

DEVELOPMENT
KNOWLEDGE AND
LEARNING

Strengthening Cross-Border Value Chains

Opportunities for India
and Bangladesh

Edited by
Sanjay Kathuria
Priya Mathur



DEVELOPMENT KNOWLEDGE AND LEARNING

Strengthening Cross-Border Value Chains

Opportunities for India and Bangladesh

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Abbreviations

APMC	Agricultural Produce Market Committee
ASEAN	Association of South East Asian Nations
BBIN	Bangladesh-Bhutan-India-Nepal
BCIM	Bangladesh-China-India-Myanmar
BSTI	Bangladesh Standards and Testing Institution
CAGR	compound average growth rate
CP	Choern Pakard
CT	computed tomography
ENT	Ear, nose, and throat
F&V	fruits and vegetables
FSC	Forest Stewardship Council
GDP	gross domestic product
GMC	Gauhati Medical College
GMCH	Guwahati Medical College and Hospital
GoI	Government of India
HS	Harmonized System
ICMR	Indian Council of Medical Research
ICP	Integrated Check Post
IT	information technology
LDC	Least Developed Countries
MBBS	Medicine and Bachelor of Surgery
MHTC	Malaysian Healthcare Tourism Council
MRI	magnetic resonance imaging
MTA	medical tourist arrivals
NBM	National Bamboo Mission
NECHRI	North East Cancer Hospital and Research Institute
NER	North East Region

NERLP	North East Rural Livelihoods Project
PEFC	Programme for the Endorsement of Forest Certification
PIWTT	Protocol on Inland Water Transit and Trade
PRA	pest risk analysis
R&D	research and development
SAFTA	South Asian Free Trade Area
SIDBI	Small Industries Development Bank of India
SITC	Standard International Trade Classification
SMEs	small and medium enterprises
WITS	World Integrated Trade Solution

Introduction

This volume synthesizes analytical work that was undertaken in support of the implementation of the World Bank-supported North East Rural Livelihoods Project (NERLP).

The North East Region (NER) of India,¹ isolated from the rest of India and the world through much of the history of independent India, is now witnessing accelerating investments in connectivity. Over the past decade, connectivity agreements with Bangladesh and accelerating infrastructure investments in NER and its neighbors, under the broad umbrella of the Government of India's "Act East" policy, are reducing the subregion's economic isolation.

Global trends also place NER in a favorable position. These include growing incomes, leisure spending, and consumer awareness in India and neighboring countries; a rising preference for fresh, healthy, safe, environmentally friendly, and socially responsible products; and the growing role of services in manufacturing, increasing demand for skilled resources.

Together, these developments can help NER showcase its strengths in agriculture and services. NER can capitalize on rising demand for fresh fruits and vegetables, and for fresh, high-quality spices, especially those produced in an environmentally friendly and socially responsible manner. It can promote bamboo, an environmentally friendly resource. It can encourage nature-based tourism, as well as trade in medical and education services. These examples are not exhaustive, but they represent some of the immediate possibilities for the region.

Bangladesh, which shares a border with four of the eight NER states, is very well placed to benefit from, and play a critical role in, NER's development. NER can find a ready and fast-growing market for its products in Bangladesh, including for raw materials and agricultural products. This means that Bangladeshi consumers can benefit through access to possibly cheaper and greater variety of goods and services. In addition, there will be growth opportunities for Bangladeshi firms through access to markets in NER (and beyond, through NER) for sourcing inputs as well as for selling finished products; through investing in goods and services that could lead to the creation of regional value chains, as well as through the prospect of learning for more demanding markets; and opportunities for gains through more efficient logistics services and transit arrangements.

The World Bank, in consultation with stakeholders—government, private sector, and academia—explored these issues at two levels. At the policy level, two cross-cutting constraints that are encountered across all sectors in NER were identified for deeper analysis: connectivity and logistics, and product standards and

quality infrastructure. To ground the policy in specific contexts, the team studied four sectors in depth—fruits and vegetables, spices, bamboo and related products, and medical tourism. These sectors are illustrative and not meant to pick winners. Within the identified sectors, the team focused on “high-impact” segments that capitalize on changing consumer preferences in a way that allows higher potential returns to women and the bottom 40 percent of those within the segment.

To keep the study focused, and yet to cover diverse states in NER, the sector studies concentrated on three states: Mizoram, which shares a border with Bangladesh and Myanmar; Tripura, given its geographic proximity and cultural affinity with Bangladesh and the presence of the only Integrated Check Post in NER in that state; and Assam, which is the junction of all the logistics networks in NER. However, the study findings should be applicable across states.

The sector studies that the team has undertaken are different in several ways. First, they bring the demand side into focus, considering how changing consumer preferences are impacting the nature of global demand, and emphasize the need to reorient the supply base in NER toward serving this changing demand. Second, they apply an explicit lens in the value chain analysis to focus on women as well as the bottom 40 percent of the workforce pyramid. In NER, existing product value chains serve market segments where most of the margin is appropriated by others, for example, intermediaries and processors in fruits and vegetables and spices, and doctors and hospitals in medical services. This study endeavors to identify product-market combinations (called “strategic segments”) or value chains within a sector that can create more and better job opportunities for women and the poor. Third, some of the studies also highlight the role that technology can play in realizing the potential of high-impact value chains in sectors in which NER has an inherent advantage.

This volume contains five chapters. The first four chapters focus on the development of inclusive value chains in different sectors. Chapter 1 focuses on spices; chapter 2 on fruits and vegetables; chapter 3 on bamboo and bamboo products; and chapter 4 on medical tourism. Chapter 5 focuses on how Bangladesh can benefit from the opportunities presented by the increasing connectivity and growth prospects of NER. These opportunities are, of course, win-win for both NER and Bangladesh, since economic exchange is mutually beneficial: for example, a growing market for NER products in Bangladesh also benefits the latter’s consumers, and FDI is good for NER but also good for Bangladeshi firms who can get access to inputs and land, and learn in a culturally similar environment.

This volume is a companion piece to the report, *Playing to Strengths: A Policy Framework for Mainstreaming Northeast India* (Kathuria and Mathur 2019). The latter analyzes the larger picture of NER, looking at its broad comparative advantage in the light of global trends; it also provides an in-depth discussion of key cross-cutting constraints: connectivity and logistics, and product standards and quality infrastructure.

NOTE

1. NER comprises all states of India to the north and east of the Indian state of West Bengal.

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1 Spices

CILIAKA MILLICENT W. GITAU

ABSTRACT This paper is part of analytical work done by the World Bank on strengthening inclusive cross-border value chains in Northeast India, in support of the implementation of the World Bank-supported North East Rural Livelihoods Project (NERLP). For illustrative purposes, four promising sectors in the North Eastern Region of India were selected for deeper value chain analysis, of which spices was one. The spice industry has developed sophisticated systems to meet the product standards laid out by food legislation and the quality requirements of discerning consumers. There is an increasing need for traceability, granular testing, and certification, as well as environmental and socially sustainable production, packaging, and distribution. Six strategic segments were identified, each with its own unique value chain. The analysis finds that the fresh spices segment would realize higher value for farmers relative to dry spices when they link to the market and upgrade to meet the required quality standards. Divergent from traditional thinking that engagement in value addition is the main approach to creating more value for farmers, this analysis indicates that upgrading upstream activities to align with consumer needs and fostering market linkages downstream create more value for farmers. To upgrade and compete in the high-value segment, an all-encompassing improvement across the value chain is critical. Countries and regions that have gained significant market value and competitiveness for farmers have focused on improving product quality through market research and development, enhancing farmers' awareness and training in appropriate cultivation and harvesting practices, using effective quality control and assurance, developing the requisite storage and transport infrastructure and logistics framework, and using sustainable labeling and packaging complemented with rigorous marketing and advertisement.

INTRODUCTION

Spices are plants and trees that are rich in essential oils and aromatic principles and mainly used as condiments. They are derived from bark, stems, buds, roots, seeds, leaves, flowers, or fruits. Some spices are used for their taste, and others are used for their aroma. Spices contain nutritional, antimicrobial, antioxidant, and medicinal properties and are often used because of their health benefits.¹

Spices can be consumed or traded as fresh, dried, or crushed/ground. In some cases, spices are transformed into paste form, dipped in brine, or processed into candy, cookies, flakes, beer, wine, juice, and so forth. Some specialized industries focus on extracting the active ingredients from the spice, such as curcumin from turmeric, capsaicin from chili, oleoresins from ginger, or oils, among others, which are then applied in industrial uses or packaged as dietary or herbal supplements.

Conventionally, spices were mainly used in food to add flavor and color, and hence their quality was determined through observation of characteristics such as freshness, color, and taste. However, the spice industry, like the rest of the food sector, is experiencing significant transformations. Spurred by growing incomes and awareness, there is an emerging segment of “discerning” consumers who are conscious of the health impacts of spices² and also concerned about environmental sustainability and social responsibility (such as use of child labor, gender balance in the labor force, and fair labor policies, including remuneration). Demand from this growing consumer segment, along with the growing demand for cosmetics and pharmaceutical products made from natural ingredients, is driving the demand for high-quality spices. The spice industry has developed sophisticated systems for granular testing and traceability to meet the quality requirements of discerning consumers and the increasingly stringent product standards required by food legislation.

Various factors are driving the expansion of the spices market. These include the growing demand for multicultural cuisines, especially Asian cuisines that use a variety of spices; healthy living consciousness and the recognized health benefits of spices; and the growing demand for cosmetics and pharmaceutical products made from natural ingredients. The global spices market was estimated at US\$11.5 billion in 2015³ and is expected to grow at a compound average growth rate (CAGR) of 5.2 percent, to reach about US\$14 billion by 2020. The United States, Europe, and the Middle East constitute the most significant share of the spice trade. Notably, in 2015, turmeric was the top-selling natural/herbal dietary supplement in the United States.⁴

This paper analyzes the sector through the lens of five strategic segments, or user-product combinations, in the spices sector. Fresh, natural, clean, safe, and sustainably produced spices were identified as differentiating factors for value creation. The analysis finds that the fresh spices segment targeted at discerning, quality conscious customers—who are health conscious, environmentally conscious, and socially responsible—has the potential to realize higher value for farmers when they link to the market and upgrade to meet the requisite quality and standards. Farmers who can deliver the product to consumers expeditiously, within a few days of harvest, and with its freshness and purity intact and assured will derive more value. Discerning consumers are willing and able to pay the relatively higher price for high-quality spices.

Spice farming in Northeast India possesses significant potential to service this demand and generate higher returns for farmers and others in the bottom 40 percent of the workforce pyramid, as well as women. The North Eastern Region's (NER's) various agroclimatic zones and its unique topography, climate, altitudes, and soil properties yield a variety of spices that are valued for their intrinsic properties and high content of active ingredients. For instance, the Naga/bird's eye chilies from Mizoram and the Bhut jolokia chilies from Assam have high pungency derived from their high capsaicin content, Lakadong turmeric from Meghalaya is high in curcumin, and Nadia ginger from all NER states is high in fiber. Furthermore, with the relatively low penetration of chemical fertilizers and pesticides in the region, spice farming is near-organic or organic in nature and aligns well with the trends in global demand. The higher quality spices obtain higher prices in the market beyond the region.

Agriculture is critical for employment creation and livelihoods improvement in Northeast India. Increasing the productivity and competitiveness of the agriculture sector is paramount for addressing low incomes and unemployment. Spice farming, like the rest of horticulture, is labor intensive and has the potential to generate substantial employment and foreign exchange compared with crop cultivation. Among spices, ginger is grown in almost all the NER states as the main cash crop. Most spice farmers are smallholder farmers and lack adequate resources to commercialize their farming. Enabling small-scale farmers to improve product quality to meet consumer needs and linking them to high-value markets comprising discerning consumers could help them realize better returns from farming. Targeting the high-value market could also help them better withstand market shocks. The spices market has been quite volatile in the volumes produced and traded and market prices. However, differentiated, high-quality spices have continued to enjoy stable prices. NER has the capability to tap into this high-value market segment.

Investment in the food and agriculture sector has the potential to boost informal and formal trade between Bangladesh, India, and Myanmar. The spices sector in NER could scale up by leveraging the opportunities provided by neighboring countries—they can serve as markets and sources of inputs and investment in the sector. Bangladesh can gain from such cross-border trade by obtaining a variety of high-quality spices for its vibrant food industry. It also has a strategic role to play in connecting NER to the global market through the Ports of Chittagong and Mongla and the rest of India through more cost- and time-efficient land or multimodal transportation corridors. Toward the east, Myanmar provides a link to China, East Asia, and Southeast Asia, which are also great consumers of spices.

The rest of the paper is organized as follows. The next section describes trends in the spices sector around the globe, in India, and in NER. The following section highlights key global trends that are impacting the nature of demand for spices and proposes a strategic segmentation of the global spice industry. The paper then evaluates the attractiveness of various strategic options for the spice industry in NER, which clearly brings out the attractiveness of fresh spices that cater to discerning customers. This is followed by a discussion of the existing value chain, the gaps that will need to be addressed to compete successfully in this strategic segment, and the industry ecosystem in NER. The final section concludes by putting forth some considerations for the public and private sectors in developing the cluster.

INDUSTRY DESCRIPTION AND TRENDS

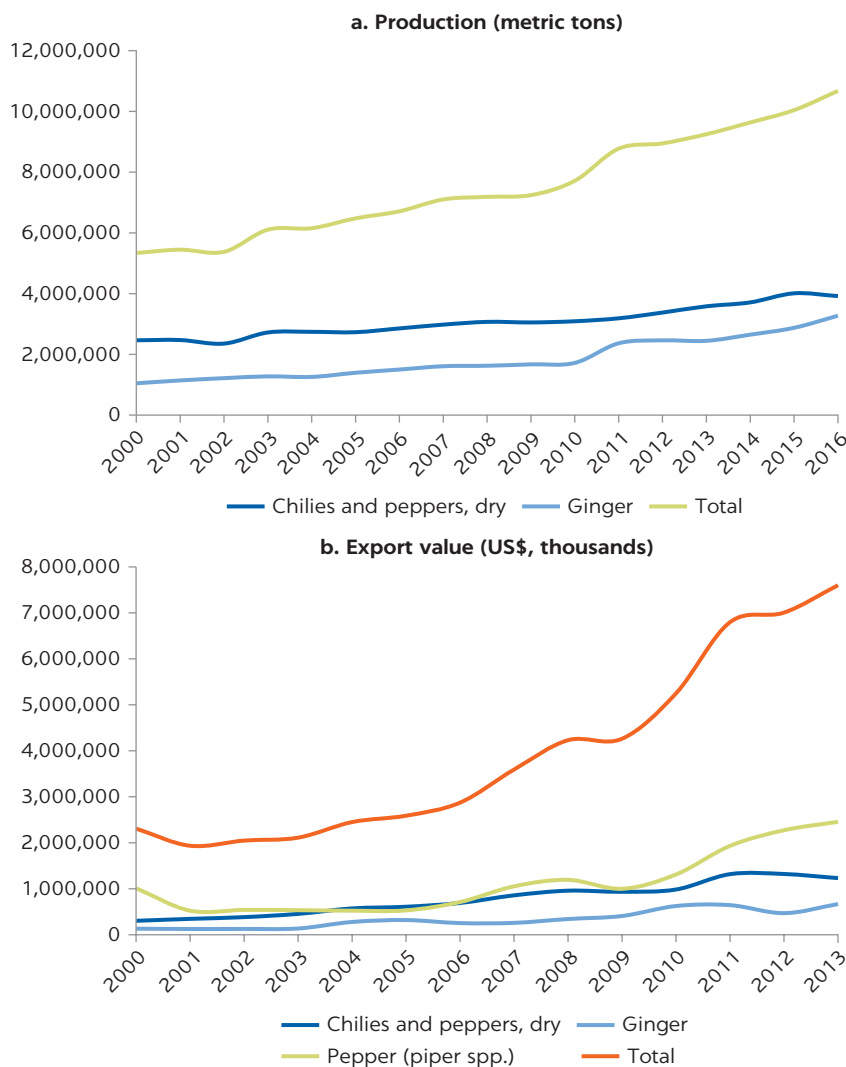
The analysis in this paper focuses on three spices—turmeric, chilies, and ginger—as representative of the larger set of spices in NER. These spices were chosen because they are produced in large volumes in the region and have unique characteristics that are in demand in the global market.⁵ They also are among the region’s main livelihood earners. Moreover, the lessons and recommendations derived from analyzing these spices will more broadly apply to other spices and the rest of horticulture in the region.

Industry trends: Global scenario

The spice industry has registered persistent growth in the past decade, reflecting growing demand. According to FAOSTAT data, about 10.6 million tons of spices were produced in 2016, compared with 5.3 million tons in 2000 (see figure 1.1). This is equivalent to an annual increase of more than 300,000 tons, and a CAGR

FIGURE 1.1

Total production and exports of spices



Source: FAOSTAT.

of 4.7 percent. The seemingly insatiable domestic and international demand for spices has attracted many countries and firms to invest in spice farming and processing. The global spices market was estimated at US\$11.5 billion in 2015 and is expected to grow at a CAGR of 5.2 percent, to reach about US\$14 billion by 2020.⁶

The production of spices is mainly driven by favorable climatic conditions and soil structure. The conducive tropical, and in some areas humid, climate in most of the Asian countries continues to support the production of a large variety and volume of spices. Some countries have adopted and adapted some of the spices and managed to capture significant market share; for instance, Madagascar today is the largest producer of cloves, a plant that appeared on the island for the first time in the early 19th century. Most spices are grown in tropical regions, with Asia accounting for over 90 percent of global production. India is the largest producer and produced more than four million metric tons of spices in 2016, followed by China, Bangladesh, and Indonesia, as shown in table 1.1.

There has been substantial growth in the production of spices.⁷ During 2000–16, Turkey⁸ registered the highest CAGR, of about 11.5 percent, followed by Nepal, at 7.5 percent, and Vietnam, at 6.2 percent. The growth in India and China averaged about 4 percent.

The spice trade has also registered exponential growth in the past decade, as indicated by figure 1.1, with pepper, capsicums (chili), cinnamon, ginger, and turmeric accounting for over 75 percent of spice exports. Between 2000 and 2013, the export value of spices recorded an average CAGR of 8.9 percent. Ginger exports are growing the fastest, at a CAGR of 12.3 percent, followed by exports of chilies and peppers, at a CAGR of 10.5 percent.

The spice export market is concentrated, with the top five exporting countries accounting for 53 percent of spice exports. These countries are China, India, the Netherlands, Spain, and Germany. The top five exporting countries contribute 92 percent of garlic exports, 82 percent of ginger exports, 84 percent of turmeric exports, and 71 percent of pepper exports. North America and Western Europe account for more than 60 percent of the imports of spices.

On the demand side, the significant growth in the use of spices is driven by changing consumer behavior, including a growing preference for health-conscious choices, increasing demand for natural flavoring and coloring agents in the catering sector, and increasing demand for cross-cultural cuisines, among others. Shifts in consumer behavior and consumption patterns have led to the development of new and innovative products, including complex mixes with

TABLE 1.1 Top spice-producing countries

Metric tons

COUNTRY	2000	2005	2010	2016
India	2,237,800	2,539,520	3,150,350	4,114,000
China	556,201	668,949	850,054	1,022,962
Indonesia	335,139	480,763	501,010	798,018
Bangladesh	227,000	321,040	312,708	378,837
Vietnam	132,352	196,176	215,207	347,595
Nepal	107,386	191,250	252,176	340,988
Turkey	46,335	84,839	122,000	263,804
Pakistan	221,524	172,297	225,462	206,192
World	5,338,581	6,478,929	7,715,256	10,674,709

Source: FAOSTAT.

unique tastes to satisfy the changing palate of consumers. Growth in demand is also driven by the rapidly growing perfume and cosmetics industry, which uses spices for their healing or aromatic properties.⁹

Ginger

Per the Markets Insider Report (2018), the global market for ginger was US\$3.06 billion in revenues in 2017 and is expected to grow at a CAGR of 6.5 percent between 2018 and 2022. Growth is spurred by the growing popularity of ginger as herbal medicine, given its antimicrobial, antioxidative, and anti-inflammatory properties as well as increased recognition and use for flavoring.¹⁰ Fresh ginger is experiencing much higher demand than the other forms of commercially available ginger, including dried, pickled, preserved, crystallized, and powdered.¹¹

Ginger exports (imports) increased from US\$170 million in 2000 to a peak of US\$1.02 billion in 2014 and then declined to US\$845 million in 2017 (UN COMTRADE database). Asia is the dominant ginger exporter; China has remained the largest ginger exporter, increasing its share of world exports from 44 percent in 2000 to 62 percent by 2017. Ginger imports were largely driven by growing demand from Europe. In 2000, Asia imported over 66 percent of the imports followed by Europe at 17 percent; Japan was a major player, importing over 40 percent of ginger. By 2017, Europe's share of imports increased to 37 percent, while Asia's share dropped to 43 percent; North America's share has been expanding and stood at 18 percent. The respective leading importing countries in these continents are Japan, at 15 percent; the Netherlands, at 9.4 percent; and the United States, at 15 percent.

Turmeric

The global turmeric market is expected to grow at a CAGR of 6.4 percent during 2017–21.¹² The global turmeric market was estimated at US\$3.16 million in 2016.¹³ One of the main drivers of this growth is the growing recognition of the health benefits associated with turmeric, especially the organic certified product, and growing popularity of cross-cultural cuisines and ethnic tastes.¹⁴ Manufacturers have been innovating new products with turmeric as a functional ingredient, and new products include food products, dietary supplements, herbal and medicinal products, and cosmetics. India is the world's largest exporter of turmeric, accounting for 74 percent of world exports in 2016. In 2016, Asia accounted for about 39 percent of total turmeric imports; the shares of Europe and North America were 27 and 19 percent, respectively, which represented a significant increase from their respective shares of about 20 and 11 percent in 2000 (UNCOMTRADE data).

Chili

The chili (commonly referred to as chili pepper) global market has also been growing, with 34.5 million tons of green chili and 3.9 million tons of dry chili produced in 2016 (UNCOMTRADE data). China is the world's largest producer of green chilis.

Although the spices market has been attracting many players, it remains quite concentrated, with few firms dominating processing and distribution. McCormick & Company, headquartered in Maryland, United States, is the world's largest manufacturer of spices, herbs, and flavorings. Man Producten, headquartered in Rotterdam, the Netherlands, is the world's biggest and most

influential spice-trading firm. Other companies include Ajinomoto Co., Inc.; Associated British Foods PLC; Kerry Group PLC; and Ariake Japan Co., Ltd, among others. These companies have established subsidiary or sister companies in India. However, innovative medium-size companies are shaking up the industry by offering unique services and products to meet evolving consumer preferences. Some of the major players capturing the spice and herb extract market include Döhler GmbH, Synthite Industries Ltd, Kalsec Inc., and Naturex SA, among others.

Industry trends: India

India is the world's largest producer and consumer of spices. India has been producing and exporting spices across the world for ages. In 2015–16, spice production in India was estimated at 6.4 million metric tons, while the area under spice cultivation was estimated at 3.3 million hectares, per the Spices Board of India (table 1.2). India is estimated to consume over 90 percent of the spices produced in the country. India produces and exports about 180 varieties of spices (52 different spices) and spice products to more than 160 countries, with about 3,700 registered exporters.¹⁵ Per a 2017 study, the Indian spices market was pegged at US\$6.46 billion; it is expected to reach US\$18 billion by 2020.¹⁶

The top six spices—chilies, garlic, ginger, turmeric, coriander, and cumin—constitute over 90 percent of spice production in India (table 1.2). Chilies, garlic, ginger, and turmeric are the main spices, accounting for 22, 22, 18, and 15 percent of production, respectively, in 2015–16.

TABLE 1.2 Major spices in India

SPICE	2014–15		2017–18		SHARE OF TOTAL PRODUCTION (%)	
	AREA (ha)	PRODUCTION (MT)	AREA (ha)	PRODUCTION (MT)	2014/15	2017/18
Pepper	124	70	136	64	1.1	0.8
Cardamom (small)	70	18	69	21	0.3	0.2
Cardamom (large)	26	5	27	5	0.1	0.1
Chili	767	1,621	815	2,303	26.3	27.4
Ginger	153	796	161	1,043	12.9	12.4
Turmeric	178	846	224	1,108	13.7	13.2
Coriander	604	547	665	867	8.9	10.3
Cumin	702	372	781	500	6.0	5.9
Celery	4	6	4	6	0.1	0.1
Fennel	47	79	90	149	1.3	1.8
Fenugreek	125	134	220	311	2.2	3.7
Ajwan	24	17	35	28	0.3	0.3
Garlic	262	1,425	322	1,717	23.1	20.4
Tamarind	54	200	49	200	3.2	2.4
Cloves	2	1	2	1	0.0	0.0
Nutmeg	21	14	23	14	0.2	0.2
Cinnamon	0	0	0	0	0.0	0.0
Total (incl. others)	3,193	6,170	3,969	8,414	100.0	100.0

Source: Spices Board of India, compiled from National Horticulture Board.

Note: ha = hectares; MT = metric tons.

The top 11 spice producing states in India produce about 80 percent of the spices, and none is from the NER. Gujarat, Andhra Pradesh, and Rajasthan are the largest spice producers, with over 40 percent of India's total spice production. The southern region of India plays a significant role in the spices market, as a producer and consumer of spices (table 1.3).

In India, the spices market is largely unorganized, and the branded segment makes up about 15 percent.¹⁷ The branded market is dominated by a few players, such as MTR, Badshah, Catch, Everest, and Ramdev. Field interviews indicated that the margins for blended (mixed) spices may be higher than those for individual spices (for example, chilies, turmeric, or cardamom powder). For consumers, blended spices help in the preparation of popular dishes in a short time and with ease.

Indian consumers also mirror global trends, such as the growing preference for health conscious choices. This trend has seen the emergence of various small and medium-size firms that cater to such demand. An example is Conscious Food, which came into existence in 1990 and is one of the pioneering firms catering to the demand for organic and natural foods. It produces wholesome spice products as well as seasonings, among other organic and natural foods. The firm's revenues have been growing at an average of 50 percent annually, as indicated in interviews done for this study.

Despite producing some of the most highly recognized quality ginger, ginger farmers in India obtain among the lowest prices globally, as shown in figure 1.2. A large share of the margins is appropriated by market intermediaries and retailers.¹⁸ Ginger farmers in Pakistan have persistently obtained almost triple the producer price in India for the past five years.

Similarly, Indian chilies fetch high market prices globally, but the farmers obtain among the lowest prices (Devi et al. 2016). According to FAOSTAT producer price data, the price obtained by farmers in India for chilies is persistently lower than that obtained by comparable farmers across countries in South Asia.

TABLE 1.3 Spice production in India, by state

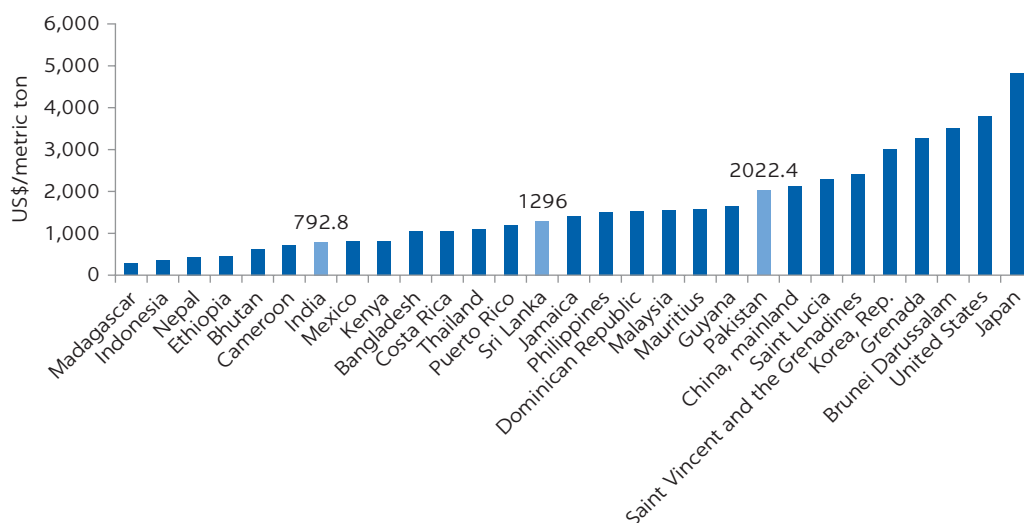
STATE	2014–15		2017–18	
	AREA (ha)	PRODUCTION (MT)	AREA (ha)	PRODUCTION (MT)
Andhra Pradesh	201	918	246	1,100
Telangana	122	494	184	787
Gujarat	474	1,014	511	907
Rajasthan	867	618	1,004	1,392
Karnataka	219	400	246	499
Tamil Nadu	105	196	43	113
Uttar Pradesh	58	222	387	281
West Bengal	98	208	120	335
Orissa	123	182	147	202
Kerala	167	140	163	140
Maharashtra	123	130	31	396
Total (incl. others)	3,193	6,170	3,969	8,414

Source: Spices Board India.

Note: ha = hectares; MT = metric tons.

FIGURE 1.2

Ginger producer price, 2015



Source: FAOSTAT.

India mainly exports ginger, turmeric, and chilies to the United States, the United Kingdom, the United Arab Emirates, and Japan. These countries have stringent food safety, quality, and regulatory standards, especially requiring traceability and low minimums of foreign matter. This requires a high level of care, maintenance, hygiene, preservation, and modern technologies to fulfill the standards.

Industry trends: NER

NER produces about 11 percent of India's spice output (table 1.4). The major spices produced in the region are chili (Naga chili, mainly in Nagaland, and Bhut jolokia in Assam), turmeric (Lakadong turmeric, mainly in Meghalaya), ginger, garlic, black pepper, and large cardamom (mainly in Sikkim and Assam).

The turmeric, ginger, and chili from NER have unique properties/matter¹⁹ and a better recovery rate of active ingredients when dehydrated (table 1.5). The active ingredients are highly valued for their use in food, cosmetics, and pharmaceutical products. Turmeric is the third most produced spice in NER. Its Lakadong and Megha varieties produced in NER provide high yields (30–32 tons per hectare)²⁰ and quality in terms of concentration of active ingredients. Meghalaya's Lakadong turmeric has higher curcumin content than turmeric produced in other regions; similarly, ginger from NER yields more oleoresins, and bird's eye chili from NER yields higher capsaicin content (table 1.5).²¹ The unique properties of spices from NER indicate that there are opportunities to develop/stimulate a niche market for natural and quality consistent high-value turmeric, ginger, and chili from NER.

Connectivity and logistics pose a significant challenge for spice farmers, as for other farmers in the region. The longer distances to markets outside the region involve greater time and costs of transportation. Discussion with traders, during field interviews in June–July 2017, indicated that it tends to take about 10–15 days to transport spices from Guwahati to Delhi and more than 25 days to Mumbai. Connectivity within NER also presents a significant challenge for collection and

TABLE 1.4 Share of NER spice production of total production in India, 2014–15

SPICE	TOTAL NER (MT, THOUSANDS)	SHARE OF NER SPICES MARKET (%)	TOTAL INDIA (MT, THOUSANDS)	NER SHARE OF INDIA (%)
Cinnamon	5.0	0.7	5.1	99.0
Ginger	410.7	60.6	760.3	54.0
Cardamom	5.6	0.8	24.4	22.9
Coriander	54.0	8.0	461.7	11.7
Turmeric	85.3	12.6	830.4	10.3
Garlic	71.5	10.5	1,425.5	5.0
Pepper	3.0	0.4	64.6	4.7
Chilies	42.3	6.2	1,605.0	2.6
Total (incl. others)	677.4	100.0	6,169.9	11.1

Source: Spices Board of India.

Note: MT = metric tons; NER = North Eastern Region.

TABLE 1.5 High intrinsic value of spices from NER

SPICE	INTRINSIC VALUE	ACTIVE INGREDIENTS	
		IN NER PRODUCE (%)	IN PRODUCE OF OTHER REGIONS IN INDIA (%)
Lakadong turmeric	Curcumin	6.8–7.6	3.0–4.0
Bird's eye chili	Capsaicin	1.0	0.5–0.6
Ginger	Oleoresin oil	5.9–8.6	5.0–8.0
		1.6–2.5	1.5–2.0

Source: A presentation by the Spices Board of India (accessed April 26, 2019), https://mdoner.gov.in/contentimages/files/10_1.pdf.

Note: NER = North Eastern Region.

aggregation of produce from the many small farms. In the absence of adequate post-harvest temperature controlled storage facilities and transportation infrastructure, post-harvest losses consume a significant share of the produce.²² The field interviews indicated that as much as approximately 20–30 percent of the produce could be going to waste during the harvest and post-harvest process, which is one of the factors that compel farmers to accept perhaps 15–25 percent lower prices for their produce.

Low volume and lack of consistent quality in spice production pose another challenge. There are many small-scale farmers (with farm size approximately 2 hectares) producing small volumes (about 1–3 metric tons per season) of spices of varying quality. Thus, the farmers can obtain only a low average price for their produce, and there is no incentive to improve the quality and/or increase the quantity of production. The inconsistent quality increases production costs for processors.

Institutional structure and policies

To support the development of agriculture, and more specifically horticulture, in NER, the state governments in the region, complemented by the central government, have put in place various institutions and schemes. However, the structure and policies have been unable to harness the full potential of horticulture, including spice farming (see box 1.1).

BOX 1.1

Institutional structure and policies

Trade in agricultural produce in India has been regulated through the Agricultural Produce Market Committee (APMC) Act, which was enacted by most state governments in the 1950s and 1960s. Under the APMC Act of a state, the state is geographically divided into markets, or *mandis*, which are headed by market committees. Any production of “notified agricultural products,” which typically include horticultural products like spices, is brought to the *mandi* of that particular area for sale to licensed commission agents only through auction. This mechanism was institutionalized to minimize the information differential between the producers and buyers and to minimize the exploitation of farmers by middlepersons. Enforcement of the *mandi* market mechanism was not strict in the Northeastern Region (NER) of India, largely due to geographical limitations, but the prevailing *mandi* prices, especially in Delhi, have largely served as a reference point for prices in the region.

The Spices Board of India, under the Ministry of Commerce and Industry (Government of India), is the leading organization for the development and worldwide promotion of Indian spices. It has been spearheading a variety of activities to improve the quality of spices. For instance, the Spices Board’s activities include development and implementation of better production methods, through scientific, technological, and economic research; guidance to farmers on getting higher and better quality yields; encouragement of organic production; and facilitation of infrastructure for processing and value addition.^a The Spices Board also helps importers and exporters of spices to establish mutual contact. The Spices Board commissioned eight spice parks to provide common infrastructure facilities to improve the grading, quality, and standards of spices.^b The spice parks are expected to train the farmers on better farming practices and ensure better pricing of spices by reducing supply chain costs. However, few of the Spices Board’s services are available in NER; field interviews indicated that its services may not adequately cover the needs of farmers, especially on training.

The government is committed to supporting the economic development of NER, and there are many

support programs established for that purpose. Although various institutions provide diverse services, the field interviews indicated that most of these services are not adequately accessible in the region. The actors involved include the following:

- *Ministries/departments.* Spice activities in NER fall under several ministries and departments, including the Department of Horticulture under the Ministry of Agriculture, the Ministry of Food Processing Industries, the Ministry of Commerce and Industry, and the Ministry of Development of North Eastern Region. Each of these has various support schemes and subsidies in place to support spice farming and other types of horticulture, or more broadly agriculture, but there is limited coordination, which has led to ineffectiveness of the programs.
- *Selling/marketing agencies.* Several agencies support farmers in linking to domestic and international markets. These include the North Eastern Regional Agricultural Marketing Corporation, state agricultural marketing boards, and the National Council of State Agricultural Marketing Boards^c; APMCs; the Agricultural and Processed Food Products Export Development Authority; and the Export Promotion Fund. Field interviews indicated that the general impression is that most of these institutions tend to focus on large-scale farmers and less so on spices.
- *Financial support agencies.* Financial institutions, such as the National Bank for Agriculture and Rural Development, National Eastern Development Finance Corporation, and Rural Development Fund, provide financial services, but most of them may not be easily accessible to farmers, especially small farmers.
- *Central schemes.* The Government of India has put various schemes in place to support the development of horticulture. These include schemes such as the Mission Organic Value Chain Development for North East Region. Some of the central schemes are unrelated to agriculture, such as the National Employment Guarantee Scheme.

a. Its other activities include promotion of exports of spices and spice products; maintenance and monitoring of quality of exports; provision of financial support to farmers; registration and licensing of spice exporters; assistance for studies and research on better processing practices, foolproof quality management systems, improved grading methods, and effective packaging techniques; and production of promotional material for Indian spices in various media.

b. Spice parks are located in Chhindwara (Madhya Pradesh), Puttady (Kerala), Jodhpur (Rajasthan), Guna (Madhya Pradesh), Guntur (Andhra Pradesh), Ivaganga (Tamil Nadu), Kota (Rajasthan), and Raebareilly (Uttar Pradesh).

c. For more information, see <http://www.cosamb.org/About>.

STRATEGIC DIAGNOSTIC

To inform a different thinking and approach to enhancing value for farmers, this section attempts to document the changing demand patterns. This information is then used as a basis for identifying the different strategic segments or product-market combinations that exist within the sector, as well as the associated value proposition for farmers, especially the poor and women.

Global trends that impact the nature of demand

Various global trends are impacting the nature of demand in the spice industry.

Growing consciousness about product quality

Worldwide, growing incomes and rising consumer awareness are driving demand for higher quality products. Increased concerns about food safety, which are also reflected in increasingly stringent food regulations, along with growing awareness about the health benefits of spices, are creating demand for clean, natural, high-quality spices that are processed under clean and safe environments if they are in dried/powdered form. Further, there is growing awareness that processing may lead to loss of flavor as well as nutrients, which in turn is driving demand for fresh, high-quality spices. For instance, dried ginger and turmeric, once ground, lose much of their flavor within a very short period (a few weeks).

Technology advancements have facilitated granular testing for quality and microorganisms. Technologies such as blockchain are being used to enhance the traceability of products while allowing for control checks for safety and standards. In some cases, “smart tags” with quality sensors are used to monitor the temperature at which the product moves along the value chain, a key factor in maintaining the freshness of the product.

Emerging preference for healthy lifestyle choices

Informed consumers are increasingly opting for healthy lifestyle choices, not only in food, but also in other products—such as cosmetics and medicines. This is spurring the demand for natural and organic ingredients in the pharmaceutical and cosmetics industries. Spices and herbs have been highly valued for their medicinal properties since ancient times.²³ The growing recognition of the medicinal properties of spices (especially turmeric, ginger, and chilies), backed by scientific evidence, has contributed to the pharmaceutical industry’s growing interest in spices. Many spices are also high in antioxidants and have antiseptic properties, which in turn are driving their demand for use in natural cosmetics. The global cosmetics market is expected to reach US\$430 billion by 2022, at a CAGR of 4.3 percent between 2016 and 2022. Although the natural cosmetics market is small, it is growing faster than the overall market.

Growing consciousness about the environment and social issues

There is increasing awareness about sustainable consumption, as well as social issues, such as the use of child labor, gender balance in the labor force, and the fairness of labor policies, including remuneration. In keeping with these trends, there is a growing demand for sustainably and responsibly produced spices by environmentally conscious and socially responsible consumers. Discerning consumers tend to place greater value on spices that are produced, packaged, and

transported in a manner that adheres to the principles of environmental sustainability and social responsibility. For instance, they are likely to value spices (and foods in general) that are produced without the use of chemicals and/or packaged using recycled or biodegradable material. To differentiate such products, while also assuring quality, certification labels such as fair trade,²⁴ non-genetically modified organism, organic, natural, renewable, and sustainable are increasingly being used. New technologies like blockchain are being employed to provide traceability to the consumers and others involved in the value chain.

Growing demand for new experiences and convenience

Household eating habits have been evolving. Many households are shifting from outside eateries to home-cooked foods, and to save time and effort, many are gravitating toward meal kits.²⁵ Meal kits have pre-portioned packed ingredients, accompanied by a recipe card, and are easier to implement. The meal kits market business is valued at more than US\$2.2 billion and continues to record exponential growth rate.²⁶ One factor driving households to adopt meal kits is their inclusion of unique items and the opportunity for new experiences. This trend is consistent across continents, although it is more intense in developed markets.

Another manifestation of this trend is the growing demand for complex spice mixes with new and unique flavors. Such innovation also helps companies differentiate their products in the highly competitive market for dried/powdered spices.

Strategic segmentation and attractiveness of strategic segments

An assessment of global trends affecting the industry and their likely evolution in the foreseeable future provides an understanding of what consumers or users are demanding and how firms are responding by changing their products or offering additional services. Thus, a strategic segmentation of the industry emerges, with several distinct strategic segments, each defined as a function of the product (supply side) as well as the user group served (demand side). Each strategic segment is supported by a unique value chain. Strategic segmentation is not country specific; rather, it provides a global overview of the segments within a sector. After identifying all the strategic segments that comprise a sector, the segments are assessed in terms of the (relative) overall margins generated and the (relative) distribution of those margins between different participants in the value chain—input suppliers, producers, and buyers. This assessment is done using an analytical framework called Porter's Five Forces (Porter 2008); the five forces are the intensity of competitive rivalry, threat of new entrants, threat of substitutes, bargaining power of suppliers, and bargaining power of buyers. In each segment, an evaluation of the relative strength of the first three forces provides a qualitative assessment of the overall margin that is generated in the value chain, while an analysis of the latter two forces provides insights into margin distribution among the various value chain participants. This analysis can provide valuable insights into which strategic segments are more inclusive, in that their margins are distributed more equitably across the entities in the value chain and down the workforce pyramid in each entity, creating the potential for higher returns for the bottom 40 percent of the income distribution and women. Strategic segmentation for the global spice industry is suggested in table 1.6.

TABLE 1.6 Strategic segmentation for the global spice industry

PRODUCTS	PRICE CONSCIOUS USERS	QUALITY CONSCIOUS USERS	INDUSTRIAL USERS
Fresh spices	A1	B1	C1
Dried/powdered	A2	B2	n.a.

Source: Based on interviews and secondary research.
Note: n.a. = not applicable.

Each strategic segment is a function of the product (supply side) as well as the user group served by the product (demand side). Strategic segmentation is based on identification of subsets of buyers within a product market who share similar needs and buying processes. All the strategic segments are distinct from each other in terms of the relative strength of Porter’s five competitive forces that shape strategy,²² as well as the value chain required to support that segment. A value chain describes the full range of activities that are required to bring a product or service from conception, through the intermediary stage of production, delivery to final consumers, and final disposal after use (Kaplinsky and Morris 2000). Strategic segmentation is not country specific, but rather provides a global overview of the segments that exist within a sector.

The segmentation exercise, which focused on ginger, turmeric, and chilies for illustrative purposes, identified five strategic segments in the spice industry.

Three types of spice users can be identified in the industry. These are price conscious users, quality conscious users, and specialized industrial users. The price conscious users are mainly interested in price-friendly turmeric, ginger, and chilies, whether fresh or dry. Barriers to entry in the segments comprising such consumers are relatively lower than those in comparable segments comprising quality conscious consumers. The quality conscious users are aware of and sensitive to the quality of spices and the nature of the production process. Typically, such consumers buy spices from specialty food stores. There are significant entry barriers to the segments comprising quality conscious users: required investment in better quality inputs, training of agricultural labor in the desired cultivation and harvesting practices, quality assurance, brand building, and well-coordinated logistics that maintain the quality and purity of the product (whether fresh or dry) from production to consumption. The specialized industrial users prefer to procure fresh spices; they extract active ingredients such as curcumin, capsaicin, oils, and oleoresins from spices for use in the pharmaceutical and cosmetics industries. Industrial users are also conscious about the quantity and quality of active matter in the spices, and hence similar significant barriers to entry apply in this segment.

Two types of products can be identified in the spice industry. Spices are broadly consumed as fresh (shorter shelf life) or in dried/powdered form (longer shelf life). The dry/powder categories subsume all the other products that can be developed from dry/powder spices, including paste, ginger candies, ginger beer, ginger wines, and turmeric tea, among others. The longer is the shelf life of an item, the more commoditized and tradeable it becomes. This commoditization allows producers around the world to deliver before the product perishes, thus allowing the entire world to participate and compete. Hence, the dried/powdered spices segment tends to be highly competitive and attracts the participation of many national and international players. These segments require high volume and significant economies of scale to capture the margins. Fresh and perishable items, including fresh spices, require more

frequent delivery. Thus, competition exists only with other producers that have access to fast logistics providers who can deliver the product, with its freshness intact, in a timely fashion and frequently to the market. The fresh segment has the potential to bring significant gains for farmers; however, it also requires effective infrastructure and logistics mechanisms to maintain and demonstrate the freshness and product standards demanded by quality conscious consumers.

