). The industry coverage is similar for palm oil, medical tourism, and TVET and higher education. But Sarawak also covers natural

Table 41.2. Sarawak's Economic Internal Rate of Return and Sensitivity Analysis

		Benefits ($ million)					Costs ($ million)						
		TVET	MEDT	POIL	RUBB	Total	Capital Costs	O&M	Total	Base	Benefits Decline 10%	Cost Overrun 10%	10% Cost Increase and Benefits Reduction
1	2018												
2	2019												
3	2020	0.8	67.5	61.4	16.1	145.9	382.0	41.8	423.9	-278	-292.6	–320.4	–335.0
4	2021	1.7	68.3	61.2	18.5	149.7	89.5	47.3	136.9	12.8	–2.1	–0.8	–15.8
5	2022	2.9	69.0	62.0	21.2	155.2	79.5	51.3	130.8	24.3	8.8	11.3	–4.3
6	2023	4.4	69.8	63.2	24.2	161.7	0.0	51.3	51.3	110.4	94.3	105.3	89.1
7	2024	6.0	70.6	21.5	21.8	119.9	44.3	57.9	102.2	17.6	5.7	7.4	–4.6
8	2025	7.6	70.7	20.7	23.4	122.4	10.0	59.4	69.4	52.9	40.7	46.0	33.8
9	2026	9.2	70.7	24.8	25.0	129.8	10.0	60.9	70.9	58.9	45.9	51.8	38.8
10	2027	10.9	70.8	28.8	26.7	137.2	0.0	60.9	60.9	76.3	62.6	70.2	56.5
11	2028	12.7	70.8	11.7	28.5	123.7	0.0	60.9	60.9	62.7	50.4	56.6	44.3
12	2029	14.5	70.1	21.1	30.3	135.9	0.0	60.9	60.9	75.0	61.4	68.9	55.3
13	2030	16.3	69.5	21.6	32.2	139.5	32.2	67.4	99.6	39.9	26.0	30.0	16.0
14	2031	18.1	68.8	29.1	34.1	150.2	0.0	67.4	67.4	82.8	67.8	76.1	61.1
15	2032	20.1	68.2	24.6	36.2	149.0	0.0	67.4	67.4	81.6	66.7	74.8	59.9
16	2033	22.0	67.5	25.0	38.3	152.8	0.0	67.4	67.4	85.5	70.2	78.7	63.5
17	2034	24.0	66.9	25.5	40.4	156.9	0.0	67.4	67.4	89.5	73.8	82.8	67.1
18	2035	26.1	65.6	26.0	42.7	160.4	0.0	67.4	67.4	93.0	77.0	86.3	70.2
19	2036	28.2	64.3	26.5	45.0	164.0	0.0	67.4	67.4	96.6	80.2	89.9	73.5

continued on next page

Table 41.2 *continued*

		Benefits ($ million)					Costs ($ million)						
		TVET	MEDT	POIL	RUBB	Total	Capital Costs	O&M	Total	Base	Benefits Decline 10%	Cost Overrun 10%	10% Cost Increase and Benefits Reduction
20	2037	30.4	63.1	26.9	47.4	167.8	0.0	67.4	67.4	100.5	83.7	93.7	76.9
21	2038	32.6	61.9	27.4	49.9	171.8	0.0	67.4	67.4	104.4	87.3	97.7	80.5
22	2039	34.9	60.7	27.9	52.5	176.0	0.0	67.4	67.4	108.6	91.0	101.8	84.3
23	2040	37.2	58.9	28.4	55.2	179.7	39.6	75.3	114.9	64.8	46.8	53.3	35.3
24	2041	39.6	57.1	28.9	58.0	183.6	0.0	75.3	75.3	108.3	90.0	100.8	82.4
25	2042	42.1	55.5	29.3	60.9	187.8	0.0	75.3	75.3	112.5	93.7	104.9	86.2
26	2043	44.6	53.8	29.8	63.9	1921I	0.0	75.3	75.3	116.9	97.6	109.3	90.1
27	2044	47.2	52.3	30.3	67.1	196.8	0.0	75.3	75.3	121.5	101.8	113.9	94.3
28	2045	49.8	51.2	30.8	70.3	202.lt	0.0	75.3	75.3	126.8	106.6	119.3	99.1
29	2046	50.1	50.2	31.3	73.7	205.2	0.0	75.3	75.3	130.0	109.4	122.4	101.9
30	2047	51.2	49.1	31.7	77.2	209.3	0.0	75.3	75.3	134.0	113.1	126.5	105.6
31	2038	52.3	48.1	32.2	80.9	213.5	0.0	75.3	75.3	138.2	116.9	130.7	109.3
32	2049	54.1	47.0	32.7	84.8	218.6	0.0	75.3	75.3	143.3	121.4	135.8	113.9
33	2050	55.2	47.0	33.2	88.8	224.2	0.0	75.3	75.3	148.9	126.5	141.3	118.9
						Economic Internal Rate of Return (EIRR) =				**19.6%**	**15.2%**	**15.5%**	**11.8%**
						Economic Net Present Value @ 9% =				**397.2**	**240.9**	**280.6**	**124.4**
						Economic Benefit–Cost Ratio (EBCR) =				**1.34**	**1.10**	**1.22**	**1.10**

MEDT = medical tourism, POIL = palm oil, RUBB = rubber, TVET = technical and vocational education and training and higher education.

Source: Authors' estimates.

Table 41.3. Summary of West Kalimantan's Economic Internal Rate of Return and Sensitivity Analysis

Item		EIRR (%)	ENPV at 9% ($ million)	EBCR (ratio)
Subprojects				
No.	**Description**			
1	Wood Products	21.2	106	2.8
2	Palm Oil	18.6	250	2.2
3	Natural Rubber	17.8	56	1.5
Whole Project				
(a) Base estimate		19.5	444	2.2
(b) Benefits reduced by 10%		17.8	363	1.8
(c) Costs overrun of 10%		18.0	407	2.0
(d) 10% cost increase and benefits reduction		16.4	326	1.8

EBCR = economic benefit–cost ratio, EIRR = economic internal rate of return, ENPV = economic net present value at 9%.

Source: Authors'estimates.

rubber, while Sabah includes fisheries and wood products. Note that wood products is also included in the Sarawak–West Kalimantan border as a technical assistance project, whereas capital investment occurs on the West Kalimantan side of the border. Among the industries common to both border areas, medical tourism and TVET and higher education have nearly the same EIRRs for Sarawak and Sabah, while the EIRR for palm oil is somewhat higher for Sarawak (19.2%) relative to that of Sabah (18.0%).

The economic net present value, which are discounted at 9%, differs across projects. For both palm oil and medical tourism, Sabah's ENPV is considerably greater than that of the corresponding industries in Sarawak. In contrast, Sarawak's ENPV for TVET and higher education project is larger than that of Sabah.

These differences reflect not only the magnitude of the intervention but also differences in the type of investments involved. For palm oil as well as wood products in Sabah, project investment focuses on much-needed road construction for delivery of raw material supplies from North Kalimantan to Sabah. In contrast, investment in the palm oil industry in Sarawak is for capacity expansion of mill processing facilities. In medical tourism, Sabah's larger project investment is directed at the development of high-end facilities for international clients, whereas that of Sarawak is for the expansion of medical facilities for middle-income clients from West Kalimantan.

On the Indonesian side of the border, the average economic internal rate of return and the economic net present value for the program in West Kalimantan and North Kalimantan are quite similar. But the average obscures important differences between projects. In particular, the EIRR and ENPV for West Kalimantan is much larger for palm oil than in North Kalimantan, while the EIRR and ENPV for West Kalimantan's wood products are much smaller than in North Kalimantan. For palm oil, this difference is due to the considerable expansion in mill processing capacity needed in West Kalimantan, relative to the much smaller road construction cost in North Kalimantan.