Price conscious segments, A1 and A2

These segments comprise users who are price sensitive and may be unaware of or less concerned about quality. In segment A1, the overall margins tend to be low. Competitive rivalry tends to be high, as there are many competing clusters and producers in this segment. The threat of new entrants tends to be high, given that barriers to entry are low with little capital investment and limited technical knowledge required to operate in this segment. The threat of substitutes is typically high, as consumers in this segment are more willing to switch to other, cheaper products.

In segment A2, the overall margins are still low. Competitive rivalry becomes even more intense because the commodity nature of the product allows participation and competition from across the world. The barriers to entry become slightly higher, given the higher investment requirements, for instance, in processing equipment, in this segment. But overall, the equipment and technical know-how required to cater to the price conscious segment is not very sophisticated, keeping the barriers to entry low. The threat of substitutes remains high for price conscious consumers.

In both segments, the low margins are largely appropriated by intermediate buyers, processors, and retailers, with a smaller share going to farmers and input suppliers. Given the price elastic nature of demand in this segment, products tend to be competitively priced. Further, small margins are left for farmers, given their lower bargaining power relative to intermediate buyers and processors, which stems from the relatively greater concentration among the latter compared with farmers. Although there are many farmers, there are relatively fewer intermediate buyers and traders as well as processors. The share of the margins is also very low for input suppliers such as agricultural labor, suppliers of certified seeds and planting material, certification agencies, and fertilizer and pesticide suppliers, as the use of quality inputs is not prioritized in this segment.

The producers in NER are mainly servicing the price conscious fresh segment and, to a lesser extent, the price conscious dried and powdered segment. Most of the produce is sold fresh; very little processing takes place in NER itself. There is limited awareness of consumer needs and the evolving nature of demand at the farm level; hence, most of the produce ends up in the mass market with a mix of different qualities and suppliers. There is limited quality control near the farm gate, and sorting is mainly carried out at the wholesale market. Discussion with traders revealed that they have informal ways of sorting out high-quality spices from the rest of the produce, with the former often fetching higher prices. Since the trader takes the risk of buying all the produce from the farmers, the trader also enjoys the gains from the higher prices fetched for high-quality spices. Segment A2 requires mass production of spices; thus, given the relatively low quantities produced in NER, the region may not have a comparative advantage over other large-scale producing states in India, like Kerala and Rajasthan, or countries such as China.

Quality conscious segments, B1 and B2

These segments comprise consumers who have the ability and willingness to pay higher prices for high-quality produce—natural and clean spices that are produced and delivered to the market in a manner that preserves and assures their purity, while adhering to principles that may be valued by the consumer, such as environmental sustainability or social responsibility.

The overall margins tend to be higher in the quality conscious segments. The threat of new entrants is lower, given the higher barriers to entry, and the threat of substitutes is also lower, given the requirements of discerning customers. Barriers to entry in the quality conscious segments arise from the significant investment required in better quality inputs, training of agricultural labor in the desired cultivation and harvesting practices, quality assurance, and brand building. A key barrier in the case of the fresh quality conscious segment is the need for an end-to-end temperature and humidity controlled infrastructure and logistics system that delivers the product, with consistent regularity, to the consumer with the product's freshness and purity intact and assured. Competitive rivalry tends to be lower relative to the associated price conscious segment, given that fewer growing regions and growers can meet the requirements to cater to this segment.

Further, in these segments, there is potential for farmers and input suppliers to appropriate higher margins, as compared with the price conscious segments. This is because in segments B1 and B2, farmers' bargaining power strengthens vis-à-vis that of intermediate buyers, processors, retailers, and final consumers, as compared with that in segments A1 and A2. In segments B1 and B2, switching becomes more difficult for buyers and retailers, due to the smaller production base and the traceability requirements of discerning consumers. The higher bargaining power of the input suppliers comes from the higher value placed on inputs such as good quality seeds, planting material, organic or natural fertilizers and pesticides, and skilled farm labor with knowledge of the appropriate cultivation and harvesting techniques, while such inputs are relatively less abundant. Although the farmers must pay more for high-quality inputs, they also receive much more for their high-quality output, which caters to discerning consumers who are able and willing to pay a higher price for assured quality. The upstream quality control practices at the input and cultivation stage are critical for realizing the required quality in this segment.

Given that competition tends to be more global in dried and powdered spices as compared with fresh spices, the overall margins tend to be lower in these segments, as compared with the fresh segment, when looking at the same user category. Competing effectively in the dried and powdered segments requires volume and scale. These segments are dominated by global players like McCormick & Company (the largest spice company in the world, with over 20 percent market share), MTR Foods, Associated British Foods PLC, Dohler Group, Kerry Group PLC, SHS Group, Olam International, Worlee Gruppe, DS Group, and Everest Spices, which have elaborate global networks. There are high barriers for other processors to enter this market due to the large scale and high capital investments required for research and development (R&D) (for example, in putting together a range of complex spice mixes) and brand building. Competition exerts downward pressure on margins, and thus low-cost regions in India and other countries, like China, which also benefit from lower logistics costs due to better connectivity, render spices from NER uncompetitive in the dried and powdered spices segment.

Industrial users, C1

The industrial user's main concern is the concentration of active ingredients in the spices and their extraction rate. They often use sophisticated technology to dehydrate and extract the active ingredients. Different spice varieties have different extraction rates, which can be influenced by the harvesting and post-harvesting handling processes in addition to the intrinsic quality of the produce. Spices produced in NER have been shown to have high active matter content. This market segment has been growing rapidly, and there are opportunities for the region to target it by upgrading the quality and standards of upstream activities. This segment demonstrates higher barriers to entry due to the sophisticated mechanism required to obtain and maintain high active matter quality and quantity and the processing techniques to extract them. There is a limited threat of substitutes and low competitive rivalry. This segment can provide higher incomes for women and the bottom 40 percent, since the production process is labor intensive. This segment enjoys higher margins, which farmers can appropriate, given the shorter value chain between farmer and consumer.

STRATEGIC OPTIONS FOR NER

The current value chain in NER caters largely to segment A1 and to some extent segment A2. Both are relatively low-margin segments and, even more significantly, bring very low returns to farmers and agricultural labor, as most of the generated margins are appropriated by the intermediate buyers, processors, and retailers.

Segment B1 has the potential to garner the highest returns, as competition is the least in this segment, while consumers have the ability and willingness to pay more for a high-quality product. On the one hand, the expanding middle class and growing incomes, along with growing awareness about the health benefits of spices, and on the other hand, food safety issues are generating demand for clean, natural, organic spices worldwide, including in India and neighboring countries. Discerning customers are willing to pay premiums for spices of high assured quality that also meet their requirements for environmentally friendly and socially responsible processes in production, packaging, logistics, and so forth.

At the same time, fresh, high-quality spices targeted at discerning customers have the potential for farmers and agricultural labor, including women, to garner higher returns. Farmers and farm workers not only create more value in this segment through the use of better cultivation and harvest practices, but also have the potential to appropriate higher margins, as the smaller production base and the quality and quality assurance requirements (certification, traceability, and so forth) of consumers impart more bargaining power to them.

The size of the margins appropriated by farmers in the B1 segment, which produces fresh spices for quality conscious users, depends on how the rest of the value chain is organized—for instance, whether the farmers sell to retailers and final customers directly or through an intermediary such as an export firm. For example, blockchain technology is being used in horticultural value chains in Haiti to empower small farmers by linking them directly to export markets comprising quality conscious as well as environmentally conscious and socially responsible consumers (Kathuria and Mathur 2019).

Further, segment B1 has relatively greater potential to generate more and better jobs for men and women. This arises from the emphasis on producing high-quality, fresh products and maintaining the quality and freshness all the way to the consumer. High-quality fresh spices that are natural, clean, and organic have very specific requirements in terms of cultivation, harvest, and post-harvest practices. For instance, horticultural produce that caters to the fresh quality conscious segment needs to be carefully harvested and handled to maintain its value and put in a temperature and humidity controlled environment immediately after being harvested. Hence, not only is more labor needed, but labor also needs to be skilled in the requisite techniques and practices. Other activities, such as sorting, grading, packaging, cold chain infrastructure, logistics, and quality assurance, also assume greater significance in the value chain for this segment and have their own requirements for labor and skills in ensuring that a high-quality product is delivered to the consumer. Thus, there is potential for the creation of more jobs as well as better paid jobs in this value chain. Additionally, the post-harvest activities and logistics requirements of this value chain may create local entrepreneurship opportunities.

Segment B1 also has greater potential for female participation and entrepreneurship. Since the participation of women already tends to be high in several activities in this value chain, such as on-farm activities in cultivation and harvesting, sorting, grading, and packaging and labeling, this also creates more and better opportunities for women. There are also potential opportunities for women's participation in other activities that also assume greater importance in this value chain—such as R&D, extension services, quality assurance, and marketing and distribution—as workers, or even as entrepreneurs, for example, in a marketing and distribution firm. Such opportunities could be realized through capacity building.

This strategic segment offers several opportunities for cross-border linkages with Bangladesh, including some beyond the ones offered by the other segments. Global export potential in this segment is growing with rising incomes and awareness about healthy foods and food safety issues. The quality conscious segment is also growing in India and neighboring countries like Bangladesh and Myanmar and may be easier to tap, given geographic proximity. For all the strategic segments in the spice industry, Bangladesh can serve as a key proximate market. Spices, like other horticultural products such as fruits and vegetables from NER, can go toward meeting the food requirements of Bangladesh, which is a net importer of food, and specifically of spices, fruits, and vegetables. In 2015, Bangladesh's total imports of spices stood at US\$215 million, while it exported about US\$25 million worth of spices (Kathuria and Mathur 2019). Already, various horticultural products, including spices from NER, reach markets in Bangladesh through formal and informal channels, with estimates indicating that informal exports of these products may far exceed the formal exports (Kathuria and Mathur 2019).

Currently, the spices imported by Bangladesh may not all fall within the quality conscious segments. However, with rising incomes and consumer awareness and the accompanying tightening of food legislation and food import controls, the demand for high-quality spices is likely to rise. Already, food regulating authorities in several South Asian countries, including Bangladesh, have demonstrated a desire and willingness to strengthen food controls (Jensen 2019). Bangladesh could also be a key source of investment in

horticultural value chains, including spices, in NER. Transit through Bangladesh is critical for NER's horticultural products, especially fresh products, to reach markets in the rest of India in a time- and cost-effective manner, as well as markets elsewhere in the world via Bangladeshi ports. Bangladesh's logistics providers could participate in this value chain and appropriate value for themselves.

Further, NER has an inherent advantage in producing spices geared toward serving the quality conscious segment. NER's unique climate and terrain, combined with high-quality inputs, produces high-quality spices with a high concentration of active ingredients. Given the prevalence of near-organic and organic agricultural practices in the region, spice production in NER aligns with the preference of consumers in this segment for pure and natural spices.

However, to gain a competitive edge in the growing high-quality fresh spices market, NER producers will need to bridge the current gap in quality, particularly in consistency in the quality of the spices. The size, color, and pungency of ginger and turmeric are some of the basic characteristics used to identify the quality of the spices. Additionally, sophisticated laboratory tests can provide scientific proof of the quality of the spices. Good quality fresh ginger and turmeric tend to have a rich color and smooth skin; they are of an appropriate size, neither too big nor too small. Clean spices that are free of any contamination are crucial.

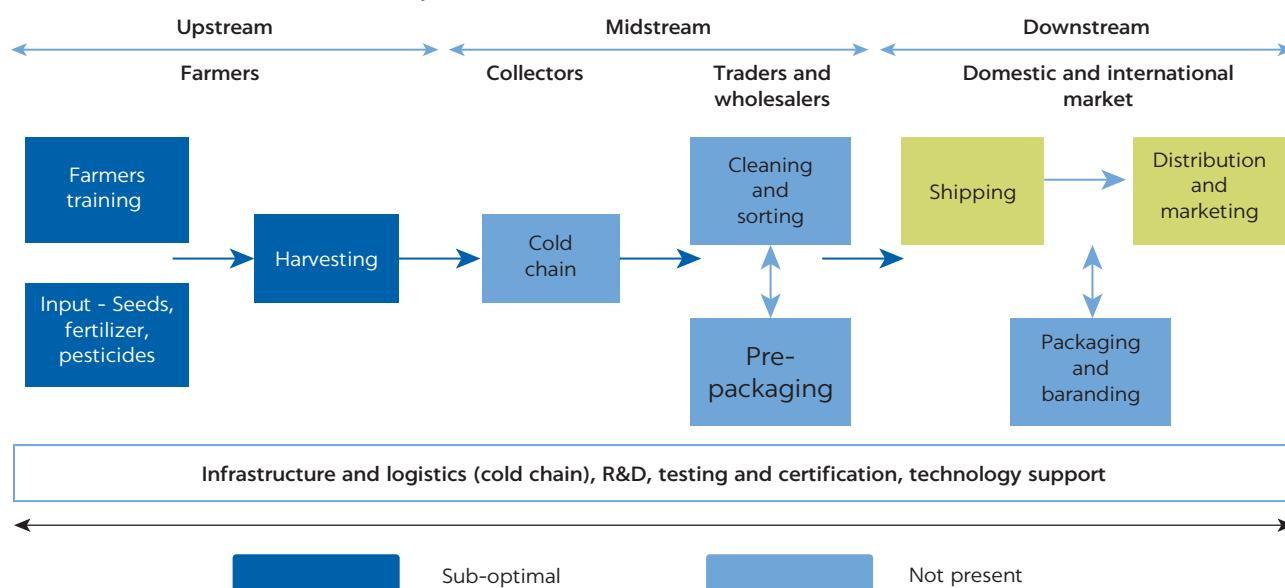
Figure 1.3 represents the value chain required to become competitive in strategic segment B1, highlighting the gaps in the existing value chain, which largely caters to segment A1.

Upstream activities

The value chain begins on the farm with the sourcing of inputs—procuring high-quality inputs such as seeds, planting material, natural or organic fertilizers

FIGURE 1.3

Value chain: Fresh spices for quality-conscious consumers



Source: Based on interviews and secondary research.

and pesticides, and skilled labor trained in the requisite cultivation and harvest practices. This is followed by cultivation, using the various factors of production, and appropriate cultivation practices. Upstream activities end with the harvest, where again the use of appropriate harvest techniques is critical to get a high-quality product.

Midstream activities

This part of the value chain begins with post-harvest activities such as cleaning, sorting, and grading; transport and logistics; and wholesale distribution. The main focus of this segment is to maintain freshness and use environmentally friendly materials and facilities. The presence of cold chain facilities is paramount, and efficiency of the transportation system will ensure that fresh spices reach their destination within the shortest time and at frequent intervals.

Downstream activities

This part of the value chain includes distribution of the produce beyond the wholesale level up to the retail level and to consumers. It includes packaging, labeling, branding, marketing, and distribution. The downstream activities are particularly critical in ensuring that the quality of the spices is not only maintained, but also that it can be differentiated and traced along the value chain as per the consumer requirements. Packaging, branding, and marketing are especially important for this value chain, to offer authentic information and credibility in reaching out to discerning customers who are able and willing to pay a premium for these services.

The existing value chain in NER largely caters to strategic segment A1, and to some extent segment A2. All the activities in the value chain will need to be reoriented to cater successfully to the needs of segment B1. Key challenges that will have to be addressed to become competitive in segment B1, as suggested by the experiences of other successful regions and countries, are discussed in the following.

Research for development and standardization of quality inputs

Use of quality inputs is a critical ingredient in realizing quality produce. The rhizomes used for planting have a direct correlation with the quality of output in terms of size, color, pungency, and content of active ingredients. The Indian Institute of Spices Research and the National Research Centre for Seed Spices have been conducting research to enhance the quality of inputs. However, there has been limited effective adoption by farmers in NER to enable the realization of high quantity and quality of output. Consistency in the quality of the product remains a challenge. Streamlining of dissemination mechanisms for technologies developed from the research is critical to realize the full benefits. This needs to be combined with a feedback mechanism from farmers and consumers to researchers, to ensure a continuous quality improvement framework for seeds and planting materials. Although several institutions currently provide support

services, including seeds and planting material, to farmers, they have limited reach and less emphasis on quality. For instance, the Spices Board of India supplies seeds to farmers, but field interviews indicated that there is a significant delay in making seeds available (due to inefficiencies in the logistics) at the right time before the planting season, which delays planting and adversely impacts product quality. Farmers often end up using their own seeds without treatment, which are susceptible to diseases and pests. To improve product quality, it will be important to address the farmers' lack of assured and timely access to quality seeds as well as other "certified" organic or natural inputs such as biopesticides and biofertilizers.

Extension services for building farmers' capacity in best practices for spice production

The capacity of farmers is a critical factor in the production of high-quality spices and farm productivity, as farmers are responsible for the choice of inputs and application of proper cultivation and harvest practices as well as post-harvest handling. Practices related to cultivation, including methods applied for pest and disease control, harvest, and post-harvest, have a significant impact on the quality of produce. A holistic approach to farmers' capacity building has been adopted in various countries, which includes conducting a needs assessment, taking into account consumers' needs as well as farmers' requirements, and designing suitable training programs. Field interviews indicated that although the Spices Board's regional offices in NER have training programs in place for farmers, there is significant opportunity to improve and expand on such programs. Hence, there has been limited application in daily farming activities of the knowledge gained through training.

Further, there is a need to ensure that training on cultivation, harvest, and post-harvest practices is aligned with the requirements of discerning consumers. Enhancing farmers' understanding of consumer needs as well as product standards laid out by food legislation, which tends to vary from country to country, will also motivate farmers to adopt effective practices, especially to meet the requirements of targeted markets. For instance, the United States, Europe, and Japan have more stringent, but varying, regulations on food imports. Turmeric carries a heavy bacterial load and hence is susceptible to molds even after curing and drying. The use of ethylene to control for toxigenic molds in turmeric and ginger is allowed in the United States, but it is banned in the European Union and Japan. Irradiation provides an alternative to the use of ethylene. However, irradiation requires specifically built and secure facilities to sterilize spices; further, it can only be carried out once on spices and hence the labeling process needs to mention clearly if it has already been carried out.

Storage and transport logistics, including aggregation and collection

The logistics of moving any product in and out of NER, and even within NER, impose an additional burden on NER products in terms of the time and cost of transportation of inputs brought from, and finished products sold, outside the region. However, the core challenge of spice farming in NER with the view of providing fresh products to quality conscious consumers is the inadequate and

often missing end-to-end storage and transport logistics framework, which allows for the produce to move from the farm to the market seamlessly and at frequent intervals, with its freshness, purity, and cleanliness intact and assured. This challenge is further exacerbated by the need for collection and aggregation of produce from small and scattered farms in the region. The limited investment in end-to-end cold chain facilities contributes to significant post-harvest losses. Developing effective infrastructure and logistics mechanisms would greatly reduce the post-harvest losses and facilitate penetration into the market for the fresh quality conscious segment.

Quality assurance

This is a key aspect of the purchase criteria of quality conscious customers. Consumers are becoming increasingly aware of the risks of food contamination, and food legislation is becoming increasingly more stringent to control such risks. They are also becoming more conscious of environmental sustainability and social responsibility. Advancements in technology now allow for granular testing for quality, microorganisms, and other toxins. Further, traceability allows consumers to trace back the produce to the farm and make environmentally conscious and socially responsible purchases. Quality assurance through testing, certification, and traceability has become an essential activity in catering to the needs of this strategic segment. However, currently, there are limited testing and certification facilities in NER, partly because of the lack of demand for such facilities, given that the existing value chains cater primarily to price conscious consumers who do not prioritize quality.

Packaging and labeling

The packaging is required to keep the product dry and secure and prevent its contamination, which needs, for example, food grade packaging materials with three-layer security to maintain the quality and purity of the products. Labeling details the ingredients, and additives if any, in the product and is an important source of information for the quality conscious consumer. Packaging and labeling together also play a key role in making the product look appealing to consumers. For example, discerning customers who care about the environment and its sustainability may value packaging material that is recycled or biodegradable (box 1.2).

Thus, packaging and labeling can be brought to bear as a branding and marketing tool for the product. Packaging and labeling have not been given adequate attention in NER, especially as a marketing tool. More significantly, the lack of

BOX 1.2

Examples of preferred sustainability practices

There is a growing market for certified products with well-known consumer logos. Sustainable products must be identified as sustainable during all stages, including storage, transport, processing,

packaging, labeling, and handling. Certification may include Fairtrade, certified organic, GlobalGap (environmental), and Global Social Compliance Program (social and environmental).

suppliers of packaging material of the requisite quality in NER forces firms to procure such material from outside the region, which, due to the associated higher logistics costs, adds to the cost of the products. This reduces the value farmers can realize from their produce.

Branding and marketing

Effective branding and marketing help in penetrating the quality conscious market segment, by providing critical information about the quality of the spices and the production process, which may differentiate the product to persuade the consumer to purchase it. Lack of sorting at the farm gate and aggregation of produce of varying quality from various farmers limit any substantial branding and marketing of the spices from NER.

A closer link between producers and consumers can help farmers meet the high consumer expectations of this strategic segment, while also garnering better returns. Traditionally, most food-related value chains were characterized by long supply chains and many actors. In the recent past, most food companies have created mechanisms to build a close link with producers, which also empowers farmers, who are responsible for delivering a high-quality product to the food companies. Consequently, there is increased cooperation with exporters and producers across the globe through the integration of activities to shorten supply chains and eliminate the need for most of the actors. This process is also contributing to a possible improvement in production processes and quality of output. Additionally, it is enhancing farmers' prospects for earning higher margins.

INDUSTRY ECOSYSTEM: PORTER'S DIAMOND

Porter's diamond framework is used to characterize the competitiveness of a cluster based on five key dimensions that describe an industry's ecosystem in which firms are born and compete: (1) demand conditions; (2) firm strategy, structure, and rivalry; (3) factor conditions; (4) related and supporting industries; and (5) government and chance variables (Porter 1990). This section analyzes the competitiveness of the spices cluster focused around fresh products that cater to quality conscious consumers in NER based on this framework.

Demand conditions

The local demand is largely in the A1 and A2 segments for fresh or dried/powdered spices for price conscious consumers, who are indifferent to quality or environmental sustainability concerns.

But the potential demand for high-quality spices, including fresh spices, is growing. Worldwide, including in India and neighboring countries, growing incomes and awareness about health and the environment are creating demand for safe and healthy food products, including spices. NER is well placed to cater to this growing market in India and neighboring countries, while also penetrating the larger global market if relevant support services and infrastructure can be put in place.

Farmers in NER face a thin market with limited opportunities or channels to trade their produce. There are few buyers²⁸ at the farm gate and, according to

field interviews, the village elders have significant control over the market or traders to whom farmers can sell their produce. These factors significantly repress farmers' bargaining power and the prices for their produce. Additionally, the inadequate infrastructure limits market access and creates an advantage for traders. There is no grading at the farm gate; instead, all farmers are offered an average low price and hence there is no incentive to enhance the quality of output or differentiate their produce.

Firm strategy, structure, and rivalry

Currently, there are hardly any firms in this sector that are operating in the B1 segment. Although NER can produce high-quality spices, the region largely caters to the price conscious segment. This is because of the lack of consistency in quality, small-scale production, and inadequate infrastructure (transport, cold chain, quality testing, standardization, and certification services, among others). However, some locally-based firms, like Parvata Foods, and firms from elsewhere in India, such as Conscious Foods, Sresta Natural Bioproducts Pvt. Ltd. (which markets organic products, including spices, in India and abroad under the 24 Mantra brand), and Phalada Agro (which markets a variety of food products, including spices, under the Phalada Pure and Sure brand) that exist in the quality conscious segments, B1 and B2, have made small forays into sourcing high-quality spices from NER.

Supply and factor conditions

Natural resources

NER has favorable soil and climatic conditions for the production of high-quality spices. Additionally, the production processes are near-organic, with limited application of chemicals to control pests and disease. The region is also faced with low labor productivity, which contributes to high production costs.

Skills

Farming practices are inadequate to meet the conditions of quality conscious consumers. Farmer training and skills development are critical inputs for upgrading quality to meet the demands of the quality conscious segment.

Access to finance

In recognition of the constraints faced by farmers and entrepreneurs in access to finance, the government has put in place various financing programs (see box 1.1). However, these programs have not adequately addressed the financing needs of farmers and entrepreneurs. Most farmers are small-scale producers, which increases the transaction costs of servicing them.

Related and supporting industries

Research and development

The Indian Institute of Spices Research has the R&D mandate for all spices across the country. It has a limited presence and reach in NER.

Quality assurance

For quality conscious consumers, quality assurance is an important purchase criterion. The Spices Board of India has put in place a range of mandatory testing

requirements to ensure that Indian spices comply with importing countries' regulations, with a view to safeguarding the reputation of Indian spices as safe for consumption in the global market. The Spices Board of India provides services like testing but does not run laboratories in NER. Similarly, the Export Inspection Council, another government agency responsible for export quality control, has established its own network of laboratories and approved external laboratories for the certification of some exports, like certain spices, but does not have any facilities in NER. The Food Safety and Standards Authority of India, India's central authority on food safety, has not notified any laboratories in NER to test against its food safety regulations. Organic certification is needed to commercialize the “de facto organic” nature of spices and other horticultural products from NER, but certification bodies are also rare in NER.

Logistics

Higher logistics costs associated with bringing key inputs to and sending the final/packaged products from NER often render NER products uncompetitive outside the region. Further, the limited investment in end-to-end cold chain facilities contributes to significant post-harvest losses. Temperature and humidity controlled storage and transport facilities are important to maintain the freshness of produce as well as its quality, given that spices are sensitive to bacterial infection and contamination.²⁹

Other related and supporting industries, such as organic inputs and packaging and labeling, which play an important role in this value chain, are absent or underdeveloped.

Government's role

Recognizing the potential of spices to improve farmers' incomes, the Government of India has been actively involved in supporting spice farming, including in NER (see box 1.1). However, government interventions and schemes have not been very effective in creating more value for farmers. Better coordination is required to translate these interventions into gainful outcomes.

CONCLUSIONS: SOME CONSIDERATIONS FOR THE PUBLIC AND PRIVATE SECTORS

The analysis has demonstrated that the spice industry has a lot of growth potential and that NER can strategically position itself to supply fresh spices to the growing segment of quality conscious consumers who are looking for natural and clean spices. NER produces high-quality spices with a high concentration of active ingredients. Given the low penetration of chemical fertilizers and pesticides in the region and the resultant prevalence of near-organic or organic agricultural practices, horticultural production in NER aligns well with the preference of quality conscious consumers for pure and natural spices.

Given the greater attention to producing and maintaining quality at every stage in the value chain and the related higher skill content required from workers, this value chain has the potential to create more and better jobs. Farmers and others at the bottom of the workforce pyramid create more value in this segment and have the potential to appropriate higher margins as their bargaining power strengthens, given the smaller production base for high-quality produce,

relatively less availability of skilled workers, and the traceability requirements of consumers.

With greater attention given to various tasks in activities in which the participation of women already tends to be high, such as the on-farm activities of cultivation and harvest, sorting, grading, and packaging and labeling, this value chain also creates more and better opportunities for women. There are also potential opportunities for women's participation in other activities that assume greater importance in this value chain—such as R&D, extension services, quality assurance, and marketing and distribution—as workers, or even as entrepreneurs, for example, in a marketing and distribution firm.

For Bangladesh and other neighboring countries, the emergence of such a cluster in their vicinity offers advantages as well. Bangladesh is a net importer of spices and other food products. NER provides Bangladesh an alternative source of spices, especially fresh quality spices where proximity to source plays an important role in maintaining freshness all the way to the market. There are also opportunities for firms from Bangladesh to create and appropriate value in this value chain. Bangladesh, with its vibrant food industry, could also invest in spice farms and other businesses along the value chain in NER. Its logistics providers could partake of margins generated in the value chain by providing services, especially if transit through Bangladesh is made possible through the required policy changes. Such transit would cut down the time and costs to reach markets in India and abroad, which could be a key enabler for NER's horticultural value chains, especially those related to fresh products where the time taken in transportation plays a very important role.

The rest of this section discusses some considerations that are critical to promoting the development of NER into a competitive spices cluster focused on fresh spices that cater to quality conscious consumers. It may require a concerted effort by the private sector and the government to address key challenges and gaps in the value chain, especially in developing early successes as a demonstration of the sector's potential. A possible approach, which will need to be refined and deepened when operationalization begins, could include some of the following elements.

Cluster promotion

Coordination will be critical across the various government agencies and programs, as well as with the private sector for building up the region's competitiveness in spices. In the case of high-quality spices, NER could consider a "Made in North East" branding initiative that plays up the region's strengths in producing organic/near-organic products as well as characteristics such as high content of active ingredients in spices.

Investment in R&D and improved linkages with farms and markets

Investments will be needed in creating and strengthening research capacity related to the development of high-quality inputs such as high-quality seeds and organic/natural fertilizers and pesticides. Stronger linkages will be needed with the market for better understanding changing consumer needs and product standards, to develop the appropriate varieties of spices, their planting material, and other farm inputs. Stronger linkages will also be needed with the farms to

ensure that the developed inputs suit local conditions, are easy to use, and are available on time, to ensure better uptake at the farm level.

Development of skills to support production of high-quality spices

Extension services involving the application of scientific research to agricultural practices through farmer education and training will be critical for improving the quality of produce and ensuring consistency in quality. Such services could be used to disseminate among farmers the knowledge about the use of high-quality inputs and appropriate cultivation and harvest practices required for fresh spices. They could also aid in improving farmer awareness about consumer needs and product standards in domestic and export markets to facilitate better alignment with consumer preferences and improved access to export markets. Farmer training would need to focus on creating that awareness as well as building the capacity of farmer groups to meet the sanitary and phytosanitary standards of export markets and stringent buyer requirements for quality and certification. To enhance information flow and farmers' awareness, training programs and exposure tours to destination markets have been shown to contribute to the adoption of improved farming practices. In a World Bank project in Haiti, coffee and mango farmers had several exposure tours to enhance understanding of how their practices contributed to product quality and influenced consumer choices and willingness to pay. The provision of extension services will need agricultural scientists, agriculturalists, and other professionals.

Greater emphasis on quality assurance

For the quality conscious segment, quality assurance is an important purchase criterion. Thus, the development of product standards that reflect customer requirements as well as conformity assessment services that assure quality are critical factors for value chain development of such products.

In this context, it will be important to develop and upgrade continuously a standardized system for grading the quality of spices that considers the requirements of quality conscious consumers and the increasingly stringent food regulation in the domestic market as well as export markets. The Spices Board of India has put in place a range of mandatory testing requirements to ensure that Indian spices comply with importing countries' regulations, with a view to safeguarding the reputation of Indian spices, as safe for consumption, in the global market. It will also be important to develop demand-based testing and certification services that are more easily accessible to producers in NER and that are also recognized in domestic and international markets. Currently, the availability of such services is limited in the region. State governments in NER will need to work closely with the central government to strengthen the national quality infrastructure, as well as encourage the latter to work with governments of partner countries to develop mutual recognition agreements for the smooth flow of fresh horticultural products to export markets.

Agriculture in NER is perceived as organic by default, given the low penetration and usage of chemicals in agricultural production. However, to commercialize this advantage, there is a need to develop a system of standards and certification for organic products that is recognized and acceptable in domestic and international markets. Currently, organic certification is provided in India

under the National Program for Organic Production. According to firm interviews, although this system is recognized in the Indian markets and valued by Indian consumers, it is not widely accepted in export markets.

Development of an integrated and interlinked transport network and cold chain facility, with strategically located aggregation points/centers

Developing an integrated cold chain, from the farm to the market, is critical for scaling up value chains related to fresh spices and other horticultural products. A cold chain can enable high-value fresh products to reach more lucrative domestic and export markets, with their freshness intact and less waste related to spoilage, improving returns from the product. It is important to ensure that spices and other horticultural products meant for the fresh quality conscious segment are put in a temperature and humidity controlled environment within a few hours of being harvested on the farm, and that they are kept in a controlled environment all the way until they reach the market. There are cold storage capacities in the region, but what is required is an interconnected system of cold storage and refrigerated trucks and rail cargo vans that extends from the farm to the market. This system can be used by other fresh horticultural products as well as fresh animal products for achieving requisite economies of scale.

Another key aspect of spices and other horticultural value chains is the last mile connectivity and near-farm infrastructure. Collection and aggregation from scattered farms are critical to securing a steady supply of products and economies of scale in horticultural value chains. The aggregation will require last mile connectivity to farms and near-farm infrastructure and services, such as collection, handling and weighing, sorting and grading, packaging, and pre-cooling and storage.

Incorporating technology in value chains

In horticultural value chains (fruits and vegetables and spices), the application of blockchain technology has the potential to create transparency, reduce operational costs, and improve food safety, while also improving inclusiveness. For example, in a transformative initiative in Haiti, with the support of the World Bank, blockchain technology is being employed to empower small-scale fruit farmers with the objective of bringing them greater returns.

NOTES

1. Spices can be classified by their aroma and/or uses. For example, some spices are used primarily for flavoring (for example, pepper, cayenne, and basil), preservation (for example, garlic, vinegar, and cloves), and/or medicinal benefits (for example, nutmeg, peppermint, thyme, ginger, rosemary, willow, and turmeric). Spices are also classified based on the degree of taste, that is, hot spices (chili, black pepper, and white pepper), mild spices (paprika and coriander), and aromatic spices (cassia, cumin, nutmeg, and mace). They can also be classified based on the part of the plant that is used to produce the spice, such as the buds (onion and garlic), berries (pepper and chili), rhizome (turmeric and ginger), bark (cinnamon), leaf (basil and mint), and seeds (coriander and ajowan), among others. Spices can be used on their own, but some spices complement each other and are often mixed to produce complex flavors.

2. For instance, fresh chili peppers are very rich in vitamin C, and they are often consumed to improve immunity and reduce pain, especially related to arthritis. And, in some cases, chilies are said to reduce cholesterol.
3. See <http://www.marketsandmarkets.com/Market-Reports/spices-market-739.html>.
4. See <http://cms.herbalgram.org/herbalgram/issue111/hg111-mktrpt.html?ts=1501084687&signature=680d76271bd889e8da12a78b80ae71b5&ts=1501084692&signature=2775a120a57f1cb2cdf3b6074efe7dc0&ts=1517284360&signature=4c48ca3ffa9c29fd8eb6b0870925f814>.
5. The flavors of most spices are unique to the regions where they are grown. Similar spices may differ in quality by the region where they are produced. This is because climatic, geographic, and soil conditions affect their quality, for example, the active ingredients and oil content of garlic from China are different from those of garlic from Spain.
6. See <http://www.marketsandmarkets.com/Market-Reports/spices-market-739.html>.
7. Changing climate, pests, and diseases are the main challenges facing spice production. The threats to spice production include depletion of soil nutrients, climate change, inadequate water, farm energy availability, loss of biodiversity, emergence of new pests and diseases, rural-urban migration, increased population, and fragmentation of farms, among others. Maintaining high-quality spices will require innovative solutions and, in some cases, developing new varieties that are more resistant to pests and diseases.
8. Turkey mostly produces thyme, sage, bay leaf, white poppy seed, cumin, mint, and pepper.
9. The global cosmetics market is expected to reach US\$430 billion by 2022, with a CAGR of 4.3 percent between 2016 and 2022 (<https://www.alliedmarketresearch.com/press-release/cosmetics-market.html>).
10. Ginger is recognized in combating various ailments, such as degenerative disorders (arthritis and rheumatism), digestive problems (indigestion, constipation, and ulcers), cardiovascular diseases (atherosclerosis and hypertension), cancer, diabetes mellitus, and nausea. Its antimicrobial potential, which aids in the treatment of infectious diseases, and its antioxidative and anti-inflammatory properties for keeping the process of aging in check are likely to boost this market substantially.
11. See <https://www.ijcmas.com/7-4-2018/Bijaya%20B.%20Bag,%20et%20al.pdf>.
12. See <https://markets.businessinsider.com/news/stocks/global-turmeric-market-2017-2021-1001875698>.
13. See <https://www.statista.com/statistics/738150/global-turmeric-market-size/>.
14. The major phytochemicals that give turmeric its most impressive and wide-ranging health benefits are curcuminoids. Curcumin is responsible for turmeric's yellowish color. Additionally, turmeric contains turmerone, which is a potent volatile oil found in the root. The global curcumin market is expected to reach a valuation of US\$465.8 million by 2026, relative to over US\$282.2 million in 2018, which translates to a CAGR of 6.5 percent over 2018–26 (<https://www.transparencymarketresearch.com/curcumin-market.html>).
15. See <http://www.indianspices.com/spices-development/spice-catalogue>.
16. See <https://www.businesswire.com/news/home/20170621006221/en/Study-Indias-Spices-Market-2017---Market> and <https://www.ibef.org/archives/detail/b3ZlcnZpZXMzMzY5MzMmODY=>.
17. See <https://www.businesswire.com/news/home/20170621006221/en/Study-Indias-Spices-Market-2017---Market>.
18. Field interviews indicated that the difference between the prices paid by consumers and those received by spice producers could be as high as 2,000 percent, which makes spice trading a very lucrative business.
19. Technology development and new varieties might reduce this advantage.
20. <https://www.thehindu.com/sci-tech/agriculture/huge-potential-for-turmeric-in-north-east/article2048056.ece>.
21. Ginger oil has a strong, spicy, warm, and sharp odor, like the smell of the fresh ginger. These features are often used by buyers to determine subjectively the quality of essential oils. Ginger essential oils and chili capsaicin are mainly applied in the fragrances, cosmetics, pharmaceuticals, aromatherapy, and food sectors, mainly for their aromatic, moisturizing, and flavoring properties. The price that chilies realize in the market is determined by their pungency, which is influenced by capsaicin content and color, driven by the pigment capsanthin.
22. To minimize post-harvest losses, the government has proposed that part of the National Horticulture Board subsidy will be used to establish cold chain facilities.

23. The capsaicin in paprika has anti-inflammatory and antioxidant properties; ginger can relieve the pain and swelling associated with arthritis; the curcumin in turmeric can inhibit the growth of cancer cells; and spices act as stimuli in the digestive system.
24. Fair trade guarantees that farmers receive a fair price for such crops as coffee, tea, cacao, fruit, sugar, rice, and spices.
25. Three of the most popular providers are Plated, Blue Apron, and HelloFresh.
26. <http://pentallct.com/wp-content/uploads/2017/06/Pentallct-POV-Meal-Kits.pdf>.
27. Porter's Five Forces are an analytical tool used to assess industry attractiveness and the distribution of margins or profits across the value chain. It does so by assessing the relative strengths of five forces in the industry: intensity of competitive rivalry, threat of new entrants, threat of substitutes, bargaining power of suppliers, and bargaining power of buyers.
28. There are 50 registered exporters of spices in NER compared with 2,300 in the rest of India.
29. According to the European regulations, only 50 percent of permitted pesticide maximum residue levels should be detectable in a product and the supply chain should demonstrate its sustainability.

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2 Fruits and Vegetables

AMAN KHANNA

ABSTRACT This paper is part of analytical work done by the World Bank on strengthening inclusive cross-border value chains in Northeast India, in support of the implementation of the World Bank-supported North East Rural Livelihoods Project (NERLP). For illustrative purposes, four promising sectors in the North Eastern Region of India were selected for deeper value chain analysis, of which fruits and vegetables was one. A rising recognition of the nutritional benefits of fruits and vegetables and health consciousness, along with rising incomes, are leading to growing demand for these products, especially those that are grown in natural environments with limited use of chemicals. The short shelf life and limited harvesting period (seasonality) of most fruits and vegetables lead to challenges in ensuring availability for consumers who are distant from production locations. However, these characteristics also create an opportunity for higher returns if the products can be delivered to the customers, with freshness and quality intact, during times when competing regions cannot. Investments that have been undertaken to address the challenge of short shelf life have involved transformation of the produce into processed products or the use of technologies that slow the aging process, to retain the freshness of the products. The former has garnered significant attention from policy makers. This paper undertakes a strategic segmentation exercise that reveals that fresh (non-processed) produce targeted toward discerning customers has the potential to deliver higher margins for smallholder farmers and women. Because of its agroclimatic conditions and current production patterns, the region is very well-suited for the cultivation of fruits and vegetables. The relatively lower use of chemical inputs adds to the region's positioning in this attractive segment. To harness Northeast India's latent strengths in producing fresh fruits and vegetables, the paper highlights key gaps that limit the ability of smallholders to be competitive and proposes policy considerations for sustainable ways to develop the region's strengths in this segment.

INTRODUCTION

Horticulture is the branch of agriculture that deals with growing plants. It contrasts with extensive field farming as well as animal husbandry. Although the definition of horticulture covers a wide range of plants across fruits, vegetables, flowers, spices, and medicinal/aromatic plants, this paper covers only fruits and vegetables (F&V).

Investing in the F&V industry delivers differentiated development impact. Globally, this industry has witnessed better farmer incomes, as seen in higher realizations per hectare of land under cultivation, compared with food grains (figures 2A.1 and 2A.2 in the annex),¹ greater employment potential,² and higher prevalence of women in the workforce across the chain—especially in value-added activities.³ Combined with the healthy growth in formal global trade in horticultural products and the rising participation of developing nations that have an inherent agroclimatic advantage,⁴ this creates attractive opportunities for policy makers to focus on this industry to drive poverty reduction and inclusive economic growth.⁵

This paper analyzes the F&V industry through the lens of four strategic segments. Among the identified segments, the segment comprising “fresh” products catering to discerning, quality conscious customers can garner the highest returns. This segment also has the potential to deliver greater returns to the bottom 40 percent of the income distribution and women, when high-quality products can be delivered to the market with their freshness and quality intact and assured.

India is among the top producers of a wide variety of key F&V products. Although the growth in production has been very high, the country’s participation in global trade of these products has remained marginal. However, highly fragmented and inefficient domestic F&V value chains are slowly adapting to respond to the rising share of discerning domestic customers who place a premium on quality and freshness. This evolution of the domestic F&V sector has also given rise to incipient success stories of exports to demanding global markets.

The North Eastern Region (NER) of India is positioned favorably for the cultivation of several F&V products. NER’s diversity of agroecological zones, high share of high-value F&V products, and relatively lower penetration of (chemical) input intensive cultivation align the region extremely well with the fast-growing global consumer segment seeking fresh and good quality products. These factors provide an effective counterbalance to NER’s inherent logistics disadvantage in access to the mainland Indian market. Significant opportunities for development of the sector are also provided by the rapid rise of urban populations in the more proximate regions of Bangladesh, Nepal, Bhutan, and Myanmar, given the many initiatives to improve connectivity to these regions. A reorientation of NER’s positioning from being a “corner of India” to the “center of East Asia”—which is deeply ingrained in the Government of India’s “Act East” policy—can potentially be brought about with the F&V industry at its center.

Realizing NER’s potential in fresh F&V products for discerning customers will require targeted action to solve the key challenges of smallholder capacity, aggregation, cold chain logistics, and finance. Smallholders in the region continue to follow outdated cultivation practices with little access to high-quality

inputs and extension services—all of which adversely affect product quality and farm productivity. Although the small size of holdings sometimes provides better care and closer attention to cultivation, often with high female participation, the limited output from each farm raises transaction costs for buyers, effectively breaking the market linkage. The care needed for fresh produce to retain its quality until it reaches the consumer's plate necessitates investments in preservation infrastructure along the supply chain. Such investments are often beyond the capacity of individual smallholders or even small groups of smallholders. Finally, financial institutions are ill-equipped to assess the risks in agriculture and the creditworthiness of smallholders.

The rest of the paper is organized as follows. The next section provides a description of the F&V industry and key trends globally, in India, and in NER. The paper then explores consumer needs and identifies market segments based on product types and buyers' purchasing criteria, followed by an assessment of the attractiveness of various segments in terms of the relative overall margins generated and their distribution across the value chain. Strategic options relevant for NER are explored in the following section. Next, the paper addresses the participation of women. The paper then evaluates the business ecosystem in NER for the most attractive segment. The concluding section offers a set of options to cater to the F&V segment.

INDUSTRY DESCRIPTION AND TRENDS

The F&V industry is diverse and vibrant, with scores of varieties of products and rapidly evolving consumer preferences. Growing health consciousness and awareness of the nutritional benefits of F&V,⁶ along with rising incomes, are driving growth in consumption and trade across geographies. The fruits that are traded and consumed in the highest quantities include grapes, apples, citrus (oranges, mandarins, and limes), bananas, and pineapples. The most commonly consumed vegetables include potatoes, onions, tomatoes, broccoli, and lettuce, to name a few. Consumption of F&V produce is not only in the fresh form, but also in the form of processed foods, like juices, jellies, flavoring agents, jams, canned fruits, and so forth. Processing is undertaken for various reasons, ranging from extending shelf life to convenience of handling and consumption.