Table 41.4. West Kalimantan's Economic Internal Rate of Return and Sensitivity Analysis

		Benefits ($ million)				Costs ($ million)						
		WOOD	POIL	RUBB	Total	Capital Costs	O&M	Total	Base	Benefits Decline 10%	Cost Overrun 10%	10% Cost Increase and Benefits Reduction
1	2018	0.6			0.6	0.0	0.0	0.0	0.6	0.5	0.6	0.5
2	2019	1.6			1.6	39.4	0.0	3 9.4	–3 7.8	–37.9	–41.7	–41.9
3	2020	2.9	8.1	1.6	12.6	91.2	7.7	98.9	–86.3	–87.5	–96.2	–97.4
4	2021	4.3	13.9	2.6	20.8	67.7	11.1	78.8	–57.9	–60.0	–65.8	–67.9
5	2022	6.0	20.5	3.8	30.3	67.7	14.5	82.1	–51.9	–54.9	–60.1	–63.1
6	2023	8.0	27.9	5.1	41.0	0.0	0.0	0.0	41.0	36.9	41.0	36.9
7	2024	8.2	31.0	5.8	45.11	0.0	14.5	14.5	30.6	26.1	29.2	24.7
8	2025	9.9	34.3	7.0	51.2	0.0	14.5	14.5	36.7	31.6	35.3	30.2
9	2026	11.6	38.2	8.3	58.0	0.0	14.5	14.5	43.6	37.8	42.1	36.3
10	2027	13.4	42.5	9.6	65.6	0.0	14.5	14.5	51.1	44.6	–49.7	43.1
11	2028	15.4	45.8	11.1	72.2	0.0	14.5	14.5	5 7.7	50.5	56.3	49.1
12	2029	17.4	50.0	12.6	80.0	0.0	14.5	14.5	65.5	57.5	64.1	56.1
13	2030	19.6	54.5	14.2	88.3	97.2	17.9	115.1	–26.8	–35.6	–38.3	–47.1
14	2031	21.8	59.9	16.0	97.7	0.0	17.9	17.9	79.8	70.0	78.0	68.2
15	2032	24.2	65.2	17.8	107.2	0.0	17.9	17.9	89.3	78.6	87.5	76.8
16	2033	26.7	70.8	19.8	117.3	0.0	17.9	17.9	99.4	87.6	97.6	85.8
17	2034	29.2	76.9	21.8	127.9	0.0	17.9	17.9	110.0	97.2	108.2	95.4
18	2035	31.9	83.3	24.0	139.2	0.0	17.9	17.9	121.2	107.3	119.5	105.5
19	2036	34.7	90.1	26.2	151.0	0.0	17.9	17.9	133.1	118.0	131.3	116.2

continued on next page

Table 41.4 *continued*

		Benefits ($ million)				Costs ($ million)						
		WOOD	POIL	RUBB	Total	Capital Costs	O&M	Total	Base	Benefits Decline 10%	Cost Overrun 10%	10% Cost Increase and Benefits Reduction
20	2037	37.6	97.3	28.6	163.6	0.0	17.9	17.9	145.7	129.3	143.9	127.5
21	2038	40.6	105.0	31.2	176.8	0.0	17.9	17.9	158.9	141.2	157.1	139.4
22	2039	43.7	113.2	33.8	190.7	0.0	17.9	17.9	172.8	153.7	171.0	151.9
23	2040	47.0	121.8	36.6	205.4	98.6	22.0	120.6	84.7	64.2	72.7	52.1
24	2041	50.3	131.0	39.5	220.8	0.0	22.0	22.0	198.8	176.7	196.6	174.5
25	2042	53.7	140.7	42.6	237.1	0.0	22.0	22.0	215.1	191.4	212.9	189.2
26	2043	57.3	151.0	45.8	254.2	0.0	22.0	22.0	232.2	206.8	230.0	204.6
27	2044	61.0	161.9	49.2	272.1	0.0	22.0	22.0	250.1	222.9	247.9	220.7
28	2045	64.8	173.5	52.8	291.0	0.0	22.0	22.0	269.0	239.9	266.8	237.7
29	2046	68.7	185.8	56.5	310.9	0.0	22.0	22.0	288.9	257.8	286.7	255.6
30	2047	72.7	198.7	60.4	331.7	0.0	22.0	22.0	309.8	276.6	307.6	274 .4
31	2038	76.8	212.4	64.5	353.7	0.0	22.0	22.0	331.7	296.3	329.5	294.1
32	2049	81.0	226.9	68.8	376.7	0.0	22.0	22.0	354.7	317.0	352.5	314.8
33	2050	85.4	242.2	73.3	400.9	0.0	22.0	22.0	378.9	338.8	376.7	336.6
								Economic Internal Rate of Return (EIRR) =	**19.5%**	**17.8%**	**18.0%**	**16.4%**
								Economic Net Present Value @ 9%=	**443.5**	**362.6**	**406.9**	**326.0**
								Economic Benefit–Cost Ratio (EBCR) =	**2.21**	**1.81**	**2.01**	**1.81**

FISH = fisheries, POIL = palm oil, RUBB = rubber, WOOD = wood processing.
Source: Authors' estimates.

Table 41.5. Comparison of Sarawak and Sabah Project Appraisal Results for Border Area Development Programs

		EIRR (%)		ENPV at 9% ($ million)		EBCR (ratio)	
Project		Sarawak	Sabah	Sarawak	Sabah	Sarawak	Sabah
1	Medical Tourism	22.0	21.9	183	248	1.4	1.7
4	Natural Rubber	15.6	NA	71	NA	1.3	NA
3	Palm Oil	19.2	18.0	62	114	1.4	1.4
2	TVET and Higher Education	19.8	20.5	83	12	2.1	2.1
5	Fisheries	TA	20.0	TA	61	TA	1.6
6	Wood Products	TA	3.7	TA	(55)	TA	0.7

EBCR = economic benefit–cost ratio, EIRR = economic internal rate of return, ENPV = economic net present value at 9%, NA = not applicable, TA = technical assistance, TVET = technical and vocational education and training.

Source: Authors' estimates.

Table 41.6. Comparison of West Kalimantan and North Kalimantan Project Appraisal Results for Border Area Development Programs

		EIRR (%)		ENPV at 9% ($ million)	
Project		West Kalimantan	North Kalimantan	West Kalimantan	North Kalimantan
1	Natural Rubber	17.8	NA	56	NA
2	Palm Oil	18.6	16.5	250	29
3	Wood Products	21.2	25.5	106	230
4	Fisheries	TA	20.0	TA	61

EBCR = economic benefit–cost ratio, EIRR = economic internal rate of return, ENPV = economic net present value at 9%, NA = not applicable, TA = technical assistance.

Source: Authors' estimates.

PART XI

Overall Nonmonetized Appraisal

42

Rating Project Characteristics

42.1 Project Prioritization

The Sarawak–West Kalimantan border economic area program seeks to address broad socioeconomic development goals. It needs an integrated rather than piecemeal approach to the design and operation. Best international practices suggest an all-inclusive approach to the development of the border area, considering interconnected cluster developments in the area. This approach will give rise to a comprehensive networking approach to border development so that economies of scale are derived from complementary cross-border activities and inter-border crossing activities.

In practice, however, technical and financial limitations may prevent the adoption of a comprehensive approach that simultaneously implements the entire program. It suggests the need to prioritize projects which, in and of themselves, would produce practical benefits otherwise not available in an all-inclusive approach. But it might, by its inherently limited approach, be unable to achieve the full benefits of scale economies that could otherwise be derived from a comprehensive approach to border development.

Possible prioritizations of projects depend on the preferences of each stakeholder group. Those interests can, for example, reflect the socioeconomic welfare of households, local commercial entities, multinational companies, local and national public authorities, or the development agenda of international development institutions. It is therefore inappropriate to simply prioritize projects according to their monetary returns since they are unlikely to consider stakeholder preferences. A weighted sum would be better, but there are many ways to weight project returns and the method selected needs to be justified. Fortunately, economics provides a way to reflect stakeholder preferences that is both theoretically and empirically sound.[172]

Each project discussed in this report has characteristics that benefit stakeholders in various degrees. Stakeholders are therefore likely to prefer certain projects because they have more of the characteristics that benefit them than others. Those characteristics consist of the following:

[172] For a technical explanation of the methodology, see M. Lord and P. Tangtrongjita. 2016. *Border Economic Zones in Thailand: A Practitioner's Guide*. Bangkok: Chulalongkorn University Press.

(i)	Commercial viability	(ii)	Knowledge transfer	(iii)	SME development
(iv)	Livelihood improvement of locals	(v)	Integrated value chain	(vi)	Border township development
(vii)	Use of cheap unskilled labor	(viii)	Poverty alleviation	(ix)	Health care access
(x)	Use of existing skilled labor	(xi)	Industrial estate	(xii)	Technical training
(xiii)	Raw materials access	(xiv)	Fiscal incentives	(xv)	Transport and logistics upgrade

42.2 Summary of Steps

A summary of the steps involved in quantifying stakeholder preferences for border economic area projects follows:

(i) Find ratings of project characteristics for each site based on structured questionnaire containing a Likert Scale (normally 1 to 5).
(ii) Determine the form of stakeholder's utility function for preference ordering (normally Cobb-Douglas function, as discussed in Appendix 2).
(iii) Establish a baseline solution for the aggregation of project features, based on a neutral preference ordering in which the parameters are all the same and sum to unity.
(iv) Determine hypothetical or actual preferences based on surveys of stakeholders, classified by major stakeholder groups (public officials on both sides of border, local population, large investors, and others).
(v) Assign weights to the parameters of the utility function that reflects the preference ordering of the major stakeholder groups.
(vi) Calculate the overall ratings and interpret results of different stakeholder groups.

42.3 Stakeholder Groups

For the Sarawak–West Kalimantan border economic area program, we consider three groups of stakeholders with different preference orderings for the prioritization of projects. The following describes the preference orderings of the three groups and their decision process.

(i) *Stakeholder Group A: Neutral preferences among projects.* In this case, the stakeholder group does not have to be compensated for changes in the amount of a project's characteristic by another one. The stakeholder group could, for example, represent the interests of public authorities that want to develop commercial activities and improve the livelihoods of the local population in ways that extend beyond possible commercially related gains.[173]

[173] Technically, in equation (A1.3) of Appendix 1, all the parameters ($\alpha, \beta, \ldots \omega$) of this group's utility function have equal values of 0.077, whose sum equals unity.

(ii) *Stakeholder Group B: Largely commercially oriented preferences for projects.* This stakeholder group prefers to develop those aspects of a project that support commercial activity along the border. The stakeholder group may be composed of large multinationals interested in exploiting cheap labor and abundant raw materials along the border area to improve their competitiveness.

(iii) *Stakeholder Group C: Social welfare-maximizing preferences of projects.* This stakeholder group prefers to develop those features that support the social and economic well-being of the population located along the border. The stakeholder group could represent development partners and NGOs with a mandate to reduce poverty and promote socioeconomic development of low-income areas.

42.4 Project Rankings

Rankings are based on stakeholder perceptions about how they rate the characteristics of each project in terms of potential net benefits. Table 42.1 presents ratings for the eight projects that make up the existing program. We exclude medical tourism and higher education and TVET from the analysis since those projects are specific to Sarawak.

The numerical values are based on a scale from 1 (low) to 5 (high) for each of the project characteristics. They are based on discussions held with Sarawak and West Kalimantan stakeholders.

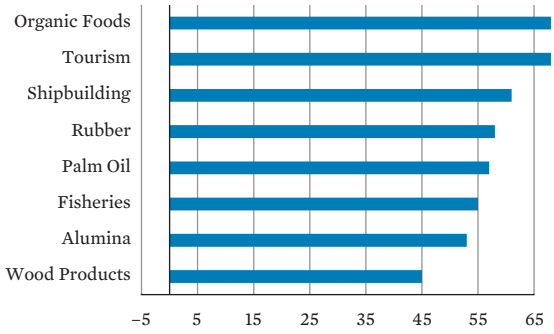
Table 42.1. Ratings of Characteristics in Projects

	Alumina	Rubber	Palm Oil	Wood Products	Fisheries	Shipbuilding	Organic Foods	Tourism
Commercial viability	5	5	5	4	5	5	5	5
Township development	2	4	3	3	3	2	5	5
Fiscal incentives	4	3	4	2	3	5	5	5
Health care access	4	3	2	2	2	5	3	3
Industrial estate	2	4	5	4	3	2	2	2
Integrated value chain	3	4	5	5	3	3	5	5
Knowledge transfer	5	3	5	2	3	5	5	5
Livelihood improvement	4	4	3	3	5	5	5	5
Poverty alleviation	4	5	2	2	4	4	5	5
Raw materials access	5	5	5	3	4	5	3	3
Small and medium-sized enterprise development	2	4	3	3	5	3	5	5
Technical training	4	3	3	2	4	5	5	5
Transport and logistics	2	3	4	4	4	4	5	5
Existing cheap labor	3	5	5	4	4	3	5	5
Existing skilled labor	4	3	3	2	3	5	5	5

Note: Scale from 1 (low) to 5 (high).

Source: Representation by the authors.

Figure 42.1. Combined Ratings of Major Project Characteristics



Source: Representation by the authors.

The following highlight the results:

(i) Strong commercial interest exists in the bauxite and alumina, shipbuilding, wood products, palm oil, and tourism.
(ii) Livelihood improvements occur mostly in organic foods, fisheries, rubber and ecotourism.
(iii) Organic foods are more likely to alleviate poverty than other projects.
(iv) SME development is closely associated with fisheries, organic foods, and tourism.
(v) Knowledge transfer that is especially associated with shipbuilding, palm oil, organic foods, and rubber (downstream industries).

Overall, the projects having the largest combined benefits are organic foods, followed by palm oil, fisheries, and tourism (Figure 42.1).

PART XII

Execution Strategy

43

Program Implementation

43.1 Advancing Program Components

The investment program comprises (i) establishment of Sarawak as a leading medical tourism center; (ii) expansion of international private TVET and higher education aligned with Sarawak's needs; (iii) development of cross-border value chains between Sarawak and West Kalimantan in shipbuilding, palm oil, wood products, fisheries, alumina, and organic foods; (iv) promotion of Sarawak–West Kalimantan tourism complementarities; and (v) capacity-building support (Figure 43.1).

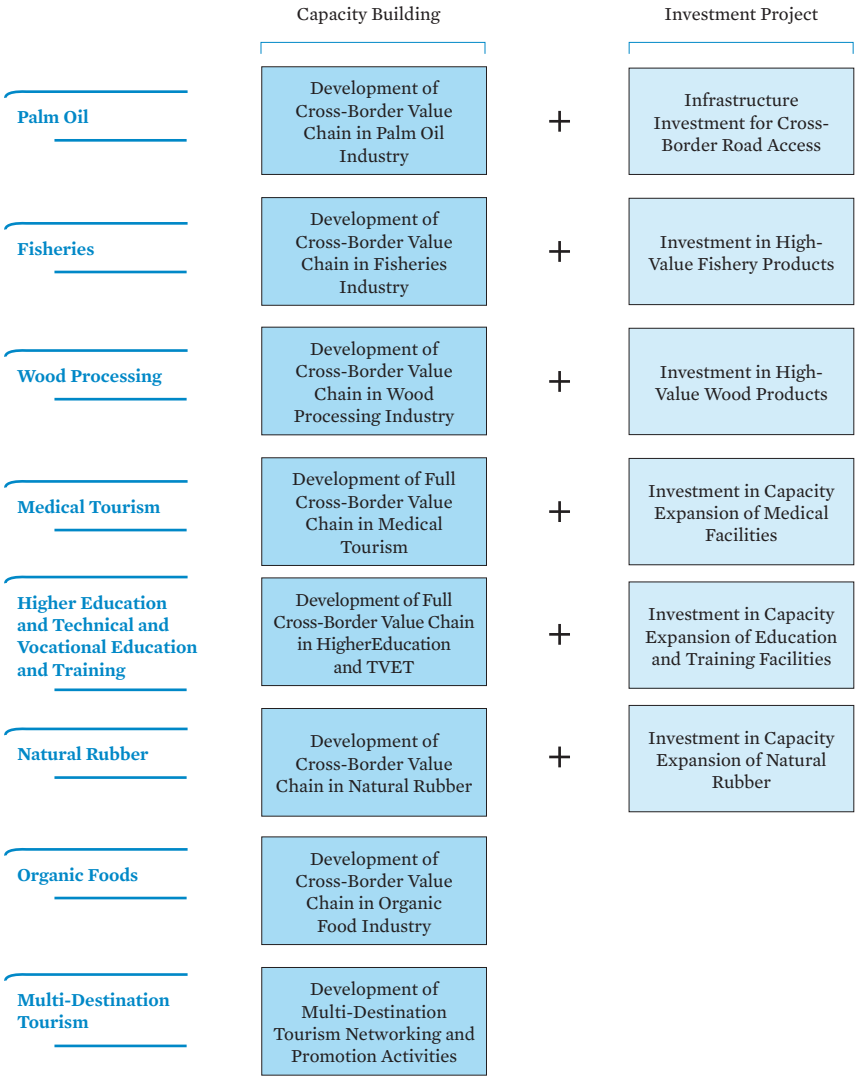
43.2 Sequencing Strategy

The transformation of border economic regions from border checkpoints into economic areas will largely depend on how border commerce is elevated to a certain level of socioeconomic development in the areas. Since the movement of goods and people along those corridors involves transnational cross-borders, development of border regions will require an integrated spatial planning approach that goes beyond purely provincial or national policies. Moreover, development of one side of the border is, sooner or later, likely to be conditional on trading conditions along both sides of the border. Figure 43.2 shows the stages of the transformation of border checkpoints into border economic areas.