Global scenario

The value and volume of F&V demand and trade are rising rapidly. Between 2001 and 2017, while overall global trade in goods increased less than three times,⁷ global F&V trade increased almost four times, from about US\$500 billion in 2001 to US\$2,000 billion in 2017. This trade growth is driven not only by an increase in the absolute volume of consumption across the globe, but also the changing geographical mix of consumption. Further, the value of F&V trade has risen much faster compared with its volume during the same period, indicating a rise in global prices of F&V produce.⁸

Growing incomes in developing countries and the fact that most popular F&V products are grown in concentrated areas are increasing the number of importing countries and the overall significance of trade in these products (figure 2A.3

in the annex). A rising recognition of the nutritional value of F&V products is contributing to overall growth in volume.

The overlap between the largest producers and the largest exporters is reducing, with rising domestic populations of the largest producers coupled with export oriented development in other countries in niches developed around their geographic or climatic advantages. Thus, key producing countries (like China, India, the United States, the Russian Federation, Nigeria, Turkey, and Brazil) are different from the key exporting countries (Spain, the United States, Chile, Mexico, China, Ecuador, Thailand, Costa Rica, the Philippines, and Colombia, among others).²

There is a rising preference for “cleaner,” “organically grown,” and “Good Agricultural Practices certified” produce in the global landscape of F&V. This is driving specialization in production locations that are already naturally limited to select agroclimatic zones (map 2A.1 in the annex). Greater preference for branded F&V products and the growing use of the online channel for purchase are the other trends being observed.

Although the value realization of developing countries from exports of key F&V crops has been lower than that for developed countries,¹⁰ this gap is closing, as developing countries—especially those in favorable agroclimatic geographies—are building capacity for specialization. For example, several nations in Latin America have leveraged their proximity to the large consumption market in the United States to build a niche around specific tropical products. Similarly, some other nations, such as Chile, Guatemala, Honduras, Mexico, Ecuador, and Thailand, have been able to utilize the complementarity of the harvesting season with that in the consuming countries to create a niche for themselves by developing large-scale, specific tropical F&V products. All exporting nations have had to build further on their inherent climatic advantages by investing in superior cultivation and harvesting practices that result in better yields and/or quality, and post-harvest infrastructure and logistics to ensure that the products reach high-value markets and consumers with quality intact and assured in terms of, for instance, traceability and conformity to sanitary and phytosanitary measures.

Global trade in processed fruits and some fresh and less perishable (or easier to store) fruits, such as bananas, pomegranates, and pineapples, is dominated by a few large players, such as Dole, Del Monte, Chiquita, Fyffes, Total Produce, Pepsico, and Unilever. However, trade in fresh fruits, especially exotic fruits, such as dragon fruit and passionfruit, and almost all vegetables is less concentrated.

India

India is a leading global producer of F&V. It accounted for about 10 percent of world fruit production in 2017, ranking first in the production of bananas, papayas, and mangoes among fruits, and okra among vegetables. India is among the top five producers in several other F&V in the same year (FAOSTAT data) (figure 2A.4 in the annex).

As of 2016, India is not only the second largest overall global producer of F&V, but it is also the country with the highest compound annual growth rate, over the period 2007–16, in production among large producers (figures 2A.8 and 2A.9 in the annex). Traditionally, policy incentives, driven by historical food security concerns, encouraged farmers to grow cereals, and therefore limited growth in

F&V production, but this situation is changing.¹¹ The government's policy direction, as outlined in its strategy for "Doubling Farmers' Income by 2022," recognizes the need for raising the share of area under horticultural crops and their yields (Government of India 2017).

However, competitiveness for export and high-value urban markets is limited, with persistent productivity gaps and supply chain challenges (figures 2A.5 and 2A.6 in the annex) arising, *inter alia*, from the small scale and non-commercial nature of farming, poor logistics to ports and airports, inconsistency in the quality and quantity of supply, and basic and poorly maintained wholesale markets. Although rising incomes and awareness of the nutritional benefits of F&V are driving an increase in demand in urban centers, an increasing share of consumption is being met by imports.¹² Thus, although protection (up to 50 percent for some products, like apples) enables less competitive F&V to thrive by catering to the domestic market, high-value export markets still remain mostly beyond reach. However, a few selected products have demonstrated competitiveness when concerted efforts to meet global consumer demand have been driven by policy and private sector action (see box 2A.1 in the annex).

F&V products are receiving greater attention in India from policy makers and the private sector. The industry is rapidly gaining prominence, with existing volumes and consumption placing India in a favorable position to emerge as a key player in global trade. Given the large volumes and high levels of waste in the supply chain,¹³ it is evident that even with a small percentage increase in production or reduction of wastage, through plugging yield gaps or resolving supply chain challenges, significant production increases can be generated. This is already being witnessed with the emergence of several first-generation businesses¹⁴ that work directly with farmers and consumers, disintermediating the supply chain and ensuring that information on consumer requirements is fed back to producers. This helps to reduce the waste and margin buildup that occurs due to the presence of multiple non-value-adding intermediaries in the supply chain.¹⁵

However, there appear to be several barriers that limit the pace of "organization" of this supply chain even as yield improvement takes place incrementally. Although these challenges are discussed in the next section, it is pertinent to point out that examples of success have been witnessed, albeit in isolated pockets where public policy and support and private initiative have come together to leverage inherent local advantages to address a high-value market (see box 2A.1 in the annex).

Northeast india

The northeast part of India has 12 agroclimatic zones,¹⁶ making it very suitable for growing a range of F&V and other horticultural products. Being geographically isolated from the rest of the country, over the years, NER has developed as an almost independent market in agricultural commodity production and consumption.

The F&V supply chain in the region is similar to that in the rest of the country, with a fragmented production base linked to a multi-tiered, fragmented set of intermediaries with limited capacity to invest in the quality required to access demanding high-value markets. Development and reform of this system has been slower than in the rest of the country, given the concerns about security

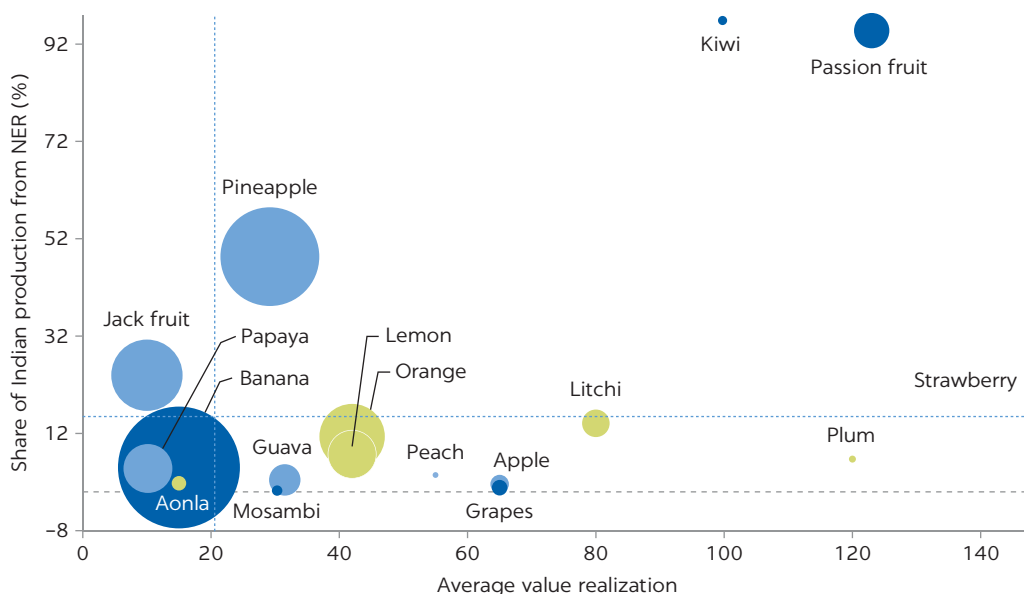
until recently. Isolation and distance from markets has kept production low and catering primarily to local markets. The low and scattered volumes of production have disincentivized a more organized system of production.

Slower development and reform of the horticultural supply chain in the region, on the flip side, has seen lower penetration of sophisticated input intensive agriculture, leaving the region's production relatively more aligned to the fastest growing segment of global demand—fresh, clean (largely chemical-free), and close to organic, “by default.”¹⁷

Produce from NER is largely organic or near-organic, or natural, as cultivation is low on fertilizer and chemical use. The region also has some of the most suitable climatic conditions and a complementary season¹⁸ in key F&V products, which provide a natural advantage in serving other parts of India.

A look at figure 2.1 reveals that the region already demonstrates a relatively greater share in Indian production of the more exotic fruits, like passion fruits and kiwis, which enjoy a niche market, and pineapples among the fruits that have a wider market base.¹⁹ All these fruits have a strong and fast-growing international market that could potentially be served by NER. For example, in the case of kiwis, although NER's production is largely organic, the cultivation and harvesting practices of growers, lack of cold chain logistics, along with poor handling and packaging practices result in high levels of waste and a high share of low-grade production. This leads to a situation where kiwis from NER cannot

FIGURE 2.1
Fruits and vegetables in Northeast India



Sources: National Horticulture Board; Agricultural and Processed Food Products Export Development Authority; www.agmarknet.nic.in; various news reports.

Note: Value realization is estimated using the price realization in the key urban markets of India. The share of Indian production from the North Eastern Region (NER) can be taken as roughly indicative of the competitiveness of NER for that product within India. The size of the bubble is indicative of the total volume from NER. The color of the bubble indicates if the share of NER volumes in Indian production is rising (green), falling (light blue), or stagnant (dark blue) over 2011–15. The products that were assessed are only those for which more than 1 percent of the cultivated area in India is in NER. Although vegetables are not included in this figure, a similar spread is witnessed for a range of vegetables.

compete with those imported into India. Given that cultivation of kiwis (as with that of most other F&V produce in the region) is relatively free of chemicals, there is potential for development of the kiwi value chain in NER to serve long-distance markets if cultivation and harvesting practices can be improved and the infrastructure and services for ensuring their availability in a wider geography is in place.

Prominent retailers of F&V produce in mainland India have attempted to address this opportunity and displace imports. However, they have found the investment in enabling infrastructure near farms and in extension services to be prohibitively expensive,²⁰ given that imported kiwis, supported with the marketing, branding, and logistics networks of some of the largest global players in the space,²¹ are relatively easily available.

STRATEGIC DIAGNOSTIC

Global trends impacting the nature of demand

Consumer demand for F&V products has been growing along with rising incomes, urbanization, and the associated increase in levels of information and education. For example, in the United States, education campaigns conducted through the 1990s to encourage greater consumption of F&V products appear to have increasingly spurred greater consumption and trade.

There has been a rising global preference for fresh produce that is sustainably grown, driven by growing health consciousness and awareness of the benefits of fresh and organic/pure produce. Growth in trade of fresh (non-processed) products is markedly greater than that of processed F&V products.²² Within fresh produce, demand has been rising for produce that is grown with minimal or no use of chemicals.²³

Demand for variety has been on the rise. Rising affluence is also driving the demand for more exotic F&V produce, such as clementines and passion fruits, as well as new varieties that are variations on standard products, such as an increasing number of tomato varieties, as an “aspirational” consumption product.

Changing consumer preferences are also evident in the year-round availability of items that were once thought to be seasonal, with consumers willing to pay a higher price for imported out-of-season fresh products. Year-round consumer demand for high-quality, fresh F&V products is a critical influence in global changes in the F&V products trade. Without trade in fresh F&V products, consumers in temperate climates, who face long winters, would have access to very limited supplies of fresh produce. Although some fresh crops, such as apples and potatoes, can be stored for a few months, more perishable products, like strawberries and tomatoes, would be available in much smaller quantities, if at all.

Strategic segmentation and attractiveness of the strategic segment

An assessment of global trends affecting the industry and their likely evolution in the foreseeable future provides an understanding of what consumers or users are demanding and how firms are responding by changing their products or offering additional services. Thus, a strategic segmentation of

the industry emerges, with several distinct strategic segments, each defined as a function of the product (supply side) as well as the user group served (demand side). Each strategic segment is supported by a unique value chain. Strategic segmentation is not country specific; rather, it provides a global overview of the segments within a sector. After identifying all the strategic segments that comprise a sector, the segments are assessed in terms of the (relative) overall margins generated and the (relative) distribution of those margins among participants in the value chain—input suppliers, producers, and buyers. This assessment is done using an analytical framework called Porter’s Five Forces (Porter 2008); the five forces are intensity of competitive rivalry, threat of new entrants, threat of substitutes, bargaining power of suppliers, and bargaining power of buyers. In each segment, an evaluation of the relative strength of the first three forces provides a qualitative assessment of the overall margin that is generated in the value chain, while an analysis of the latter two forces provides insights into margin distribution among the various value chain participants. This analysis can provide valuable insights into which strategic segments are more inclusive, in that their margins are distributed more equitably across the entities in the value chain and down the workforce pyramid in each entity, creating the potential for higher returns for the bottom 40 percent of the income distribution and women.

One way to present a strategic segmentation of the global F&V industry is suggested in table 2.1. Each strategic segment is a function of the product (supply side) as well as the user group served by the product (demand side). All the strategic segments are distinct from each other in the relative strength of Porter’s five competitive forces that shape strategy,²⁴ as well as the value chain required to support each segment.

Four key strategic segments can be identified in the global F&V industry based on combinations of user groups and products. Consumers or user groups differ from each other in their preferences for quality, which are determined by characteristics such as purity (as evidenced in the absence of chemical pesticides or preservatives), absence of damage or marks on the surface and attractive overall appearance of the product, and consumers’ willingness to pay premiums for such desired characteristics. Products can be categorized into fresh (shorter shelf life) and processed (longer shelf life). The longer is the shelf life of an item, the more commoditized and tradeable it becomes. This commoditization allows producers around the world to deliver the produce before it perishes, thus allowing the entire world to participate. These segments require high volume and very significant economies of scale to be competitive. Fresh and perishable items require more frequent delivery, and thus competition exists only with other producers that have access to fast, third-party logistics providers who can deliver the product with its freshness intact, quickly and frequently to the market. This is especially relevant in the case of fresh products geared toward quality conscious consumers. This creates higher margins in the

TABLE 2.1 Strategic segmentation

PRODUCTS	PRICE CONSCIOUS CONSUMERS	QUALITY CONSCIOUS CONSUMERS
Fresh fruits and vegetables	A1	A2
Processed fruits and vegetables	B1	B2

Source: Based on interviews and secondary research.

segment and the potential to appropriate higher margins for those engaged in production. Thus, four distinct segments emerge that differ in the strategic approach or business model required to gain market share. Table 2.1 lays out the segments, and the subsequent discussion delves into their key characteristics and relative attractiveness in margin generation and distribution across players in the value chain. Relative attractiveness is determined through the framework of Porter's Five Forces.

Segment A1

Segment A1 comprises highly price conscious consumers for whom the level of freshness of the produce is relatively less important than the price at which it is available. Consumers in this segment are not discerning in terms of quality, and their primary buying criterion is price. The vast majority of F&V produce in India (including NER) currently moves in this chain (as depicted in figure 2A.6 in the annex). Although this ensures widespread delivery of F&V produce across the country, the quality, purity, and/or appearance of the produce may fall short of the expectations of discerning consumers who value quality.

The margins in this segment are relatively low. Competitive rivalry is high because of the presence of a large number of growers of such produce who are not differentiated in the inputs they use, the cultivation practices they deploy, or the supply chain through which their produce moves—all of which have a strong bearing on the quality and ability of produce to garner higher prices. The threat of new entrants is high, as barriers to entry are low, with little capital investment and limited technical knowledge required to operate in this segment. The threat of substitutes is high, as consumers in this segment are more amenable to switching to other products that may be cheaper. Given the low margins, profitability in this segment depends on volumes and ability to optimize costs. This segment represents the dominant fresh F&V produce chain in India and NER, and it is characterized by high waste and low value addition.

Margins in this segment are typically appropriated by intermediate buyers and retailers, with a smaller share going to farmers. This is because the bargaining power of buyers is high relative to that of the farmers, as relative fragmentation in the producer base is significantly higher than that in the buyer base of the traders and commission agents who buy from the farmers. Demand tends to be price-elastic, with highly price conscious consumers often choosing to switch to cheaper priced F&V produce when the price of their preferred produce rises. The bargaining power of input suppliers—agricultural labor; suppliers of certified seeds, root stocks, and planting material; certification agencies; and fertilizer and pesticide suppliers—tends to be low, given the low propensity to use quality inputs.

Given the relatively low purchasing power of the majority of the consumers in this category, the prices and margins tend to be low. The chain is beset with waste, including waste and losses during transportation and distribution, especially in emerging markets compared with more advanced economies.

Despite the waste, or perhaps because of it, there is a sharp focus on costs in this segment.

Segment B1

Segment B1 is characterized by processed products that cater to relatively price sensitive consumers. The bulk of the current consumers of processed F&V produce in India fall under this segment. In India, as in many economies in

emerging markets, a large share of processing is carried out in the informal sector, including in juice making, where the informal sector includes small shops and roadside vendors who make use of manually operated or basic motorized equipment.

The margins in this segment are low, given the commodity nature of the end product. Competitive rivalry in this segment is high because of the presence of a large number of informal and small-scale processors who are not differentiated by the processing equipment or process they use or the nature of the inputs they employ. The threat of entry remains high, given the low capital investment and technical knowhow needed for this segment, and the threat of substitutes remains high with the availability of other processed foods and drinks.

Greater price sensitivity of consumers and the availability of cheaper, synthetic juices, jellies, and so forth also raise the bargaining power of buyers and make it easy for consumers to switch to these substitutes. The bargaining power of suppliers and entry barriers are also low for the same reasons as for segment A1.

Segment A2

Segment A2 is characterized by consumers who have the ability and willingness to pay a premium for better quality of F&V produce that is delivered consistently fresh. These discerning consumers seek produce that is not only fresh (moved through a seamless cold chain, with minimum time spent between harvesting and consumption), but also organically grown (preferably certified) or near organically grown, global Good Agriculture Practices compliant, and with superior packaging. Consumers in this segment tend to comprise health-conscious families with high disposable income in developed markets and a growing share of urban markets in developing countries.

In developing countries like India, consumers in this segment also increasingly comprise middle-income households across tier 1 and tier 2 cities in addition to the peri-urban areas of large metro areas. These consumers are increasingly exposed to messages around the importance of clean and fresh produce, and they aspire to consume high-quality produce.

The international market for organic certified F&V produce is believed to be about US\$35 billion, and its growth rate is in the double digits.²⁵ There is no reliable estimate for the size of this segment in India, but it is known that this market is growing rapidly.²⁶

The margins tend to be relatively high in this segment. Compared with segment A1, the threat of new entrants is lower, given the higher barriers to entry, and the threat of substitutes is also lower, given the requirements of discerning customers. Given that this segment requires frequent delivery of high-quality, fresh products to discerning customers, a notable barrier to entry is the specialized logistics and coordination needed to deliver the product seamlessly from the farm to the consumer with its freshness and purity intact. Other barriers to entry in this segment come from the significant investment required in better quality inputs, training of agricultural labor in the desired cultivation and harvesting practices, the cold chain, and quality assurance. Further, a long gestation period is required for moving away from the traditional methods of cultivation and handling the produce, toward newer practices that ensure that acceptable standards of quality, purity, and minimization of harmful residues are met. However, since it is a rapidly growing market, targeted strategies to address this segment with appropriate financial support for smoothing cash flows can

enable even smallholders to develop differentiated propositions and participate in this value chain. The edge provided to NER farmers by their current low level of pesticide and fertilizer use, in addition to the “pure” varieties of some fruits (like kews and queen pineapples) that are grown here in abundance, can help surmount NER’s logistics disadvantage of distance to markets.²⁷ Competitive rivalry is relatively low, given that fewer growing regions and growers can meet the requirements to cater to this segment.

There is greater potential for farmers and input suppliers to appropriate higher margins for themselves in this segment, compared with segment A1. This is because their bargaining power strengthens vis-à-vis intermediate buyers, retailers, and final consumers in this segment as compared with segment A1, as competition narrows. The higher bargaining power of the input suppliers comes from the higher value placed on inputs such as good quality seeds and planting material, organic or natural fertilizers and pesticides, and farm labor skilled in the appropriate cultivation and harvesting techniques, while such inputs are relatively less abundant. Although the farmers must pay more for the inputs, they can potentially receive even more for the output, since it caters to discerning consumers who are able and willing to pay a higher price for assured quality. The farmers’ bargaining power improves, as switching becomes more difficult for buyers and retailers due to the smaller production base and traceability requirements, as well as growing demand for products in this segment.²⁸

Segment B2

Segment B2 is characterized by discerning customers who have the ability and willingness to pay a premium for high-quality fruit juices, jellies, and other processed F&V products. Quality is judged by characteristics such as the product’s relative freshness and purity, preservation of nutrients contained in the F&V used as input, and lack of preservatives or additives, as well as criteria that may be important for environmentally conscious and socially responsible consumers. In this segment, farmers typically use as input fresh produce that is relatively less suitable for table consumption due to factors such as its poor appearance or partial damage. Sometimes, specific varieties that are more suitable for processing are developed and cultivated. As in the case of segment B1, the bulk of the value added in this segment is at the manufacturing stage. Hence, the value derived from the manufacturing process gains relatively greater significance than in any of the fresh produce value chains. Thus, the costs and margins in the post-harvest part of the chain, more than in cultivation itself, are greater determinants of the consumer price.

A focus on cold-pressed juices clearly illustrates the difference between segments B1 and B2. On the one hand, cold-pressed juices apply zero heat extraction, which enables valuable enzymes and vitamins to be preserved for about 72 hours. Thus, they have low shelf life. On the other hand, if the juice is pasteurized (treated at extreme heat for a short period), this enhances its life up to several months, but also destroys valuable nutrients. Clearly, cold-pressed juice will be a premium product, enjoying higher margins, since competition is limited and can only emanate from a finite geographical vicinity. Similarly, fresh sauces and dips are now readily available in stores, with higher nutrient value but shorter shelf lives. The reasoning on margins here is analogous to that in segment A2.

The overall margins are still relatively high in this segment. Given the emphasis on quality, competitive rivalry remains low, as few regions and producers can

meet the required criteria. And, given low shelf life, competition is inherently limited, which helps especially the processors. Consumers are willing to pay higher prices for a premium product, and limited competition in such premium processing, with a low threat of substitutes, allows companies to gain a significant share of the overall margin.

The bargaining power of farmers in this segment is relatively low compared with that in segment A2, but it is better than that in segment B1. Typically, processors do not need the highest quality produce and can manage with lower grade material that the farmer may find difficult to sell in the fresh product segment; there is likely to be some competition among farmers to supply this grade of output. However, the farmers' output, although it is a lower grade than that in segment A2, may need to be organic or near organic and of better quality than would go into the segment B1. The processor (buyer) may also have more bargaining power vis-à-vis the farmer compared with the buyer in segment A2. Hence, farmers' margins are likely to fall between the margins in segments A2 and B1.

STRATEGIC OPTIONS FOR NORTHEAST INDIA

The current F&V value chain in NER caters largely to segment A1 and, to some extent, segment B1. Both are relatively low-margin segments and, even more significantly, often bring low returns to farmers and agricultural labor, as most of the generated margins tend to be appropriated by intermediate buyers and retailers. Value chain interventions in the sector in the past have perpetuated the status quo and kept farmer incomes low.

Targeting segment A2 provides better margins and has the potential to bring greater returns to smallholder farmers. F&V products that reach the market with their freshness and quality intact and assured (through certification, traceability, and so forth), superior packaging, and other attributes valued by discerning customers, who also have the ability and willingness to pay higher prices, can command higher premiums. The higher potential for smallholders and agricultural labor to garner higher margins in this segment arises from the closer attention that use of inputs, cultivation, and harvesting practices require for products targeted to consumers in this segment, and the traceability requirements, which can increase the costs associated with switching sources of supply.

The attractiveness of segment A2 is further enhanced by using the lens of three key criteria—the potential for employment generation, the potential for female participation and entrepreneurship in the value chain, and the possibilities of leveraging opportunities offered by neighboring countries like Bangladesh to scale up the value chain.

Employment prospects, especially for women, are relatively high. The level of care and attention needed in cultivation and harvesting, the organized trade and logistics that take place in the value chain, and the relatively greater penetration of organized retail in segment A2 make it more amenable to employment creation, especially for women,²⁹ compared with the other segments. In general, employment intensity in segment A2 is likely to be higher than in segment A1, given the need for much closer attention to how the produce is sown, grown, plucked, stored, packaged, and transported. Because of this closer attention to cultivation and the associated need for less strenuous physical effort,

the participation of women in cultivation for this segment is higher. Research has shown that women comprise an estimated 70–80 percent of the workers in value-added activities that are essential for the consumer in this segment, like picking, grading, washing, chopping, and mixing, as well as packing, labeling, and bar-coding produce, and women dominate quality control positions (Staritz and Reis 2013). Improvements in the sophistication of the packed product (chopped, mixed, and so forth) also increase total female employment. Expansion of the packing segment offers women a higher paid employment alternative to farm labor (Staritz and Reis 2013). Some of this is captured in data for Chile, a leading exporter of F&V products. Although for F&V as a whole men earn 26 percent more than women, in F&V for export, this difference among temporary labor decreases to 10.8 percent (Staritz and Reis 2013). To the extent that export of F&V in Chile focuses on segment A2, which it does to a significant extent, these data are relevant for the present discussion.

Higher value F&V products tend to be more fragile, leading to increased female employment in crop management and harvesting. It was also observed in field visits that several primary agricultural activities are undertaken by women, irrespective of the strategic segment (for example, while men do the plowing, women typically do the hoeing, digging, and weeding), and women's roles are also observed in primary processing (for example, small-scale pickle making, cleaning, packaging, and so forth) (Staritz and Reis 2013). According to a report on the adoption of organic horticultural techniques in the United Kingdom, published in 1999, organic horticultural producers are more likely to be younger, run smaller enterprises, and be female than their conventional counterparts (Burton, Rigby, and Young 1999).

A focus on segment A2 can also give a fillip to cross-border trade, investment, and commerce with regions adjacent to NER, particularly Bangladesh. Bangladesh imports rising volumes of several fresh F&V products from various parts of the world to cater to the rising urban middle and upper class population in key metro areas (see Kathuria and Mathur 2019, box 1.2). At the same time, Bangladesh's ports offer the most proximate access to NER for exports of these products, and even beyond the subcontinent to discerning consumers in the Far East to whom logistical access from competing geographies may be limited. The natural complementarity of NER's productive capacity and Bangladesh's capacity to provide a conduit for produce originating from NER lays the ground for productive partnerships and investments.

Global export potential is high, owing to the rapidly rising share of consumers in this segment in developed and developing nations. Many prominent global suppliers (exporters) of F&V produce—Chile, Mexico, Guatemala, Costa Rica, Peru, and Thailand, to name a few—have attained their position by following a deliberate process of development of their value chains to align with the needs of this segment.

The rising demand for fresh and high-quality fruits, which is not limited to Western markets but is also seen in markets in the Far East, presents an opportunity for NER to develop F&V produce that can meet international standards (figure 2A.7 in the annex). Although developed markets remain the fastest growing in quality conscious consumers, urban centers with relatively greater affluence in the immediate proximity of NER, including in Bangladesh and mainland India, present an opportunity that is relatively easier to access. The significant cross-border potential in this segment, especially from urban centers in the proximate markets, including Bangladesh, is currently underexploited.

NER's climate and near-organic/organic agricultural practices give it an inherent advantage in producing F&V products geared toward serving the “premium” segment (fresh produce for quality conscious consumers). Further, NER's harvesting season provides attractive windows of opportunity to cater to this segment. For example, in the case of kiwis, imports from New Zealand, which are the most predominant in the market, are available between May and November, and harvesting in NER takes place between December and March. This provides an opportunity for NER to cater to domestic demand in India during the period when the competition is from countries like Greece and the Islamic Republic of Iran.

This discussion indicates that a sharper focus on segment A2 can

- Lead to better realizations across the chain through reduced waste and higher value realizations
- Contribute to better farmer realizations
- Enhance gender impact, since the segment has greater participation of women
- Boost cross-border trade and foster regional value chains
- Be developed using NER's inherent advantages.

NER will require a very different approach to cater to segment A2. The existing F&V value chain in NER is more akin to the value chain required for servicing relatively quality-agnostic consumers (segment A1). To upgrade the chain to cater to segment A2, it will be important to identify the gaps that need to be bridged. Serving this new segment, which commands a premium, will also go a long way toward helping NER counter its logistics disadvantage in accessing mainland India; and it will enable better outcomes for the bottom 40 percent and women while developing cross-border value chain potential.

Designing a value chain that meets the requirements of consumers in segment A2 will raise the total realizable value available for stakeholders across the chain. The distribution of value among the stakeholders in the value chain will depend significantly on the relative bargaining power in each part of the value chain. Technology can play a critical role in changing the relative bargaining power, in favor of farmers.

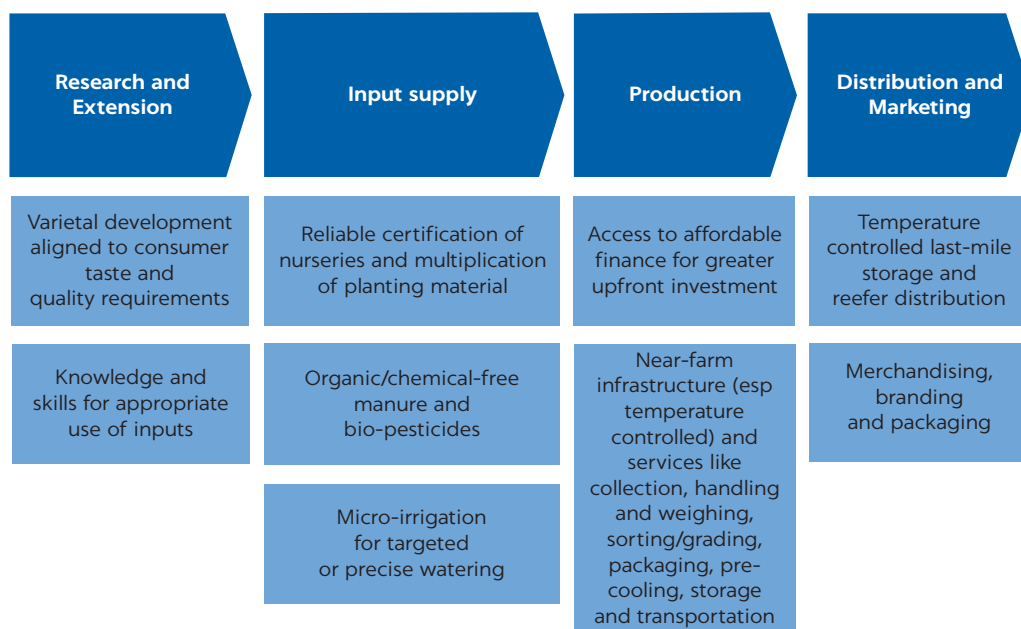
The required value chain for segment A2, compared with the incumbent chain (primarily catering to segments A1 and B1), reveals crucial gaps that deserve attention to enable NER to realize economic, development, and gender-related gains from targeting segment A2. A summary representation can be seen in figure 2.2.

For *inputs*, the availability of improved varieties of F&V planting material suitable for the local agroecology is constrained by the limited number and reach of certified nurseries. Often, smallholders purchase unsuitable planting material from uncertified nurseries, the performance of which is only revealed after investments in other inputs and labor for cultivation have been made. For example, the appropriate use of organic pesticides (like neem) or fertilizers, in terms of the quantity of the same to be applied at specific points in the lifecycle of the plant, can be vital in determining the health of the produce, in addition to the time of harvesting and care to be taken therein.

Varietal development aligned to the taste preferences of consumers while maximizing shelf life is limited, and extension services do not focus sufficiently on production practices for this segment. The availability of certified seeds and

FIGURE 2.2

Representation of the value chain to service segment A2



Source: Based on interviews and secondary research.

education of willing farmers and farmer groups to adopt certified seeds are also limited, while micro irrigation facilities that can play a vital role in expanding volumes and the customer base by enabling availability of produce in the off-season are lacking. The small size of landholdings not only increases the costs of procurement, but also creates barriers for adherence to best practices at the input usage, during cultivation and harvesting by smallholders, and in post-harvest activities by agri-enterprises. The lack of on- and near-farm infrastructure, particularly infrastructure that enables preservation of the quality and freshness of produce, is a binding constraint that individual smallholder farmers cannot overcome. Even for entrepreneurial businesses and producer groups that have startup capital for the same, lack of access to finance on reasonable terms creates disincentives for them to counter the constraints arising from this market failure.

Public extension services are mostly geared toward *cultivation* practices that are aligned with the prevalent low-cost, low realization mindset. Mixing different varieties in the same field, poor spacing of plants, and limited or improper use of drip irrigation are some of the factors that compromise the quality and quantity (yield) of output. For example, staggering the planting of pineapples, which can improve the yield and duration of availability of good quality fruit, is not understood and adopted widely.

Although the lack of cold chain infrastructure for *storage and transportation* pervades the chain, the absence of the most crucial link in the chain—pre-cooling immediately after harvest for the removal of field heat—limits the utility of cold chain infrastructure, to the extent it is available, even downstream. In addition to pre-cooling, F&V harvested for discerning customers in segment A2 require particularly meticulous sorting and grading to separate the superior fruit from fruit

that may be damaged or unattractive, care in handling, and customized packaging to prevent damage. For example, instances of unprofessional practices are frequent, such as lining the bottom layers of the boxes with smaller size or relatively low-grade fruit compared with the upper layers.

Trading and wholesaling activities in the incumbent chain are multi-tiered and fragmented, which makes the produce's path to the market long winded and wasteful. If segment A2 is to be targeted beneficially, the structure of this supply chain also deserves attention for upgradation. A multi-tiered value chain structure disincentivizes operators in each tier to invest in quality preservation—primarily the cold chain—and other value-enhancing activities, like grading, sorting, cleaning, packaging, branding, merchandizing, and so forth. The existing value chain provides only one option to smallholders for the sale of their produce, and that is to make the sale to the local agent or trader or sometimes (rarely) a trader who might come from another market that serves as a hub.³⁰ Other options for offloading produce, such as sale on a long-term contract, cold storage for delayed sale, and reefer transport for sale to distant markets, are not available.³¹ Delayed sales for expected higher realizations in the offseason are limited because of the limited availability of cold storage facilities. Sales to distant markets are limited because of the lack of physical access to those markets and affordable finance to “hold on” to the produce, given farmers' need for immediate cash. The remoteness of several growing areas also discourages large, organized buyers from establishing reach and sourcing from these dispersed locations. The difficulty that financial institutions face in appraising small and unorganized intermediaries also limits the financing available in the midstream.

The absence of *grades and standards* and certification facilities to establish these also gives rise to dependence on personal networks for quality assurance, which inherently limits scale efficiencies.

In most contexts, addressing the market imperfections in the inputs, cultivation, and near-farm post-harvest activities automatically triggers activity in *distribution*. However, in the case of NER, its geographical location, which leads to high logistics costs and perceived “inaccessibility,” creates the need for public support toward market development. Further, the inability of some stakeholders, like farmers, and the unwillingness of others, like large retailers, to invest in branding, marketing, and merchandising in the face of heavy expenditure on the same by global majors, like Zespri, from source countries limits the access of NER farmers to domestic high-value and high-growth demand. (See box 2A.2 in the annex for an elaboration of the specific issues and gaps in the kiwi value chain in NER.)³²

PARTICIPATION OF WOMEN

Livelihood generation for women is relatively high across the segments of the value chain in segment A2. In input provision and use, women can play a variety of roles in seed multiplication and/or development of nurseries working with agricultural input supply companies. Women can act as agro-input retailers and agro-dealers, and they can be hired as extension workers and rural agro-agents. Women's activities are well-suited to assist input supply companies and enable an effective and wide reach of companies' products to large consumer markets.

Given the closer attention to cultivation and less strenuous physical effort required for the same, women's participation in cultivation in this segment is higher. Research has established that women comprise an estimated 70–80 percent of the workers in value-added activities that are essential for consumers in this segment, like picking, grading, washing, chopping, and mixing, as well as packing, labeling, and bar-coding produce, and women dominate quality control positions (Staritz and Reis 2013).

Unlike segment A1, segment A2 typically witnesses greater participation of women in trading activity—in part because of the more direct and/or relationship-based selling approach required. This differs from trade in other segments where transactions typically take place in crowded open markets (in most developing countries), the locations and working conditions of which may not make them convenient for women's participation.

Product diversification into fresh horticultural products for discerning consumers who demand F&V throughout the year is particularly positive for women. Such diversification extends the packing season and decreases the temporary nature of the work. Thus, any improvements in the sophistication of the packed product (chopped, mixed, and so forth) increase total female employment. Expansion of the packing segment also offers women a higher paid employment alternative to farm labor (Staritz and Reis 2013).

INDUSTRY ECOSYSTEM IN NER

Success in strategic segment A2 would require the evolution of an industry ecosystem that supports the full realization of the potential of this segment. Policies and regulations can play a vital role in creating the right incentives for industry stakeholders to create such success, by addressing the opportunities presented by this segment. The traditional value chains will continue to dominate the F&V sector for the foreseeable future, even if there is a concerted effort by the public and private sectors to focus on segment A2. The hope is that success in segment A2, and higher margins for women and the poor, will incentivize an increasing number of stakeholders to opt for this segment. The following subsections use Porter's diamond framework to outline factors that can drive positive change.³³

Firm strategy, structure, and rivalry

Currently, the F&V sector is dominated by informal and unorganized players across the chain. The intense competition between these informal players is partly a result of the lower value available for distribution along the chain. The lack of (financial and operational) capacity and willingness among incumbents to address the higher value A2 segment limits their ability to access the higher value that consumers in this segment are willing to pay, in turn limiting their ability to upgrade. Thus, there is a vicious cycle of poor quality and poor realizations, even as buyers in this segment often turn toward imported F&V products to fulfill their needs.

Large multinationals do not face any overt barriers to entry. A global leader in this segment, Del Monte, has even attempted sourcing pineapples from the region in the past, primarily with a view to address segment A2, but the presence

multinationals in NER is negligible. This is largely due to the availability of more commercially viable locations for their operations and sourcing in mainland India.

Some innovative first-generation companies are working toward capitalizing on the opportunity provided by segment A2. However, typically, they are handicapped by the lack of enabling infrastructure (for example, the inability to invest in pre-cooling and cold chain facilities and poor road access in growing areas) and lack of access to affordable and/or long-term finance.

Related and supporting industries

Related and supporting industries, like packaging, logistics, and organic inputs, which are indispensable for penetration into segment A2, are absent or underdeveloped (see box 2A.2 in the annex). Region-specific research, particularly on planting material, is limited. Such research would benefit from the superior research and development infrastructure in the mainland.

The lack of good quality packaging material suppliers in NER magnifies the adverse impact of high logistics costs, with some firms having to source packaging material from mainland India to be used for packaging in NER and thereafter moving the packaged product back to mainland India.

Higher logistics costs associated with bringing key inputs to NER and sending out the final/packaged product from NER often render NER products uncompetitive outside the region. Large logistics service providers that service NER, like Delhi Assam Roadways Corporation, rue the lack of sufficient load emanating from NER to enable optimized capacity utilization of their trucks, which primarily carry consumer and industrial goods into NER but have to return with little or no loads. Lack of sufficient volumes and scattered production have also disincentivized the development of temperature controlled logistics, which are critical for catering to segment A2.

Supply and factor conditions

Supply and factor conditions in the region must contend with the terrain, location, and some other issues. The mountainous terrain and inclement weather in the region raise the costs of development and maintenance of basic infrastructure. Lack of irrigation facilities constrains production to rainfed areas. At the same time, these characteristics lend the region diversity of agroclimatic zones for the cultivation of a wide variety of F&V products.

The availability of extension services that cater to the specific requirements of cultivation of produce suitable for the premium segment is also extremely limited, since the government's extension network tends to focus on the existing segment (see box 2A.2 in the annex). Some states in the region impose restrictions on the movement of labor from other states, thus restricting the availability of requisite skills.

The availability of external finance for enterprises is constrained by the higher risk perception of the region, which is based on lack of political stability in the not so distant past. Although credit providers require significant collateral for the release of any financing, equity providers are slowly starting to operate in

the region. The region has witnessed at least two significant investments from mainstream venture capital funds, motivated by the potential to cater to segment A2, into agricultural enterprises in the past 3–4 years.³⁴

Demand conditions

Even when the region's logistical position limits its competitiveness for addressing the large mainland market of India, its proximity to the large importing nations in the East—with a rising population of individuals with high disposable income—makes it amenable for development as a hub for India's exports to the East. The region's relatively lower population density and consequently greater availability of land for cultivation positions it as an attractive source for F&V produce that neighboring countries like Bangladesh, with its growing middle class, can absorb.

Government's role

Government support has focused relatively more on processed outputs, rather than improving the production and delivery capabilities in fresh products. The following section outlines a possible approach to thinking of the government's role in developing the fresh and high-quality F&V sector in NER.

SOME POLICY CONSIDERATIONS

Traditionally, capital subsidies have been the dominant means of directing public spending toward solving the issue of marketing produce. The research carried out for this study indicates that development of capacity and support in addressing operational challenges is also important. This can include developing the capacity of farmer producer companies in actual transactions, facilitating investment in end-to-end cold chain infrastructure, enabling contract farming arrangements, and promoting selected crops that have potential for competitiveness.

From the field visits, it is clear that private investment and entrepreneurial activity have picked up in the recent past, especially in Assam.³⁵ In addition to the compromised security situation until the recent past, another cause of low success may have been lack of capacity-building support and policy support for linkages to high-value markets that enable sustained offtake for high-value urban and international demand. Several well-intentioned offtake arrangements have failed or been discontinued due to the lack of an end-to-end “custodianship” of the chain of movement of produce from the farm to the market. Feedback from the sourcing locations in NER on the potential to develop their produce for far-off markets is mirrored by buyers in Mumbai and as far as Italy and South Africa—yet attempts to bridge this gap have been sporadic and driven by the enterprise of individuals as against being institutionally driven.

Current policy and investment efforts appear to be diffused across all the segments. Although the greatest number of smallholders operate in the incumbent segment (A1), efforts directed toward that segment risk misalignment with the emerging and fast-growing dynamic of consumer demand for produce that is

grown with improved cultivation practices and delivered fresh to the consumer's plate. Further, disproportionate resource allocation toward segment A1, where margins are inherently low, limits the headroom available for income growth of the "bottom 40 percent." Thus, the disproportionate share of resources dedicated to developing the value chain of the incumbent mass market (segment A1), in addition to the sporadic efforts to develop segment B1 (for example, food parks with pulping facilities, incentives for juice factories, and so forth) could potentially be reallocated toward the development of high-margin segments that could also be more value accretive to growers. Supplemented with efforts to maintain the purity of cultivation of growers and enabling their certification, this focus can generate high development impact and help surmount the logistics disadvantage of the region.

A demonstration effect is important. Initial small successes in tapping the premium fresh segment, even if the success is in mainland India, could hold important lessons for scaling up and also moving to markets in Bangladesh as well as further East to Singapore; Hong Kong SAR, China; or Japan.

It is also important to be mindful that there is no one right approach to address all the identified gaps, and there are variations in approaches used by various successful countries, regions, and enterprises. Moreover, with limited government capacity, a long list of issues is not practical. Hence, the following list is an initial attempt at sifting out the most critical issues that, if addressed, could help excite private investment in the premium fresh segment for F&V. This possible approach, which will need to be refined and deepened when implementation begins, could include some of the following policy considerations.

Improve cultivation and harvesting practices, including skills and capacity upgradation

The quality of produce is most materially impacted by the inputs used for cultivation, the practices deployed in planting and caring for the crop until it is ready for harvesting, and the activity of harvesting itself. While other stages in the value chain can only influence quality as a preventive action—preventing deterioration in form or value—it is only the cultivation stage where actions to enhance quality can be undertaken. Thus, meeting the stringent quality requirements of consumers in segment A2 may require enhanced availability of certified seeds and planting material accompanied by extension services that encourage their usage with improved cultivation practices, particularly targeted toward women farmers. This could also include training for initial grading, sorting, and packing prior to collection of the output.³⁶

Developing economies with large numbers of smallholder farmers have typically addressed this challenge by using a combination of government funded extension services supplemented with private sector inputs. Often, large lead firms that enter into contracts with smallholder farmers undertake capacity building for these farmers in addition to supplying inputs and providing other support services, in exchange for a commitment from the farmers to sell their produce to these firms.³⁷ In other cases, incentives for the formation of farmer organizations are provided, which enables smallholder farmers to pool their resources to overcome the challenge of low capacity for investment in improved practices. A few illustrative options for achieving this are outlined in the following.