(i) *Stage 1: Cross-border gateway of transport corridor.* Initially, cross-border gateways represent soft and hard infrastructural investments along priority corridors that aim to accommodate transport activities between Sarawak and West Kalimantan. As such, the corridors are viewed as transport axes in which infrastructural measures are intended to reduce trading costs and travel time. Reduced costs and time traveled, in turn, increase the competitiveness of companies using the corridors to deliver their products to intermediaries or end-users. At this stage, the focus is on transport facilitation through customs cooperation and integrated transport projects between the border economies.

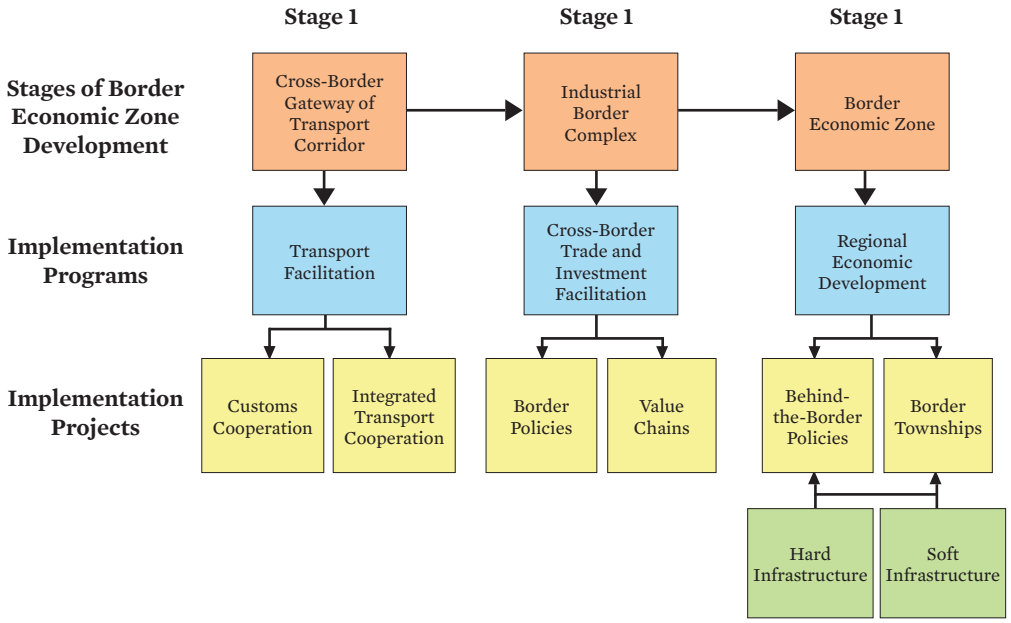
(ii) *Stage 2: Industrial border complex.* The next level of border area development involves improvements in spatial interaction among cross-border economic activity. These so-called cross-border supply chains, and value chains with them, are delimited areas having the following characteristics: (a) integrated infrastructure in a designated location; (b) raw material or component supplies originating from cross-border sources; (c) provision of hard and soft infrastructure that includes transport, high-power electric supplies, high-end communications systems, large-volume water supplies, and possibly high-volume gas lines; (d) eligibility for investment incentives;

Figure 43.1. Sarawak–West Kalimantan Investment Program



Source: Representation by the authors.

Figure 43.2. Sarawak–West Kalimantan Sequence of Border Economic Area Development



Source: Representation by the authors.

and (e) localized environmental controls that are specific to the needs of the industrial area. At this stage, the focus is on the development of systems to organize activities and resources involved in moving products or services from supplier to customer by transforming natural resources, raw materials, and components into finished products, using cross-border value chains to interconnected activities between bordering countries.

Cross-border supply chains create new opportunities for trade and investment. The result is an enlargement of markets and the creation of circumstances where value can be added through spatial interactions along the corridor. For the private sector, these activities center on their participation in value chains, while for governments, business associations and international development institutions, facilitating and enabling initiatives take the form of improvements in the production or export quality infrastructure to ensure that the products originating from different sides of the border meet the standards required of domestic or foreign markets.[174] In this context, it is useful to view trade and investment facilitation as involving actions needed to get products to intermediaries, and production or export quality infrastructure as the standards required by the intermediary or end-user, or those established by domestic or foreign governments.[175]

[174] Examples of production and export quality infrastructure are certification of products and management systems, competence of laboratories related to export, accreditation of laboratories, proficiency testing, metrology and inspection and, in the case of foods, inspection systems.

[175] Quality standards and requirements on specific product imports are often applied by governments.

(iii) *Stage 3: Border economic zones.* This stage involves the development of networks and clusters among interconnected activities within the geographic location that extend well beyond the industrial complex to include all aspects of spatial planning and development of hard and soft infrastructure for people living in the border region. These activities cover development of (a) the industrial zone, including soft and hard infrastructure and related fiscal incentives; (b) transport and logistics infrastructure to facilitate movement of goods and people along corridor systems; and (c) development of cross-border value chains to coordinate activities between bordering countries that have a direct impact on the local economy, employment, and income and which create opportunities for regional development. The third happens through industrial development policies that target cross-border value chain tasks; establishment of an enabling framework for cross-border trade and investment; and development of local production capabilities and training of the local workforce. To that end, border economic area developers need to jointly plan and implement the spatial distribution and functioning of industrial zones; customs, immigration, quarantine and security (CIQS) facilities; transport and logistics systems; governance capacity; public utilities; learning centers; townships; recreational facilities; and health care infrastructure.

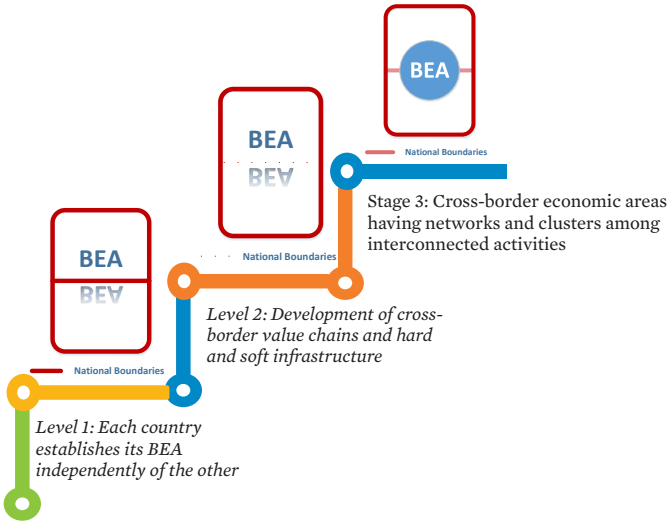
The role of the private sector in the development of the border economic area will progress rapidly if economic corridors reach the stage where increased spatial interaction among enterprises is significantly enhanced. Trade in goods and mobility of people along the West Borneo Economic Corridor could therefore become a major driver for promoting cross-border investment in activities that add value to the production of goods. Support in the form of trade related-technical assistance for trade development activities supporting trade finance, business support services, e-commerce, and public–private sector networking; and trade-related capacity-building activities to increase productive capacity through business development and actions aimed at improving the business climate, privatization, and assistance to key sectors and subsectors. Finally, the participation of micro and small-sized enterprises (MSEs) are an essential part of the process of converting the current transportation corridors into an economic corridor. One proven mechanism is through the integration of MSEs into subregional value chain activities; another is the development of subregional business development services along the corridors, supported by a Cost Sharing Facility (CSF) with Credit Guarantee Facility (CGF).[176]

43.3 Stages of Collaboration

Differences in the degree of collaboration between bordering countries give rise to a structured and phased approach to its development. Unilateral actions are associated with the initial stages of development (Figure 43.3). At subsequent stages, collaboration gradually increases through formal and informal agreements between bordering nations like Indonesia and Malaysia until the final stage is reached in which two geographic areas like Sarawak and West Kalimantan may establish an area with common regulations and incentives. At this final stage, the broad range of soft and hard infrastructure needed in the common territory requires close institutional collaboration for the joint planning and management of trans-boundary flows of goods and services, as well as movement of people.