Support cold chain logistics for diffused farmers

Policy support in the domain of post-harvest management has been heavily loaded toward facilitating the development of cold storage infrastructure, in particular by means of providing capital subsidy support to investors. The findings from the research and analysis carried out for this report point toward a need for government support to move beyond only cold storage (which is but a link in the chain), to support for the end-to-end cold chain, including pre-cooling, pack-houses, and reefer transport. Investment in commercial packhouses—which includes precooling and cold storage—in rural areas has been shown to attract young, unmarried females as wage laborers, creating much needed off-farm rural employment (Staritz and Reis 2013). Female income contributions from this off-farm work to family operations can help ease liquidity constraints for smallholders. One way to attract private sector firms to invest in end-to-end cold chain technology will be to support them until their operations attain a critical volume of business. A viability gap model can be used to compensate private firms for the difference between actual demand and an agreed minimum viable demand. This can include cross-border partnerships, such as facilitating joint ventures between Indian and Bangladeshi fresh produce operators for setting up cold chain infrastructure for products such as pineapples, kiwis, and others (box 2A.3 in the annex).

Leverage technology for quality assurance

High-value agriculture is becoming increasingly dependent on technology, given the rising awareness of quality and risk of plant-based diseases. The example of a World Bank supported project currently underway in Haiti shows the possibilities (Kathuria and Mathur 2019, box 1.3). Blockchain technology is being introduced to create transparency, reduce operational costs, and improve food safety. Farmers bear the risk, but they also reap greater rewards. Fresh produce is tagged from the farm to the table, with a QR code affixed to the fruit immediately after harvest. Blockchain tracking and payment technology has the potential to be transformative, since it can alter the balance of power between farmers, aggregators, and consumers. This example highlights many possibilities for NER, beginning perhaps with a pilot exercise, as was done in Haiti. More details are in Kathuria and Mathur (2019, box 1.3).

Other possible areas for support

- *Facilitating value chain finance for stakeholders in the value chain.* The higher available margins and presence of more organized buyers in segment A2 can provide greater assurance of the creditworthiness of stakeholders and reliance on loan repayment through a lien on future cash flows (for example, invoice discounting).
- *Improving the credit assessment capacity of banks and financial institutions, particularly through the use of technology.*³⁸ Given that women producers' late credit repayments and default rates have been found to be markedly lower compared with men's, it may make sense to target credit directly toward women farmers.³⁹

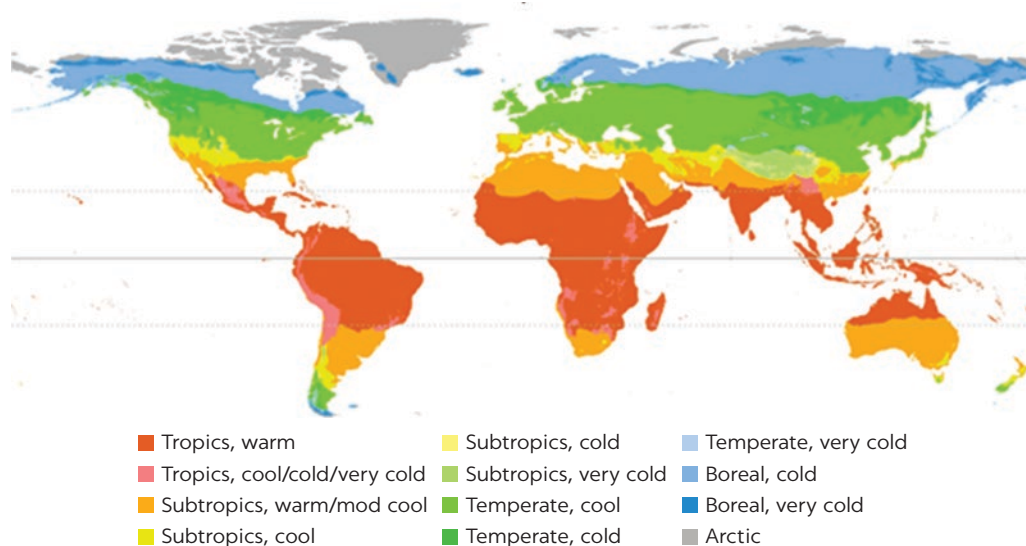
- *Promoting financial literacy, particularly among women, to help better manage farm income cycles.* The challenges of access to finance in the already credit constrained horticultural sector are intensified for women due to their limited access to information about credit availability and, in more extreme cases, by societal norms that require a woman to be authorized or represented by her husband or a male relative to obtain credit.
- *Forming an association of Northeast Indian agricultural marketing professionals and firms* to advocate common interests with the government and mobilize scale to leverage government capacity. This effort would provide much-needed advocacy support for fledgling entrepreneurs in the region. Such an industry association that can advocate for policy reform can help the industry move closer to achieving higher value from this segment.
- *Defining product and process standards to maintain quality and traceability,* supplemented with the creation and dissemination of specific extension services to enable adherence. These efforts will enable greater alignment with high-value markets.

As the capacity of farmers in NER rises to meet the requirements of segment A2, the opportunities to expand cross-border trade, investment, and commerce, particularly with Bangladesh, can be explored. Exports of such fresh F&V products—especially those that Bangladesh imports from elsewhere, like oranges and pineapples—can cater to the rising urban middle and upper class population in key metro areas in Bangladesh. With relatively greater available productive capacity in NER⁴⁰ vis-à-vis Bangladesh at one end and higher prevalence of proven contract farming models in Bangladesh vis-à-vis NER at the other end, the potential for investment and commerce through cross-border arrangements like contract farming is high. Such cross-border contract farming arrangements have worked well in Southeast Asia (see box 2A.3 in the annex). There are also possibilities for cooperation in logistics, including cross-border operations and investments on both sides (see Kathuria and Mathur 2019, chapter 3) for details).

ANNEX 2A: MAP, FIGURES, AND BOXES

MAP 2A.1

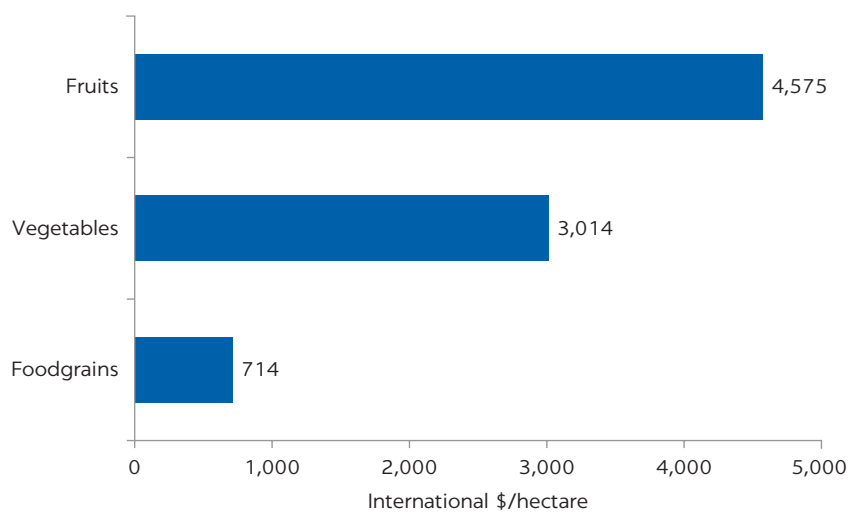
Global agroecological zones



Source: Food and Agriculture Organization.

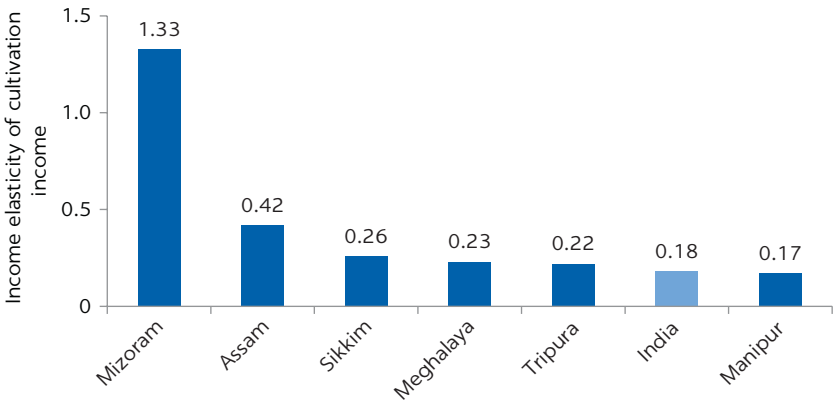
FIGURE 2A.1

Price realization by commodity, global average, 2014



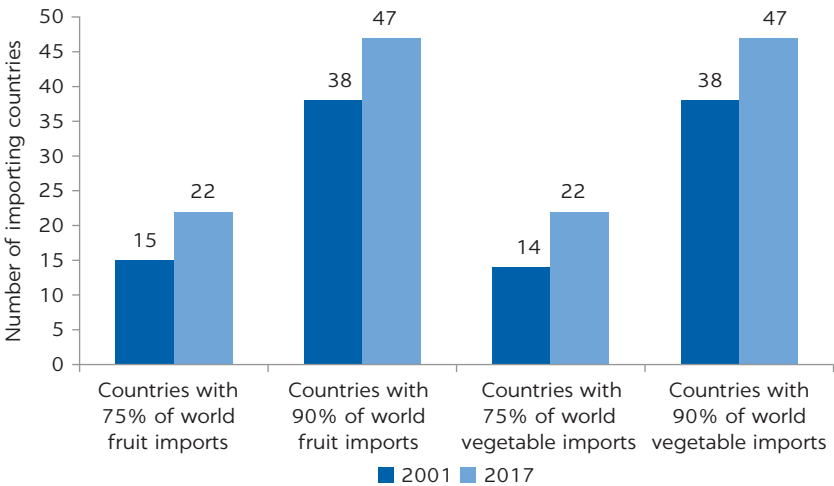
Source: FAOSTAT 2014.

FIGURE 2A.2
Income impact of cultivation of fruits and vegetables



Source: Government of India 2017.
Note: Income elasticity of cultivation income with respect to shifting the area under staple crops to horticulture.

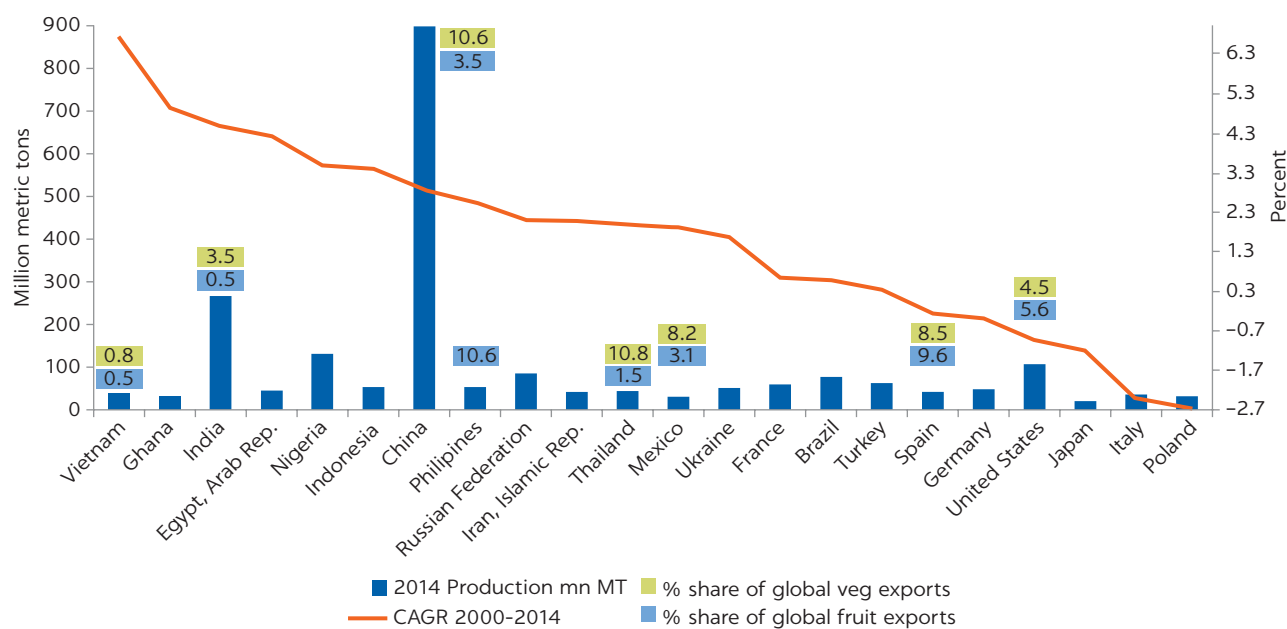
FIGURE 2A.3
Rising trade with more importing countries



Source: UNCOMTRADE.
Note: Fruits includes Harmonized System (HS) code 08; vegetables includes HS code 07 (except pulses).

FIGURE 2A.4

India: A major producer but negligible exporter

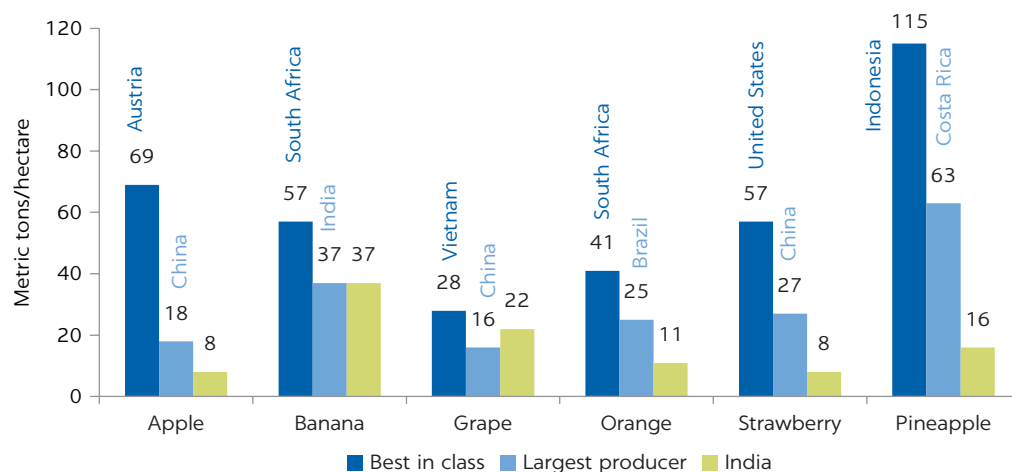


Sources: UNCOMTRADE; National Fruit and Vegetable Board of India; FAOSTAT.

Note: Fruits includes Harmonized System (HS) code 08; vegetables includes HS code 07 (except pulses).

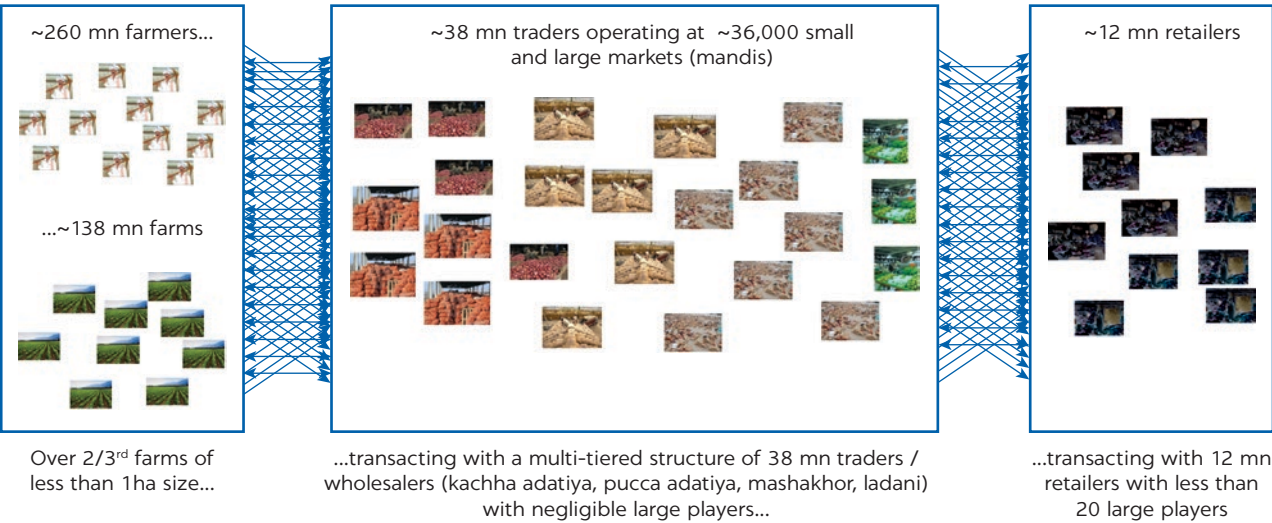
FIGURE 2A.5

Yield gap in key fruits



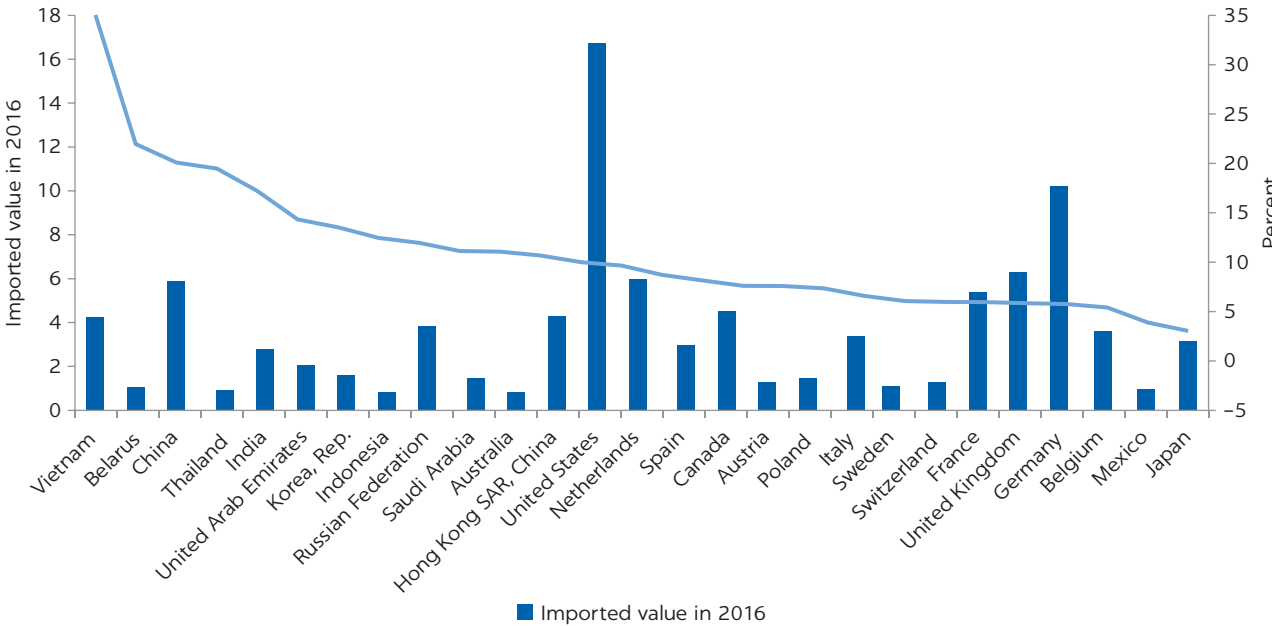
Source: FAOSTAT.

FIGURE 2A.6
Complex food supply chain in India



Source: Census of India, Agricultural Census of India, 2011.

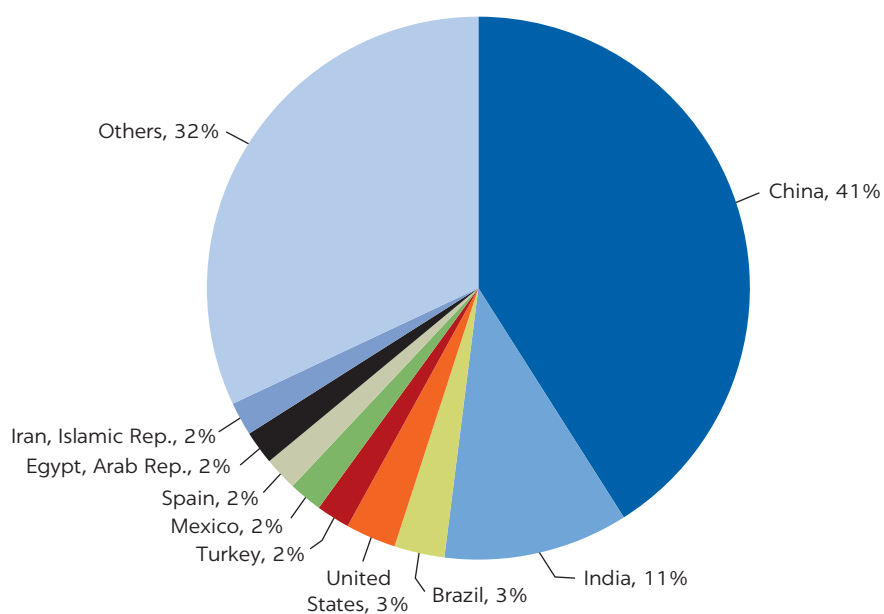
FIGURE 2A.7
Greatest growth in imports of fruits by Far East economies



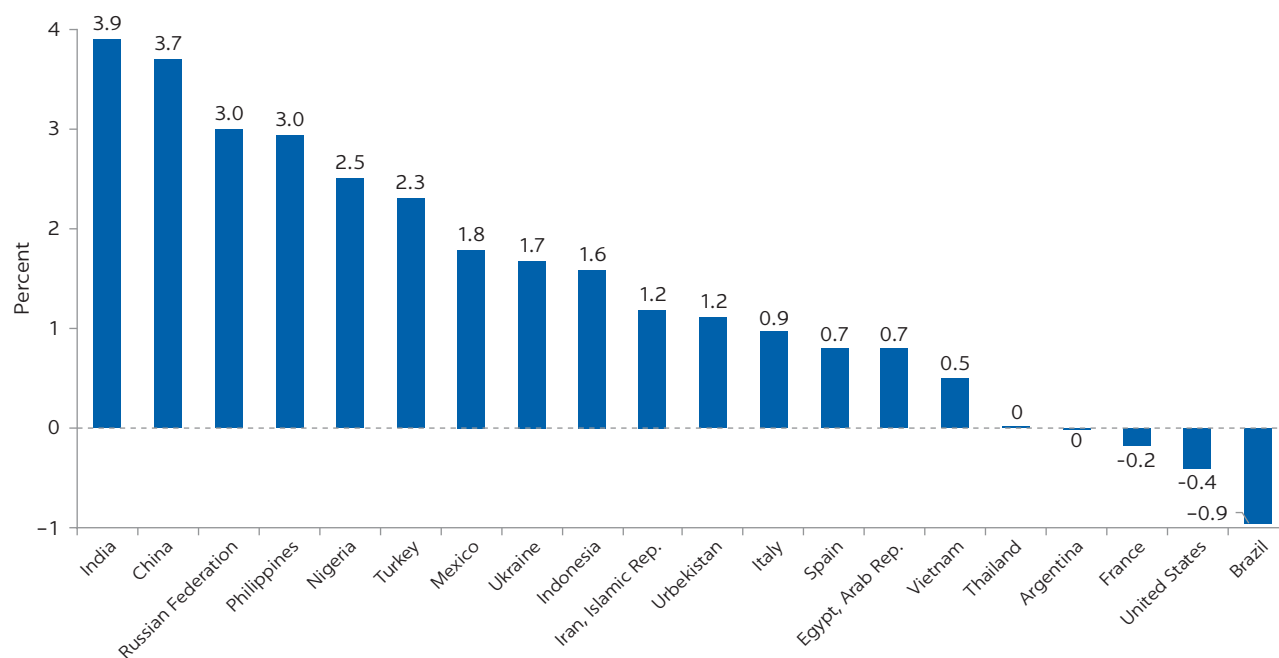
Source: UNCOMTRADE.
Note: Fruits includes Harmonized System (HS) code 08; vegetables includes HS code 07 (except pulses).

FIGURE 2A.8**Share of fruit and vegetable production, by country, 2016**

Total: 2.1 billion metric tons



Source: FAOSTAT.

FIGURE 2A.9**Growth of fruit and vegetable production, by country, 2007–16**

Source: FAOSTAT.

BOX 2A.1

Success of the grape exports cluster

Grapes can be harvested in India at such a time when no grapes are harvested anywhere in the world, by virtue of the country's unique agroclimatic conditions and cultivation practices. Approximately 90 percent of the area under grapes is in the tropical region of the country, and harvesting can be carried out more than once in a year.^a

Overall grape exports, which hovered between 1 and 2 percent of total production until 2005, have risen to 6 percent (with a high of 13 percent in FY2010). This has translated into export earnings that increased from Rs. 19 million in FY1992 to Rs. 9.8 billion in FY2013, a compound annual growth rate of 21 percent.

This turnaround in grape production and its growing access to the high-value export market have depended on the efforts of several institutions, including those created and developed by producers.

The nodal body for export promotion of fresh and processed agricultural products—the Agricultural and Processed Food Products Export Development Authority (APEDA)—an organization under the Ministry of Commerce and Industry, Government of India, played the pivotal role from the central government's end while being supported by other national- and state-level agencies, including the National Cooperative Development Corporation, National and State Horticulture Boards, and state governments of the key grape growing states.

APEDA positively impacted the grape value chain by undertaking and supporting several initiatives, which can be broadly summarized under three areas:

- Support for the establishment of Mahagrapes: a partnership of producer cooperatives established to promote exports of grapes
- Development of Grapenet: a traceability system for fresh grapes exported from India to the European Union

- Facilitation of agri-export zones: a concept that attempts to take a comprehensive look at a particular type of produce located in a contiguous area for the purpose of driving exports.

It is worth exploring why grapes in the export value chain have achieved 100 percent cold chain penetration, leading to positive ruboffs on domestic grape availability and relatively lower wastage vis-à-vis some of the other prominent fruits.^b

Key reasons why the cold chain was not just necessary but commercially viable in the case of grapes include the following:

- High upside in realizations achievable through export and/or market development to unleash latent demand in the domestic market^c
- Ability to extend the life of grapes by 3–4 months in basic cold storage
- Surplus production beyond what domestic demand could absorb at prevailing prices
- Short duration of the grape season in India and its complementarity with the seasons of competing exporting countries.

Other determinants of success for similar interventions for other fruit and vegetable products would include the sponsorship and dedication of the state government (since agriculture is a state subject); the ability of the multiple agencies that work in this space to work in tandem, suitably complementing each other as in the case of grapes; effective deployment of technology (not only for traceability, but also for cold storage, harvesting practices, and so forth); relatively concentrated area of cultivation and availability of suitable enabling infrastructure, like port-based cold storage and reefer container plug points; reefer trucks; road connectivity; and so forth.

Sources: National Horticulture Board; Agricultural and Processed Food Products Export Development Authority; discussions with multiple private sector stakeholders.

a. <http://www.mahagrapes.com/> (accessed July 29, 2018).

b. <http://www.sciencedirect.com/science/article/pii/S0305750X08001095> (accessed July 29, 2018).

c. The average export price in FY2014 was Rs. 89/kilogram (kg), compared with the domestic wholesale price at Mumbai of Rs. 35/kg and at Delhi of Rs. 67/kg (source: Agmarknet).

BOX 2A.2

Key gaps in the kiwi value chain in the North Eastern Region of India

To highlight the compelling gaps in the current value chain in the North Eastern Region (NER) and that which will be required to cater to the premium (A2) segment, the example of kiwis—a key high-value fruit cultivated in NER—is taken.

Upstream

Although NER is a predominant producer of kiwis in India, farm yields of the fruit in the region are abysmally low. Compared with a global average farm yield of 16 metric tons per hectare (MT/ha) and a yield of 34 MT/ha in New Zealand, yields in NER are 12 MT/ha and 3.4 MT/ha in Nagaland and Mizoram, respectively.

The constrained availability of quality planting materials in sufficient quantities is a key limiting factor in improving kiwi production. Farmers typically procure the plants from various sources, such as nurseries (not all of which are registered), fellow farmers, and sometimes the Horticulture Department. However, farmers are generally unsure about the variety of the planting material until fruiting occurs. Often, there are more male plants than required, leading to a situation where farmers are forced to increase the area under kiwis slowly. Growing different varieties of kiwis in the same orchard unsystematically with similar cultivation practices leads to challenges in productivity, grading, packing, and marketing the produce, as the high-end buyers prefer the same variety in a lot.

Almost 70 percent of the production is of B, C, and D grades (with C and D grades covering about 40 percent of the production). This leads to lower price realization for the farmers and mismatch with the requirements of customers in the premium segment to which imports cater. Lack of irrigation and water storage facilities also limits productivity.

The initial years of kiwi cultivation typically require high investments, for example, kiwi vines require a support structure (T-bar), which most farmers cannot afford. Further, timely weeding, which can make a significant difference in quality and output, is typically not done with the required frequency. All this points

to a severe lack of not only quality planting material, but also education to enable the best use of the same. There is a lack of on-farm training and demonstration of best practices and exposure to the practices being adopted by kiwi growers globally.

Midstream

Grading and packing done at the farm level by farmers is typically not at par with the requirements of the consumers. Instances of unprofessional practices are frequent, for example, where the bottom layer of the boxes is lined with smaller size or relatively low grade kiwis compared with the upper layers. This necessitates additional grading and sorting near market locations, leading to additional costs. With high costs near the market, often the produce is sold at a low average price without grading.

Farm-level infrastructure, such as collection centers and packhouses, is missing, with no facilities for machine-based sorting, grading, and packing.

The absence of integrated cold chain infrastructure is a key gap. The entire produce after harvest is immediately transported to the markets within and outside the state, resulting in high levels of waste.

Downstream

The quality of the packaging is an important determinant of the attractiveness of the produce for discerning customers. However, the farmers in the region are not very enthusiastic about better packaging practices. Most of the farmers who sell at local markets use low-quality cardboard boxes and plastic crates instead of packaging in trays, much in contrast with how the imported kiwis arrive at retail shelves in key urban centers. Farmers typically market their produce on their own and are often faced with limited bargaining power vis-à-vis the limited set of traders who are willing to buy the produce. The government has made efforts at setting up farmer producer companies, which plan to market kiwis for the members collectively. These companies could improve farmers' bargaining power; however, the lack of upstream infrastructure and education might limit the improvement achievable.

continued

Box 2A.2, continued

Retail chains are only willing to procure grade A quality fruit, which, being a small fraction of the total produce, does not attract farmers who continue to sell all grades to a single market. Unlike the heavy expenditures on branding and promotion undertaken by kiwi exporters to India, there is no such investment for kiwis from NER.

Imports of kiwis from New Zealand come under the brand name Zespri in directly packed trays weighing 3 kilograms (kg). Unlike in the case of kiwis from NER, since this fruit is already packed properly, it does not require further grading and packing and is readily available for sale. Imports from other countries, such as the Islamic Republic of Iran and Greece, also come in plastic crates; but in this case, the sorting, grading, and packing takes place at the wholesale level. However, the wholesalers grade and pack the fruit under their own brand names in trays of different units weighing 3 kg. Zespri kiwis have continued to be the most accepted among the higher income groups, with the higher price being due to its better quality and packaging. Kiwis from Greece and the Islamic Republic of Iran are most preferred for sale to middle-income groups due to the lower prices.

Since these kiwis are supplied to the wholesale market in bulk in plastic crates, they capture less space, transportation cost is reduced, and trader margins are higher. The quality of the fruit is far better compared with domestic produce in color, size, and shape, as well as shelf life. The presence of superior cold chain infrastructure for imports also results in higher standard fruit with low levels of damage.

Although the high prices of imported kiwis provide a window of opportunity for the growth of domestic kiwis in the retail market, production enhancement in quantity and quality to bring them at par with the import market is lacking. Upgradation of production; post-harvest technology; and distribution, marketing, and branding are required to improve the quality of delivery of the fruit to meet domestic consumer preferences as well as match the international standards for tapping export potential. Since Indian kiwis are only available for 2 months (November and December), whereas demand for kiwis is throughout the year, cold chain infrastructure to increase the shelf life and reduce wastage is required to expand the trade window for domestic produce.

Source: National Institute of Agricultural Marketing 2018.

BOX 2A.3**Cross-border contract farming in Southeast Asia**

Thailand has employed several approaches to foster closer cross-border trade links with its country neighbors. First, it has signed novel business arrangements with its counterparts in these countries. Specifically, national and provincial government officials as well as business entrepreneurs from Thailand have inked contract farming agreements and business matching deals with their counterparts, recently with Cambodia (2015) and previously (circa 2013) with Myanmar and the Lao People's Democratic Republic. Second, for Cambodia, 13 contracts for the purchase of farm products (tapioca, rice, soybeans,

and others), as well as 18 business matching arrangements covering, among others, food and agro-industry, have been signed.

Thailand's large agribusinesses have long and deep experience in outgrower schemes for a variety of agricultural products. As a result, the agribusinesses have established large market networks regionally and globally.

Improving incomes through enhanced incomes of the generally rural and impoverished provinces of the three countries bordering Thailand can thus be equity inducing.

Source: Asian Development Bank.

NOTES

1. Horticulture has also yielded better farmer incomes in India and Northeast India. Figure 2A.2 in the annex highlights the potential income gain from shifting land under food grain cultivation to horticulture. In India, for every 1 hectare of area shifted from cultivation of staple crops to horticulture, the farmer's income will increase on average by 18 percent.
2. Compared with cultivation of food grains, horticulture has greater potential to generate employment, as it tends to be more labor intensive. A study in 1997 found that F&V generate higher person-days of employment than food crops: 704 person-days for papaya and 329 for bananas, 439 for brinjal and 314 for okra, and 285 for sugarcane and 104 for groundnut field crops. Some fruit crops (like custard apples, jamoons, bers, cashews, and wood apples) can offer the best utilization of waste and undulating land (Parimalarangan 2005).
3. Research has documented that women comprise an estimated 70–80 percent of workers in value-added activities that are essential for the consumer in this segment, like picking, grading, washing, chopping, and mixing, as well as packing, labeling, and bar-coding of produce, and women dominate quality control positions (Staritz and Reis 2013).
4. Map A.1 in the annex shows the spread of agroecological zones globally. It is evident that the tropics (and, to an extent, the subtropics) are dominated almost exclusively by developing countries, providing these countries natural advantages in tropical fruits, like mangoes, pineapples, and papayas, and tropical vegetables, like okra, sweet potatoes, and others. Several exotic fruits, like dragon fruit, lychee, and others, are also primarily suitable for the tropics.
5. The share of smallholders among Indian growers is over 90 percent for fruits and 87 percent for vegetables, while it is slightly smaller at 83 percent for food grains (Agriculture Census, Government of India, 2011; <https://agcensus.nic.in/>).
6. In 1998, only 6 of the 14 World Health Organization regions had an availability of F&V equal to or greater than the recommended intake of 400 grams per capita per day. The relatively favorable situation in 1998 appears to have evolved from a markedly less favorable position in previous years, as evidenced by the great increase in the availability of vegetables recorded between 1990 and 1998 for most of the regions. In contrast, the availability of fruit generally decreased between 1990 and 1998 in most regions of the world (WHO 2003).
7. The value of global trade increased a little less than three times, from US\$6.3 trillion in 2001 to US\$17.8 trillion in 2017 (UNCOMTRADE; fruits includes Harmonized System (HS) code 08; vegetables includes HS code 07 (except pulses)).
8. The volume of horticultural trade increased less than two times, from 90 million metric tons in 2001 to 157 million metric tons in 2017 (UNCOMTRADE).
9. Russia moved from sixth to second largest importer; China moved from 14th to sixth; and India moved from 77th to 45th between 2001 and 2016 (UNCOMTRADE).
10. The average unit price of exports of fruits across the top 10 developing country exporters rose over two and a half times, from US\$0.33/kilogram (kg) to US\$0.88/kg between 2001 and 2017, compared to an increase of less than two times, from US\$0.68/kg to US\$1.25/kg across the top 10 developed country exporters of fruits. Similarly, the average unit price of exports of vegetables across the top 10 developing country exporters rose by over two times, from US\$0.38/kg to US\$0.78/kg, compared with an increase of less than 1.6 times for developed countries in the same set (from US\$0.58/kg to US\$0.94/kg in the same period). For the most traded fruit in the world—bananas—the export unit price realization for the top developing country exporter (Ecuador) rose from US\$0.43/kg to US\$0.46/kg, while that of Belgium, the top developed country exporter, dropped from US\$1.03/kg to US\$0.81/kg between 2013 and 2017. Similarly, for one of the most traded vegetables—tomatoes—the export unit price realization for the top developing country exporter (Mexico) rose from US\$1.19/kg to US\$1.20/kg, while that of the top developed country exporter (the Netherlands) fell from US\$1.67/kg to US\$1.61/kg in the same period.
11. Horticulture's share of agricultural production is rising. Production rose from 70 million metric tons in 1980 to 266 million metric tons in 2014, translating into an increase from 19 percent of total agricultural production in 1980 to 26 percent in 2014. Similarly, the share of cultivated land under horticulture in India increased from 2.9 percent in 1980 to 6.4 percent in 2016 (FAOSTAT).

12. For example, from zero imports of apples in the 1990s, India now imports (as of 2017) over 10 percent of its consumption of apples (roughly 200,000 metric tons per year), despite an import duty of 50 percent on apples (as of 2017) (UNCOMTRADE, FAOSTAT).
13. Estimates of waste in the supply chain for various horticultural products in India range from 5 to 18 percent of production (CIPHET 2014).
14. Some examples of such companies include INI Farms (www.inifarms.com), Go4Fresh (www.go4fresh.in), and Waycool (www.waycool.in), several of which have been found attractive for investment by internationally funded private equity and venture capital funds.
15. Many of these incumbent intermediaries are limited in their capacity and willingness to invest in quality and efficiency enhancing measures (see figure 2A.6 in the annex).
16. <http://www.imdagrimet.gov.in/node/3535>.
17. Organic “by default” is a phrase commonly used to describe produce that is organic by virtue of being grown without the use of chemical inputs.
18. For example, oranges can be harvested in Assam between October and June, while the season is between November and March in other parts of India (National Horticulture Board website, http://nhb.gov.in/statistics/Publication/Horticultural%20Statistics%20at%20a%20Glance%202016_468%20page.pdf).
19. Fruits like strawberries, plums, litchis, oranges, gooseberries, and peaches demonstrate NER’s rising share of total production in India—all these fruits have high and growing price realizations and volumes in global trade (see figure 2A.1 in the annex). Even in a “commodity” fruit like bananas, the malbhog variety is distinct and can enjoy a premium positioning; similarly, for lemons, the Assam Lemon variety has a distinct market.
20. Qualitative interviews revealed that specific attempts were made by BigBasket, India’s largest food produce e-retailer, and Future Group, India’s largest offline retailer, to procure kiwis from farms in NER. Although a few shipments took place, these could not be sustained because of the high overheads of working with large numbers of farmers and maintaining an end-to-end cold chain in addition to the operational challenges associated with logistics from the source.
21. Zespri International Limited—the world’s largest marketer of kiwifruit—targets India as one of its key, fast-growing markets and has made significant investments in branding and marketing of its brand in India (http://www.afaqs.com/news/story/53287_Zespri-appoints-PointNine-Lintas-as-omni-channel-agency-for-India and <http://www.fnbnews.com/Fruits-Vegetable/zespri-international-sees-india-as-strongest-emerging-mkt-for-kiwifruit-43258>).
22. Growth in trade of “fresh” (non-processed) horticultural products was over 3 percent, while that of processed horticultural products was below 1 percent between 2012 and 2016 (UNCOMTRADE; fresh fruits includes Harmonized System (HS) code 08; fresh vegetables includes HS code 07 (except pulses); HS code 20 has been taken to cover processed F&V).
23. The growth rates of demand for conventional fresh fruit in value and volume terms between 2014 and 2015 in the United States were 3 and 4 percent, respectively. Growth in demand for organic fresh fruit was 10 percent in value and 14 percent in volume. In the case of vegetables, these numbers were 3, 0.5, 14, and 15 percent, respectively (United Fresh Produce Association and Nielsen 2016).
24. Porter’s Five Forces is an analytical tool used to assess industry attractiveness and distribution of margin or profits across the value chain. It does so by assessing the relative strengths of five forces in the industry: intensity of competitive rivalry, threat of new entrants, threat of substitutes, bargaining power of suppliers, and bargaining power of buyers.
25. <https://www.ams.usda.gov/market-news/fruits-vegetables>; U.S. Department of Agriculture.
26. In 2014, the size of the domestic organic (including noncertified but believed to be organically grown) food market in India was US\$0.36 billion, with annual growth of about 20 percent per year; horticultural produce accounted for about 10 percent of this market, amounting to a market size of US\$36 million (Yes Bank 2014).
27. For example, pure varieties of kews and queen pineapples grown in NER in abundance as against various hybrids that are far removed from the original varieties grown in the rest of India provide the region an edge.

28. However, it is important to note that the *relative* bargaining power of farmers vis-à-vis buyers in this case can be affected if farmers are dependent on buyers for inputs, logistics, traceability, or other requirements in this segment and/or the buyer ecosystem is concentrated. In this case, introducing technology is important. While bearing the entrepreneurial risk, the technology enables farmers to reap greater rewards, as margins that were earlier appropriated by middlepersons and local exporters revert back to the farmers.
29. https://www.jstor.org/stable/41839334?seq=1#page_scan_tab_contents.
30. For example, many smallholders in Mizoram must depend on traders from Cachar in Assam who are their only source of sales. In this context, it is particularly telling that although Bangladesh imports large quantities of oranges (worth US\$62 million) from places as far as South Africa and Uganda, its share of imports from India is low (at US\$14 million), with a very limited share coming from Mizoram.
31. Reefer is the term for refrigerated trucks.
32. Although gaps in competitiveness are visible throughout the chain for most F&V products, these are particularly pronounced in the case of F&V products that have distinctive characteristics unique to NER, which can be monetized to realize their high value potential better. For example, although pineapples grow extensively in Tripura and mostly with limited use of chemical fertilizers and pesticides, in the absence of widespread testing and certification facilities, the commercial upside of this feature is unexploited. Marketing of pineapples takes place through itinerant traders who source at the farm gate at prices that are dictated by them, with farmers having no real alternatives for sale. In some cases, traders can capture value from cleaning, grading, primary processing, packaging, and other value adding activities. However, typically the lack of financial and technical capacity for the produce to reach high-value markets, in terms of storage capacity and market linkages with high-value buyers, prevents farmers as well as traders from achieving premium prices.
33. The diamond model is an economic model developed by Porter (1990), in his theory of why particular industries become competitive in particular locations.
34. These two investments include Parvata Foods (<https://www.globalcitizen.org/en/content/Siddhi-parvata-foods-founder-young-innovator/>), a woman entrepreneur-led organic produce marketing company that works closely with ginger (and other) farmers in the region, and Arohan Foods (<https://yourstory.com/2013/04/arohan-foods-a-startup-in-north-east-india-receives-series-a-funding-from-omnivore-partners/>), a pork integrator that works with smallholder pig farmers across NER and retails pork products nationwide (accessed July 29, 2018).
35. The team met several first-generation entrepreneurs who returned, after studying in mainland India or abroad, to develop their own land.
36. Activity under cultivation and extension could also embrace deeper research in varieties that have longer shelf life and respectable farm yields even without the use of chemical fertilizers and pesticides. Catering to the premium and quality conscious segment will require greater research and extension activity—both of which witness relatively greater female participation. Given its relatively greater availability of unutilized land, NER could become the “testing ground” or “research base” for development of new and improved varieties.
37. <http://www.fao.org/3/md923e/md923e00.pdf>.
38. A range of credit assessment platforms that enable low-cost assessment and underwriting of small and medium-size enterprises have been developed by private entrepreneurs in the recent past. Some examples include Samunnati Financial Intermediation & Services Pvt. Ltd. (<https://samfin.in/>), Capital Float (<https://www.capitalfloat.com/>), Intellegrow (<http://www.intellegrow.com/>), and Aye Finance (<http://www.ayefin.com/>) (accessed July 29, 2018).
39. “Raising financial institutions’ awareness of the female producer market, developing innovative financial instruments, and improving financial literacy to facilitate women’s access to credit is consistent with findings of female participation in microfinance—female vegetable producers have been found to be more rigorous than their male counterparts in loan repayments” (Staritz and Reis 2013).
40. NER’s population density is less than 400 people per square kilometer, compared with 1,252 in Bangladesh. Field interviews also indicated that land that is suitable for agriculture but undeveloped or underdeveloped is also greater in NER vis-à-vis Bangladesh (Census of India 2011).

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3 Bamboo and Bamboo Products

RUCHITA MANGHNANI

ABSTRACT This paper is part of analytical work done by the World Bank on strengthening inclusive cross-border value chains in Northeast India, in support of the implementation of the World Bank-supported North East Rural Livelihoods Project (NERLP). For illustrative purposes, four promising sectors in the North Eastern Region of India were selected for deeper value chain analysis, of which bamboo and bamboo products was one. Bamboo is an eco-friendly timber substitute, and recent years have witnessed rapid growth in its commercial applications. The market for bamboo products is largely in high-income countries, while global supply is dominated by China. Although the current industrial base in India's North Eastern Region is small, the region has the potential to develop the bamboo and bamboo products industry, given its natural resource base. The paper analyzes the bamboo sector through the lens of four strategic segments, or user-product combinations, and finds that bamboo products with high technical specifications that cater to environmentally conscious consumers have the potential to bring greater returns for the region in the medium-long term and generate employment, particularly for women and the bottom 40 percent of the income distribution. However, there are several weak or missing links in the value chain of the bamboo segment. The industry could benefit from the growth of a commercial plantation sector, the development of a pre-processing sector close to the resource base, as well as access to ancillary services such as research and development, product design, and marketing. The public and private sectors have a role to play in developing the bamboo cluster in the region.

INTRODUCTION

Bamboo is an eco-friendly timber substitute. Bamboos are evergreen perennial flowering plants in the subfamily *Bambusoideae* of the grass family *Poaceae*. Bamboo grows faster than wood (3–5 years vs. 60 years) and releases more oxygen into the atmosphere than equivalent wood. When harvested, bamboo grows a new shoot from its extensive root system with no need for additional planting or cultivation. It is strong and can replace wood in almost every application.

The past couple decades have witnessed rapid growth in commercial applications of bamboo, and the potential market for bamboo products is very large. Uses of bamboo in such applications include flooring, laminated furniture, building panels (similar to timber-based plywood, chipboard, or medium-density fiberboard), high-quality yarn and fabrics, activated carbon, and bamboo extracts. More recently, bamboo has been used to make the interior of cars and as the printing material in 3D printing. As technology continues to evolve, so will the demand for products made from bamboo, as it has the potential to replace wood as well as steel and plastic in many of their applications. Moreover, there has been growing consciousness about the environment worldwide, particularly in high-income countries in Europe, where consumers demand products that are made from materials that are sourced in a sustainable manner and have a low environmental footprint.

Although India is abundant in natural bamboo resources, it is a net importer of bamboo. India has twice the bamboo forest area of China and is second in the world in biodiversity. However, in 2016, the bamboo trade deficit was as much as nearly US\$34 million, and much of it can be attributed to the rising imports of bamboo raw materials. This has been largely because of regulatory and other constraints that have limited the harvesting of bamboo from forest areas and disincentivized commercial plantation of bamboo on private lands.

The North Eastern Region (NER) of India has the potential to develop the bamboo industry. The region is very rich in bamboo stock and diversity. Around 35 percent of the area and 66 percent of the growing stock of bamboo in India is in the NER subregion, and over 50 percent of the bamboo species in India are found in the region. Moreover, bamboo has been an integral part of the culture of the region, and there is familiarity with the material. However, the industrial base of the bamboo cluster is currently very small in the NER states.

This paper analyzes the bamboo sector through the lens of four strategic segments, or user-product combinations, and finds that bamboo products with high technical specifications that cater to environmentally conscious consumers have the potential to bring greater returns to women and the bottom 40 percent of the income distribution in NER. The paper is organized as follows. The next section presents the trends in the bamboo industry globally, in India, and in NER, focusing on the three states of Assam, Mizoram, and Tripura. The paper then describes key global trends that are impacting the nature of demand for bamboo products and proposes a strategic segmentation of the global bamboo industry. The following section evaluates the attractiveness of various strategic options for the bamboo industry and suggests that products with high technical specifications for environmentally conscious consumers could bring the highest returns for NER in the medium-long term. The paper then discusses the value chain and the gaps in the value chain in NER and evaluates the industry ecosystem for the suggested strategic option. The final section concludes by presenting some considerations for the public and private sectors to develop the cluster.

INDUSTRY DESCRIPTION AND TRENDS

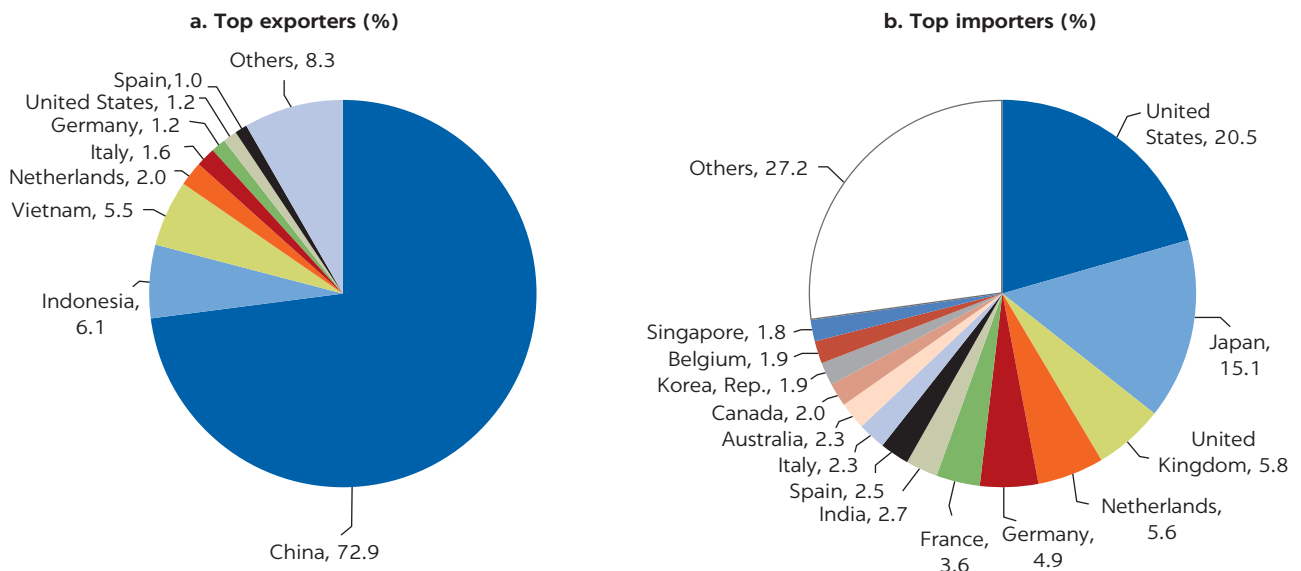
Industry trends: Global scenario

The global market in bamboo and related products is dominated by producers in China.¹ China accounted for almost 73 percent of world exports in 2015 (figure 3.1, panel a). Other major suppliers include Indonesia (6.1 percent) and Vietnam (5.5 percent). Advanced countries, such as the Netherlands, Italy, Germany, the United States, and Spain, also sell in international markets, albeit to a much lower extent.

China's dominance in production and exports can be attributed to several reasons. The country is home to more than 500 bamboo species in 39 genera, and estimates suggest that it has almost 7 million hectares under bamboo forests (INBAR 2018a). China has the first-mover advantage, given that it was one of the initial countries to undertake massive industrialization of the bamboo sector. The industry in China utilizes every single part of the bamboo, with minimal waste. It transformed the supply chain in bamboo where farmers undertake pre-processing near the source of bamboo. They split the bamboo culms into parts and feed the different parts into separate product chains. The industry in China was also at the forefront of introducing new technologies in production and developing new products (Marsh and Smith 2007).

The market for bamboo products is largely in developed economies. High-income countries account for around 82 percent of world imports of bamboo (figure 3.1, panel b). The United States leads as the single largest market (20.5 percent of world imports), followed by Japan (15.1 percent) and Europe. The United Kingdom, the Netherlands, Germany, France, Spain, and Italy are all leading consumers of bamboo products. These six countries accounted for almost 20 percent of world imports in 2015. Other important importers include India, Canada, the Republic of Korea, and Belgium.

FIGURE 3.1
Share in world bamboo trade, 2015



Sources: World Integrated Trade Solution; Comtrade; World Bank calculations.

Table 3.1 summarizes the product-wise markets for bamboo in 2015. The first column presents the products that are traded according to the Harmonized System 2007 classification. The second column shows the share of the specific product in total trade of bamboo, and the third and fourth columns present the major exporters and importers of the products in 2015 along with their shares in the market.

TABLE 3.1 Bamboo: Global demand and supply, 2015

PRODUCT	TRADE SHARE (%)	MAJOR EXPORTERS	MAJOR IMPORTERS
Raw material	8.5	China (70.7%), Vietnam (10.6%), Netherlands (7.3%)	India (17.4%), United States (16%), Netherlands (10.8%), Italy (6.5%), United Kingdom (6.1%), Spain (5.6%), Hong Kong SAR, China (4.6%), Japan (4.2%), Germany (3.3%), Poland (3.2%), France (3.1%)
Preserved shoots	19.3	China (88.8%), Thailand (3.2%)	Japan (58.9%), United States (13%), Germany (4.2%), United Kingdom (3.3%), Netherlands (3.2%), Korea, Rep. (2%)
Mats and screens	5.4	China (89%), Vietnam (1.3%), Spain (1.3%), Germany (1.2%), Egypt, Arab Rep. (1.1%), Netherlands (1.1%)	Japan (12.6%), Korea, Rep. (11.7%), Italy (7.1%), United States (6.8%), Germany (6.1%), Vietnam (5.9%), Spain (5.7%), Israel (4.2%), France (3.5%), Australia (2.4%), Netherlands (2.2%), United Kingdom (2.2%)
Plaits and similar products	3.3	China (93.4%), Vietnam (1.5%)	United States (17.6%), Russian Federation (14.7%), Italy (11.2%), Japan (9.9%), France (4.9%), Israel (4.1%), Germany (3.7%), Brazil (2.8%), United Kingdom (2.6%), Australia (2.3%), Greece (2.1%), Spain (1.8%)
Basketwork and wickerwork	14.4	China (65.6%), Vietnam (23.7%), Indonesia (2.4%), Belgium (1.4%), Germany (1.4%)	United States (33.1%), Japan (9.6%), United Kingdom (7.5%), Germany (5.7%), France (4.6%), Italy (2.9%), Spain (2.9%), Netherlands (2.7%), Korea, Rep. (2.6%), Canada (2.5%), Belgium (1.9%)
Charcoal	3.2	China (60%), Namibia (16%), Indonesia (6.5%), Netherlands (3.5%), India (3.4%), Russian Federation (3.2%), Spain (2.4%)	Netherlands (23.7%), Japan (16.3%), United Arab Emirates (10.9%), Qatar (7.8%), United States (6.7%), Bahrain (5.6%), Saudi Arabia (3.7%), Canada (2.7%), United Kingdom (2.3%), Jordan (2%), Belgium (2%)
Flooring	13.1	China (94.5%), United States (1.8%), Netherlands (1.3%)	Australia (13.6%), Malaysia (12.1%), United Kingdom (7.7%), France (7.5%), Canada (5.6%), New Zealand (4.6%), Saudi Arabia (3.8%), United States (3.8%), Belgium (3.2%), Germany (3%), Netherlands (2.7%), Bahamas, The (2.5%), Poland (2.5%)
Plywood	8.7	China (76.7%), United States (4.6%), Netherlands (3.7%), Singapore (2.7%), Spain (1.9%), Denmark (1.8%)	United States (23.8%), Netherlands (14%), Singapore (10.3%), India (5.1%), Ethiopia (4.2%), United Arab Emirates (3.8%), Oman (2.8%), Japan (2.7%), Australia (2.1%), Belgium (2.1%)
Pulp	0.4	China (54.8%), Germany (19.1%), Indonesia (14.3%), Myanmar (3.9%), Italy (2.5%), Netherlands (1.3%), United States (1.3%)	India (18.4%), United States (17.1%), Germany (11.3%), Italy (7.6%), Austria (5.6%), Thailand (5.4%), Australia (3.2%), Japan (2.9%), Belgium (2.6%), Spain (2.3%), China (2.2%), Netherlands (2.2%), United Kingdom (2.1%), Russian Federation (2.1%)
Paper-based articles	2.4	China (39.1%), Belgium (5%), Netherlands (4.5%), France (3.8%), United States (3.4%), Australia (1.8%), Singapore (1.6%), United Kingdom (1.6%), Denmark (1.2%)	Qatar (13.6%), United States (11.9%), United Kingdom (10.9%), Netherlands (10.8%), France (7.8%), Ethiopia (5.3%), Singapore (4.4%), Belgium (4.2%), Ireland (2.5%), Denmark (2.3%), United Arab Emirates (2.2%),
Seats	9.2	Indonesia (59.2%), China (11.7%), Vietnam (7%), Netherlands (3%), Belgium (2.6%), Germany (2.3%), Spain (2.2%), Italy (1.7%), Sweden (1.7%), United States (1.5%)	United States (31.5%), Japan (8.3%), Germany (6.7%), United Kingdom (6%), France (4.3%), Spain (4.1%), Russian Federation (3%), Netherlands (2.7%), Belgium (2.4%), Austria (2.1%), Australia (2.1%), Sweden (2.1%)
Furniture	12.2	China (42.9%), Indonesia (17.4%), Italy (11.7%), Vietnam (5.7%), Spain (4.7%), Germany (4.4%), United States (2.1%), Belgium (1.6%), United Kingdom (1.6%), France (1.2%)	United States (26.7%), United Kingdom (11.3%), Germany (9.4%), France (5.4%), Qatar (3.1%), Canada (2.4%), Spain (2.3%), Japan (2.1%), Korea, Rep. (2%)

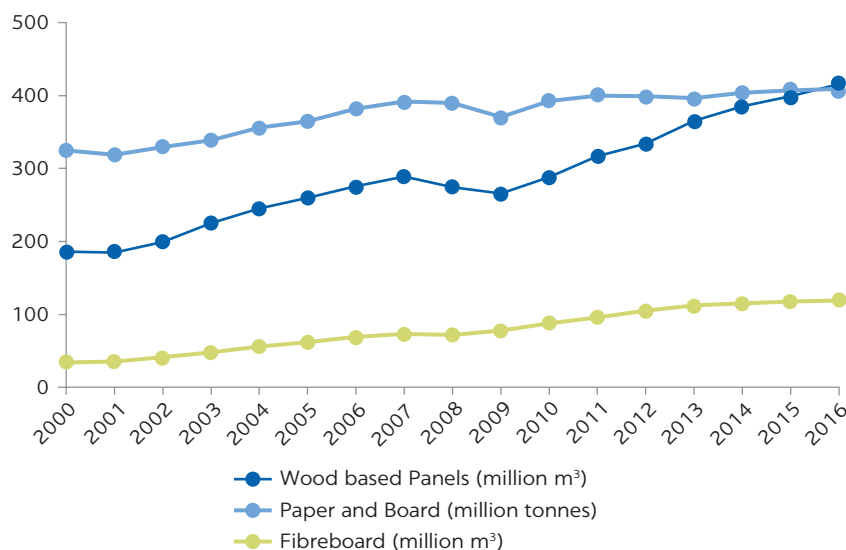
Sources: World Integrated Trade Solution; Comtrade; World Bank calculations.

Industrialized bamboo products account for over 25 percent of global trade in bamboo, and the share of bamboo woven products is around 23 percent.² The share of furniture and seats in total bamboo trade is 21.4 percent.³ Although China is the main exporter in almost all individual bamboo products (except bamboo seats), the extent of its share in total world exports varies across products. Indonesia is the dominant exporter of seats and an important exporter of furniture; Italy is also a significant player in bamboo furniture. The United States is the largest market for several of the product categories, including plywood, furniture, seats, basketwork, and plaits. Countries in Western Europe are also large buyers of bamboo products across categories. The largest importer of bamboo raw material is India (17 percent of world imports), followed by the United States and the Netherlands.

The potential market for bamboo is substantially larger than the recorded market for bamboo products. The discussion related to figure 3.1 and table 1 provides a limited perspective about the potential market for bamboo, given that it pertains to current trade in existing bamboo products. The broader market for bamboo is substantially larger, as it is considered a highly competitive timber substitute. Wood has applications in a wide variety of industries. These include (a) interior wooden spaces and furnishings; (b) habitats and constructs (including prefabricated buildings and traditional construction); (c) fuel, heating, and energy; (d) pulp and paper; and (e) crafts, manufactured consumables, and other advanced uses (for example, 3D printing) (World Bank 2017). The global production of wood-based articles has been steadily rising and has exceeded the pre-2008 crisis levels to keep up with rising demand (figure 3.2).

As technological applications evolve, bamboo will increasingly be able to replace wood in many of its uses. Bamboo also has the potential to substitute for

FIGURE 3.2
Global production of wood-based articles



Source: FAOSTAT.

Note: m = cubic meters.

TABLE 3.2 Global trade, bamboo and wood products, 2015*Exports and imports (US\$, billions)*

	INDUSTRY	VALUE
Narrow market	Bamboo and bamboo products	2.8
Broad market	Wood and wood products	212.8
	Furniture	931.8
	Total broad market	1,144.6

Sources: World Integrated Trade Solution; Comtrade; World Bank calculations.*Note:* Wood and wood products refers to products 44-49 2-digit categories.

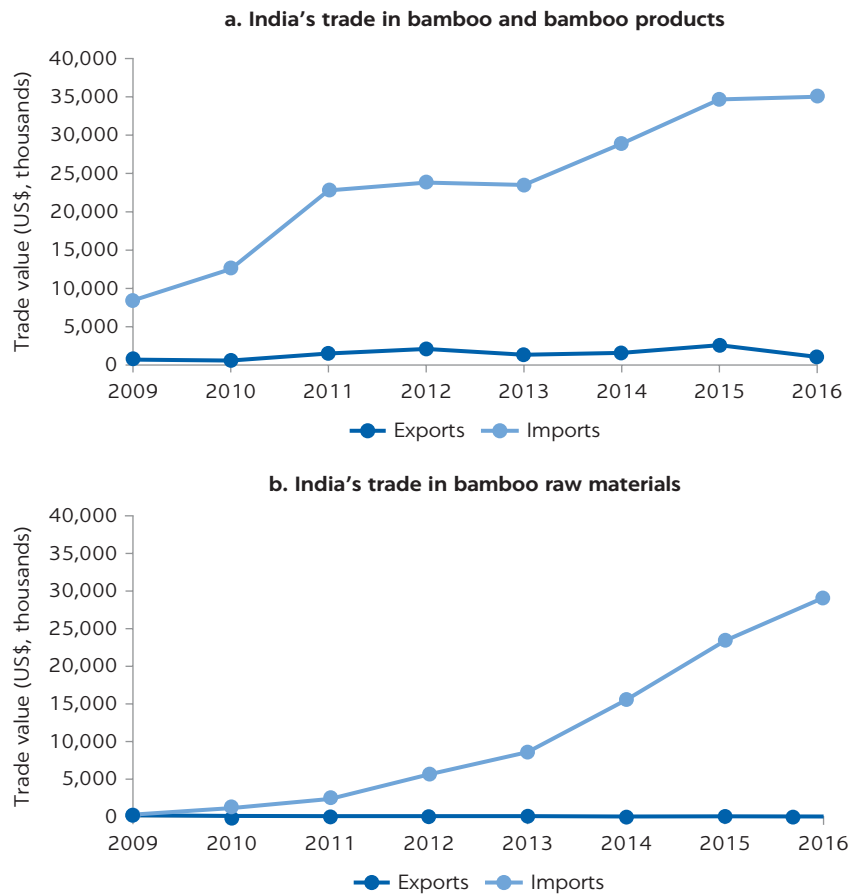
many steel and plastic products (Chaowana 2013). Table 3.2 reports the current global trade in the narrow market of bamboo products as well as the trade in wood-related products and furniture, which represents the broader potential market for bamboo. The numbers (US\$2.8 billion versus US\$1,144.6 billion) suggest that there is tremendous potential for bamboo-related products to make up a larger share of global consumption.

Industry trends: India

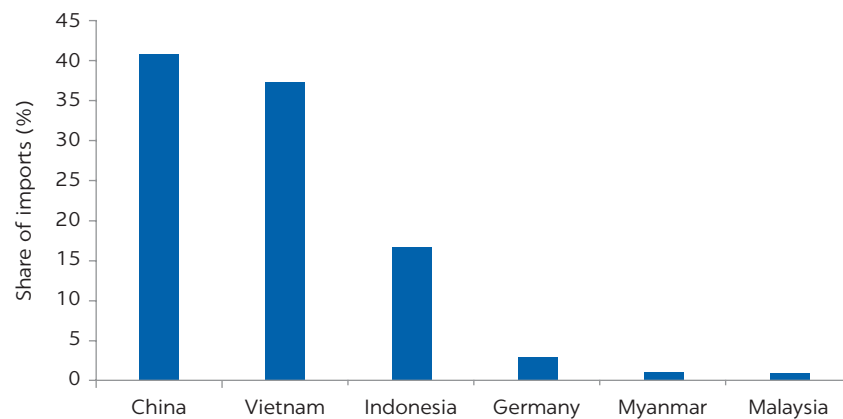
Although India has abundant natural resources in bamboo, its export base is very low, and it is a net importer of raw bamboo and bamboo products. India is the second richest country in the world (after China) in bamboo genetic resources (Lobovikov et al. 2007). There are 136 species of bamboo (125 indigenous species and 11 exotic species) belonging to 23 genera found in India. The total bamboo-bearing area in the country is estimated to be around 15.69 million hectares, and bamboo is found in almost all parts of India (Government of India 2017). Despite the abundant natural resource base of bamboo in India, trade statistics reveal a rather dismal picture of the state of the bamboo industry. Exports of bamboo are very low and have stagnated in recent years. In contrast, imports have been rising, and this has resulted in a rising trade deficit in bamboo and related products. In 2016, the trade deficit was almost US\$34 million (figure 3.3, panel a). The rising imports of bamboo, and the subsequently high trade deficits, have been driven by the rising imports of bamboo raw materials (figure 3.3, panel b).

Imports of bamboo raw materials account for most of India's bamboo trade with other countries. Almost 95 percent of India's imports of bamboo and related products are from China, Vietnam, and Indonesia, the three countries that dominate world exports of bamboo. India also imports from Germany, Malaysia, and Myanmar (figure 3.4). Product-wise data on imports of bamboo reveal that bamboo raw materials account for around 83 percent of India's total imports of bamboo, followed by flooring (6.3 percent). Total imports of bamboo-related products into India are around 33 times the exports from India. India imports several bamboo-based manufactured products, such as flooring, plywood, furniture, mats and screens, plaits, paper bamboo-based products, as well as edible preserved bamboo shoots (table 3.3).

It is difficult to estimate the overall size of this industry in India. There are more than 1,500 documented uses of bamboo. Much of the bamboo-based industry operates in the informal sector, where products such as mats, basketwork, construction materials, agricultural poles, incense sticks, and handicrafts are produced. Rudimentary techniques of production are employed in this sector,

FIGURE 3.3**India's trade in bamboo**

Sources: World Integrated Trade Solution; Comtrade; World Bank calculations.

FIGURE 3.4**India's bamboo suppliers, 2015**

Sources: World Integrated Trade Solution; Comtrade; World Bank calculations.

TABLE 3.3 India's bamboo trade, by product, 2016*US\$, thousands*

PRODUCT	EXPORTS	IMPORTS
Raw material	30.7	29,115.5
Preserved shoots	0.1	102.4
Charcoal	246.0	58.0
Flooring	315.4	774.6
Plywood	47.8	2,185.2
Mats and screens	3.8	455.0
Plaits and similar products	89.0	142.2
Basketwork	30.1	606.4
Pulp	17.5	945.8
Paper-based articles	1.0	4.7
Sears	89.0	53.3
Furniture	191.3	561.4

Sources: World Integrated Trade Solution; Comtrade; World Bank calculations.

and value addition is relatively low. Data on domestic production and consumption are not available. Even when firms operate in the organized sector, firm- and plant-level data are usually classified as per the International Standard Industrial Classification Revision 4, where firms are mapped to the industry to which they belong. There is no separate classification for bamboo-based industry in this international classification system and, given the plethora of uses for bamboo, bamboo-based firms can fall under several industry categories, including paper and paper-based products, wood and wood-based products, furniture, miscellaneous manufacturing, food products, textile and apparel, construction, and so forth. Given this data constraint, it is difficult to get an estimate of domestic production of the different bamboo products as well as a geographical distribution of firms and labor in this industry. However, a quick review of online firm directories, such as INDIAMART, which lists suppliers and exporters of various products, including those made of bamboo, reveals that bamboo producers and suppliers are present across several states, including Tamil Nadu, Kerala, Gujarat, Maharashtra, Madhya Pradesh, Karnataka, Rajasthan, Andhra Pradesh, and the National Capital Region.

The trade deficit suggests that there is a large unmet demand for bamboo and related products even within India. The trade data provide a macro picture of the inflows of bamboo-related products into the country from abroad, as well as the outflow of these products from India to other economies. Although they do not provide an estimate of the size of domestic production and consumption in the economy, the data indicate that there is a large unmet demand for bamboo and related products in India.

The industrialization of bamboo is at a relatively low level in India, which is currently an insignificant player in the global market for bamboo. Exports of bamboo-based products are very low and have been stagnant for many years. The patterns of trade suggest that the size of the bamboo industry producing industrialized products is very small.

The rising imports of bamboo raw materials despite the large natural resource base suggests that there are constraints to the utilization of bamboo resources in India. Given its vast natural resources in bamboo, India has the potential to be a

major supplier in the world market. However, despite being home to a rich biodiversity in bamboo and having a large area under bamboo forests, imports of raw bamboo are high and have been rising. This suggests that productivity of these bamboo areas is low or there are constraints to harvesting bamboo resources from this forest area for commercial use. In addition to bamboo grown in forest areas, commercial bamboo plantations can also provide the flow of inputs necessary for industrialization of bamboo. However, despite suitable climatic and soil conditions, commercial bamboo plantations are relatively underdeveloped in the country.

There are some promising examples that indicate that there could be a domestic market for bamboo products based on bamboo's eco-friendly attributes. Bamboo India, a firm based in Maharashtra, substitutes bamboo for plastic and other materials and produces products such as toothbrushes, audio speakers, and others. The demand for bamboo toothbrushes is reported to have gone up exponentially since the 2018 ban on single-use plastic in Maharashtra. Godrej Interio, a leading furniture company, introduced processed bamboo in the formal furniture market in India under its green eco-friendly line of furniture, and this is being retailed through its large network of showrooms and dealers.⁴ Manasaram Architects design their projects on the principles of sustainability and climate change mitigation, by using naturally occurring, renewable, low-cost, and locally available materials. They have worked on more than 100 projects in which bamboo is the principal material and have replaced 70 percent of the steel and wood with bamboo in the constructions they have designed.⁵ These examples illustrate that although the market for bamboo-based products based on the material's eco-friendly characteristics may currently be small in India, it has the potential to expand, particularly in urban centers. It is expected to increase as incomes rise and people become more conscious about the environment and embrace sustainable products and lifestyles.

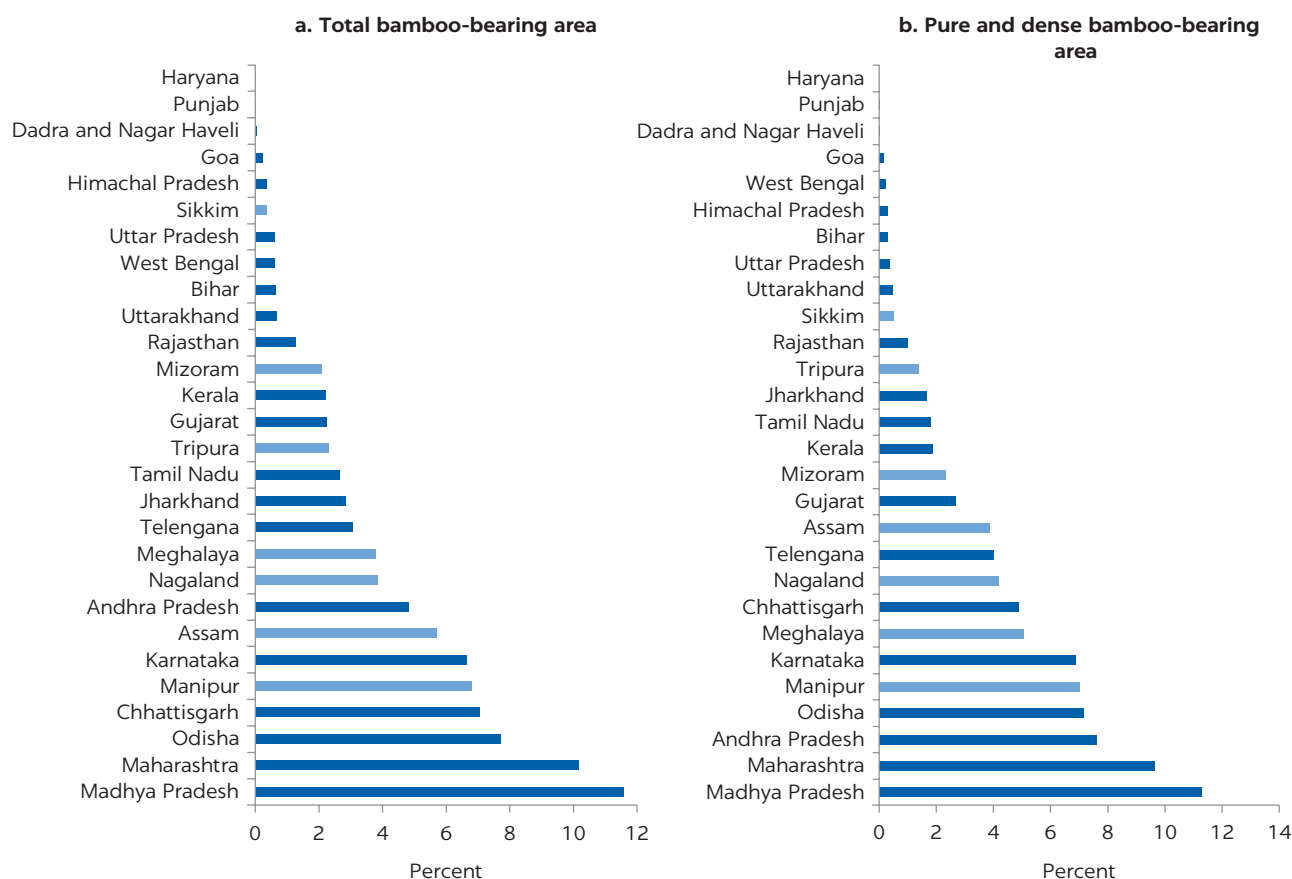
Industry trends: NER

NER is rich in bamboo resources. Over 50 percent of the bamboo species in India are found in NER. The region also has a disproportionate share of area under bamboo in the country. NER makes up approximately 8 percent of the geographical area of India, yet NER has approximately 35 percent of the bamboo-bearing area and 38 percent of the pure and dense bamboo-bearing area in the country (figure 3.5).

The majority of the enterprises in the bamboo sector in NER operate in the informal sector. Systematic data on enterprises in the sector are not available; however, field visits were undertaken in December 2017 in three states—Assam, Tripura, and Mizoram—where interviews were conducted with firms and other stakeholders operating in the bamboo sector. The visits revealed that the industrial base in bamboo is very small in the three states. Most enterprises are in the unorganized sector and engaged in activities that involve very little value addition. Although there are firms in the formal sector, many of them operate below capacity and are loss-making. All three states have recognized the potential for bamboo and made attempts to help develop the industry through policies or programs. Bamboo was recognized as one of several promising sectors for accelerated and sustainable growth of NER at the second meeting of the National Institution for Transforming India Forum for North-East organized in December 2018.⁶

FIGURE 3.5

Bamboo-bearing area, by state



Sources: Government of India 2017; World Bank calculations.

Tripura is home to around 21 bamboo species, and the bamboo-bearing area in the state makes up approximately a third of the total geographical area, but the sector has declined in recent years.⁷ Incense stick production and bamboo-based handicrafts were once important economic activities, with many households dependent on these bamboo-based industries. Tripura was a major player in the incense stick industry in India in the past. Around 90 percent of the bamboo sticks utilized by the Indian incense stick industry were supplied by Tripura. However, the industry declined when the supply of bamboo was affected by the flowering of the *Muli* plant. Combined with a difficult regulatory environment to access bamboo resources from forests, this reduced the supply of raw materials for the industry.⁸ Simultaneously, import duties on incense sticks were reduced, and the market in India began to be dominated by imports of mechanized incense sticks from China and Vietnam (Sinha and Deb 2016). The transition from hand rolled to semi-mechanized and mechanized incense stick production has been slow, and the state has not been able to recover its position in the Indian market.

The Tripura Bamboo Mission has adopted a livelihoods-based approach and supports farmers, artisans, and micro and small enterprises in plantation, production, and marketing. The Tripura Bamboo Mission was launched by the State Government of Tripura in public-private partnership mode to develop the bamboo sector in the state. It began operations in 2007 and aims to focus on bamboo handicrafts and incense sticks as well as bamboo plantations and industrial

applications of bamboo. The state has 16 clusters for incense stick production, 24 for handicraft/furniture production, and seven for bamboo plantations (TBM [2017], cited in Bhandari [2018]).

The Tripura state government also established a Bamboo Park; however, occupancy rates are low. The Bamboo Park was established in Bodhjungnagar in the outskirts of Agartala to facilitate setting up bamboo-based industries, by creating physical infrastructure and providing common facilities like a bamboo raw material depot, bamboo splitting and slivering unit, bamboo treatment and processing center, machine maintenance center, and so forth. During a visit to the Bamboo Park in December 2017, the study team found that there was one large enterprise established there (commissioned in 2014) making bamboo wood and products.² There was also a small unit making incense sticks set up in a shed. Despite the various incentives provided through the Tripura Industrial Investment Promotion Incentives Scheme, 2017, and access to land and shared facilities for bamboo, no other large enterprise belonging to the bamboo industry has set up operations in the state.

The Assam and Mizoram state governments have identified the bamboo industry as one of the thrust areas for investment and promotion.¹⁰ Both states have set up common infrastructure facilities. The Bamboo Technology Park Ltd., a company promoted by Assam Industrial Development Corporation Ltd., was inaugurated in 2017. It was established with the purpose of providing infrastructure facilities, such as bamboo stick-making facilities, bamboo plastic composite facilities, a glue and resin plant, charcoal plant facilities, and so forth, for bamboo entrepreneurs against payment of a user charge. The Bamboo Development Agency in Mizoram set up the Bamboo Technology Park at Sairang, where industrial plots were developed for use by bamboo-based industries on a lease basis.

Several firms that were interviewed in the two states revealed that they were making losses or operating below capacity. Mizoram had several bamboo chipping units, which is a low value-added industry. Some of these units had shut down in recent years due to a break in demand, as the paper mill to which they supplied closed. Some of the larger enterprises producing bamboo wood and other industrial products were operating below potential or had become sick units (for example, Venus Bamboo). In Assam, there are several scattered units producing mat boards, incense sticks (mechanized), and bamboo furniture. ITC Limited has recently tied up with a local manufacturer in Assam to produce incense sticks, to market in NER. Numaligarh Refinery Ltd. and Finnish technology firm Chempolis Oy have entered a joint venture agreement to produce 60 million liters of ethanol using bamboo each year.¹¹

Overall, the bamboo industry is relatively underdeveloped in the three states. Commercial utilization of bamboo is below the optimal level in the region. There is significant potential to improve performance, given the advantage the region enjoys in natural resource availability.

STRATEGIC DIAGNOSTIC

Global trends that impact the nature of demand

Several factors and trends potentially impact the demand for bamboo-related products. These include population and economic growth, growing consciousness about the environment, sustainable sourcing of raw materials, and rapid advances in technology and material sciences.

The demand for housing construction material, including wood and bamboo, and the demand for furniture are positively correlated with population and economic growth. There is a growing middle class with aspirations that could influence demand. As population and income levels increase, so does the demand for housing, home improvements, and furniture. The size of the middle class is extremely large and growing rapidly. Kharas (2017) estimates that it was 3.2 billion in 2016, with 140–170 million added annually, with most of the new additions being in emerging economies in Asia (China and India). Furthermore, the middle-class market accounted for one-third of global spending in 2016, and this market is growing at 4 percent annually in real terms, thus exceeding overall global gross domestic product (GDP) growth. This group has historically fueled consumption demand and could potentially be a very significant factor in the demand for bamboo and related products.

There is growing consciousness about the environment and climate change as well as social issues. The market for sustainable products has been on the rise, as there has been increasing awareness about sustainable consumption.¹² Many of the environmentally conscious consumers reside in high-income countries in Europe. There is also growing consciousness about social issues, such as the use of child labor, gender balance in the labor force, and the fairness of labor policies, including remuneration. The environmentally conscious and socially responsible consumer cares about which materials are used for production, how the materials are sourced, how products are made, and how they are delivered to the consumer. Recent surveys have found that a substantial proportion of adults were willing to pay a premium for products from companies that were committed to environmentally and socially conscious practices (Gibbs and Soell 2013; Nielsen 2015).¹³ Bamboo plays an important role as a carbon sink: it sequesters carbon in its biomass at rates comparable to or even better than many tree species.¹⁴ Products made from bamboo are likely to appeal to this consumer.

With rapidly depleting natural resources, there has been a growing focus on materials that can be harvested and used in a sustainable manner, and governments and the private sector are making the shift toward sustainable forestry certification. This provides an incredible opportunity for bamboo, which has a growing cycle of three to five years, compared with more than 60 years for wood. Moreover, when harvested, bamboo grows a new shoot from its extensive root system without requiring additional planting and cultivation. Industries as well as governments across the world, particularly in developed countries and emerging economies, are adopting Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC) certification requirements for those engaging in the wood and bamboo industries. This certification is a market-based instrument for sustainable forestry and is needed to access international markets where this is a requirement. Several global retail firms (for example, IKEA) require mandatory certification for sourcing forest-based products.

There have been rapid advances in technology and material sciences. It is difficult to predict the many ways in which bamboo will be used in the future. Bamboo is an extremely versatile material and is being used in myriad ways, from flooring and furniture as a timber substitute, to natural fibers, and more recently to make the interior of cars and as the material in 3D printing. As technology continues to evolve, so will the demand for products made from bamboo.

Strategic segmentation and attractiveness of strategic segments

The preceding section on global trends that affect demand for bamboo and their likely evolution in the near future provides some insights on what consumers are demanding and how firms are responding. This allows us to examine the industry using the perspective of strategic segments. The segmentation goes beyond the conventional approach of dividing the industry by product categories. Instead, it takes a demand-side as well as a supply-side perspective of the industry. A strategic segment is a function of the product and the user or market group the product serves. Each of the segments varies with respect to Porter's Five Forces, which include (a) the intensity of competitive rivalry, (b) the threat of new entrants, (c) the threat of substitutes, (d) the bargaining power of suppliers, and (e) the bargaining power of buyers.¹⁵ The segmentation provides a global overview of the industry and is agnostic to the specific country or cluster in question. Within each segment, the first three forces provide an assessment of the overall margin generated in the value chain, while the latter two forces suggest what the margin distribution could be among the different players in the value chain, thus providing insights on the potential of the value chain to create opportunities for women and the bottom 40 percent of the income distribution.

A strategic segmentation is presented for the bamboo industry in table 4. The rows in the table present the types of products in the bamboo industry. Products can be categorized broadly into two groups. The first category is the simple, more traditional products. These include bamboo baskets; incense sticks; preserved bamboo shoots;¹⁶ bamboo poles used for scaffolding, fencing, and in agriculture; temporary construction; low-cost housing; basic furniture; handicraft items; pulp for paper; and energy pellets. Products with hard technical specifications fall into the second category. These include bamboo wood, high-end furniture, bamboo plywood, flooring and panels made of bamboo, home products with consistent quality and design, bamboo as an input for production of clean biofuels like ethanol, bamboo fiber and textiles, bamboo to make car interiors, and bamboo as a material for 3D printing.

The columns in table 4 present the types of consumers. Users are categorized into two groups. The first category consists of consumers who are not environmentally aware and are indifferent to the impact their consumption patterns may have on the environment. The second category consists of conscious and aware consumers who care about the environment and are willing to pay a premium for products that are produced and sourced in a sustainable manner. Many of these consumers reside in urban areas and advanced countries in Europe.

Each cell represents a combination of a user type and a product type and comprises a strategic segment; the segments vary in their attractiveness of the margins generated and their distribution and the potential they represent for firms to grow and prosper.

TABLE 3.4 Strategic segmentation for the global bamboo industry

PRODUCTS	CONSUMERS INDIFFERENT TO ENVIRONMENT/SUSTAINABILITY	ECO-CONSCIOUS CONSUMERS
Simple traditional products	A1	A2
Products with hard technical specifications	B1	B2

Source: Based on interviews and secondary research.

Simple traditional products (segments A1 and A2) are relatively low value added, as they involve minimal or no industrial processing. The barriers to entry are very low, given the low technological requirements. Competitive rivalry is high, as several producers, many of which operate in the informal sector, produce these simple products. The threat of substitutes is particularly high in segment A1 compared with segment A2, as consumers in segment A1 are unconcerned about the environment and willing to substitute for products made of other materials, such as plastic, timber, and so forth. The overall margins are low for all players across the value chain, including the consumers, in segments A1 and A2, with margins for the consumers in segment A2 being even lower because of the relatively higher switching costs for the consumer compared with segment A1. Although the consumers in segment A2 care about the environment, the market for segment A2 is likely to be small. There tends to be a positive correlation between income level and consciousness about the environment. Although there is not a perfect overlap, higher income levels are associated with greater concern about sustainability issues. However, high-income individuals and households are also likely to demand products of high quality and technical specifications.

Products in segments B1 and B2 have high technical specifications. Production of these products requires a steady supply of raw materials, industrial research and development (R&D), machinery and equipment, and skills, at the design and conception stage as well as in production and quality control. Barriers to entry are relatively higher in segments B1 and B2 compared with segments A1 and A2. In segments B1 and B2, the threat of new entrants is relatively low. Competitive rivalry is also low, as there are fewer competing clusters and producers in these segments compared with segments A1 and A2.

Segment B1 is unlikely to be a very large market, and the threat of substitutes remains high. The consumer who is not environmentally conscious will be unwilling to pay a premium for a product produced and sourced in a sustainable manner. There are many competitors and substitute products available in the market (made of timber, plastic, steel, and so forth), as the consumer who is not environmentally conscious is willing to purchase products made from alternate materials, even if these substitute materials are not as environmentally sustainable as bamboo. Firms operating in segment B1 will be competing with firms producing similar products made from other materials, based on costing and pricing.

Segment B2 is the most attractive segment for firms in the bamboo sector. The barriers to entry are highest here, since the technical specifications as well as market specifications are high. The technical specifications for the products are similar to those in segment B1, since they are essentially the same products. However, in addition to these technical specifications, firms also have market specifications they need to fulfill. All the materials used in production, including packaging materials and the entire process from the procurement of various materials to manufacturing and distribution, are geared toward serving the needs of environmentally conscious and socially responsible consumers. Since the end user is an environmentally conscious consumer, catering to this segment and selling in these markets requires quality certification as well as sustainable forestry certification, such as FSC and/or PEFC.

There is a high fixed cost to acquiring this certification as well as costs related to maintaining the certification. For example, selling directly in European markets requires this additional certification. Moreover, retail chains, like IKEA, that source globally require their suppliers to maintain this certification even if

the sales are in local markets in developing countries. Overall value added is highest in this segment, with the margins distributed across the value chain. The operation of segment B2 requires scale and specialization, unlike the segments involving the production of traditional products. Not only is the potential scale for overall employment higher, but the jobs created are of better “quality” compared with those in the other segments. The level of skills required at each stage of the value chain is relatively higher in this segment. Segment B2 also has relatively fewer substitutes. Most of the substitute materials available to make similar products are not as environmentally sustainable and are less likely to appeal to the “green” consumer. The environmentally and socially conscious consumer is willing to pay a premium to ensure that products are sourced in a sustainable and socially responsible manner, and traceability in this segment assumes greater importance. Players across the value chain—farmers and plantation owners, workers on the plantations, extension workers, processors and manufacturers, as well as workers in the units, technicians, specialists, researchers, and service providers—all receive a share of the margins.

Bamboo has the advantage of strength and versatility to adapt to different uses. The applications of bamboo are evolving rapidly, with recent examples ranging from bicycles and the interior of cars to the material for 3D printing. It is difficult to predict how the applications will continue to evolve in the future. As technology advances and the tribe of environmentally conscious consumers increases, segment B2 is only expected to grow.

STRATEGIC OPTIONS FOR NER

Suggested strategic options for NER

Firms in Assam, Mizoram, and Tripura currently largely operate in segment A1, with simple, traditional products that cater to consumers who are not particularly invested in the eco-friendly characteristics of bamboo. Examples of these products include incense sticks, handicrafts, poles for agriculture and basic construction, mats, baskets, pulp, and others. These products cater to markets that are largely local/domestic, and there is very little value addition. The margins are low for enterprises in this segment. Furthermore, the segment brings very low returns to farmers and laborers. Value chain interventions in the sector have also been largely in segment A1. In Tripura, for instance, the Tripura Bamboo Mission has adopted a livelihoods-based approach, where the focus has largely been on simple, traditional products like incense sticks and handicrafts so far.