[176] ADB. 2010. *Strategy and Action Plan for Greater Mekong Subregion East–West Economic Corridor*. Manila. http://www.adb.org/publications/strategy-and-action-plan-greater-mekong-subregion-east-west-economic-corridor.

Figure 43.3. Sarawak–West Kalimantan Stages of Cross-Border Collaboration under Integrated Border Area Development Program



BEA = border economic area.

Source: Representation by the authors.

APPENDIX 1

Project Ranking Methodology

The preference ordering of a group of representative stakeholders (for example, development partners, multinationals, small businesses, local communities) can be represented by a utility function that takes the following form:

$$U(X_1, \ldots, X_n) \tag{A1.1}$$

where U represents utility, X is the group of projects numbered from 1 to *n*. For example, X_1 can represent the gain obtained from the "industrial park" feature of the project, denoted X_2 the gain obtained from the "value chain" feature, and so forth.

Utility is an abstract measure of benefits obtained from a stakeholder group. Since it cannot be measured directly, it is inferred by "revealed preferences" that are observed by the compensation that needs to be offered to the stakeholder for substituting one feature for another. We can represent the rate of substitution between two features in such a way that the stakeholder is indifferent between the two as long as that stakeholder is compensated by an amount d for the difference between X_1 and X_2:

$$X_1 = dX_2 \tag{A1.2}$$

If substitution among project features takes place in the form of a *Cobb-Douglas utility function*, then the utility (or benefits) derived from the project features by a particular stakeholder can be measured according to the following preference ordering:[1]

$$U(X_1, \ldots, X_n) = X_1^{\alpha} X_2^{\beta} \cdots X_n^{\omega} \tag{A1.3}$$

The values of the parameters is such that $\alpha + \beta + \ldots + \omega = 1$, that is, the sum of all the parameters equals unity.

This relationship describes an *indifference curve* for a stakeholder because it expresses equal levels of gains for the stakeholder from various combinations of the features. In other words, there is not a single "optimal" value of a project feature such as fiscal incentives within specific cluster. Instead, when forming part of a cluster, fiscal incentives can be different, as long as they are *compensated* by changing the values of other features. Therefore, various combinations of features can form a cluster, as long as they provide a stakeholder with the same value of overall gains from the cluster.

[1] The Cobb-Douglas utility function is a special case of the more general Constant-Elasticity-of-Substitution (CES) utility function.

For example, consider a cluster with only two project features having values of 3.5 and 4.5, respectively. Let $\alpha = 0.4$ and $\beta = (1 - \alpha) = 0.6$. Then the indifference curve is represented as follows:

$$U(X_1, X_2) = 3.5^{0.4} * 4.5^{0.6} = 4.1 \quad \text{(A1.4)}$$

The gains of the cluster for the stakeholder is equal to 4.1 on an overall rating scale ranging from 1 to 5. The stakeholder is indifferent between how much of a project feature, X_1 he receives, as long as he is compensated for any changes in its size by variations in the amount of X_2 he receives, so that his total benefits equal 4.1 for all combinations of X_1 and X_2.

The rate of substitution among cluster categories underlies much of the analysis in feasibility studies. They essentially extend equation (A2.3) to the application of optimization analysis. In the case of border economic zones, the optimization problem involves determining the size of each project feature by valuing each of them and estimating the optimal amount of the combined cluster categories for the stakeholder group, given a budget constraint.

Since the parameters $\alpha, \beta, \ldots, \omega$ represent the weights of the corresponding features preferred by the stakeholder, we can use equation (A2.3) to calculate the overall results of the features values derived from the survey or other type of assessment for alternative border areas by assigning values to those parameters that would characterize the stakeholder's choices for them.

APPENDIX 2

Econometric Modeling of Trade

Indonesia's and Malaysia's import and export demand relationships are explained in this appendix. The estimated equations are for product-specific imports and exports, defined at the 6-digit Harmonized System (HS) level of products that are representative of the main types of traded products by six leading industries in Sarawak and West Kalimantan (Table A2.1).

There are three steps involved in the process: (i) test whether the import and export series are stationary; (ii) find the long-run relationship between each country's demand for exports by the other country; and (iii) include the effect of price competitiveness in the export demand relationship of each country.

Table A2.1. Representative Traded Products of Leading Sarawak and West Kalimantan Industries

Product	HS Code	Product Description
Alumina	281820	Aluminum oxide, aluminum hydroxide, aluminum oxide
Rubber	400129	Natural rubber, in primary forms or in plates, sheets or strip; natural rubber in other forms
Palm Oil	151110	Palm oil and its fractions, whether or not refined, but not chemically modified; crude oil
Wood Products	440890	Sheets for veneering, for plywood or for similar laminated wood and other wood, sawn lengthwise, sliced or peeled
Fish and Crustaceans	30749	Cuttlefish, squid, frozen, dried, salted or in brine
Vessels	890190	Cruise ships, excursion boats, ferry-boats, cargo ships, barges and similar vessels for the transport of persons or goods

Source: Based on information provided by national statistical offices.

Unit Root Tests

An economic relationship generally refers to a state where there is no inherent tendency to change. Such a relationship is, for example, described by the export demand relationship of the log linear form $x_i = \beta y_j$, where export changes in country i are related to changes in the economic activity of a foreign market j. In practice, however, an equilibrium relationship is seldom observed, so that measures of the observed relationship between x_i and y_j include both the equilibrium state and the discrepancy between the outcome and the postulated equilibrium. The discrepancy, denoted d, cannot have a tendency to grow systematically over time, nor is there any systematic tendency for the discrepancy to diminish in a real economic system since short-term disturbances are a continuous occurrence. The discrepancy is therefore said to be stationary insofar as over a finite period of time it has a mean of zero.

Individual time series that are themselves stationary are statistically related to each other, regardless of whether there exists a true equilibrium relationship. Thus, before estimating the export demand for Indonesia and Malaysia, it is useful to determine whether the data generating process of each of the series is itself stationary. Since economic activity variables have a tendency to grow (positively or negatively) over time, the variables themselves cannot be stationary, but changes in those series might be stationary. Series that are integrated of the same order, however, are said to be cointegrated and to have a long-run equilibrium relationship.[2] For trending variables that are themselves nonstationary but can be made stationary by being differenced exactly k times, then the linear combination of any two of those series will itself be stationary. It is therefore important to test the order of integration of the key series in the model.

Tests for stationarity are derived from the regression of the changes in a variable against the lagged level of that variable. Consider the following simple levels of regression:

$$y_t = a + by_{t-1} + d \tag{A2.1}$$

where a and b are constants and d is an error term. The term y is a stationary series if $-1 < b < 1$. If = 1, y is a nonstationary series and is instead a random walk with drift; if the absolute value of b is greater than one, the series is explosive.

By subtracting y_{t-1} from both sides, we obtain

$$\Delta y_t = \mathrm{a} + (\mathrm{b} - 1)y_{t-1} + \mathrm{d} \tag{A2.2}$$

The disturbance term d now has a constant distribution and the t-statistic on y_{t-1} provides a means for testing nonstationarity. If the coefficient on y_{t-1} is zero, then b must be equal to 1, and y is therefore stationary. The Augmented Dickey-Fuller test is a test on the t-statistic of the coefficient on y_{t-1}. The hypothesis $\mathrm{H}_0 = b - 1 = 0$ is called the unit-root hypothesis and it implies that y_t is nonstationary.

The unit-root test result for Indonesia's and Malaysia's total imports and exports to each other is shown in Table A2.2. The t-statistic values of the natural log of exports to one another, with intercept and trend, in the levels form are higher than the critical values at 1%, 5%, and 10% significance levels. Therefore, each of the export series is integrated with order I (1) and indicates a nonstationary behavior. The results therefore it fails to reject the null hypothesis. In contrast, the 2nd of both export series are integrated with order zero (0) since the t-statistic values with intercept and trend are less than the critical values of the 1%, 5%, and 10% significance levels, which means that the series are stationary.

Similarly, t-statistic values of the natural logarithm of Indonesia and Malaysia import volumes from the world, with intercept and trend, in the level forms are higher than the critical values at 1%, 5%, and 10% significance levels. Those results suggest that the series are integrated with order I (1) and they appear to exhibit nonstationary behavior. In contrast, the unit-root test for those imports in their 1st difference form demonstrate stationary behavior since the t-statistic values are less than the critical values at the 1%, 5%, and 10% significance levels.

[2] A series is said to be integrated of order k, denoted $I(k)$, if the series needs to be difference k times to form a stationary series. Thus, for example, a trending series that is $I(1)$ needs to be differenced one time to achieve stationarity.

Table A2.2. Unit Root Test Results for Indonesia and Malaysia Exports and Imports

Country	t-statistic and level of significance	Critical values of log (Indonesian export volume to Malaysia) Trend and intercept values Level	Critical values of log (Indonesian export volume to Malaysia) Trend and intercept values 2nd difference	Critical values of log (Malaysian import volume) Trend and intercept values Level	Critical values of log (Malaysian import volume) Trend and intercept values 1st difference
Indonesia	t-statistic	–2.744433	–3.373971	–2.632544	–2.632544
	1%	–4.667883	–4.886426	–4.296729	–4.296729
	5%	–3.7332	–3.828975	–3.568379	–3.568379
	10%	–3.310349	–3.362984	–3.218382	–3.218382
Malaysia	t-statistic	–3.373971	–4.968312	–2.667617	–4.147392
	1%	–4.886426	–4.728363	–4.296729	–4.374307
	5%	–3.828975	–3.759743	–3.568379	–3.603202
	10%	–3.362984	–3.324976	–3.218382	–3.238054

Source: Authors' estimates.

Modeling Demand Relationships in Trade

Economic series that are related to the long-run adjustment processes of other variables have been designated to be cointegrated series by Granger and Weiss (1983) and Engle and Granger (1987).[3] The theory of cointegration states that if two series, x and y, grow over time in such a way that the linear combination of these two variables, given by $d_t = x_t - \alpha y_t$, is stationary, and if α is unique, then x and y are said to be cointegrated. The series d_t measures the disequilibrium at period t when the long-run relationship between the two variables is $x_t = \alpha y_t$. The theory of cointegration states that movements in variables are related in a predictable way to the discrepancy between observed and equilibrium states. The sequence of this discrepancy tends to decay to its mean of zero.

Engle and Granger (1987) have demonstrated that a data-generating process of the form known as the "error-correction mechanism" (ECM) adjusts for any disequilibrium between variables that are cointegrated. The ECM specification thus provides the means by which the short-run observed behavior of variables is associated with their long-run equilibrium growth paths. Davidson et al. established a closely-related specification know as the "equilibrium-correcting mechanism" (also having the acronym ECM) that models both the short and long-run relationships between variables. Rearranging the terms of a first-order stochastic difference equation yields the following ECM:

$$\Delta x_t = \alpha_o + \alpha_1(x - y)_{t-1} + \alpha_2 \Delta y_t + \alpha_3 y_{t-1} + v_t \qquad \text{(A2.3)}$$

where x denotes export demand volume and y represents foreign real gross domestic product (GDP). The expected coefficient values are $-1 < \alpha_1 < 0$, $\alpha_2 > 0$ and $\alpha_3 > -1$, and all variables are measured in logarithmic terms.[4]

[3] C. W. J. Granger and A. A. Weiss. 1983. Time Series Analysis of Error-Correcting Models. In S. Karlin, S., Amemiya, T. and Goodman, L.A., eds. 1987. *Studies in Econometrics, Time Series, and Multivariate Statistics*. New York: Academic Press. pp. 255–278. https://doi.org/10.1016/B978-0-12-398750-1.50018-8; and R. Engle and C. Granger. 1987. Cointegration and Error Correction Representation, Estimation and Testing. *Econometrica*. 55. pp. 251–276.

[4] J. E. H. Davidson et al. 1978. Econometric Modelling of the Aggregate Time-Series Relationship Between Consumers' Expenditure and Income in the United Kingdom, *Economic Journal* 88: 661–92. https://ideas.repec.org/a/ecj/econjl/v88y1978i352p661-92.html.

The second term, $\alpha_1(x - y)_{t-1}$, is the mechanism for adjusting any disequilibrium in the previous period. When the rate of growth of the dependent variable x_t falls below its steady-state path, the value of the ratio of variables in the second term decreases in the subsequent period. That decrease, combined with the negative coefficient of the term, has a positive influence on the growth rate of the dependent variable. Conversely, when the growth rate of the dependent variable increases above its steady-state path, the adjustment mechanism embodied in the second term generates downward pressure on the growth rate of the dependent variable until it reaches that of its steady-state path. The speed with which the system approaches its steady-state path depends on the proximity of the coefficient to minus one. If the coefficient is close to minus one, the system converges to its steady state path quickly; if it is near to zero, the approach of the system to the steady-state path is slow. Since the variables are measured in logarithms, Δx and Δy can be interpreted as the rate of change of the variables. Thus the third term, $\alpha_2 \Delta y_t$, expresses the steady-state growth in *X* associated with *Y*. Finally, the fourth term, $\alpha_3 y_{t-1}$, shows that the steady-state response of the dependent variable *X* to the variable *Y* is nonproportional when the coefficient has nonzero significance.

The first step is to discuss the estimates of α_1 (Table A2.3). The associated t-statistic is a cointegration test statistic. Kremers et al. show that the t-statistic for the error-correction term follows the normal distribution in large samples.[5] Using a standard normal distribution table and performing a single-tailed test at the 5% significance level, based on the critical value 2.57, it is possible to reject the hypothesis of no cointegration for both Indonesia and Malaysia. For small samples, they recommend using the critical values of the Dickey-Fuller distribution, which are higher. At these values it is also possible to reject non-cointegration for both countries.

Table A2.3. Results of the Error Correction Model for Indonesian and Malaysian Exports to Each Other

Country	α_0	α_1	α_2	α_3	R^2 adjusted	F-Statistic	Log likelihood	Durbin-Watson
Indonesia	1.57	(0.60)	(0.32)	(0.12)	0.47	5.81	33.58	1.92
	2.61	3.43	2.57	0.95				
Malaysia	0.91	(0.27)		(0.19)	0.74	15.86	32.47	1.20
	1.85	2.14		1.76				

Note: Figures below the coefficients are t-statistics.
Source: Authors' estimates.

Once the steady-state relationship is analyzed, the next step is to assess the short-run dynamics of import demand, which is captured by the coefficient α_2.

(i) For Malaysia, the foreign income coefficient is statistically significant, suggesting the existence of a short-run (transitory) response of the demand for Malaysian exports to changes in Indonesia's real GDP.
(ii) For Indonesia, there does not appear to be such a short-term response of exports to changes in Malaysia's real GDP.

[5] J. Kremers, N. Ericsson, and J. Dolado. 1992. The power of cointegration tests. Oxford Bulletin of Economics and Statistics. 54(3). 325–348. https://core.ac.uk/download/pdf/29399509.pdf.

The long-run response of export demand to changes in foreign income is given by the equilibrium solution of equation (A2.3). Since the long-run equilibrium solution is unrelated to time, the rate of change over time of the dependent variable X (given by Δx_t) and the explanatory variable Y (given by Δy_t) are equal to zero. However, in dynamic equilibrium, equation (A2.3) generates a steady-state response in which growth occurs at a constant rate, say g. For the dynamic specification of the relationship in (A2.4), if g_1 is defined as the steady-state growth rate of the dependent variable X, and g_2 corresponds to the steady-state growth rate of the explanatory variable Y, then, since lowercase letters denote the logarithms of variables, $g_1 = \Delta x$ and $g_2 = \Delta y$ in dynamic equilibrium. In equilibrium the systematic dynamics of equation (A2.3) are expressed as:

$$g_1 = \alpha_o + \alpha_1(x - y) + \alpha_2 g_2 + \alpha_3 y \qquad \text{(A2.4)}$$

or, in terms of the original (anti-logarithmic) values of the variables:

$$X = k_0 Y^{\beta} \qquad \text{(A2.5)}$$

where $k_0 = \exp\{(-\alpha_o/\alpha_1) + [(\alpha_1 - \alpha_2\alpha_1 - \alpha_3)/\alpha_1^2]g_2$, and where $\beta = 1 - \alpha_3/\alpha_1$.