NER can harness its vast bamboo natural resources to cater to segment B2. The region should aspire to move toward this segment in the medium-long term. In segment B2, the products with technical specifications for the environmentally conscious consumer are the most attractive, given the growth in demand globally, as well as rapidly evolving technology on the supply side. The scale of operation, traceability, and specialization requirements, as well as the skills needed compared with the other segments, ensure that the participants across the value chain get a share of the margins. The segment has the potential to employ more people and provide better quality jobs. Further, this segment has the potential to provide relatively greater returns to the poor and women, compared with the other segments in the bamboo industry.

Segment B2 has the potential for greater employment of women and the rural poor in the plantation and pre-processing sectors near the source of bamboo

raw materials. Employment opportunities in segment B2 are higher than those in the other segments, within the value chain and in ancillary industries, because of activities such as R&D, extension services, logistics, transportation, and infrastructure.

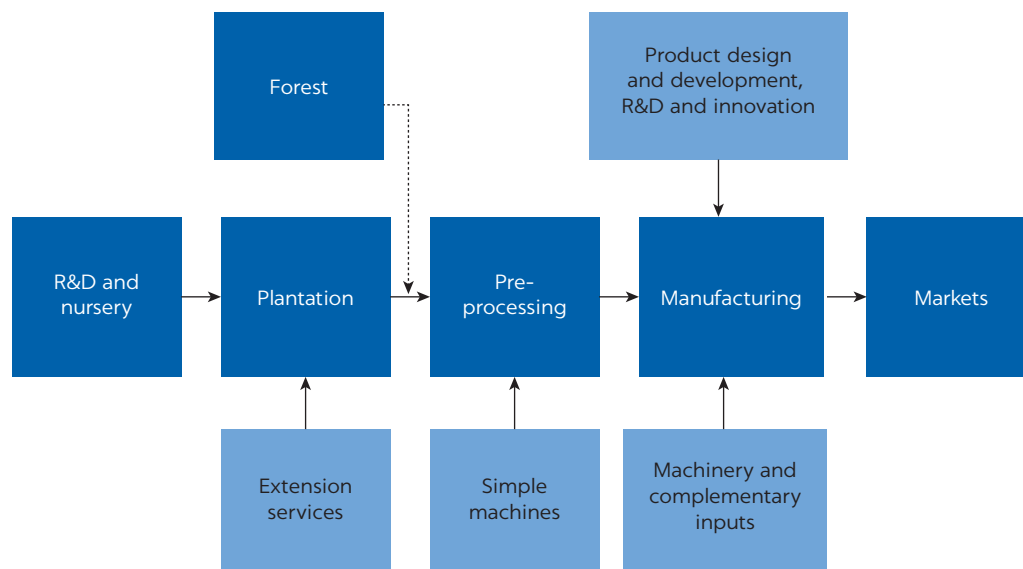
Segment B2 has a large export market, particularly in advanced economies in Europe and the United States, compared with the other segments. Typically, segments A1 and A2 do not have much export potential. Segment B1 is also unlikely to have market potential, given that there are several competing products and competing clusters. Urban Bangladesh may also offer some market potential for segment B2. Bangladesh can also provide logistics services and access for export products from segment B2. Bangladesh has a growing industry in wood furniture and can potentially also be a source of foreign investment.

Although segment B2 is the most desirable segment for firms, NER has a considerable way to go before firms can compete in this segment internationally. Bamboo has the unique characteristic that almost every part of the bamboo plant can be put to use. One of the reasons behind China's success in the bamboo industry is that it has been able to achieve very high levels of efficiency (which other countries have found difficult to match), by organizing production in a way that every single part of the bamboo is utilized.¹² Different segments where an array of products with varying levels of technologies are produced for a wide spectrum of consumers can exist simultaneously while the cluster gradually moves toward segment B2.

The value chain required for successfully competing in strategic segment B2 (products with high technical specifications that cater to the eco-conscious consumer) is illustrated in figure 3.6. This is a simplified pictorial representation of the required value chain.

Any industrial use of bamboo requires a steady supply of raw material. Although supply from forest areas is one option, to ensure an uninterrupted flow of materials to downstream processors and manufacturers, this needs to be

FIGURE 3.6
Value chain in segment B2



Source: Based on interviews and secondary research.

supplemented by a robust plantation sector. To ensure high yields and productivity of bamboo plantations, the plantation sector requires several inputs and needs the support of extension services. These extension services could be accessed through public provision or private service providers. The plantation sector also requires a supply of plantation material from the nursery sector.¹⁸

Once raw bamboo is harvested, the next step along the value chain is pre-processing. Pre-processing or primary processing is done close to where the bamboo plant is harvested. Bamboo is debranched and simple machines are used to separate the bamboo culm into different parts (base, middle, top sections, and so forth), sort, and in some instances follow by splitting, planing, sanding, and refinement.¹⁹ The sawdust is collected to be used as fuel, charcoal, paper, or for other purposes.²⁰ The different parts are then directed to secondary processors. Pre-processing of bamboo near the source has several benefits. First, raw bamboo is bulky, and the transportation of bamboo poles involves high costs. Pre-processing greatly reduces the transportation cost. Second, pre-processing reduces wastage, as every part of the bamboo is directed to the relevant supply chain. This results in near full utilization of bamboo and improves efficiency. Marsh and Smith (2007) suggest that the pre-processing model (which is the model followed by China) has wastage rates of only 5–10 percent compared with the direct supply model, which has wastage rates of 50–70 percent. The pre-processing innovation has been one of the primary reasons behind China's competitiveness in the bamboo industry. Third, pre-processing in hubs near the source provides tremendous opportunities for rural employment and value addition at the local level.

Following pre-processing, manufacturing or secondary processing is done in factories or workshops. The production process requires machinery (suitable for bamboo species and the application) and other complementary inputs (such as adhesives) and needs to be supplemented with quality control, testing, and certification of the product, particularly if the target market is the export market.

Several ancillary services are required to support the value chain in segment B2. Bamboo resources (forests or plantations) are usually at a distance from centers of industrial activity where most factories and workshops are located. Similarly, the market for bamboo products in this segment is in high-income countries or the larger urban centers in India. A well-developed transport network and logistics services are required to ensure that the raw bamboo and semi-processed materials reach production centers in a timely manner and the finished bamboo products reach the end consumers. R&D activities are fundamental to this segment and are required at various stages of the value chain. At the nursery and plantation stage, R&D is needed to ensure the high productivity of bamboo growth and steady supply of materials that are suitable for the end use. Bamboo varieties and species need to be suitably matched to end-use commercial applications, and this requires R&D in material sciences and technological innovations. Industrial research institutes (public and private), research universities, agricultural and forestry research institutes, and technology centers all have an important role to play here, complementing the R&D undertaken in firms. Given that applications of bamboo in this segment range from 3D printing, to bikes and automobile interiors, to flooring and construction of furniture, and home and kitchen products, the concept and product design is an important upstream activity for products in segment B2.

Several parts of the value chain in segment B2 are missing or display weak linkages in the states of NER. Most bamboo enterprises fall within segment A1 of simple, traditional products for consumers who are indifferent to environmental and sustainability issues. Products in segment B2, with high technical specifications for the environmentally conscious consumer, are largely undeveloped in the region, and the value chain for this segment has several gaps.

The commercial bamboo plantation sector is underdeveloped in the region. The supply of bamboo raw materials is largely from forest areas or community land. There are several restrictions in place related to harvest, transit, and trade, and these have been historically applicable to government and private lands (Aggarwal 2014). These restrictions often result in delays and constrain the supply of bamboo raw materials to processors. A commercial plantation sector that provides assured and timely raw material supply is underdeveloped in the NER states. A vibrant plantation sector requires supply-side (R&D, nursery, extension services, and other inputs) and demand-side (steady demand for raw material from industry) conditions, both of which are inadequate in the region.

Currently, the value chain follows the direct supply model. The pre-processing step is absent in the value chain in the region, and a vibrant wholesale market for slivers, strips, and other parts of bamboo is virtually nonexistent. The value chain operates on the direct supply model, where bamboo poles are directly purchased by processors, mostly through traders. The processor—whether a craftsperson who uses a couple of bamboo poles to weave bamboo baskets, a small unit producing agarbattis, or a factory producing mat boards—tends to produce the product from scratch using the raw bamboo pole. This results in immense amounts of wastage and low rates of resource utilization.

In India, the market for “green” products is underdeveloped, and linkages to international markets are weak. Limited value addition takes place within the region. A substantial share of raw bamboo poles is also sent outside the region without any value addition done within NER. There are very few manufacturers in the formal sector working on systematic value addition in the region. The existing manufacturers and processors often face unreliable supply of raw materials, given the reliance on bamboo sourced from forests. Moreover, their access to markets (input and final products) is constrained. And there is no critical mass of organized producers and processors who produce products with technical specifications targeted to the environmentally conscious consumer. There is a lack of appreciation of “eco-friendliness” in the domestic market and linkages to international buyers are weak. Moreover, international buyers require additional quality compliance and certification, which the manufacturers in the region do not possess.

Opportunities for women in segment B2

The value chain in the identified segment has the potential to provide higher returns for the bottom 40 percent of the income distribution and women. The timber industry has largely been dominated by men and this is the case along the value chain, including the harvesting of wood and timber from forests for commercial purposes. One possible reason for this could be that timber and charcoal require physically demanding machines and tools such as machetes, axes, and saws, which have traditionally been in the male domain (FAO 2014).

In contrast, women have largely engaged in the harvesting of non-wood forest products. Even in the case of these non-timber products harvested from forests,

although women have traditionally participated in these value chains, including bamboo value chains, they have largely been engaged in the lower-paying activities. As an example, women are often more likely to be engaged in the collection of bamboo shoots, while men are involved in the harvesting of higher-value bamboo culms (IFAD 2008).

When the only source of bamboo resources is the forest, the majority of the natural resources are often captured by contractors or the elite who are able to harvest and transport the bamboo resources to the source of demand. Bamboo plantations, which are an important source of bamboo supply in segment B2, provide opportunities for income earnings for farmers as well as on-farm workers, a large share of whom are women. Women have traditionally worked on the land. Commercial bamboo plantations are an important part of the B2 value chain and have the potential to provide women farmers and workers a share of the returns.

There is considerable scope for female employment and entrepreneurship in segment B2. The existence of pre-processing hubs close to the source of bamboo provides potential for value addition in rural communities and earnings for the poor and women. In contrast, a direct source model where raw bamboo is directly sent to producers and manufacturers increases wastage and reduces the scope for value addition by women and low-income households in pre-processing units. In a well-developed bamboo industry, there is substantial scope for employment of workers (including women) in factories and workshops for secondary processing as well as in the ancillary services that support manufacturing, such as R&D, product design, branding and marketing, logistics, and distribution. Mutha Industries, in Tripura's Bamboo Park, directly employs about 15–20 percent women in various tasks except those involving heavy machines, as indicated in interviews during field visits. Figure 3.7 illustrates the

FIGURE 3.7

Potential for female participation in the value chain

R&D and nursery	<ul style="list-style-type: none"> • Women scientists to work in R&D • Women to work in bamboo plant nurseries
Plantation	<ul style="list-style-type: none"> • Women cultivators to grow bamboo commercially (Women farmers, labor) • Women involved in extension services with adequate training
Pre-processing	<ul style="list-style-type: none"> • Rural women employed in areas close to sources of bamboo supply
Manufacturing	<ul style="list-style-type: none"> • Women to work as employees and entrepreneurs in manufacturing firms • Participation of women in services related to manufacturing (ex: product design)
Marketing	<ul style="list-style-type: none"> • Involvement of women in marketing and brand-building • Women in trade (wholesale, retail, and online)

Source: Based on interviews and secondary research.

Note: R&D = research and development.

areas in which women can participate in the value chain of segment B2 and realize a share of the returns. The figure demonstrates the considerable potential for female employment at all stages of the value chain in segment B2.

There are examples of women engaging successfully as entrepreneurs in segment B2. One such successful female entrepreneur is Neelam Manjunath. Neelam Manjunath has transformed the use of bamboo in modern construction in India. She is the proprietor and principal architect of Manasaram Architects in Bengaluru.²¹ She is also the founder and managing trustee of the Centre for Green Building Materials & Technology and a World Bamboo Ambassador of the World Bamboo Organization. Her work has focused on green and sustainable methods of construction and the use of bamboo. She has replaced 70 percent of the steel and wood with bamboo in the constructions she has designed and has used bamboo as the principal material in more than 100 projects. Bamboo has been used to make walls, doors, windows, roofs, railings, fencing, staircases, boundary walls, precast walls, and roofs in her projects and has replaced steel and concrete for columns and beams.²² Some of the major projects where she has been able to incorporate these green principles and the use of bamboo include Aditi Greenscapes in Bengaluru; Bamboo Centre, Agra; CGBMT headquarters, Sustainability Institute, Bengaluru; one of the metro stations in Bengaluru; the cafeteria at the Petroleum University in Gandhinagar, Gujarat; National Bamboo Centre in Rajaborari, Madhya Pradesh; and the VIP pantry at Raj Bhavan in Bangalore.²³

INDUSTRY ECOSYSTEM: PORTER'S DIAMOND

Porter's diamond framework is used to characterize the competitiveness of a cluster based on five key dimensions that describe an industry's ecosystem in which firms are born and compete: (a) demand conditions; (b) firm strategy, structure, and rivalry; (c) factor conditions; (d) related and supporting industries; and (e) government and chance variables (Porter 1990). This section analyzes the competitiveness of the bamboo cluster, focused around products with high technical specifications that cater to environmentally conscious consumers, in the NER states, based on this framework.

Demand conditions

Bamboo enterprises, a majority of which are informal and household based, largely cater to local demand in NER. However, this demand does not fall in segment B2. The local demand is largely in segment A1: simple, traditional products for consumers who are indifferent to environmental and sustainability concerns. The demand is largely for low value-added commodities such as incense sticks, bamboo poles for agriculture and scaffolding, bamboo baskets, basic furniture, and pulp for paper industries by local households and enterprises.

The potential demand for segment B2 is very large, particularly in the global market. It comprises the market in the larger urban centers in India (such as Bangalore, Mumbai, and the National Capital Region) and neighboring countries, and the global markets, particularly in high-income countries where environmentally conscious high-income consumers reside. Not only is the global market sizable, but it is growing, as more and more consumers opt for green and

environmentally sustainable products and as technological advances facilitate the substitution of bamboo for non-sustainable materials like timber, plastic, and steel.

Developments in the retail space in India have created favorable demand conditions for segment B2. The furniture market in India is estimated to be around US\$15 billion.²⁴ Although traditional local stores and markets dominate the Indian furniture market, recent years have witnessed the entry and expansion of companies such as Pepperfry, Urban Ladder, Flipkart, and others in the online retail space as well as brick and mortar players like Godrej Interio, Home Town, and Home Center.²⁵ This has been in response to the growing demand, in larger urban areas, for branded furniture and home goods with a modern aesthetic. With the right marketing and promotion, Bamboo products from segment B2 can tap into this expanding market.

IKEA is looking to source bamboo from India for its global markets. IKEA is the world's largest furniture retailer and uses around 1 percent of the world's total supply of lumber.^{26,27} The company opened its first store in India in Hyderabad in August 2018 and aims to have 25 stores across nine cities by 2025.²⁸ Regulations that govern 100 percent foreign direct investment in single-brand retail in India require at least 30 percent local sourcing, which IKEA must fulfill by 2023. Although the company has been sourcing from India for over three decades and has more than 55 local suppliers, it is expected to add more local suppliers over the next few years as local sourcing increases.²⁹ Currently, IKEA sources most of its bamboo from China, Vietnam, and Indonesia. Furniture products made from bamboo constitute about 1 percent of its global sales.³⁰ As the company is looking to expand its portfolio of sustainable products, it is exploring the sourcing of bamboo from India for its global operations and has identified potential suppliers from several states, including Assam, Madhya Pradesh, and Karnataka.³¹

Firm strategy, structure, and rivalry

Currently, hardly any firms in this sector are operating in segment B2. The local demand for bamboo products in NER is largely for traditional products by consumers who are not necessarily conscious about sustainability issues. There is a lack of appreciation of “eco-friendliness” in the local market in NER and even in the domestic Indian market. Thus, most firms in NER are currently operating in segment A1. There are some exceptions to this. For example, a few firms (Eses Biowealth, Mutha Industries, and others) using relatively more advanced technologies to make products such as bamboo wood, flooring, and panels have emerged in recent years. However, they have yet to make a substantial dent in the target market of segment B2.³²

The competition faced by firms in segment B2 is global. The market for the segment is advanced economies in Europe and larger urban areas in India. Most of the bamboo-producing countries are in the emerging economies. The competition for potential firms in NER in this segment is from firms in countries such as China, Vietnam, and Indonesia. China has the first-mover advantage in this industry and has been able to achieve scale efficiencies and capture global markets.

Uninterrupted supply chains of sustainable bamboo, innovation, and product differentiation will be important aspects of firm strategy in the medium to long term. Firms in this cluster that want to compete in the global market in this

segment will have to invest in innovation and quality, differentiate their offerings, and focus on the sustainability angle. For the Indian market, particularly the furniture and home goods retailers such as IKEA, firms in the cluster will be competing with firms in other states where bamboo is grown and bamboo products are produced, such as Madhya Pradesh, Maharashtra, and Karnataka, and will have to focus on building their supply chains.

Factor conditions

Natural resources

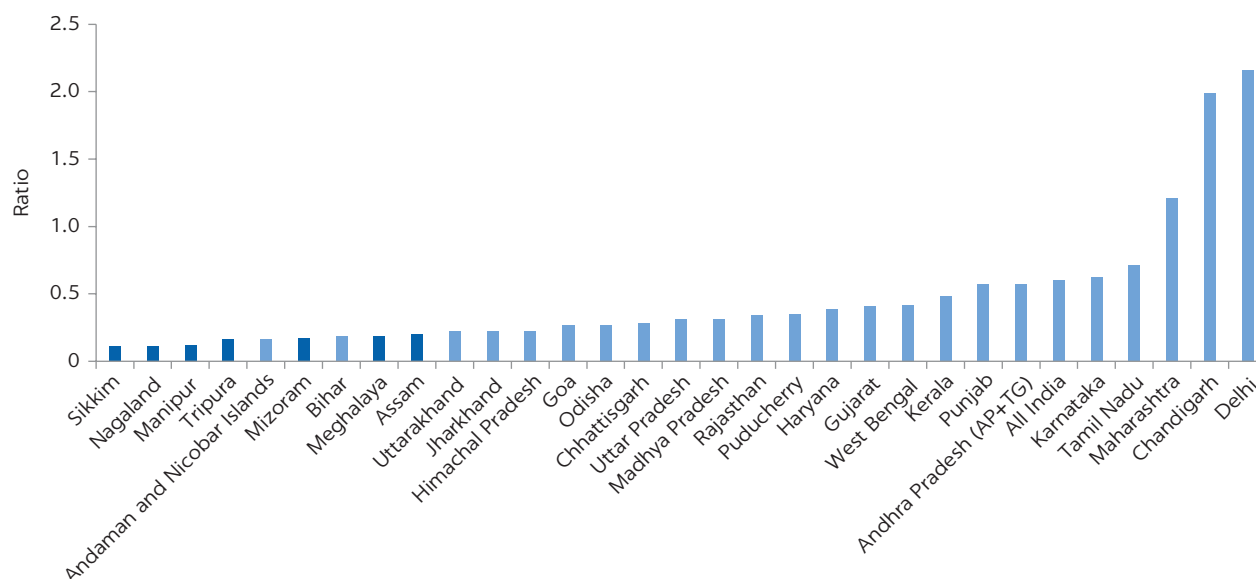
The climate, soil, and environmental conditions in NER are ideal for bamboo to grow and flourish. The region is home to a substantial share of the bamboo resources in India and has a disproportionate share of area under bamboo. However, much of this is in forests or community lands, and there are restrictions on the felling and transportation of these resources. Until recently, these restrictions also existed on bamboo grown outside forest areas, and this has stunted the development of commercial plantations of bamboo.³³

Finance

The ratio of credit to state GDP is extremely low in the region (figure 3.8). Although the average credit-to-GDP ratio for the country was around 0.60 in 2013–14, in Assam, Mizoram, and Tripura, the ratio was 0.20, 0.17, and 0.16, respectively. These low ratios could reflect the limited supply of credit in the region as well as demand-side constraints, such as the low demand from firms or ineligibility of firms for formal finance. Difficulty in accessing finance repeatedly came up as a major constraint in interviews conducted with firms in the region, suggesting that firms would like to access external finance from formal banking institutions but are unable to do so.

FIGURE 3.8

Credit-to-SGDP ratio, by state, 2013–14



Sources: Niti Aayog SGDP 2004–05 series and RBI Basic Statistical Returns of Banks; World Bank calculations.

Note: SGDP = state gross domestic product.

Infrastructure

The region suffers from inadequate infrastructure in terms of low road density and the poor quality of existing road networks, distance from ports, and limited railway lines. Connectivity within NER itself as well as the connectivity of the region to other parts of India and the rest of the world is not only costly in terms of money and time, but also unreliable. Bamboo is grown in more remote forest areas and rural areas away from urban centers of economic activity. The cost of bringing raw bamboo to processing centers as well as transporting capital equipment and other materials from other states of India and the world into the region is high.

Interviews with firms in the region suggest that the high costs of moving bamboo products from the region to other parts of the country is a major constraint. It is more cost-effective for mainland India to import bamboo products from China and Vietnam than to bring them from NER. Similarly, poor connectivity to export markets in Europe and the United States reduces the overall competitiveness of the region. Until recently, Bangladesh did not allow bamboo-based products through the Agartala-Akhauda Integrated Check Post. This restricted the ability of firms to send bamboo products to Bangladesh and other countries.³⁴ Port restrictions were lifted on nine products in 2018, including bamboo-based products.³⁵

Related and supporting industries

Local access to physical and service inputs is limited. The inputs required for manufacturing, such as machinery, equipment, and other intermediate inputs like adhesives, are not available locally and are difficult to access in the region. Machinery and equipment are largely imported from China and, in some instances, other industrialized states in India. The poor connectivity of the region makes this an expensive proposition. Ancillary services such as transportation and logistics are also underdeveloped, which raises the price of bringing these inputs to the region. In interviews, some firms also complained that the machinery imported from China, in certain instances, was not adaptable to the properties of the local species. In China, the predominant bamboo species for commercial use is the Moso bamboo; it is used as timber as well as edible bamboo shoots and constitutes over 70 percent of the bamboo growing area in China (Fu 2001). Much of the machinery and equipment in China is designed around its material properties.

Segment B2 also needs modern service inputs. Upgrading in manufacturing is positively associated with the use of productivity-improving service inputs such as information technology and R&D and business services, which include management consulting, technical and engineering services, advertising, and so forth (Hurria et al. 2019). This especially holds for segment B2, where products with high technical specifications are targeted to eco-conscious consumers residing in high-income regions. These services are not easily accessible locally in NER.

Although there are several research institutions working on bamboo development, there is potential to improve their scope and effectiveness. Several public research institutions are working on bamboo development, such as the Advanced Research Centre for Bamboo and Rattan, Cane and Bamboo Technology Centre, Bamboo and Cane Development Institute, Tripura Bamboo and Cane Development Centre, and North East Centre for Technology Application and Research. However, they have limited resources and their linkages with industry and markets are often weak. This limits their ability to make an impact, in improving the productivity of plantations upstream as well as in aiding industrial design and product development for enterprises.

Government's role

The Government of India as well as the state governments of the three states—Assam, Tripura, and Mizoram—recognize the importance and potential of the bamboo industry. In 2006, the Government of India launched the National Bamboo Mission (NBM), to address issues related to the development of the bamboo industry in the country. There have been concerns that NBM has largely emphasized the propagation and cultivation of bamboo, with less focus on processing, product development, and value addition, as a result of which linkages between farmers and the industry remain weak.³⁶ NBM was restructured in 2018 with the aim to increase bamboo plantation on non-government and private land; improve post-harvest management through primary processing and treatment units, technologies, and market infrastructure; promote product development for industry, skills, and capacity building; and promote the productivity of raw materials for industrial use.³⁷ The recent restructuring of NBM and the allotment of resources to it provide the impetus for government support for the development of the entire bamboo value chain.

Development of commercial bamboo plantations has been slow, but recent regulatory changes are positive. When NBM was launched in 2006, one of its stated objectives was to focus on plantations on forest and non-forest lands through Joint Forest Management Committees and Village Development Committees. The states have made substantial progress (with the aid of the bamboo development agencies) in creating bamboo plantations on forest land through the Joint Forest Management Committees and Village Development Committees. However, progress has been limited in creating plantations on non-forest land involving farmers and private landowners.³⁸ Until very recently, bamboo was classified as a tree under the Indian Forest Act, 1927. Thus, bamboo grown outside forests was also subject to the rules on felling and transit. This served as a disincentive to the development of commercial bamboo plantations. The Act was amended in 2017 to exclude bamboo grown outside forest areas from the definition of tree.³⁹ This has removed some of the regulatory constraints, as the felling and transit of bamboo grown in non-forest areas is now permitted.

The three state governments have made efforts to provide land and shared facilities to bamboo enterprises. The Tripura state government set up the Bamboo Park and provides incentives through the Tripura Industrial Investment Promotion Incentives Scheme, 2017. The Assam government, through the Assam Industrial Development Corporation Ltd., has promoted setting up the Bamboo Technology Park for shared infrastructure facilities. Similarly, the Mizoram government set up the Bamboo Technology Park at Sairang. However, the uptake has been low in these parks, and much remains to be done to develop the complete value chain of the sector.

CONCLUSIONS: SOME CONSIDERATIONS FOR THE PUBLIC AND PRIVATE SECTORS

NER can capitalize on the availability of natural bamboo resources and develop the bamboo industry. There is a tremendous opportunity for the bamboo sector, given its sustainability and eco-friendliness. The market for bamboo products is large and has been expanding in high-income countries where there is growing consciousness about the environment. To tap into the market, NER needs to turn

this homegrown resource into products with strict technical specifications that cater to eco-conscious consumers. This strategic segment has higher potential for employment creation compared with other segments and can bring greater returns to women and the poor, as it allows everyone across the value chain to create more value.

For Bangladesh and the other neighboring countries, the emergence of such a cluster in its vicinity offers advantages. Bangladesh has a thriving furniture industry, particularly for wood. The country can source semi-processed and finished bamboo products from NER for the industry as well as invest in the region. Logistics and other service providers from Bangladesh can provide supporting and ancillary services to firms in the region and transit services for NER's exports to and imports from the rest of the world.

In the short to medium term, NER can be an upstream supplier of semi-processed bamboo to more advanced firms in other clusters and regions. Firms in this cluster are largely small and unproductive, and very few firms currently have the capability to compete successfully in segment B2. While firms in the cluster develop capability and the region improves its connectivity and overall business environment, bamboo enterprises can operate in the pre-processing stage of the value chain and become upstream suppliers to downstream firms in other more advanced clusters. The skills and technology requirements for enterprises in the pre-processing stage of the value chain are relatively less demanding and hence feasible for the cluster in the short term. Moreover, the development of a critical mass at the plantation and pre-processing stage is conducive to the development of segment B2, as has been illustrated by the success of the bamboo industry in China.

In the medium-long term, the cluster should aspire to move toward segment B2 products with high technical specifications for the eco-conscious consumer. Developing the bamboo industry focused on the new strategic segment will require concentrated efforts by the government as well as the private sector. A possible approach to develop the segment would involve some aspects of the following.

Promotion and marketing of bamboo as a sustainable timber substitute

The market for sustainable products is large and has been growing in Europe and other advanced countries. There is also potential for such a market in larger urban centers in India. Moreover, promotion and information dissemination about the potential to use bamboo in place of timber, plastics, and other materials as well as the environmental benefits of doing so is needed. In the past, the government has had experience with launching the “Incredible India” campaign to promote tourism (domestic and international) in India. A similar branding campaign to popularize the use of bamboo would go a long way in developing the market for bamboo as a sustainable and desirable product. The government (center and states) and industry associations will need to work together to conceive, launch, and sustain such a campaign.

Support for forestry sustainability and quality standards

The market for segment B2 is largely in developed countries where FSC and PEFC certifications are required for engagement in bamboo industries.

Global retail firms like IKEA require mandatory certification for sourcing forest-based products. IKEA's expanded IWAY Forestry Standard now covers bamboo, rattan, and paper.⁴⁰ More than 90 percent of the bamboo used by IKEA is grown in China, and in 2016, nearly all of it was FSC certified. Similar standards will be rolled out in India.⁴¹ Firms in this segment will need to make an effort to achieve the necessary certification to export to global markets and supply large retailers like IKEA. The government may need to provide the necessary support to firms in the areas of information sharing, certification labs, legal support, as well as support for building traceable and sustainable production of bamboo. The grading of bamboo is currently not done systematically in NER or elsewhere. A new standard on bamboo structures (ISO 19624:2018) dealing with the structural grading of bamboo culms for construction was published by the International Standardization Organization in September 2018.⁴² The properties of the various Indian species will need to be researched and analyzed to see how they can be used in construction and for other purposes. The development of international standards is at an early stage, and the Indian government has a role to play in ensuring that as these standards are developed, they capture the quality characteristics of bamboo from India.

Better coordination among agencies

The recent amendment to the Indian Forest Act, which removed bamboo from the definition of tree in non-forest areas, has addressed some of the disincentives to commercial plantation of bamboo. Now that, in principle, bamboo from non-forest areas is not subject to felling and transit restrictions, coordination among different government agencies—forest departments, roadways, check posts, and agriculture departments—will be needed to ensure that this is effectively implemented, within states as well as across states in the country. This will require that effective systems of traceability are developed and implemented, to enable identification and seamless transport and use of bamboo from non-forest areas. Furthermore, coordination between forest and agriculture departments will be necessary to facilitate the development of an effective nursery sector as well as extension services for bamboo plantations.

Integration of government programs with the bamboo sector

Several rural development programs can be harnessed to develop the primary processing stage of the value chain. These include, but are not limited to, the Deen Dayal Upadhyaya Grameen Kaushalya Yojana (youth employment) and the National Rural Livelihood Mission (rural livelihoods). There are several small and medium-size enterprise (SME) schemes that firms can tap into related to incubation, quality management, standards and quality technology tools, credit linked capital subsidy, and others. In addition, the National Housing Scheme could be encouraged to use bamboo as a construction material. This would popularize the use of bamboo in modern construction and facilitate expansion of the market for bamboo.

Investment in R&D and technology and improved linkages of research institutions with firms and markets

The private sector as well as public agencies funded by the government will need to make substantial investments in the development and adaptation of technologies as well as R&D. R&D is required at different stages of the value chain in the

identified segment. These include (a) mapping different varieties of bamboo to different commercial applications, (b) developing indigenous machinery and adapting imported machinery to local varieties, (c) engaging in R&D in material sciences and the properties of bamboo for different applications, and (d) supporting product design. The linkages of firms with the various institutions working in the bamboo sector, such as the Advanced Research Centre for Bamboo and Rattan, Cane and Bamboo Technology Centre, Bamboo and Cane Development Institute, Tripura Bamboo and Cane Development Centre, North East Centre for Technology Application and Research, as well as the Indian Institutes of Technology and other technology universities, need to be improved so that the cluster can supply well-designed and high-quality products to global markets and compete effectively in the segment.

Development of skills and firm capabilities

The development of segment B2 will require the presence of a skilled workforce at the various stages of the value chain. The R&D activities require professionals and technicians with high levels of human capital, trained in tertiary educational institutions within and outside the region. The primary processing and processing stages will need workers trained in the use of machinery, which will require a combination of skilled workers graduating from industrial training institutes and on-the-job training. The nursery sector as well as extension services will need graduates from agricultural universities to ensure high upstream productivity. This requires investment in and expansion of universities and tertiary educational institutions as well as vocational training programs. Firms will need to adopt more sophisticated managerial practices to compete effectively in segment B2. Evidence suggests that upgrading managerial capabilities can result in substantial improvements in firm productivity.⁴³ This can be done through SME programs on managerial training as well as facilitating the development of the market for consultancy services through the development of platforms.

Improvements in connectivity

Efforts to improve railways, waterways, and road networks to expand intra-region connectivity as well as the connectivity of the region to mainland India, neighboring countries, and export markets is a necessary condition for the cluster to compete effectively in the segment. This is needed not just to connect forest and rural areas to industrial clusters within NER to facilitate the flow of raw materials, but also to connect the region to external markets, to access inputs as well as sell the final products. This will require investments by the state governments in state highways and local roads in the respective states, as well as by the center in national highways and railway lines. The possibility of transit through Bangladesh will greatly reduce the cost of imports of raw materials and capital equipment into the region and the cost of exports of finished products to external markets. A more detailed assessment of the challenges for connectivity along with recommendations for the way forward are presented in Kathuria and Mathur (2019).

Support for rural women and female entrepreneurs

The development of the segment of products with high technical specifications for environmentally conscious consumers presents an opportunity to substitute

an industry that is male dominated, the timber industry, for an industry that can have greater participation of women. Efforts will need to be made to support female cultivators and link them with government schemes, provide training and loans for tools to rural women to engage them in primary processing, improve access to finance for female entrepreneurs, link women entrepreneurs of SMEs to larger firms, and facilitate mentorship programs for women entrepreneurs to encourage their participation in all stages of the value chain.

NOTES

1. Bamboo and bamboo products refer to the following product codes according to the Harmonized System (2007) classification: 140110 (bamboo raw materials), 200591 (bamboo shoots), 440210 (bamboo charcoal), 440921 (bamboo flooring), 441210 (bamboo plywood), 460121 (bamboo mats and screens), 460192 (bamboo plaiting material), 460211 (bamboo basketwork), 470630 (bamboo pulp), 482361 (bamboo paper-based articles), 940151 (bamboo and rattan seats), and 940381 (bamboo and rattan furniture).
2. Industrialized bamboo products refer to bamboo charcoal, bamboo shaped products, bamboo flooring, plywood, pulp, and paper-based articles; woven products refer to mats and screens, plaits and similar products, and basketwork and wickerwork.
3. The furniture and seats categories include rattan furniture and seats, as data on rattan furniture are not separately available.
4. <http://theinsidetrack.in/greenspeak/godrej-introduces-bamboo-furniture>.
5. <https://www.moneycontrol.com/news/business/personal-finance/bamboo-isnew-steel-931080.html>.
6. The National Institution for Transforming India Forum for North-East, constituted in February 2018 by the Prime Minister's Office, has been tasked with identifying various constraints in the way of accelerated, inclusive, and sustainable economic growth in NER and recommending suitable interventions for addressing the identified constraints, for ensuring sustainable development in NER (<http://pib.nic.in/newsite/PrintRelease.aspx?relid=176707>).
7. <http://industries.tripura.gov.in/bamboo/>; calculations based on Forest Survey of India and Census data.
8. Forest transit regulation meant that there would be multiple checks at many forest check posts, which constrained the transportation of bamboo.
9. Mutha Industries manufactures bamboo wood and products such as flooring, furniture, wall panels, and so forth. A large share of the sales are through sales to the public sector through tenders in various states.
10. Industrial and Investment Policy of Assam 2014 and The Mizoram Industrial Policy of 2012.
11. https://www.business-standard.com/article/companies/bamboo-to-ethanol-india-s-biofuel-industry-to-explode-into-a-15-bn-market-118040300588_1.html. The foundation stone for the refinery was laid in February 2019.
12. For example, in 2015, around half of Unilever's growth came from its sustainable living brands. These sustainable brands grew 30 percent faster than the rest of the company's business. See <https://www.environmentalleader.com/2016/05/unilever-sustainable-brands-grew-30-faster-than-other-brands-in-2015/>.
13. The surveys suggest that 66–75 percent of adults responded positively on this.
14. <http://www.inbar.int/five-ways-bamboo-can-fight-climate-change/>.
15. See Porter (2008) for an overview of the Five Forces.
16. Bamboo shoots are young bamboo culms eaten as vegetables.
17. Shoots (food), culms (toothpicks, skewers, and so forth), middle upper parts (woven articles, handicrafts, bamboo curtains, laminated panels, and so forth), middle lower parts (laminated furniture and floorings), base parts (charcoal and bamboo vinegar), processing residue (energy, bamboo particleboard, and bamboo viscose fiber textiles), leaves (fodder, pigments, medicine, and beverages), twigs (brooms), and rhizome (handicrafts) (Yue [2012], cited in Mera and Xu [2014]).
18. Bamboo seeds and cuttings are propagated directly in polybags or nursery beds and then transplanted into polybags. The polybags are maintained in nurseries for around six months and then sold to plantations (SNV Netherlands Development Organization 2018).

19. Although this can be done manually, using simple tools like strip knives, saws, striking planks, sharp knives, shaving knives, and hand drills, the use of simple machines like cross-cutting machines, sliver-making machines, splitting machines, and width sizing machines reduces wastage of raw material and improves productivity. These machines are generally utilized in the pre-processing step in segment B2. In segments A1 and A2, pre-processing is often not a separate stage; it is integrated within the production stage where it is done manually using simple tools.
20. <https://pacificbamboo.org/research/examining-bamboo-industries/>.
21. <https://www.thehindu.com/life-and-style/homes-and-gardens/symphony-of-bamboo/article24113677.ece>.
22. <https://housing.com/news/bamboo-new-steel/>.
23. <https://www.moneycontrol.com/news/business/personal-finance/bamboo-isnew-steel-931080.html>.
24. <https://www.livemint.com/Companies/8tIS6VtqGT3Ws2QjW4ZJAM/How-Flipkart-is-trying-to-fight-Ikea-in-furniture-market.html>.
25. <http://knowledge.wharton.upenn.edu/article/will-ikea-find-home-india/>.
26. <https://www.forbes.com/sites/walterloeb/2012/12/05/ikea-is-a-world-wide-wonder/#617fc2a027b9>.
27. https://www.ikea.com/us/en/about_ikea/newsitem/022615_pr_making-solid-wood.
28. <https://www.outlookbusiness.com/the-big-story/lead-story/ikeas-india-play-4588>.
29. <https://www.dnaindia.com/business/interview-india-is-a-unique-market-where-ikea-will-go-full-throttle-patrik-antoni-2588843>.
30. <https://economictimes.indiatimes.com/industry/services/retail/ikea-to-make-india-global-sourcing-hub-for-bamboo-products/articleshow/51048577.cms>.
31. <https://www.thehindubusinessline.com/companies/ikea-looking-to-source-bamboo-indigenous-wood-species-from-india/article9672332.ece>.
32. Interviews with a prominent firm in the region revealed that the firm is currently focused on targeting government contracts (particularly with state governments), and this accounts for the majority of the firm's sales.
33. Until very recently, bamboo was classified as a tree under the Indian Forest Act, 1927. Thus, bamboo grown outside forests was also subject to the rules on felling and transit, which discouraged the development of commercial bamboo plantations. The Act was amended in 2017 to exclude bamboo grown outside forest areas from the definition of tree. See <https://www.thehindu.com/news/national/bamboo-not-a-tree-parliament-passes-bill-amending-forest-act/article22287886.ece>.
34. In some of the interviews with firms, this was mentioned as a major constraint they faced.
35. https://www.business-standard.com/article/pti-stories/tripura-exports-broomsticks-worth-usd-6-000-to-bangladesh-118092801070_1.html.
36. <https://www.downtoearth.org.in/blog/agriculture/the-story-of-national-bamboo-mission-61016>.
37. <https://www.nbm.nic.in>.
38. <https://www.downtoearth.org.in/blog/agriculture/the-story-of-national-bamboo-mission-61016>.
39. <https://www.thehindu.com/news/national/bamboo-not-a-tree-parliament-passes-bill-amending-forest-act/article22287886.ece>.
40. <https://wwf.panda.org/?326016/New-IKEA-forestry-standard-raises-sustainability-baseline>.
41. <https://www.ikea.com/in/en/this-is-ikea/choosing-materials-pube92d4011>.
42. <https://www.inbar.int/iso19624/>.
43. See Bloom et al. (2013) on textile firms in India.

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4 Medical Tourism

PRIYA MATHUR

ABSTRACT This paper is part of analytical work done by the World Bank on strengthening inclusive cross-border value chains in Northeast India, in support of the implementation of the World Bank-supported North East Rural Livelihoods Project (NERLP). For illustrative purposes, four promising sectors in the North Eastern Region of India were selected for deeper value chain analysis, of which medical tourism was one. India has emerged as a major medical tourism destination, with Bangladesh as the leading source country—in 2015–16, it accounted for 35 percent of the estimated medical tourists (~165,000) and 55 percent of the estimated revenues from medical tourism (US\$343 million) in India. The North Eastern Region’s geographic proximity and cultural affinity with Bangladesh and other neighboring countries offer an opportunity to build up the region’s medical services and medical tourism industry. In doing so, the North Eastern Region would play to its strengths—its strong service sector orientation and highly literate workforce. This paper analyzes the sector through the lens of five strategic segments, or product-market combinations, in the medical tourism industry. It finds that the segment focusing on long-duration complex services, such as cancer care, has the potential to bring greater returns to women and those in the bottom 40 percent of the income distribution. In the North Eastern Region, Guwahati, with well-developed medical services and significant private sector participation, is best placed to develop into a medical tourism cluster focused on long-duration complex services. Other large cities, such as Agartala, can also participate in this value chain as spokes to the Guwahati hub. However, to compete successfully in this value chain, concerted efforts by the private sector and the government will be required to address several challenges related to cluster promotion, connectivity, skills, investment, and quality.

INTRODUCTION

Medical tourism can be defined as individuals choosing to travel across international borders to receive medical treatment (Lunt et al. 2011). In the past century, rich people from less developed countries traveled to developed countries to access better medical facilities and highly trained physicians. However, medical tourism has now become a more widespread phenomenon. The nature of its flows has changed to include the movement of medical tourists from developed to less developed nations and to become more intraregional. The global medical tourism market is significant, at US\$65 billion to US\$87.5 billion (~20–24 million medical tourists), and growing steadily, at 15–25 percent per year, per one estimate.

India has emerged as a major destination for medical tourists, especially from Asia and Africa, with Bangladesh as its leading source country. A recent survey estimated medical tourist arrivals (MTAs) in India at 460,000 and export revenues from medical tourism at US\$620 million (only medical treatment) in 2015–16. Bangladesh accounted for 35 and 55 percent, respectively, of the estimated medical tourists and revenues.

The geographic proximity and cultural affinity of the North Eastern Region (NER) of India with Bangladesh and other neighboring countries offers an opportunity to build up NER's medical services and medical tourism industry. In doing so, NER would play to its strengths—its strong service sector orientation and highly literate workforce. In NER, Guwahati, with well-developed medical services and significant private sector participation, is best placed to develop into a medical tourism cluster. Other large cities, such as Agartala, even with their greater proximity to the international border, are constrained in this respect by inadequately developed medical services and limited private sector participation.

This paper analyzes the sector through the lens of five strategic segments, or user-product combinations, in the medical tourism industry. It finds that the long-duration complex services segment has the potential to bring greater returns to women and those in the bottom 40 percent of the income distribution. Long-duration complex services, for example, cancer care, require patients to stay in the destination for several weeks, alternating between hospitals and hotels. Patients in this segment place great value on convenience and compassionate, patient-centric services, which require service organizations in this value chain to be customer focused. This segment can be developed in NER by leveraging the region's strengths in providing customer-centric services. For example, nurses from NER can be found in hospitals across India and are widely acknowledged for their nursing capability and soft skills, and NER youth are found in abundance across service sectors that value customer experience (such as airlines, hotels, and restaurants).

Although Guwahati is best placed to develop into a medical tourism cluster focused on long-duration complex services, Agartala and other large cities in NER can participate in this value chain as spokes to the Guwahati hub. Further, Agartala and other cities located near the border can benefit from easing access for medical tourists in general, as the increase in footfall at private hospitals would allow reaping the benefits of economies of scale and scope. This, in turn, will aid growth of the private sector and eventually benefit consumers through expansion of medical services. The need for medical services in this second most populous NER city¹ is expanding rapidly with its fast-growing population.

Concerted efforts by the private sector and the government will be required to develop the value chain to compete successfully in this segment. Several challenges will need to be addressed. These challenges include cumbersome

transport connectivity between Guwahati and key source markets, absence of coordinated cluster promotion or individual hospital strategies and plans to target neighboring countries as potential markets, insufficient availability of required skills, high investment required in medical equipment, and inadequate focus on hospital accreditation and customer protection laws.

The paper describes trends in the medical tourism industry around the globe, in India, and in NER, focusing on Guwahati and Agartala. It highlights key global trends that are impacting the nature of demand for medical tourism and proposes a strategic segmentation of the global medical tourism industry. It then evaluates various strategic options for medical tourism in Guwahati and Agartala, which clearly brings out the attractiveness of the long-duration complex services segment. This is followed by a discussion of the existing value chain and the gaps that will need to be addressed to compete successfully in this strategic segment, using cancer care for illustrative purposes. The paper then evaluates the industry ecosystem for that specific strategic option in NER. The paper concludes by putting forth some considerations for the public and private sectors in developing the cluster.