The estimates from equation (A2.4) yield the following long-term equilibrium solutions:

(i) For Indonesia, the long-run foreign income elasticity of export demand is 0.81, and $k_0 = 2.1$.
(ii) For Malaysia, the long-run foreign income elasticity of export demand is 0.31, and $k_0 = 8.9$.

The dynamic solution of equation (A2.5) therefore shows X to be influenced by changes in the rate of growth of Y, as well as the long-run elasticity of X with respect to Y. For example, where the rate of growth of the explanatory variable accelerate, say from g_2 to g'_2, the value of the variable X would increase. However, it is important to reiterate that the response to each explanatory variable can be either transient or steady-state. When theoretical considerations suggest that an explanatory variable generates a transient, rather than steady-state, response, it is appropriate to constrain its long-run effect to zero.

Modeling Price-Competitiveness Effects

We measure the competitiveness of Indonesia and Malaysia as the real exchange rate, R. The real exchange rate (RER) is the bilateral rate which considers changes in relative price levels between Indonesia and Malaysia and a foreign country. It measures changes in the purchasing power between the domestic and the foreign economy, and it provides an indicator of changes in the international competitiveness of the domestic economy in its ability to purchase more (or less) goods and services per unit of foreign currency.

The bilateral real exchange rate, R, of a country i with trading partner j can be expressed as:

$$R_{ijt} = \frac{P_{it}\, E_{ijt}}{P^*_{jt}} \qquad \text{(A2.6)}$$

where P_i measures the domestic price level for country i; P_j^* the foreign price level in country j; and E_{ij} is the relevant nominal exchange rate (expressed as foreign currency

per unit of domestic currency). Since this measure is used as an indicator of international competitiveness, a fall (depreciation) in the bilateral real exchange rate should result, ceteris paribus, in an increase in the demand for exports of a country in the foreign country.

The effects of changes in the international competitiveness of Indonesia and Malaysia inter-regional trade can be measured by extending the first-order stochastic difference equation to include that variable. Transformation of an autoregressive distributed lag into an ECM with a "differences" formulation of the relative price or exchange rate term nested in the levels form of the equation yields the equation:

$$\Delta x_t = \alpha_o + \alpha_1(x - y)_{t-1} + \alpha_2 \Delta y_t + \alpha_3 y_{t-1} + \alpha_4 \Delta r_t + \alpha_5 r_{t-1} + v_t \qquad \text{(A2.7)}$$

where $-1 < \alpha_1 < 0$, $\alpha_2 > 0$, $\alpha_3 > -1$, $\alpha_4 < 0$ and $\alpha_5 < 0$, and where all variables are measured in logarithmic terms.

Table A2.4 reports the results of equation (A2.7) estimates. The short-run dynamics of the bilateral real exchange rate, captured by the coefficient α_4, are as follows:

(i) For Malaysia, the coefficient is statistically significant, suggesting the existence of a short-run (transitory) response of the demand for Malaysian exports by Indonesia in response to changes in the real cross-rate.
(ii) For Indonesia, the coefficient is also statistically significant, suggesting the existence of a short-run (transitory) response of the demand for Indonesian exports by Malaysia in response to changes in the real cross-rate.

Table A2.4. Results of the Error Correction Model for Indonesian and Malaysian Exports to Each Other with Effect of Bilateral Real Exchange Rates

Country	α_0	α_1	α_3	α_4	α_5	R^2 adjusted	F-Statistic	Log likelihood	Durbin-Watson
Indonesia	1.50	(0.60)	(0.32)	(0.12)		0.47	5.81	33.58	1.92
	2.61	3.43	2.57	0.95					
Malaysia	1.05	(0.19)	(0.11)	(0.48)	(0.11)	0.67	6.43	32.82	1.89
	0.65	1.35	0.70	2.89	(0.53)				

Note: Figures below the coefficients are t-statistics.
Source: Authors' estimates.

In neither case, however, are the coefficient estimates for the long-run dynamics of the bilateral real exchange rate, measured by the coefficient α_5, statistically significant.

The long-run response of export demand to changes in partner country imports and the real cross-rate is given by the equilibrium solution of equation (A2.7), based on the same procedure used to derive the earlier equilibrium solution in equation (A2.5):

$$X = k_0 Y^{\beta} R^{\theta} \qquad \text{(A2.8)}$$

where $k_0 = \exp\{(-\alpha_o/\alpha_1) + [(\alpha_1 - \alpha_2\alpha_1 - \alpha_3)/\alpha_1^2]g$, and where $\beta = 1 - \alpha_3/\alpha_1$ and $\theta = -\alpha_4/\alpha_1$.

The estimates from equation A2.7 yield the following long-term equilibrium solutions:

(i) For Indonesia, the long-run demand for exports with respect to foreign income of Malaysia is 0.47, and $k_0 = 5.58$.
(ii) For Malaysia, the long-run demand for exports with respect to foreign income of Indonesia is 0.42, and $k_0 = 26.4$.
(iii) For Indonesia, the long-run bilateral real cross rate with respect to Malaysia is not statistically significant.
(iv) For Malaysia, the long-run bilateral real cross rate with respect to Indonesia is –0.11.

Gravity Trade Modeling

We use the following log/linear regression model:

$$ln(M_{ijk}) = \alpha_i + \beta_{i1} ln(Y_{ik}) + \beta_{i2} ln(Y_{ij}) + \beta_{i3} ln(ED_{jk}) + \beta_{i4} ln(GD_{jk}) + \beta_{i5} ln(TC_{jk}) + \beta_{i6} WB_{jk} + \beta_{i7} WL_{jk} + \varepsilon \quad \text{(A2.9)}$$

α_i denotes the intercept, β_{i1}, β_{i2}, β_{i3}, β_{i4}, β_{i5}, β_{i6} and β_{i7} denote the partial regression coefficients, and ε represents the random error term. In expression (1) "*i*" denotes industries while "*j*" and "*k*" denote countries.

The following are the variable definitions:

M_{ijk} Country *k*'s imports from country *j* in industry *i*.
Y_{ik} Country *k*'s own output of industry *i*.
Y_{ij} Trading partner *j*'s output of industry *i*.
ED_{jk} Economic distance represented by the absolute differences between the per-capita income of country *j* and country *k*.
TC_{ijk} Trade costs of industry *i* in imports from *j* to *k*.
GD_{jk} Geographic distance between country *j* and *k*.
WB_{jk} Binary variable indicating whether *j* and *k* are contiguous to one another.
WL_{jk} Binary variable indicating whether *j* and *k* share ethno-common language because at least 9% of each of the country speaks that language.

The dependent variable is the log of the amount of bilateral merchandise exports, which results in two observations for each country pair, i.e. the export flows from country *i* to *j*, and those from *j* to *i*. These data come from the United Nations' COMTRADE database for bilateral trade flows and refer to 1999. We use reported imports rather than reported exports, because the former provides a better coverage. We use mirror import flows that correspond to the export flows.

(i) The source of the GDP and GDP per capita data is International Monetary Fund (IMF) database for the World Economic Outlook (April 2018). The values are in current United States dollars.
(ii) The data on geographic distance, common border, common official language, common regional trade agreement, common dominant religion, and common colonial history come from Centre d'Études Prospectives et d'Informations Internationales (CEPII). The center makes available a "square" gravity dataset for all world pairs of

Table A2.5. Final Estimation Results of Gravity Model for Malaysia's Import Demand for Products from Key Sarawak Industries

	Aluminum	Rubber	Palm Oil	Wood Products	Fish and Crustaceans	Ships
GDP of reporter (log)	0.45 (3.1)	1.52 (5.9)	0.98 (3.46)	0.70 (4.4)	1.33 (8.1)	1.12 (3.4)
GDP of partner (log)	1.17 (16.1)			0.39 (7.2)	0.27 (3.5)	
Economic distance (log)		–1.61 (–7.0)			–0.76 (10.0)	–0.13 (–0.8)
Geographic distance (log)		–0.35 (–2.5)			–0.46 (–3.6)	
Trade costs (log)	–1.48 (–6.4)	–1.61 (–3.8)	–1.15 (1.4)	–0.70 (–4.1)	–0.35 (–1.2)	
Contiguity			2.77 (5.2)			
Language commonality				(1.3) 5.20	0.57 (2.2)	0.50 (1.2)

GDP = gross domestic product.

Note: t-statistics are given in parentheses.

Source: Authors' estimates.

Table A2.6. Gravity Model Variable Descriptions and Sources

Variable Name	Label	Unit	Detailed Description	Data Source
M_i	Imports of industry-specific products, current US dollars	$ million	Value of bilateral imports at 6-digit HS level	IMF DOTS: http://www.imfstatistics.org/dot/.
Y_j	GDP of reporter (million), current US$	$ million	GDP of reporter country	IMF: World Economic Outlook database. https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx.
Y_k	GDP of partner country (million), current US$	$ million	GDP of partner country	IMF: World Economic Outlook database. https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx.
ED_{jk}	Economic distance	$	Absolute difference between GDP of reporter country and partner trading country, current US dollars	IMF: World Economic Outlook database. https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx.
GD	Geographic distance	km	Distance between trading partners	CEPII: http://www.cepii.fr.
C	Bilateral trade costs	Percent	Bilateral trade costs computed by Inverse Gravity Framework	http://data.worldbank.org/data-catalog/trade-costs-dataset.
WB	Two countries are contiguous	Binary	Binary variable. Value of 1 if two countries contiguous and "0" otherwise	CEPII: http://www.cepii.fr and http://artnet.unescap.org/databases.html.
WL	Two countries share common language based on the fact that at least 9% of each of the country speaks the same language.	Binary	Binary variable. Value of 1 if two countries share ethno-common language; 0 otherwise	CEPII: http://www.cepii.fr and http://artnet.unescap.org/databases.html.

GDP = gross domestic product.

Source: Representation by the authors.

countries, for the period 1948 to 2015, allowing the estimation of international flows as a function of GDP, population, and trade costs. CEPII's GeoDist database provides several geographic variables, in particular bilateral distances measured using city-level data to account for the geographic distribution of population inside each nation. In that same database, different measures of bilateral distances are available for 225 countries. For most of them, different calculations of "intra-national distances" are also available.

(iii) The common border dummy takes the value of one if two countries are adjacent.

Because economic theory makes clear predictions about both the sign and the magnitude of the expected coefficients of the explanatory variables and their associated elasticities, only the final equation estimates for the coefficients are normally reported in the literature. We take a full-disclosure approach and report estimates of the final gravity model regression in Table A2.5. For descriptions about the model's variables and their sources, see Table A2.6.

APPENDIX 3

Project Appraisal

Internal Rate of Return

Throughout this study we use the *internal rate of return* (IRR) to measure the monetary benefits of a project. It is the *discount rate* at which the *net present value* of an investment is zero. The *discount rate*, in turn, is the rate of return used in a discounted cash flow analysis to determine the present value of future cash flows. In a discounted cash flow (DCF) analysis, the sum of all future cash flows (C) over some holding period (n) is discounted back to the present using a rate of return (r), using the formula $DCF = [C_1/(1 + r)^1] + [C_2/(1 + r)^2] + \ldots + [C_n/(1 + r)^n]$.

The *net present value* is the *present value* of the expected future cash flows minus the cost. The *present value* is the amount of cash today that is equivalent in value to a payment, or to a stream of payments, to be received in the future. To determine the present value, each future cash flow is multiplied by a *present value factor*. The *present value factor* is the factor used to calculate an estimate of the present value of an amount to be received in a future period. For example, if the opportunity cost of funds is 10% over next year, the factor is $[1/(1 + 0.10)]$.[6]

The IRR is either measured in economic or financial prices. The *conversion factor (CF)* is used to measure the relation between the two prices; specifically, CF = economic price (EP)/ financial price (FP), and it is defined as the economic price value of all goods in the economy at their border price equivalent values to their domestic market price value.

Economic Internal Rate of Return

Rate of return achieved on all project resource costs measured in economic prices; for a project to be acceptable, the EIRR should be greater than the economic opportunity cost of capital. The EIRR is calculated through an iterative mathematical process that automatically discounts net benefits of a project over its life cycle. For infrastructure, the time horizon is normally 20 to 30 years. Projected net benefit in any given year is subject to a (compounded) discount factor; the further into the future, the smaller the discount factor and the smaller the net benefit.[7]

---

[6] C. R. Harvey. *Hypertextual Finance Glossary.*

[7] A discount rate is used irrespective of inflation since time has an inherent value associated with it. A person would prefer one dollar today than one dollar in the future. To accept the same dollar in the future, a person would want to be financially compensated. For example, instead of receiving one dollar today a person is likely to accept $\$1 \times (1 + i)^n$ in a future year *n*, where i is the discount rate (equivalent to an interest rate).

Financial Internal Rate of Return

Rate of return achieved on all project costs, where all costs are measured in financial prices and benefits represent the financial revenues that would accrue to the main project participants. The FIRR is mainly of interest to the private sector (private projects), whereas the EIRR is of interest to the public sector (public projects). Generally, taxes and subsidies are incorporated into the FIRR calculation, whereas they are excluded in EIRR calculations. Also, in FIRR calculations, market prices are used, whereas in EIRR calculations the shadow price is used.

Consumer Preferences in Nonmonetized Project Analysis

The preference ordering of a group of representative stakeholders (for example, development partners, multinationals, small businesses, local communities) can be represented by a *utility function* that takes the following form:

$$U(X_1, \ldots, X_n) \tag{A3.1}$$

where U represents utility, X is the group of projects numbered from 1 to *n*. For example, X_1 can represent the gain obtained from the "industrial park" feature of the project, denoted X_2 the gain obtained from the "value chain" feature, and so forth.

Utility is an abstract measure of benefits obtained from a stakeholder group. Since it cannot be measured directly, it is inferred by "revealed preferences" that are observed by the compensation that needs to be offered to the stakeholder for substituting one feature for another. We can represent the rate of substitution between two features in such a way that the stakeholder is indifferent between the two as long as that stakeholder is compensated by an amount *d* for the difference between X_1 and X_2:

$$X_1 = dX_2 \tag{A3.2}$$

If substitution among project features takes place in the form of a *Cobb-Douglas utility function*, then the utility (or benefits) derived from the project features by a particular stakeholder can be measured according to the following preference ordering:[8]

$$U(X_1, \ldots, X_n) = X_1^{\alpha} X_2^{\beta} \ldots X_n^{\omega} \tag{A3.3}$$

The values of the parameters is such that $\alpha + \beta + \ldots + \omega = 1$, that is, the sum of all the parameters equals unity.

This relationship describes an *indifference curve* for a stakeholder because it expresses equal levels of gains for the stakeholder from various combinations of the features. In other words, there is not a single "optimal" value of a project feature such as fiscal incentives within a specific cluster. Instead, when forming part of a cluster, fiscal incentives can be different, as long as they are *compensated* by changing the values of other features. Therefore, various

[8] The Cobb-Douglas utility function is a special case of the more general Constant-Elasticity-of-Substitution (CES) utility function.

combinations of features can form a cluster, as long as they provide a stakeholder with the same value of overall gains from the cluster.

For example, consider a cluster with only two project features having values of 3.5 and 4.5, respectively. Let $\alpha = 0.4$ and $\beta = (1 - \alpha) = 0.6$. Then the indifference curve is represented as follows:

$$U(X_1, X_2) = 3.5^{0.4} * 4.5^{0.6} = 4.1 \quad \text{(A3.4)}$$

The gains of the cluster for the stakeholder is equal to 4.1 on an overall rating scale ranging from 1 to 5. The stakeholder is indifferent between how much of a project feature, X_1 he receives, as long as he is compensated for any changes in its size by variations in the amount of X_2 he receives, so that his total benefits equal 4.1 for all combinations of X_1 and X_2.

The rate of substitution among cluster categories underlies much of the analysis in feasibility studies. They essentially extend equation (A3.3) to the application of optimization analysis. In the case of border economic zones, the optimization problem involves determining the size of each project feature by valuing each of them and estimating the optimal amount of the combined cluster categories for the stakeholder group, given a budget constraint.

Since the parameters $\alpha, \beta, \ldots, \omega$ represent the weights of the corresponding features preferred by the stakeholder, we can use equation (A3.3) to calculate the overall results of the features values derived from the survey or other type of assessment for alternative border areas by assigning values to those parameters that would characterize the stakeholder's choices for them.