INDUSTRY DESCRIPTION AND TRENDS

Industry trends: Global scenario

In the literature, there is wide disparity in estimates of the annual number of medical tourists as well as the size of the market, mainly because of inconsistencies in defining medical travel and lack of verifiable data at the country level (Lunt et al. 2011).

Nevertheless, there is widespread agreement that the size of the medical tourism market is significant and growing steadily. A recent estimate of global medical tourism pegs the size of the market at US\$65 billion to US\$87.5 billion, based on approximately 20–24 million cross-border patients worldwide spending an average of US\$3,410 per visit, including medical-related costs, cross-border and local transport, inpatient stays, and accommodations.² This estimate excludes in-country expatriates, tourists in need of emergency medical care, companions accompanying medical travelers, and multiple patient episodes that occur over the course of one medical visit. The same source estimates that the worldwide medical tourism market is growing at a rate of 15–25 percent per year. Medical tourists avail a variety of treatments, but most often medical procedures such as cosmetic surgery, dentistry, cardiovascular surgery, orthopedic surgery, cancer care, reproductive treatment, bariatric surgery, and diagnostics and second opinions.³

Medical tourism is driven by several push and pull factors (see Chen and Wilson 2013; International Trade Centre 2014; Lunt et al. 2011). These include growing global demand for medical services due to aging populations and increasing longevity, along with a rise in the burden of noncommunicable diseases (NCDs); cost savings for the uninsured and underinsured in countries with prohibitively high costs of health care; the quest for shorter wait times and faster access to medical care; unavailability of quality health care in some developing countries; and the availability of quality health care and growing number of accredited facilities in destination countries. These factors are aided by more affordable international travel and improvement in communications technology.

Many destination countries have emerged across the globe,⁴ and source countries include developed and developing nations. Several Asian countries are

among the leading destinations; within Asia, India, Thailand, Malaysia, and Singapore comprise about 90 percent of the market share (Government of India 2017). Medical tourism is increasingly becoming intraregional, with Europeans tending to remain in Europe, Asians in Asia, and Americans and Canadians in North, Central, or South America (Youngman 2013).

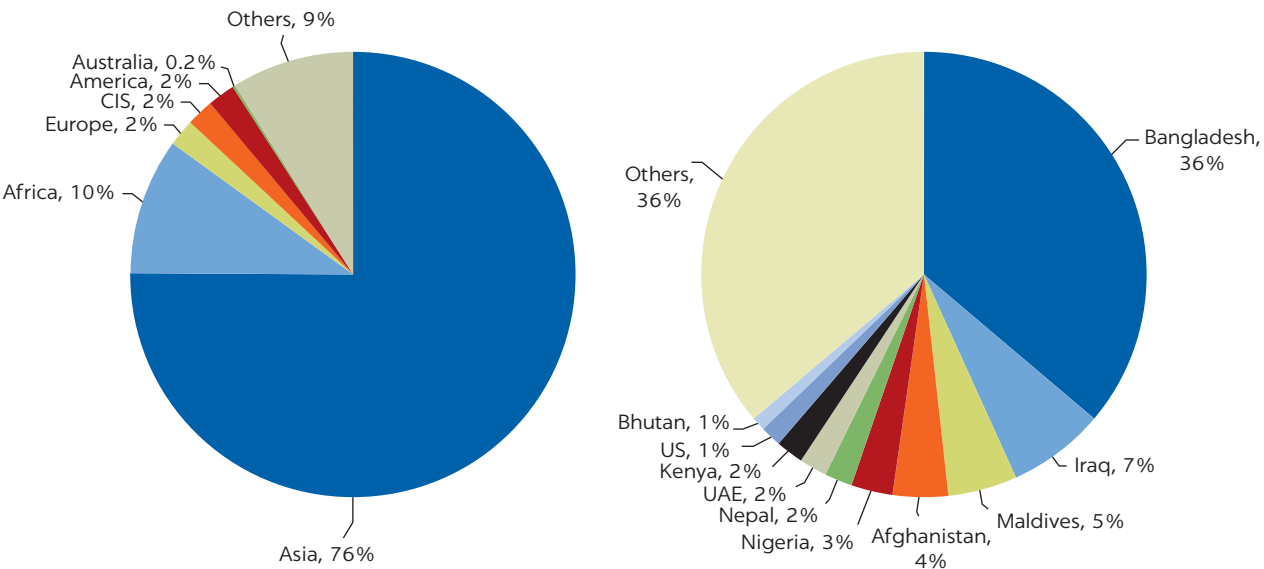
Destination countries have gained a reputation for specializing in certain procedures and tend to attract patients seeking those medical services. For instance, India is popular for orthopedic and cardiac surgery, organ transplants, and fertility treatment; Thailand and Brazil are well-known for cosmetic surgery; Poland, Mexico, and Costa Rica are known for dentistry; and Singapore is well-known for stem cell treatment and cardiac surgery (Government of India 2017).

Industry trends: India

India is fast emerging as a preferred destination for medical treatment, with rapidly growing MTAs and market size. A white paper estimated MTAs in India at ~420,000 and the size of the Indian medical tourism market at about US\$3 billion in 2015; it projected that the market would grow to US\$7 billion to US\$8 billion by 2020 (Confederation of Indian Industries and Grant Thornton 2015). To address the lacunae in data pertaining to medical tourism and exports of health services in India,⁵ the Directorate General of Commercial Intelligence and Statistics conducted a primary survey and estimated MTAs at 460,000, with export revenues from medical tourism at US\$620 million (only medical treatment) in 2015–16 (Government of India 2017).

The largest source countries for India are in Asia and Africa, with Bangladesh emerging as the leading source (figure 4.1). Bangladesh alone accounted for

FIGURE 4.1
Estimated medical tourists in India, by region and country, 2015–16
Percent of total



Source: Government of India 2017.
Note: Based on data from a primary survey conducted by the Directorate General of Commercial Intelligence and Statistics between June 2016 and March 2017. The total number of medical tourists estimated to have arrived in India during 2015–16 is 459,735. CIS = Commonwealth of Independent States; UAE = United Arab Emirates; US = United States.

35 percent of the estimated medical tourists (~165,000) and 55 percent of estimated revenues (US\$343 million) in 2015–16.

Key medical tourism destinations in India include major metropolitan cities, such as Chennai (Tamil Nadu), Mumbai (Maharashtra), the National Capital Region (including New Delhi, Gurgaon, and Noida), Bangalore (Karnataka), Kolkata (West Bengal), and Hyderabad (Telangana); the state of Kerala is well-known for Ayurveda treatment; and hospitals in smaller towns, such as Manipal and Vellore, receive many medical tourists (Confederation of Indian Industry and Grant Thornton 2015; Government of India 2017). New cities and states continue to emerge as destinations, for example, Goa and Ahmedabad in Gujarat in recent years. Although reliable data on MTAs by destination cities do not exist, the evidence indicates that Kolkata in East India is a popular destination for medical tourists from Bangladesh, due to its proximity and cultural affinity with that country (See, for instance, Ali and Medheker 2016; Taneja et al. 2017).

Growth in medical tourism in India has been led by private sector hospitals, especially large corporate chains. Some, such as Apollo Hospitals and Fortis, have a pan-Indian presence; some others, like Narayana Hrudayalaya and CARE hospitals, are present in multiple states, with strong presence in certain regions of India; and some others, like Max, are largely present in a single state. Apart from corporate hospital chains, there are also stand-alone hospitals in the private sector (such as Medanta—The Medicity in the National Capital Region and the Asian Heart Institute in Mumbai) as well as some public hospitals of repute (such as the All India Medical Sciences Institute in the National Capital Region) that draw medical tourists. Although many hospitals involved in medical tourism are multispecialty, some have a narrower focus (for example, the Asian Heart Institute in Mumbai focuses on cardiac treatment, and Shroff Eye in Mumbai provides eye care).

India has gained a reputation as a destination that offers “value for money,” providing high-quality health care services at relatively low cost (International Trade Centre 2014), covering various disciplines such as ophthalmology, orthopedics, oncology, neurology, cardiology, and Ayurveda.⁶ Treatment costs are significantly lower than in developed countries—with average savings of 65–90 percent as a share of costs in the United States—and compared with other Asian competitors.⁷ At the same time, India offers quality treatment at state-of-the-art hospitals, mostly private, that are internationally accredited⁸ and/or accredited by India’s National Accreditation Board for Hospitals & Healthcare Providers (NABH),⁹ which in turn is certified by the International Society for Quality in Healthcare.

Indian doctors and hospitals have built familiarity and strong brand recognition for themselves. India produces some of the finest doctors, many of whom are working in other countries like the United States.¹⁰ Many Indian doctors who have trained and/or worked abroad have returned to the country, lured by improved income prospects from the growth of private hospitals and medical tourism in India (International Trade Centre 2014). Additionally, some hospitals have affiliations with world-renowned medical institutes (for example, Apollo Hospitals with Johns Hopkins, and Wockhardt Hospitals and the Heart Institute with Harvard Medical International), which enhances brand perception for some patients. Some of the large hospital groups are also expanding services overseas through various modes of supply,¹¹ creating a strong global brand name and building referral opportunities.

The Indian government has taken various measures to support the development of India as a medical tourism destination. Some measures to promote

medical tourism were introduced early on, such as considering medical tourism as a “deemed export” in the National Health Policy 2002, which granted the sector fiscal incentives in the form of lower import duties, prime land at subsidized rates, and tax concessions (Chanda 2013). However, the government has become more proactive in the past few years and seems to be poised to take a more structured approach, with the constitution of the National Board for Medical and Wellness Tourism by the Ministry of Tourism in 2016. The board comprises representatives from related government departments, industry associations, well-known hospital chains, and other stakeholders such as hotels, tour and travel operators, and the wellness sector, with the objective of promoting this segment of tourism in an organized manner. In 2015, the Department of Commerce (Ministry of Commerce and Industry) and the Services Export Promotion Council developed the health care portal to provide hospital- and travel-related information on India to medical tourists. Apart from the Ministry of Tourism’s efforts to promote India as a medical tourism destination in its Incredible India Campaign, as well as at various international events and tourism fairs, in 2009 the government included medical tourism in its Market Development Assistance Scheme, under which, currently, financial support is provided to approved medical tourism service providers and wellness tourism service providers for promotional activities abroad.¹²

Most significantly, the government has introduced medical visas—the M-category visa for the patient and MX-category visa for up to two accompanying medical attendants. The M-visa and MX-visa are valid for a duration of up to 1 year (from the day of issuance) or the length of treatment, whichever is less, and permit three visits in a year; an additional visit and an extension for another year are possible on recommendation of the Foreigners Regional Registration Offices.¹³ Reportedly, the process to obtain the medical category visa can be time-consuming and cumbersome (*International Medical Travel Journal* 2016). In 2016, the government cleared a policy on e-visas for the convenience of medical patients. E-visas are now available to nationals of 165 countries; eligible countries exclude Bangladesh, Pakistan, and Afghanistan. Patients can apply for medical e-visas online and collect them on arrival at 28 designated airports and five designated sea ports in India. They are valid for 60 days from the date of arrival, permit triple entry, and can be applied for twice in a calendar year.¹⁴

Industry trends: Northeast India

NER lags the rest of the country in health care services and private sector participation, particularly that of private corporate hospital chains. The public relies largely on government facilities to provide medical services not only in rural areas, but also in urban centers. Tertiary care is still developing in the region. Most private sector hospitals and nursing homes, which tend to be concentrated in a few NER cities, provide secondary care; in some cases, even government hospitals lack tertiary facilities. Therefore, NER witnesses significant outbound domestic medical tourism for tertiary care to other Indian cities such as Vellore, Chennai, Delhi, Kolkata, and Patna (Confederation of Indian Industry and PricewaterhouseCoopers 2013).

The biggest challenge in providing health care services in NER is the availability of a skilled health sector workforce. State averages in NER for density of health care personnel are far below those for India as a whole (table 4A.1 in the annex), which falls behind several comparator countries. For instance, the

number of physicians per 1,000 population in India is 0.79 (allopathic doctors), compared with Singapore's 1.9, China's 1.5, and Malaysia's 1.3.¹⁵

The shortage of health care skills is a reflection of the medical education infrastructure in the region and the region's inability to attract and retain workers (table 4A.2 in the annex). Although five new medical colleges have been set up in NER in the past decade, the skilled workforce remains inadequate. Twelve medical colleges in NER offer courses at the Bachelor of Medicine and Bachelor of Surgery (MBBS) level; 10 offer post-graduate degrees in medicine (Doctor of Medicine, or MD) and surgery (Master of Surgery or MS), while only three colleges offer super specialty post-doctoral degrees in medicine (Doctor of Medicine, or DM) and Surgery (Magister Chirurgiae or MCh), and that too in a few disciplines.¹⁶ Thus, admission capacity falls progressively from 1,200 seats at the MBBS level, to 568 seats at the MD/MS level, and further to only 24 seats at the DM/MCh level (tables 4A.2 and 4A.3 in the annex), which is in line with what is observed in the rest of India. The smaller number of medical seats for advanced degrees can be taken up by students from anywhere in the country. The share of seats reserved for students from the state is 85 percent at the MBBS level, 50 percent at the MD/MS level, and nonexistent at the DM/MCh level.¹⁷ Interviews with hospitals and medical colleges, during a field visit for this study in June 2017, indicated that, typically, NER finds it difficult to retain students from outside the region once they complete their degrees; NER also loses some doctors from the region to lucrative opportunities elsewhere. In nursing education as well, fewer institutions offer higher level courses such as Master of Science (MSc) in Nursing or Post-Basic Diploma Program in Nursing (table 4A.2 in the annex), which would create a nursing workforce with specialized skills, for instance, in cardiovascular and thoracic surgery, critical care, and oncology nursing.¹⁸ Moreover, there is migration out of NER for better paid nursing opportunities.

NER's geographic and cultural proximity to Bangladesh and other neighbors offers an opportunity to build up NER's medical services and medical tourism industry. Already, there is some evidence of medical tourist inflows, for example, to Guwahati (Assam) from Bhutan and Bangladesh, to Agartala (Tripura) from Bangladesh,¹⁹ and to Imphal (Manipur) from Myanmar (*Sangai Express* 2013). To evaluate the potential for medical tourism in NER, this study focuses on Guwahati, where medical services are better developed and the private sector is significant and growing; and Agartala, where medical services are more constrained and private sector participation is limited, but which could still leverage its proximity to the India-Bangladesh border and the only Integrated Check Post (ICP) in NER (only 10 kilometers away) to attract medical tourists from Bangladesh.

Guwahati

Guwahati has relatively well-developed medical services as well as greater private sector participation in this sector, compared with other cities in NER. Medical services are available in the public sector through hospitals such as the Guwahati Medical College and Hospital (GMCH) (2,185 beds), a multispecialty hospital with a newly set up cancer wing (200 beds), and Dr. B. Barooah Cancer Institute (BBCI) (210 beds), as well as in the private sector. Private sector participation, particularly in larger hospitals, is far greater in Guwahati compared with other cities in NER. At the time of the field visit in June 2017, apart from many private nursing homes, Guwahati had several private hospitals—more than

10 private hospitals with bed capacity of 100 or more, of which at least seven hospitals have bed capacity of 200 or more. At least three new hospitals with 200 or more beds were expected to come up in the city.²⁰

A notable development has been the recent foray made by two well-known corporate hospital chains with strong presence in the rest of India—Narayana Hrudayalaya commissioned a 286-bed hospital in December 2013, and Apollo completed its acquisition of the 220-bed International Hospitals in March 2016. Guwahati also attracted the first foreign direct investment in health care in NER—Netherlands-based Ayursundra BV invested in the 272-bed Ayursundra super specialty hospital, launched in February 2017, expanding its venture, which already included a functioning one-stop medical center and a diagnostic center in Guwahati and another diagnostic center in Tinsukia (Assam).²¹ In diagnostic services, Indian corporate chains entered Guwahati much earlier—Dr Lal PathLabs, one of India’s leading providers of diagnostic services, set up a diagnostic center in Guwahati in 2006 (*OneIndia News Portal* 2006); other leading providers, such as SRL Diagnostics, Metropolis India, and Thyrocare, also have a presence in the city. Among the leading Indian pharmacy chains, Apollo Pharmacy is present in Guwahati.

Super specialty services are still developing in Assam, and only select hospitals in Guwahati offer such services. Thus, Assam, like the rest of NER, faces significant outbound medical tourism for tertiary care. But that scenario is changing. Super specialty services are expanding in the private sector with the two recently set up corporate hospitals (Narayana Hrudayalaya and Apollo), other newly set up and upcoming hospitals (for example, Ayursundra, North East Health City), along with expansion into super specialty by some existing hospitals (for example, Nemcare). In 2017, the Government of India approved setting up an All-India Institute of Medical Sciences (750 beds) in Guwahati within 48 months; this institute will provide super specialty services as well as create a pool of skilled professionals through the attached medical college and nursing school (*Indian Express* 2017).

The biggest challenge in expansion of medical services, especially super specialty services, is the shortage of skilled professionals—doctors with specialized skills, along with related specialized nursing and paramedical staff. Of the six medical colleges in Assam (three set since 2010), four offer post-graduate degrees, and only one offers post-doctoral (super specialty) degrees, with only 18 seats (see table 4A.4 in the annex). Hence, the state and the entire NER produce only two cardiothoracic surgeons²² and only two neurosurgeons in a year. Further, retention after graduation can be a challenge. Some super specialties, like medical oncology and surgical oncology, are not even offered by the existing medical colleges.²³ Apart from the government teaching hospitals, some private hospitals are allowed to teach, but they offer very few seats in very few specialties at the post-graduate level in NER.²⁴ To circumvent nursing staff challenges, several private hospitals have set up their own nursing schools, but specialized nursing and paramedical talent remains a constraint.

Currently, most hospitals in Guwahati are not focused on medical tourism, particularly with Bangladesh. This is partly due to their emphasis on trying to capture outbound medical tourists from the state and NER and partly due to lack of direct air connectivity with Bangladesh and Myanmar (available only through Kolkata). There are no reliable data available on medical tourism inflows into the city. However, interviews with 15 private and public hospitals in Guwahati in June 2017 indicated that such flows were negligible, especially from Bangladesh,

in 2016–17.²⁵ The interviewed hospitals reported receiving no patients, or fewer than five patients if any, from Bangladesh; the exception was a not-for-profit eye hospital, which reported that it received about 300 inpatients from Bangladesh.²⁶ Two interviewed hospitals, empaneled with the Government of Bhutan, together received about 250 inpatients and 750 outpatients from Bhutan, while the other interviewed hospitals altogether received 40–60 inpatients and 50–60 outpatients from Bhutan. The interviewed hospitals reported treating very few patients from Myanmar, and perhaps some from Nepal (typically, Nepalese patients are difficult to distinguish from the local population). Since medical services are best developed in Guwahati in NER, it also receives patients from the rest of Assam and neighboring states.

Field interviews indicated that Guwahati hospitals, compared with hospitals in other cities, including Kolkata, are encumbered by higher costs related to the salaries of the top of the workforce pyramid, consumables, and repairs and maintenance of plant and machinery. Hospitals' willingness to accept lower margins, partly to accommodate the lower paying capacity of the local population, along with lower salaries of the bottom of the workforce pyramid, ensures hospital viability. Although hospitals did not share their profit and loss statements, interviews provided some indicative information to support this. Labor costs, which dominate the hospital cost structure (typically, 40–50 percent of operating costs for Guwahati hospitals), could possibly be 15–20 percent lower, on average, in Guwahati, despite the higher salary costs of super specialists and specialized staff. Such staff are in short supply in the region and often must be hired from outside NER; typically, they need to be paid more than, or at least as much as, elsewhere in India, to attract and retain them. Other doctors and staff, who are locally available, comprise the larger base of the workforce pyramid and tend to claim lower salaries. They are often willing to work at such salaries for opportunities closer to home. For the same reason, even in hiring specialist staff from outside NER, hospitals first target NER natives, who are often willing to forgo higher salaries for opportunities closer to home.

The costs of consumables (typically, 20–35 percent of operating costs for Guwahati hospitals) could be 5–15 percent higher, on average, because of higher logistics costs associated with the transportation of goods from the rest of India to NER. The costs of repairs and maintenance related to plant and machinery (typically, 3–5 percent of operating costs for Guwahati hospitals) also could be 5–15 percent higher, on average, for the same reason. In the case of medical equipment, most of the larger and more advanced equipment is sourced from outside NER, from Indian and global manufacturers such as Siemens, GE Healthcare, Johnson & Johnson, and Phillips. Higher logistics costs for NER raise the costs of the equipment and comprehensive and annual maintenance contracts—partly because they are stipulated as a percentage of equipment costs and partly because providing maintenance services through local service centers in NER would entail higher costs for the providers (because of the higher skilled labor and logistics costs involved in the delivery of spares and parts from outside the region). Overall, hospital costs could be at least 10 percent lower, on average, in Guwahati. Lower overall cost structures, along with hospitals' willingness to accept lower margins to accommodate the local population's lower capacity to pay, result in treatment costs for patients that possibly could be as much as 10–30 percent lower in the city, on average, as compared with cities like Kolkata.

Given the current lack of focus on medical tourism in Guwahati, there is not much coordination between hospitals and other key agents of a medical tourism

cluster, such as hotels and travel agents. Several hospitals have their own guest houses; some have negotiated corporate rates with hotels and guest houses. Although there are several guest houses and small hotels in the city, and very few large/premium hotels, they are not geared toward medical tourism. And travel agents have not focused on facilitating medical travel or offering packages targeted at medical tourists.

Agartala

Medical services in Agartala are highly constrained by the near-absence of super specialty services and a missing robust private sector. Public sector hospitals include multispecialty hospitals such as the GB Pant Hospital (~700 beds), attached to the Agartala Government Medical College, and the Indira Gandhi Memorial Hospital (~520 beds). However, they provide limited super specialty services, offered partly through consultants periodically flown into the city. There is also the Regional Cancer Centre (100 beds), whose services are constrained by the unavailability of doctors with requisite skills. A new super specialty wing (120 beds) is now coming up at GB Pant Hospital, with financial support from the Government of India.

The private sector comprises mostly single-doctor establishments, many set up by government doctors during out-of-office hours; 10–12 nursing homes (10–20 beds each), largely maternity with a few services like ear, nose, and throat (ENT), general medicine, and eye care; and only two large private sector hospitals, Dr BRAM Teaching Hospital (558 beds), attached to Tripura Medical College, and ILS Hospital (205 beds).²⁷ Dr BRAM Teaching Hospital does not have established super specialty services. ILS Hospital has been at the forefront in providing super specialty services since its inception in 2011. But its services have also been constrained by lack of skilled workers and significant outbound medical tourism.

Specialty and super specialty skills are scarce in Tripura. There are two medical colleges in the state; neither offers super specialty courses; and they offer very few post-graduate seats in a very narrow set of specialties (see table 4A.5 in the annex). Due to the lack of locally available specialty/super specialty doctors, hospitals must rely on hiring such doctors from outside the state and often at higher retainers, compensating for lack of other work opportunities in the absence of a robust private sector. It is difficult for private hospitals to retain such talent, given inadequate footfall. Although nursing staff in general is available, and large private hospitals have their own nursing schools, finding specialized nursing skills can be a challenge. General shortages of paramedical staff have been addressed to a large extent by setting up the only paramedical school in Tripura, the Tripura Institute of Paramedical Sciences, in 2009. However, the availability of paramedical workers in several specialized areas remains a challenge. There are no courses in the state, for instance, on emergency trauma and critical care technology, cardiothoracic and vascular surgery technology, blood transfusion technology, audiology and speech-language pathology, prosthetics orthotics and rehabilitation, and dental technology.²⁸

Given the lack of super specialty services and, to some extent, specialty services, Tripura faces significant outbound medical tourism by those who can afford to pay. This trend has been aided by frequent direct flights between Agartala and Kolkata. Those who cannot afford to travel out rely on the overflowing government hospitals, where treatment is free or highly subsidized, or on single-doctor establishments. Outbound medical tourism thus contributes to

inadequate footfall for larger private sector hospitals. To attract outbound medical tourists, as well as those with lower capacity to pay, private hospitals are required to keep their prices low—for instance, 20–30 percent lower compared with hospitals in Kolkata. At the same time, although labor costs in general are lower, the costs of super specialists and other staff with specialized skills hired from outside the state are higher, as are costs related to hospital consumables and repairs and maintenance (as in the case of Assam). Thus, any private hospital that provides super specialty services in Agartala would have much lower margins, making footfall and volumes essential for viability. The government has helped, but only marginally, in shoring up footfall for some private hospitals, by directing toward them patients covered by state schemes, such as the Tripura State Health Assurance Scheme for Poor, which was launched in 2014.

Lack of super specialty services and a robust private sector has also prevented Agartala from leveraging its locational advantage in attracting medical tourists from Bangladesh. Agartala is located only 10 kilometers from the ICP on the India-Bangladesh border, with the adjoining Bangladeshi districts of Habiganj, Brahmanbaria, Comilla, and Feni within ½ hour to 4 hours' driving distance from the ICP. However, the inflow of Bangladeshi patients to Agartala remains small, as revealed by interviews (in June 2017) with four large private sector and government hospitals and two nursing homes. The interviews indicated that only one of the two large private sector hospitals received about 10–15 inpatients and about 250–300 outpatients from Bangladesh in 2016–17; the other did not receive any medical tourists. Government hospitals indicated that they may have treated some Bangladeshi patients, but firm estimates were unavailable. The medical tourist inflow to Agartala is restricted by the narrow spectrum of available medical services, as well as visa-related constraints. Until recently, to get a visa, patients from the adjoining Bangladeshi districts had to travel 2–4 hours in the other direction to Dhaka (a medical services hub), Sylhet, or Chittagong, but in January 2019, visa processing facilities were made available in Comilla and Brahmanbaria (*Dhaka Tribune* 2019). E-visas are not available to Bangladeshi nationals.

With negligible medical tourism inflows, there are no linkages between hospitals, hotels, and travel agents. Moreover, tourism infrastructure in Agartala remains inadequately developed, and accommodation options remain limited to guest houses and small hotels.

STRATEGIC DIAGNOSTIC

Global trends that impact the nature of demand

Various global trends are impacting the nature of demand in the medical tourism industry.

Growing global demand for medical services and the rising burden of NCDs

Globally, people are living longer. The share of the elderly (age 60 and above) in the population is rising and is projected to rise further from 12.3 percent in 2015 to 21.5 percent by 2050 (United Nations 2015). This is accompanied by a rise in old age–related diseases, particularly NCDs such as cardiovascular diseases, cancer, respiratory diseases, and diabetes. Between 2012 and 2030, while deaths due to infectious diseases are projected to decline, NCD deaths are expected to

increase, and within that, deaths due to cancer are expected to rise even faster than deaths from cardiovascular diseases, the leading cause of NCD deaths (WHO 2014).

Growing emphasis on minimally invasive procedures

Minimally invasive procedures have evolved as the gold standard for surgeries, given their advantages over conventional invasive surgeries—superior aesthetic results, reduced post-operative pain, faster recovery rates, and shorter hospitalization periods. Robotic-assisted laparoscopic surgery, or robotic surgery, is the latest advancement in minimally invasive surgery. Robotic systems offer better visualization through three-dimensional imaging and greater scope for manipulation with their articulated instruments; their applications are increasingly being explored and, in some cases, for example, prostatectomies, have now become the standard of care (Kockerling 2014). Despite being capital intensive, the uptake of robotic surgeries has been significant.²⁹

Rising expectations of product and service quality

Rising incomes and a growing middle class are making quality health care more affordable. Modern consumers are also better informed about health care options, aided by the internet. Given their greater ability to pay and awareness, consumers have higher expectations of product and service quality. Modern patients exhibit a preference for comparison shopping, an appetite for personalized information and care, and a preference for convenience offered by integrated solutions (for example, packaging of medical treatment with travel and accommodations) and support services to ease their medical travel (see box 4.1). There is a growing emphasis on patient experience, along with clinical experience, in choosing providers, and the value placed on the former increases with the duration of treatment and stay in the destination.

Mounting concerns about the quality of treatment and aftercare

Concerns about the quality of treatment are compounded when traveling abroad for treatment, given the foreign location, concerns about aftercare on returning home, and dependence on the destination country's laws in case of complications. To allay such concerns, destination hospitals are increasingly opting for measures such as accreditation, tie-ups with doctors and hospitals in source countries to provide aftercare, and tie-ups with insurance companies in source countries. Some destination countries are taking more comprehensive steps—for instance, the Dubai Health Authority has put together a Patient Protection Plan, which includes a Charter of Patients' Rights and Responsibilities, medical complaint procedure, and inbound travel insurance scheme to cover medical liability.³⁰

Strategic segmentation and attractiveness of strategic segments

An assessment of global trends affecting the industry and their likely evolution in the foreseeable future provides an understanding of what consumers or users are demanding and how firms are responding by changing their products or offering additional services. Thus, a strategic segmentation of the industry emerges, with several distinct strategic segments, each defined as a function of the product (supply side) as well as the user group served (demand side). Each strategic segment is supported by a unique value chain. Strategic segmentation

BOX 4.1

Hospitals offer value-added services for better patient experience

Destination hospitals, especially in Asia, are increasingly providing personalized medical care centered around the needs of international patients. In Thailand, for example, Bumrungrad International in Bangkok offers a variety of dedicated services for foreign patients.^a It maintains a multi-language website in 12 languages and has local referral offices in 23 countries, to ensure that patients receive the required information and support in coordinating travel. The hospital's medical coordination office, comprising more than 250 professionals, includes physicians and nurses representing more than 30 countries and speaking more than 20 languages. It coordinates information exchange between patients and hospitals, provides transparent price estimates for treatment, extends assistance with international insurance and third-party payment assistance, tracks the progress of treatment and relays it to patients, provides language support, arranges airport reception and transport to the hospital, provides travel and accommodation advice and help, and provides visa extension assistance services and embassy contact assistance. The hospital offers

in-hospital accommodations, ranging from standard shared rooms to suites, along with the choice of renting a serviced apartment in the Bumrungrad Hospitality Residence (which is connected to the hospital by an elevated walkway) as well as the Bumrungrad Hospitality Suites.

Another dimension of patient-centric care is visible in the growth of hospitals that cater to the specific needs of, for example, Muslim patients in their top destination countries of choice like Malaysia, Thailand, and India. In Malaysia, for example, KPJ Healthcare Berhad provides a full range of Muslim-friendly services—a prayer room, broadcasting the call to prayer, halal food, and funeral preparation; the hospital also accommodates requests for female doctors and caregivers to attend to female patients.^b India has a network of halal certified hospitals that accommodate the needs of Muslim patients.^c Thailand's Bangkok International Hospital has a special wing for Arab patients, with its own doctors, nurses, and interpreters, as well as halal food; similarly, it has a special wing for patients from Japan, another major source country.

a. Hospital website (accessed May 29, 2019), <https://www.bumrungrad.com/en>.

b. Shafaki (2016) on the *Global Islamic Economy Gateway* portal.

c. Shafaki (2016) on the *Global Islamic Economy Gateway* portal.

is not country specific; rather, it provides a global overview of the segments within a sector. After identifying all the strategic segments that comprise a sector, the segments are assessed in terms of the (relative) overall margins generated and the (relative) distribution of those margins among different value chain participants—input suppliers, producers, and buyers. This assessment is done using an analytical framework called Porter's Five Forces (Porter 2008); the five forces are intensity of competitive rivalry, threat of new entrants, threat of substitutes, bargaining power of suppliers, and bargaining power of buyers. In each segment, an evaluation of the relative strength of the first three forces provides a qualitative assessment of the overall margin that is generated in the value chain, while an analysis of the latter two forces provides insights into margin distribution among the various value chain participants. This analysis can provide valuable insights into which strategic segments are more inclusive, in that their margins are distributed more equitably across the entities in the value chain and down the workforce pyramid in each entity, creating the potential for higher returns for the bottom 40 percent of the income distribution and women.

A strategic segmentation of the global medical tourism industry is suggested in table 4.1.

TABLE 4.1 Strategic segmentation of the global medical tourism industry

PRODUCTS	USERS SEEKING SHORT-DURATION TREATMENTS	USERS SEEKING LONG-DURATION TREATMENTS
Basic services	A1	A2
Specialized services	B1	
Complex services	C1	C2

Source: World Bank.

Users are segmented by the duration of their treatment, which is likely to be positively linked with the value patients place on “patient experience.” Thus, users are segmented into those seeking:

1. *Short-duration treatments.* These require patients to stay in the destination hospital/country for 1 day to typically about 2 or 3 weeks.
2. *Long-duration treatments.* These require patients to stay in the destination hospital/country for more than 2 or 3 weeks at a stretch, often much longer, or to return for further treatment.

The value patients place on patient-centric, compassionate service at destination hospitals and hotels increases with long-duration treatments. The same is the case with the value placed on destination hospitals’ capacity to coordinate with medical service providers in the source country, as well as with destination hotels and other service providers, for seamless treatment and experience. Thus, service orientation and coordination capacity become entry barriers in the industry for long-duration segments.

Products are segmented based on the required degree of expertise of doctors, investment in expensive and technologically advanced equipment, and team skills and coordination as opposed to the individual expertise of one doctor. Thus, they are segmented into:

- A. *Basic services.* Typically, these require basic equipment and doctors with basic training (not very specialized skills or advanced training/degrees).
- B. *Specialized services.* Typically, these require doctors with specialized skills and advanced training/degrees, where advanced training and length of experience count toward making individual doctors a “star” attraction for the patients. Although some expensive and advanced equipment may be needed, it is not prohibitively expensive and, as such, several hospitals may have access to it.
- C. *Complex services.* Typically, these require (a) very expensive and technologically advanced equipment, which only few hospitals/clinics with deep pockets can afford, and the skills of the technical/paramedical staff proficient in using that equipment, and/or (b) teamwork where the skills of several doctors of various specializations and others on the team (such as technicians) are critical, making coordinated team skills more important than the individual skills of one doctor.

Thus, barriers to entry arise from the required expertise of doctors, in the case of specialized services. Barriers to entry also arise from the required investment in expensive, technologically advanced equipment and the expertise of the technical and paramedical staff needed to operate it, and/or coordination within the hospital team, in the case of complex services.

The segmentation of users and products results in five strategic segments (A1, A2, B1, C1, and C2 in table 4.1). Segment attractiveness is determined in this section based on the relative profitability of the segment and the distribution of margins across the players in the value chain.

Basic services segments, A1 and A2

The basic services segments differ in duration of treatment. Services in segment A1 typically involve a quick procedure or one or more consultations with a doctor, which may not require the patient to stay in the hospital at all, but definitely not beyond 2 or 3 weeks. Examples of services in segment A1 include simple procedures—related to health checkups, ENT procedures, eye care, dental treatment, general medicine, and general surgery. Services in segment A2 may not require a hospital stay but require repeat visits, with treatment spanning more than 2 or 3 weeks. Examples include stand-alone dialysis services and routine treatment for common infectious diseases. Segments A1 and A2 rely only on simple equipment and doctors with basic training. Such services are provided by hospitals and nursing homes, but also by clinics with a single doctor and some rudimentary staff. In availing basic services, patients may prefer to go to an easily accessible facility.

In segments A1 and A2, competitive rivalry tends to be high, given their easy availability through providers of different sizes across destinations. Margins tend to be relatively low, as the threat of new entrants is high, given low barriers to entry. The threat of substitutes also tends to be high, as telemedicine or e-consultation, to some extent, can substitute for basic services. Further, the margins are typically captured by the establishment providing treatment, as the bargaining power of suppliers (doctors, nurses, technicians, and equipment suppliers) tends to be low, given the basic nature of the required skills and equipment. The bargaining power of consumers (patients) also tends to be low, given the low price elasticity of demand for medical treatment. Typically, segments A1 and A2 do not attract a significant number of medical tourists, given the relative abundance and accessibility of basic services in most countries. As medical facilities improve in source countries and opportunities for telemedicine and e-consultation increase with advancement in information technology (IT), medical tourism opportunities in this sector will continue to be limited.³¹

Specialized services segment, B1

Segment B1 covers medical services such as specialized ENT procedures, like cochlear implants; specialized eye surgeries, like Lasik or retina surgeries; cardiac surgery; orthopedic surgery; and cosmetic surgery. Typically, such services require a hospital stay from a day or even half a day (for example, Lasik eye surgery) to a week or so (for example, joint replacement surgeries or cardiac bypass surgeries), with roughly another 1 or 2 weeks needed in the destination country for recuperation. Some degree of aftercare and physical therapy may be needed back home as well. The success of such services relies on the individual doctors' specialized skills in using innovative medical techniques and the "touch" of their hands. Thus, individual doctors with advanced training/degrees, significant experience, and established reputations become the star attraction for patients. Although more expensive and advanced equipment may be needed, compared with basic services, it is affordable for many hospitals.

The margins tend to be relatively high in segment B1. Competitive rivalry tends to be strong, as several hospitals across various destinations provide such

services and compete on price and quality. Hospitals compete on prices, given the varying cost structures across destinations, but can also differentiate their products with the doctors' reputed expertise and use of cutting-edge technology, and increasingly through support services provided to patients (see box 4.1). The threat of new entrants is relatively low, given the high barriers to entry—especially the availability of specialist doctors, whose expertise and reputation grow with years of experience. The threat of substitutes is low. Telesurgery, which is an alternative in some cases, has not gained patients' confidence sufficiently, but robotic surgery (which falls within the short-duration complex services segment) is an emerging substitute in some cases. In the distribution of margins, more value is likely to be captured by star specialist doctors, since they are not easily replaceable. The bargaining power of other input suppliers, such as nurses, paramedical staff, and equipment providers, remains relatively low, as does the bargaining power of customers for medically necessary procedures. The margins in segment B1 may face some pressures from increasing competitive rivalry, as more medical tourism clusters catering to this segment emerge across the world, and from the increasing threat of substitutes like robotic surgeries as their applications grow.

Complex services segments, C1 and C2

Segments C1 and C2 differ in duration of treatment. Services in segment C1 include specialized surgical procedures using robotics and sophisticated health checkups using expensive equipment like magnetic resonance imaging (MRI) and positron emission tomography-computed tomography (PET-CT) scans. They require a hospital stay of about a week, followed by another 1 or 2 weeks in the destination for recuperation (less time is needed if availing diagnostics only). Some degree of aftercare and physical therapy may be needed back home as well. Services in segment C2 include cancer care and neurological treatment (for example, for tumors and strokes). These may require hospital stays of short durations at a time, but they require repeat visits and hospitalizations, with the entire treatment spanning several months. Even after the patient returns home, medical care is needed and, in some cases, like cancer and organ transplants, patient monitoring and medical treatment continue throughout the patient's life. Thus, this segment needs far greater coordination of treatment and aftercare between destination and source countries, compared with short-duration services. Given the longer duration of treatment, patients place greater value on the service orientation of hospitals, hotels, and other service providers, and on the convenience offered by support services that ease their travel and treatment. Like segment B1, segments C1 and C2 need specialist doctors with advanced training/degrees and knowledge of innovative medical techniques. However, segments C1 and C2 rely on the coordinated skills of a team of specialist doctors and other staff (such as technicians and paramedical staff who are proficient in using advanced equipment) as opposed to the individual skills of one doctor.

The margins tend to be high in segments C1 and C2. Competitive rivalry is comparatively low, as few hospitals across destinations can offer such high-investment services. The threat of new entry is low because of the high entry barriers, such as high investment requirements and the expertise of specialist doctors and technicians in both segments, hospitals' service orientation, and, in the case of segment C2, their ability to coordinate within the treatment team and with hotels and other support services in the destination country and home country providers for continued treatment or aftercare. The threat of substitutes

is low, as telemedicine and telesurgery are less of an option for complex services requiring multidisciplinary teams. The margins are likely to be more equitably shared in segment C1 compared with segment B1, as the bargaining power of input suppliers as well as hospitals (owners of expensive equipment) strengthens relative to that of doctors. In segment C2, the margins have the potential to be even more widely and equitably distributed, as the bargaining power of all input suppliers strengthens, as everyone creates value in this segment, given the emphasis on service orientation and a seamless experience for patients. In segments C1 and C2, the buyers' bargaining power remains low for medically necessary procedures. High margins are likely to be sustained, as the entry barriers are likely to be reinforced with time and experience.

STRATEGIC OPTIONS FOR NORTHEAST INDIA

Strategic options for Guwahati

Specialized services segment B1 and complex services segments C1 and C2 are attractive, high-margin segments. The overall size of the margin generated in segment C2 is greater than that in the other strategic segments due to the longer duration of services. The long-duration complex services segment also has the potential to bring greater returns to women and the poor. Its high margin is shared across the value chain. Patients spend substantial time outside the destination hospital, which allows other service providers in the destination to create value by providing services. Given the need for aftercare and patient monitoring for a longer time back home, hospitals in the source country can also create more value for themselves. The margins are also likely to be better shared down the workforce pyramid, by hospitals, hotels, and other service organizations. In hospitals, the coordinated skills of a team of doctors and equipment technicians provide treatment and the requisite clinical experience, while everyone in the workforce contributes to creating the desired patient experience by offering compassionate, patient-centric care. Similarly, in hotels and other service organizations, everyone in the workforce is involved in creating value through the patient experience desired by long-duration patients.

Long-duration complex services, by definition, have greater potential to create jobs for women and men, high-skilled and low-skilled, since all the various services that patients require are needed over a longer span of time. Moreover, there is potential for higher compensation for all skilled staff—technicians, paramedics, nurses, as well as care staff valued for their compassionate care in hospitals and hotels.

Although female participation tends to be high in all the strategic segments of medical tourism, the potential for female employment and entrepreneurship is even greater in long-duration complex services. Women account for a relatively high share of the workforce in hospitals (35–45 percent, on average), hospitality sectors (hotels and restaurants), other service organizations (travel agents and airlines), as well as supporting institutions (colleges for medical, nursing, and paramedical education). Long-duration complex services also offer other opportunities for female employment, especially in convalescent homes, an accommodation option that could suit the needs of long-duration patients. Such homes employ nurses and care staff, a staff category that predominantly comprises women in India. The usual avenues for female entrepreneurship in any medical

services value chain, for instance, in stand-alone diagnostic centers and pathology labs, nursing homes and clinics, guest houses and home stays, and restaurants, are also available in the long-duration complex services segment, but with greater opportunity for these entities to add value when patients stay in the destination beyond their hospital stay. Long-duration complex services also offer entrepreneurial opportunities for women in convalescent homes for medical tourists and homecare nursing services for local patients and medical tourists who stay in hotels, home stays, or rented accommodations.

Bangladesh can play an important role in the development of long-duration complex services in NER, which will also bring gains to consumers (patients) and firms in Bangladesh. For NER, in all segments of the medical tourism industry, Bangladesh can serve as an important market, given its current position as the top-ranked source of medical tourists to India and its geographic and cultural proximity to NER. Given the large medical tourist outflow from Bangladesh, patients in Bangladesh would gain from having another choice of destination for availing medical treatment, a more familiar destination that is also close to home. Bangladeshi firms can help medical tourism value chains and businesses in NER to scale up, while availing growth opportunities for themselves. They could play a role in the initial stages in any medical tourism value chain—initial diagnostics could be done in that country, with local hospitals and doctors providing referrals, followed by a local medical travel company or travel agency coordinating travel arrangements. In any strategic segment, Bangladeshi firms could potentially participate in joint ventures in hospitals in NER. In the long-duration complex services segment, specifically, hospitals in Bangladesh could participate in joint ventures with hospitals in Guwahati, which would be the hub, while they themselves would serve as spokes. They could also partner with hospitals in other NER cities, such as Agartala, which would also serve as spokes for the Guwahati cluster. In this segment, the need for aftercare and patient monitoring for several months or years after patients return to their home country can be better met with the participation of health care providers in Bangladesh. Over time, through knowledge exchanges and requisite training, hospitals in Bangladesh can participate in the procedure stage, and eventually take it over themselves (see box 4.2).

Further, Guwahati can cater to the long-duration complex services segment by leveraging NER's strengths in its strong service sector orientation and the associated soft skills of its people. For instance, Assam and the rest of NER provide hospitals in other parts of India with nurses who are widely acknowledged for their nursing talent and soft skills, and NER youth in general are found in abundance in services that value service orientation, such as hospitality sectors and airlines. Guwahati can leverage this strength and further build it up, to create a differentiated proposition for segment C2, where high value is placed on service orientation. In this segment, Guwahati will also have ample scale-up opportunities, given the large potential demand for such services within Assam and NER, and in neighboring countries like Bangladesh. Guwahati can become a hub for such services for NER and neighboring countries, as well as a spoke that feeds into other advanced centers for more sophisticated treatments (for example, stem cell treatment for certain cancers) that may not be available in Guwahati.

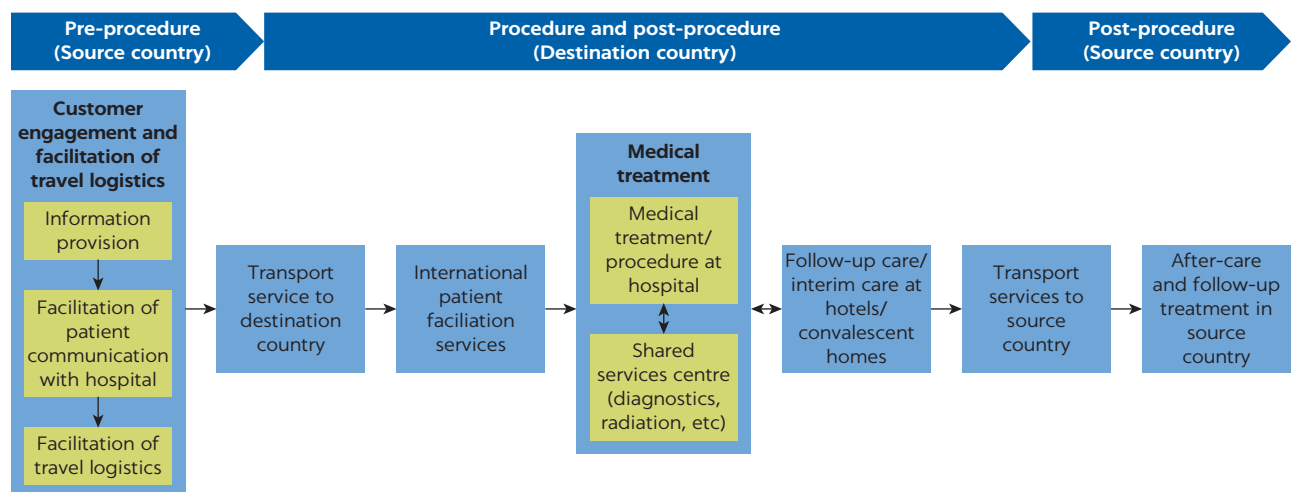
From a public policy perspective, the complex services segments are likely to need greater government support to scale up, given the very high investment requirements. In contrast, the specialized services segment, which is relatively less capital intensive, is likely to develop on its own, as super specialty services expand through increased private sector participation.

BOX 4.2**Creating value together: The peace clinic initiative**

The Peace Clinic initiative between Pakistan and India provides an example of collaboration between destination hospitals and source country hospitals. This initiative, launched in 2013, connected the Dr. Ziauddin Hospital in Karachi, Pakistan, to the Apollo, Medanta, and Fortis Hospitals in India, to work together to address the ailments of patients from Pakistan. A virtual outpatient clinic was set up at Dr. Ziauddin Hospital for Pakistani patients to consult with Indian doctors. Subsequently, under the same Peace Clinic initiative, hospitals such as Apollo and Medanta have collaborated with the Karachi hospital to work together on patients who need liver and kidney transplants.

Pre- and post-procedure care is provided at the Karachi hospital, with the procedure, if necessary, undertaken at a hospital in India. The initial diagnosis and assessment of transplant needs are done at Dr. Ziauddin Hospital by local doctors and Indian doctors who are available through the online outpatient clinic or during camps held periodically by visiting doctors from India. The patient travels to India for the transplant procedure, if required. Patient monitoring and aftercare on returning to Pakistan are provided by Dr. Ziauddin Hospital. Doctors at the Karachi hospital have received training in pre- and post-procedure care at the partner Indian hospitals. From time to time, joint surgeries are conducted at the Karachi hospital with the collaboration of doctors from both countries.

Sources: *Financial Express* 2014; *Dawn* 2015a, 2015b; website of Apollo Hospitals (accessed May 27, 2019), <https://www.apollohospitals.com/news/peace-clinic-indian-doctors-to-assist-pakistani-counterparts-in-transplant-procedures>.

FIGURE 4.2**Value chain: Medical tourism in the long-duration complex services segment**

Source: Based on interviews and secondary research.

Figure 4.2 provides an illustration of the value chain required to compete in the long-duration complex services segment. The figure portrays the sequence of activities undertaken by the patient before and after receiving medical treatment in the destination country.

Given the current lack of focus on medical tourism in Guwahati, there are several gaps in the value chain that will need to be addressed to compete successfully in the long-duration complex services segment.

Pre-procedure stage in the source country

The value chain begins with customer engagement and facilitation of travel logistics for the patient. A patient who is willing and able to travel for medical intervention starts with seeking information on destinations and hospitals through various sources, including the information centers of destination hospitals in source countries, local doctors and hospitals, medical travel companies, the internet, and word-of-mouth from family and friends. Next comes facilitation of communication between the chosen hospital and patient, with sharing of diagnostic reports, potential treatment plan, appointments, and payment options and insurance tie-ups (if any); this is followed by coordination of travel logistics such as airline/railway bookings and visas and accommodation arrangements. Both these activities are typically facilitated by the local information center of the hospital, the international patient facilitation team/department of the hospital, a medical travel company,³² or a travel agency that may have travel plans for medical travelers, and sometimes even by the government or corporate for which the patient works, in cases where treatment is being sponsored. This stage ends with transportation of the patient to the destination country, most commonly by air. In this stage of the C2 value chain in Guwahati, the gaps are as follows:

1. *A network of partners for customer engagement and facilitation of travel logistics in source countries is missing*, given the current lack of focus on medical tourism. Typically, in Bangladesh and other potential source countries, hospitals in Guwahati do not have information centers or a formal network of partners, such as doctors, hospitals, medical travel companies, travel agencies, and insurance companies to channel patients to them. Typically, they also do not have dedicated international patient facilitation teams to coordinate enquiries, appointments, or travel arrangements for the patients.
2. *Transportation links between Guwahati and potential source countries like Bangladesh and Myanmar are weak*. Guwahati is a hub for air, rail, and road connectivity within NER—it has direct air links with most NER state capitals and rail links with several states. However, Guwahati currently has no direct air links with potential international markets for medical tourism, especially Bangladesh and Myanmar, although this may be changing soon.³³ The existing air connectivity is via the Indian city of Kolkata, which is a medical tourism hub, especially for patients from Bangladesh. In interviews, Guwahati hospitals cited this as a key reason for not focusing on medical tourism with Bangladesh or Myanmar. Road connectivity, especially with neighboring countries, requires several hours of difficult travel, making it cumbersome for ailing patients. Moreover, e-visas are not available for nationals of Bangladesh.³⁴

Procedure and post-procedure stage in the destination country

This stage begins with the patient arriving in the destination country. The patient is received and transported to the hospital or the chosen accommodation by the patient facilitation services team of the hospital or medical travel company or travel agency, depending on the distribution channel used by the patient. The main activities in the value chain at this stage involve medical treatment at the hospital, also making use of “shared services” centers (such as for diagnostics or radiation treatment in the case of cancer), and follow-up/interim care at an accommodation adapted to patient needs. In the case of cancer treatment, for instance, the patient is required to stay in the hospital for a few weeks only, for

purposes of surgery, chemotherapy, and/or radiotherapy, which are carried out over several weeks and can typically be availed by outpatients.³⁵ Between treatment cycles or after treatment ends, the patients and/or attendants may also avail vacation opportunities in the destination, although this is less likely for patients requiring invasive surgeries or debilitating treatment. This stage ends with transportation back to the home country. In this stage of the C2 value chain in Guwahati, the gaps are as follows:

1. *Patient facilitation services are missing.* Facilities are missing to coordinate logistics for the patient in the destination, including hospital appointments, interface with the treatment team, airport pickups/drops and other local transportation, translation services, vacation arrangements, and other support services. Hospitals do not have dedicated international patient facilitation teams and currently there are no local medical travel companies or travel agencies that coordinate medical travel.
2. *Equipment sharing and coordination of treatment across hospitals is not formalized.* A challenge in developing complex services like cancer treatment is the very high cost of equipment (diagnostic and radiation) and consequently high treatment costs. A 100-bed cancer hospital would typically need an investment of about Rs 1 billion, excluding the cost of land (*Business Today* 2013), or even more. Interviews with hospitals and equipment manufacturers indicated that diagnostic equipment such as a PET-CT scan can cost Rs 80 million to Rs 150 million, MRI machines can cost Rs 40 million to Rs 150 million, and a gamma camera can cost Rs 30 million to Rs 50 million; radiation equipment such as a linear accelerator can cost Rs 40 million to Rs 200 million; and a proton beam therapy machine can cost more than Rs 2 billion in its new, smaller, and cheaper version (Advisory Board 2016). Equipment sharing by hospitals can help bear such large costs and allow greater utilization of the equipment, making it possible to offer related treatment at economical prices. In Guwahati, there are no stand-alone shared services centers for diagnostic and/or radiation equipment. However, field interviews indicated that equipment sharing takes place to the extent that hospitals without radiation facilities, after surgery or chemotherapy, hand off their patients to hospitals with such facilities for radiation. Although some informal coordination of treatment may take place, given the small oncology community in Guwahati, there is no formal coordination mechanism. Worldwide, typically, integrated cancer hospitals (with radiation facilities), including the ones in Guwahati, have a team (tumor board) comprising doctors from all oncology and related disciplines. This team formulates patient-specific treatment plans upfront; it tracks and analyzes the case history of every patient, modifying treatment plans, as needed.
3. *Hospitals suffer staffing challenges, which can impact their services, due to the inadequate supply of specialized health care professionals.* For instance, in cancer care in Guwahati, several private hospitals tend to rely on specialist doctors and surgeons in various disciplines and rarely use specialists in oncology or surgical oncology, given the paucity of such doctors. Availability of specialized skills among nursing and paramedical staff also remains a challenge.
4. *There is a gap in managing patient data through electronic medical records and transcription services, which are inadequately developed.* Managing patient data is essential to coordinate treatment—through the long duration involving repeat visits, across facilities in the case of shared services, and with home

country providers for aftercare. Several hospitals have, or are currently implementing, hospital management systems and electronic medical records, but there is fragmentation, with heterogeneous systems being used and partial implementation or usage of systems.

5. *Accreditation and certification, which can enhance brand perceptions, has not been given adequate attention by all providers.* The integrated cancer hospitals are not accredited by NABH. Among the private multispecialty hospitals that offer oncology services (surgical and medical oncology), only a handful have NABH accreditation or are in the process of obtaining it.
6. *Patient protection laws are inadequate.* India's limited malpractice laws remain a cause of concern for foreign patients and insurance companies, given their implications for medical liability and legal settlement (Chanda 2013).
7. *Coordination between hospitals and hotels is nonexistent or weak; in addition, hotels are not adapted to patient needs.* This is partly driven by the current lack of focus on medical tourism in Guwahati. Several hospitals, including BBICI, have their own guest houses; some have negotiated corporate rates with some hotels/guest houses. Guest houses and hotels have not been adapted for the special needs of medical tourists, especially in the long-duration segment. Convalescent homes could be well-placed to serve the needs of the long-duration complex services segment. Such homes, apart from providing accommodation, also provide basic medical care by engaging a team of nurses, paramedical staff, and other medical personnel. The medical care provided could range from handling pain management, emergencies, physiotherapy, and psychiatric counseling, to providing some aspects of treatment that can be easily managed outside the hospital. Other support services could include scheduling hospital appointments, spiritual counseling, translation services, special dietary plans, complementary alternative medicine therapies (like yoga, meditation, and acupuncture), and entertainment services for patients and attendants. Guwahati has a few hospices (meant primarily for the poor), which are similar in concept to convalescent homes. They offer palliative care and attend to residents' emotional and spiritual needs, but the hospices are typically meant for the end-of-life phase of terminally ill patients.

Post-procedure stage in the source country

The post-procedure stage in the source country begins with the patient arriving back home. It involves follow-up care and continued treatment in the source country. In this stage of the C2 value chain in Guwahati, the gap is as follows:

A formal system of aftercare/follow-up treatment in the source country is missing. Given the current lack of focus on medical tourism, follow-up using solutions such as telemedicine or coordination of further treatment through tie-ups with local doctors/hospitals has not been established.

Opportunities for women in the Guwahati cluster

Female participation and opportunities for female entrepreneurship tend to be relatively high throughout the long-duration complex services value chain.

In the pre-procedure stage in the source country, customer engagement and facilitation of travel logistics are provided by the hospital's international patient facilitation team, a medical travel company, or a travel agency, all of which tend to have high female participation. Within hospitals, women's participation tends

to be high in customer service roles and hence international patient facilitation teams. As studies on the tourism sector show, travel companies employ many women, as would medical travel companies, but women tend to be concentrated as clerical staff for travel agents and tour operators, with limited roles in management and business ownership (Staritz and Reis 2013). The airline industry also employs many women but mostly as air hostesses or in customer service roles and less so as pilots or in management.

In the procedure stage in the destination, facilitation services are provided by the same entities as above, all of which have high female participation. Medical services are provided by hospitals, which too have a relatively high share of women in their workforce. Women comprise 35–45 percent of the total hospital workforce, including outsourced staff, as indicated by hospital interviews in Guwahati.³⁶ Women are found among all categories of hospital staff—doctors, nurses, paramedical and technical staff, and “other employees” (including administrative and operations staff), which typically comprise 10–20, 20–30, 10–15, and about 50 percent of the total workforce, respectively. Women comprise the majority of nursing staff (90 percent or more on average), as in the rest of India.³⁷ They account for a lower but still significant share of doctors (20–30 percent on average). However, in some hospitals, the female-male gap worsens going from junior doctors with only undergraduate degrees to more senior doctors with post-graduate/post-doctoral degrees. Women also comprise a relatively large share of “other employees” (in some cases, as high as 30–35 percent), with greater participation in functions like customer service, billing, and house-keeping, and among ward attendants. Although women comprise a relatively lower share of paramedical and technical staff in most of the hospitals that provided data (10–15 percent), their share was higher in some others, probably reflecting that women are now found in comparable numbers as men among paramedical students.³⁸

The gender gap in employment as doctors is reflected in the gender gap in medical education in India, but the encouraging news is that the gender gap in medical education has been improving. Based on the All-India Survey of Higher Education (AISHE) 2011–12 and 2015–16 (Government of India 2012, 2016), at the MBBS level, the gap has closed—women’s share in enrolled students stood at 49 percent in AISHE 2015–16, marginally up from 48 percent in AISHE 2011–12. However, the gender gap exists and progressively worsens at higher levels, as seen in AISHE 2015–16: the share of women declines to 43 percent at the MD level, further to 34 percent at the MS level, and further still to 17 percent at the DM and MCh levels. But women’s share at all higher levels improved between the two survey years.³⁹ The same gender gap in medical education, and the improvement at the MD/MS and DM/MCh levels in the past few years, can also be seen in the admissions data received from GMCH. GMCH is one of three medical colleges in NER, and the only one in Assam, to offer MD/MS and DM/MCh degrees (table 4.2). Paradoxically, the GMCH data reveal a decline in the share of women at the MBBS level.

The gender gap among doctors, and in turn in medical education, can be explained largely by gender norms and gender roles in household chores and childcare. Men are still viewed as the primary breadwinners and women as the primary caretakers in the family, and this was even more deeply ingrained when the present crop of senior doctors would have obtained their medical education. Interviews with women doctors and their male colleagues, as well as nurses (some chose nursing after they could not clear the medical entrance exams),

TABLE 4.2 Admissions data for Gauhati Medical College and Hospital

ADMISSION YEAR	MBBS		MD/MS		DM/MCh	
	TOTAL STUDENTS	FEMALE STUDENTS	TOTAL STUDENTS	FEMALE STUDENTS	TOTAL STUDENTS	FEMALE STUDENTS
2015	156	52 (33%)	126	50 (40%)	12	2 (17%)
2014	154	58 (38%)	127	51 (40%)	17	3 (18%)
2013	156	71 (46%)	132	38 (29%)	16	2 (13%)
2012	155	64 (41%)	130	40 (31%)	13	1 (8%)
2011	156	70 (45%)	130	38 (29%)	15	4 (27%)
2010	156	63 (40%)	128	40 (31%)	16	2 (13%)

Source: Gauhati Medical College and Hospital.

Note: MBBS = Bachelor of Medicine and Bachelor of Surgery; MD/MS = Doctor of Medicine/Master of Surgery (post-graduate degree); DM/MCh = Doctor of Medicine/Master of Chirurgiae (post-doctoral degree).

indicated that women's responsibilities for domestic work and childcare, along with their families' concern for their safety and security, limit their time and mobility in seeking higher education and opportunities for career advancement. Medical entrance exams require significant preparation and coaching, more so at the MD/MS and DM/MCh levels, given the intensity of competition for very few seats. Further, coaching may require aspiring students to move to other cities with reputed coaching centers; medical education invariably requires them to move to other cities, even states, as a student's college of admission depends on the all-India rank obtained in medical entrance exams. Among women who get married after earning their MBBS, some opt out of higher education because of their reduced ability to move, while some others find it difficult to prepare for the entrance exams along with balancing family and work. Complacency also sets in for MBBS doctors, especially in NER states, where the state is a big employer and a popular one. Sometimes families are reluctant to send women to other cities for reasons of safety and security. Although some families may be comfortable sending women to out-of-state medical colleges, where they would live on campus, they are not comfortable sending them to other cities for coaching, where they may be required to live on their own. Another manifestation of the gender roles assigned to women is that women tend to self-select and typically opt for preclinical (anatomy, physiology, and biochemistry) and paraclinical subjects (pathology, microbiology, and pharmacology) and clinical specialties that do not require emergency attendance (such as dermatology, ENT, ophthalmology, and dental), with the exception of gynecology and pediatrics, where female participation is significant, as indicated by interviewees. Unsurprisingly, women interviewees who opted for higher education or nontraditional specialties cited support from family along with counseling and mentoring from teachers and other influencers as key success factors (see box 4.3 on Arya Hospital).

Although female participation is high in hospitals, it is also relatively high in other services that enter as inputs into medical treatment. This is so in stand-alone diagnostic centers, pathology labs, and blood banks, where potential for female entrepreneurship also exists. The potential for female participation is also high in stand-alone radiotherapy centers, including as doctors. The share of women among enrolled students at the post-graduate level in radiotherapy is 38 percent in India (Government of India 2016). Similarly, in medical, nursing, and paramedical education institutions, the share of women tends to be high, including among higher-skilled staff like teachers.

BOX 4.3

Arya Hospital: A tale of success

Dr. Bijoya Goswami, like several women doctors of her time, got married in 1984, immediately after completing her Bachelor of Medicine and Bachelor of Surgery from Gauhati Medical College (GMC). She had her first child in 1986, following which she joined the Out-Patient Clinic of Bharat Sanchar Nigam Limited, a public sector company, working only a few hours a day. Dr. Goswami's sister-in-law, an endocrinologist, counseled and coaxed her to pursue a Doctor of Medicine (MD) degree to further her career. Dr. Goswami obtained an MD in anesthesiology from GMC in 1989–92. She was supported in this endeavor by her husband and his parents, who also helped with child care. Their support also enabled her to get back to work as a Registrar at GMC, immediately after the arrival of her second child in 1992. Long hours at work, including night duty, were difficult. However, this did not stop Dr. Goswami from pursuing bigger dreams.

Dr. Goswami set up her first hospital in 1996. Although Small Industries Development Bank of India (SIDBI) agreed to provide a loan of Rs 7.2 million for a project involving two more partners, it asked for collateral. Collateral could not be mustered, and SIDBI backed out from providing funds. Both Dr. Goswami and her husband had left their jobs to indicate commitment to the project. With no job between them and only Rs 30,000 in their joint bank account, Dr. Goswami was still not deterred. She went on to borrow money from family and friends. She set up the eight-bed Good Friend Hospital in an ordinary building with secondhand equipment. It was declared an orthopedic hospital but was converted into a general hospital within a year. By 1998, it had grown into

a 35-bed hospital. Meanwhile, Dr. Goswami had her third child in 1998.

The next challenge came when it was time to move the hospital and rebuild it due to construction of a fly-over nearby. Standard Chartered Bank was offering professional loans to doctors, and it agreed to provide a loan of Rs 300,000 at 21.5 percent interest rate. However, more was needed. Dr. Goswami came up with another novel idea. She tapped family and friends again to raise funds, and asked everyone to bring two more investors if they wanted to become a shareholder. Shareholders were promised a 20 percent discount on all medical services, as well as a dividend starting after 3 years. She managed to raise funds amounting to about Rs 20 million from 945 individuals, “even ordinary people like plumbers and painters.” With a loan from Indian Overseas Bank, without collateral, given their track record in making loan repayments, land was purchased in 2001. In 2004, Arya Hospital commenced operations as a multispecialty hospital. Today, it is a 100-bed hospital with several specialties, including cardiology, orthopedics, neurology, and oncology.

Dr. Goswami and her husband, meanwhile, have also diversified their business interests. They created the charitable Surakhya Trust; set up the Arya School of Nursing and Arya Nursing College; started a real estate company called Arya Erectors Limited, which has completed a township project with villas called Arya Smart Living; set up the Arya Eco Resort; and have just launched the Arya Wellness Centre, a super specialty outpatient clinic. Dr. Goswami, as the Chairperson cum Managing Director, helms the sprawling Arya Group, which has a net worth today of more than Rs 1 billion.

Source: Interpretation based on an interview with Dr. Bijoya Goswami in June 2017.

In the other major activity in the destination country, accommodation at hotels or convalescent homes, there is again significant female participation and scope for entrepreneurship. Data on the tourism industry show that in Asia, women account for 35 percent of the workforce in hotels, guest houses, and restaurants, but women are relegated mostly to low- and mid-skill positions in hotels, such as housekeeping, laundry, food and beverage service, and clerical work (Staritz and Reis 2013). Although guest houses and home stays in general offer women opportunities for entrepreneurship, convalescent homes, which are more suited to the needs of the long-duration complex services segment, also

present such opportunities. For instance, a cooperative of nurses could set up such accommodations in the cluster. Even where out-of-town patients opt to stay in hotels, guest houses, or rented houses, and in the case of local patients residing in their own homes, a cooperative of nurses or a group of entrepreneurial nurses could possibly offer home-based nursing services.

Strategic options for Agartala

Currently, Agartala may find it difficult to develop as a stand-alone medical tourism destination targeting a particular strategic segment. This is largely because medical services in Agartala are highly constrained by the near-absence of super specialty services and limited specialty services, and the lack of a robust private sector in health care, especially medium-size and large hospitals.

However, Agartala could benefit from easing access for medical tourists, especially from Bangladesh. Given significant outbound medical travel by locals who can afford to pay, easing access for medical tourists could help build up footfall for private hospitals, where capacity is underutilized. Drawing on the case of Singapore, international medical tourists could help hospitals reach economies of scale and scope and catalyze high-technology medicine by enlarging the market (Chee 2010). Growing work opportunities in the private sector, aided by medical tourism, could also help attract doctors and other specialized health care professionals from elsewhere, which is currently a challenge. Some exporting countries have taken advantage of the expansion of medical tourism to attract the return of health workers who had emigrated, reversing the brain drain (Smith, Alvarez, and Chanda 2011). India too has seen doctors migrating back to the country, attracted by work opportunities provided by the growing private sector, aided by inbound medical tourists (International Trade Centre 2014). Further, any risks posed by medical tourism can be reduced or managed through appropriate policy measures.⁴⁰

Although Agartala may not be in a position to become a full-fledged medical cluster, it can plug into the long-duration complex services value chain in Guwahati (and other medical tourism value chains in the rest of India). For initial diagnostics in the pre-procedure stage or aftercare and patient monitoring in the post-procedure stage, it may be more convenient for patients from Bangladeshi districts closer to Agartala to travel to this city instead of other Bangladeshi cities with the required services or Guwahati. Thus, hospitals in Agartala could tie up with hospitals in Guwahati to provide such services to domestic patients from Agartala and nearby towns, as well as to Bangladeshi patients from adjoining districts.

Opening to medical tourists and increased footfall will support the private sector in Agartala and eventually benefit consumers through expansion in medical services. The viability of current private sector ventures is critical for attracting more investment from other corporate hospitals and investors.

INDUSTRY ECOSYSTEM: PORTER'S DIAMOND

Following Porter's "diamond" characterization of an industry cluster, five key dimensions describe an industry's ecosystem in which firms are born and compete: demand conditions; firm strategy, structure, and rivalry; factor conditions; related and supporting industries; and government and chance variables (Porter 1990). This section focuses on long-duration complex services in Guwahati.

Demand conditions

The combined population of the region comprising NER, Bangladesh, Nepal, Bhutan, and the Western provinces of Myanmar bordering India (Sagaing Region and Chin) is more than 210 million (2016). This translates into significant potential demand for many specialized and complex services, given the rising burden of NCDs worldwide, and particularly the need for long-duration complex services for NCDs like cancer.

Focusing on Assam and NER, there is a significant domestic market for long-duration complex services such as cancer care and related neurological treatments (such as for tumors). The incidence of cancer is significant and rising in India, accounting for 7 percent of all deaths.⁴¹ In India, the incidence of cancer is highest in NER, according to a recent report by the Indian Council of Medical Research (ICMR).⁴² It is estimated that NER sees more than 37,000 new cancer cases each year (Government of India 2014), and at any point in time, there are about two to three times as many cancer patients. New and old patients together account for multiple visits and treatments in a year. Thus, in Guwahati, which receives patients from across NER, BBCI, a cancer hospital in the public sector, registered 11,000 new patients in 2015–16, but visits by new and old patients translated into more than 85,000 outpatient consultations and about 5,000 inpatient admissions (BBCI 2016).

Bangladesh also has a high incidence of cancer. There are about 1.3 million to 1.5 million cancer patients at any point in time in Bangladesh, with about 200,000 new patients diagnosed each year (Noronha et al. 2012); cancer accounts for 10 percent of all mortality in the country.⁴³ Domestic facilities are inadequate to serve these patients (*ASCO Post* 2017); as a result, Bangladesh witnesses significant outbound medical tourism for cancer treatment.

Although there is significant potential demand within Assam and NER, the capacity to pay is generally low. Among those who can pay, there is significant outbound medical travel to other cities, although that trend will slow down as super specialty services expand further in Guwahati. To bolster the paying capability of poor and low-income households for several specialized and complex medical services, the Government of Assam launched the Atal Amrit Abhiyan, a health insurance scheme, in December 2016. The scheme covers six high-cost diseases—cancer, neurological conditions, kidney disease, cardiovascular disease, neonatal diseases, and burns—and provides cashless treatment up to Rs 200,000 per household member per year for treatment at empaneled hospitals.⁴⁴

Firm strategy, structure, and rivalry

The market for long-duration complex services is underserved in NER, and therefore the few hospitals that offer such services do not have much competition. For instance, in cancer care, in Guwahati, only three hospitals, two government and one private, offer integrated facilities including radiotherapy. These are BBCI (230 beds), set up in 1974, and the cancer wing at GMCH (200 beds), established in 2016, in the public sector; and the North East Cancer Hospital and Research Institute (NECHRI) (100 beds), set up in 2008, in the private sector. Radiotherapy facilities, a vital component of cancer treatment, are found only in these three facilities in Guwahati and some other facilities across NER and are inadequate for the region (BBCI 2016). Moreover, not all radiotherapy machines incorporate the latest technological advances (which improve the precision of treatment with the least damage to healthy cells) (BBCI 2016).

Several private hospitals in Guwahati also offer cancer treatment, but only in medical and surgical oncology. They tend to rely on specialist doctors and surgeons in various disciplines and rarely use super specialists in oncology or surgical oncology, especially given the paucity of such super specialists. For radiotherapy, the private hospitals send their patients to BBCI, NECHRI, and now also GMCH. However, typically, there is little formal coordination between the two hospitals.

In response to the demand-supply mismatch in long-duration complex services, especially cancer care, the Government of Assam has stepped up investment in expanding such services, and several private sector hospitals are also poised to make investments. In addition to setting up a cancer wing in GMCH, the government, in February 2018, signed a memorandum of understanding with the Tata Trust to boost cancer care capabilities in the state in a joint venture (Tata Trust 2018). The proposed infrastructure footprint comprises a three-tier model—the three existing Apex Cancer Hospitals in the state will be complemented by the second tier of stand-alone cancer centers created in medical colleges and the third tier of diagnostics and day care centers developed next to district hospitals. Interviews in June 2017 in Guwahati indicated that at least five private hospitals are considering setting up integrated cancer care facilities, with two of them in advanced stages of planning and implementation.

Factor conditions

Labor

A key challenge in providing long-duration complex services for cancer and other complex and specialized services in Guwahati and the rest of NER is the shortage of skilled professionals, especially doctors with specialized skills. Medical colleges in Assam or NER do not offer super specialty post-doctoral courses (DM/MCh) in medical and surgical oncology; they offer only five seats for the post-graduate (MD) course in radiotherapy (see tables 4A.3 and 4A.4 in the annex). BBCI initiated Medical Council of India (MCI)-recognized oncology super specialty courses in 2016 and 2017, but it has very limited seats—five in DM/MCh courses from 2017,⁴⁵ and two in MD-radiotherapy since 2013. Apart from inadequate capacity, all the DM/MCh seats and 50 percent of the MD seats are open to candidates from anywhere in India; out-of-state students tend to leave after finishing their degrees. To bridge the gap, in 2016, BBCI, in collaboration with Tata Memorial Hospital, started a 2-year post-graduate fellowship program in head and neck surgery (two seats), gynecological oncology (two seats), medical oncology (two seats), surgical oncology (two seats), and oncopathology (two seats), but it is not MCI-recognized. In 2012, BBCI initiated an MSc in Radiological Physics (10 seats), in collaboration with Gauhati University, to address the shortage of medical physicists. It also offers 21 paramedical courses (degree and diploma) to create the requisite paramedical staff for cancer treatment. In time, establishment of the planned cancer centers in all the medical colleges in Assam will allow these colleges to offer MCI-recognized seats in oncology super specialties and enable the creation of a related skilled workforce. Currently, however, the availability of doctors specializing in oncology and other specialized professionals, such as onco-nurses, remains a challenge in Guwahati, as well as in the rest of Assam (and NER).⁴⁶

Thus, although the salaries in health care are generally lower in Guwahati (and the rest of NER) relative to other major metropolitan Indian cities, super

specialists and other specialized staff often need to be paid as much or more when they are hired from outside NER. However, overall labor costs, which dominate the hospital cost structure, could still possibly be 15–20 percent lower in Guwahati, as indicated by the field interviews.

Finance

Complex services such as cancer treatment require large investments in hospitals and equipment. Raising capital of that magnitude can be difficult solely through individual investors and debt financing, which has been the primary source of funding for hospitals in Guwahati. Viability becomes difficult when hospital projects rely on debt financing through banks at high interest rates, as has been the case in the eastern states in India (Indian Chamber of Commerce and PricewaterhouseCoopers 2012), especially if it is not well-understood that such projects have a relatively long gestation period. Elsewhere in India, foreign direct investment and private equity funds have been a growing source of funding for large hospitals and the rest of the health care industry,⁴⁷ but not so in NER. Until recently, the hospital sector could benefit from the Government of India's North East Industrial and Investment Promotion Policy, 2007, which provided a host of fiscal incentives to new units and expansion of existing ones. This scheme has now been replaced by a new incentive package, the North East Industrial Development Scheme, 2017 (effective from April 2017 to March 2022). This scheme can be availed by new industrial and service sector units, but not by expansion projects, in any of the eight NER states.⁴⁸

Infrastructure

Road connectivity within NER and between NER and the rest of India suffers from long transit times and costs. This impacts all industries, including the health care sector, where more advanced medical equipment and most of the consumables are procured from global or Indian manufacturers outside NER. Cumbersome road travel also makes it difficult for domestic and international medical tourists to access hospitals in Guwahati or other NER cities. Moreover, for international medical tourists, seamless connectivity requires speedy processing of visas and conveniently located Indian visa processing and collection facilities. The medical visa that India introduced for medical tourists has reportedly suffered from cumbersome procedures and long processing times, as well as high visa fees. However, for Bangladeshi nationals, there are no visa fees, and medical visa applications are accepted on a walk-in basis without prior appointment at the visa centers, which are available in 15 Bangladeshi cities.⁴⁹ E-visas, which have been introduced for the convenience of tourists to India, including medical tourists, have not been extended to Bangladeshi nationals. The visas issued to Bangladeshi tourists mention the port of entry/exit (by air or road), which can be limiting. In June 2017, this policy was relaxed to allow Bangladeshi nationals to enter/exit India through any of 24 international airports, including Guwahati, and two land ports, Benapole (Bangladesh)–Haridaspur (West Bengal, India) and Darshana (Bangladesh)–Gede (West Bengal, India) (Indian High Commission, Bangladesh, 2017). However, this relaxation does not apply to the various land ports in NER.

Collaboration platforms

Currently, there is no collaboration platform or association bringing together the health care industry, hotels, and tour operators to promote medical tourism in Guwahati.

Related and supporting industries

Medical equipment industry

Advanced medical equipment is sourced from global manufacturers and some Indian manufacturers, all based outside NER; therefore, such purchases are subject to higher logistics and time costs. For complex treatments, diagnostic machines (for example, MRI equipment and PET-CT scanners), radiotherapy equipment (for example, linear accelerators, telecobalt machines, and brachytherapy equipment), and other sophisticated equipment are typically sourced from global manufacturers such as Siemens, GE Healthcare, Johnson & Johnson, Phillips Healthcare, Elekta, and Varian Medical Systems. Higher logistics costs associated with transportation of goods between the rest of India and NER raise the costs of the equipment and comprehensive and annual maintenance contracts. Repairs and maintenance related to plant and machinery could possibly be 5–15 percent higher, on average, for Guwahati hospitals compared with hospitals in major metropolitan cities in India, as indicated by interviews with hospitals and equipment manufacturers.

Consumables

Hospitals procure consumables (for example, syringes, needles, catheters, bandages and plasters, dressings and cotton, and sutures) from local vendors, who source them largely from Indian manufacturers outside the region. Thus, the cost of consumables could possibly be 5–15 percent higher, per interviews with hospitals, because of the associated logistics costs. In the interviews, some hospitals also reported that direct procurement, bypassing the local vendor, could backfire, as local vendors will then not provide the consumables even in an emergency.

Government's role

Guwahati's current lack of focus on medical tourism is reflected in the absence of any explicit or coordinated efforts by the Government of Assam, along with the private sector, to promote the city to medical tourists.

However, the Government of Assam has been proactively contributing to the development of medical services, particularly super specialty services, including complex services such as cancer treatment. On the supply side, the Government of Assam has committed to setting up cancer wings in all government medical colleges in the state, and one such wing with all modern equipment has recently been established at GMCH in Guwahati. But mechanisms such as public-private partnerships and shared equipment centers (expensive diagnostic and radiation equipment) could be further leveraged. Although private sector hospitals send their patients for radiation services to BBCI and GMCH in the public sector (and to NECHRI in the private sector), there is no formal mechanism to coordinate treatment across institutions. On the demand side, recognizing the low capacity to pay of a large part of the population for high-cost treatments, including cancer treatment, the Government of Assam recently launched a health assurance scheme called Atal Amrit Abhiyan.

Another big challenge to expanding complex services like cancer treatment is the shortage of skilled professionals, especially doctors with specialized skills. Government medical colleges are the primary source of creating such skills in the state, as in most of India. The Government of Assam has set up three new

medical colleges in the past decade (see table 4A.4 in the annex). Although none of them offers post-doctoral (super specialty) courses currently, and only one offers post-graduate courses, their stated goal is to offer post-graduate courses in time. Moreover, the creation of oncology centers in all state medical colleges will allow these institutions to apply for MCI-recognized seats in oncology courses.

In line with the Government of India's Act East Policy, the central government and state governments in NER are also engaged in alleviating the logistics challenge faced by all industries in NER, through massive investments in connectivity.

CONCLUSIONS: SOME CONSIDERATIONS FOR THE PUBLIC AND PRIVATE SECTORS

NER can leverage its proximity with neighboring countries, especially Bangladesh, the largest source of medical tourists to India, to develop Guwahati as a medical tourism cluster focused on long-duration complex services. In NER, medical services are better developed, and private sector participation is significant and growing in Guwahati. Other cities, like Agartala, where medical services are constrained and private sector participation is limited, can participate by plugging into the Guwahati cluster.

In Guwahati, the region's strengths in its strong human resources, particularly in nursing and hospitality sectors, and their widely acknowledged soft skills can be leveraged to build up the long-duration complex services segment. This strategic segment has high potential for employment creation, as well as women's participation and entrepreneurship. Most importantly, it has the potential to bring greater returns to women and the poor. Further, this value chain can leverage several cross-border opportunities with Bangladesh (and other neighboring countries) to grow, which would also bring gains to Bangladeshi consumers and firms.

Developing Guwahati into a medical tourism cluster focused on long-duration complex services may require concerted effort by the private sector and the government to address key challenges. A possible approach, which will need to be refined and deepened when operationalization begins, could include some of the following elements.

Promotion of destinations

Promotion of the Guwahati cluster

In several destination countries, hospitals, hotels, travel agents, and other agents of the cluster, along with relevant government departments, work together to come up with a coherent strategy to promote the country as a medical tourism destination, focusing on key offerings and source markets. This is the case, for instance, in Thailand and Malaysia, two leading medical tourism destinations in Asia.⁵⁰ Even India, at the national level, is taking a similar approach, as reflected in the constitution of the National Board for Medical and Wellness Tourism by the Ministry of Tourism in 2016.

Promotion of hospitals

Destination hospitals that target medical tourists have their own individual strategies, backed by marketing and communication plans, for targeted countries.

They rely on a formal network of partners in the targeted source countries to channel patients to them as well as to help in aftercare once the patients return home.

Network building

Network building is critical for successful tie-ups between hospitals in Guwahati and Bangladesh, and it is a critical enabler in providing coordinated treatment to patients of long-duration complex services. Hospitals could build networks by participating in medical conferences in source countries or setting up doctor exchange programs with hospitals in Bangladesh. The government could promote network building by encouraging government medical schools in NER to establish exchange programs with medical schools in Bangladesh. It could also encourage Bangladeshi students to apply to nursing schools and paramedical schools, especially private ones, in NER, and ensure that student visas, with appropriate duration, are granted promptly. A shared community of doctors and other health care staff will lay a foundation for better cooperation through tie-ups.

Improvement in connectivity

Roads, railways, and waterways

Ongoing connectivity investments in NER, with the possibility of transit through Bangladesh, will aid the medical services industry in NER by decreasing the costs and time involved in bringing in inputs such as sophisticated equipment and parts as well as consumables from outside the region. Improved road/railway connectivity would also make the commute easier for medical tourists.

Airlines

Direct air links between Guwahati and key source countries, like Bangladesh and Myanmar, would aid medical tourism but are currently missing. The government has recently announced that Guwahati will be directly connected to several countries in the region, while promising to provide viability gap funding (*Economic Times* 2018). In January 2019, bids were approved for two routes: Guwahati-Dhaka and Guwahati-Bangkok (*LiveMint* 2019).

Visas

Indian visa processing facilities are available in 15 Bangladeshi cities, but residents from other cities still need to travel to these centers for visas. The e-visa facility, not extended to Bangladesh, would ease access to visas. Allowing the collection of e-visas at key land ports in NER would further aid medical travel to Guwahati or other NER cities. Liberalizing visa rules to allow flexibility to use any mode of travel (air/road) as well as entry/exit through any land port in NER would allow patients to combine treatment with tourism, if they so wish.

Creation and enhancement of skills and service orientation

Specialized skills in health care

A key challenge is the shortage of specialized health care professionals, especially doctors, within Guwahati and NER, and the inadequacy in attracting and retaining such workforce from outside the region. The Government of Assam has set up three new medical colleges in the past decade, with plans underway

to set up more (*India Today* 2017), which, in time, will expand into offering more specialized courses. In the case of oncology in particular, the Government of Assam's plans to establish cancer centers in all state medical colleges will help create the skilled workforce as well as allow these colleges to offer MCI-recognized seats in oncology. Such expansion will require additional funding to meet the infrastructure and staffing requirements of the medical colleges. The government could also consider introducing adequate flexibility in compensation rules, to allow specialists from outside the region to be hired at competitive salaries.

The private sector can also pitch in to relieve this constraint in various ways. As pointed out in Govindarajan and Ramamurti (2013), Indian hospitals that provide world-class health care at very low costs make use of their specialized staff more efficiently by rethinking who does what and thereby also reducing costs. The hospitals increase the staff supporting their super specialists, while also upskilling their staff by encouraging specialist doctors to become super specialists and nurses to become nurse practitioners. So, for example, Healthcare Global Enterprises Ltd. (HCG) oncology hospital has developed a cadre of nurses to assist oncologists and intensivists. While creating specialized skills, this also allows specialized staff to use their time more efficiently.

Service orientation of hospitals, hotels, and other service organizations

Hospitals will need to consider investing in staff training to build up service orientation as well as in providing international patient facilitation services and other value-added services to patients (box 4.1). Hospitals will also need to consider investing in digital technology and IT systems, as well as telemedicine infrastructure, for better coordination of treatment across entities and geographies. Coordination requires patient data to be managed carefully and shared securely, which can be enabled through use of digital technology for digitizing patient data (for instance, through use of transcription services and electronic medical records) and IT systems for data sharing in a secure manner. The local IT industry, which is still in a nascent stage, can play a key role here. This cluster will also create business process outsourcing opportunities for transcription services, which can leverage the high literacy advantage of NER.

Hotels, guest houses, and homestays too will have to build up their service orientation and adapt to the needs of long-duration patients. It is increasingly recognized that hotels that cater to medical tourists need to provide quality care to complement treatment (Chin 2018). This is even more relevant for long-duration patients, as they alternate between hospitals and hotels, spending more time in accommodations outside hospitals. Staff in hotels and guest houses need to be trained to understand the needs and expectations of medical guests (Chin 2018; International Healthcare Research Centre 2014). Such guests may need more hands-on care—for instance, special assistance from concierge services, expedited check-in, in-room support, periodic calls from hotel staff to check on them, frequent linen and towel changes, special dietary requirements, entertainment services in the language of choice, and translation services. Apart from attending to some of these needs, several destination hotels have also taken patient needs on board in their choice of location, architectural design, and furniture.⁵¹ Going further into the realm of hospital services, for example, Metro Hotel (Perth, Australia) is working toward providing in-room treatment such as chemotherapy and medical infusions for cancer patients (*Travel Weekly Asia* 2018). Hotels, guest houses, and homestays can adapt more easily to providing some of these

needs through staff training, but meeting other needs, such as wheelchair-friendly architectural design and furniture or providing even basic medical care, may require additional investment. Patients of long-duration complex services may find that convalescent homes suit their needs well. A possible investor in such homes could also be a cooperative of nurses, with possible government support provided in the form of mentoring and help in accessing loans.

Creation of shared services

Expensive diagnostic and radiation equipment that is needed for long-duration complex services requires high investment and involves high treatment costs. High treatment volumes can help achieve economies of scale, bringing down treatment costs. A shared center for expensive equipment, whether within the same hospital group or across hospitals, can help bear large investment costs and achieve scale. HCG, an oncology hospital chain in India that has often been cited for its low-cost business model, builds volume through its hub-and-spoke model of hospitals, where expensive equipment is concentrated in the hub hospitals (Govindarajan and Ramamurti 2013). Other ways to reduce costs include encouraging the use of expensive equipment throughout the day, including at night,⁵² and by patients from other hospitals. A group of private sector hospitals offering cancer care (or private sector investors) could also consider creating a shared center for expensive equipment. Another possibility is government provision of a shared facility. In Assam, the latter may be a possibility, given the heavy investments the Government of Assam is already making toward boosting cancer care capabilities in the public sector. In either case, whether put together through private or public investment, a pricing mechanism as well as a formal coordination mechanism for treatment would be required.

Greater emphasis on customer protection and accreditation

Customer (domestic and foreign) protection laws and enforcement need to be given due emphasis but remain an area of concern in most destination countries. Dubai Health Authority has put in place a Patient Protection Plan to address such concerns of medical tourists.⁵³ On its website, it only includes medical facilities that have been evaluated and approved through a process that requires each facility to meet stringent standards, onsite inspections, and ongoing review from the Health Regulation Department. It has laid out a Charter of Patients' Rights and Responsibilities, which allows patients to understand their rights before arriving in Dubai. It has set up a medical complaints procedure to address medical complaints against a health practitioner or health facility, with a clear timetable for resolution, based on the level of severity of the complaint. It offers medical insurance to inbound patients through a third-party company to cover any complication or medical liability.

Greater emphasis is also needed on accreditation, which can help in developing protocols for treatment and other hospital services, contributing to the overall quality of the hospital's services. Hospitals and other medical facilities can be incentivized to obtain accreditation in various ways. The Malaysian Healthcare Tourism Council (MHTC), the coordinating agency for medical tourism in Malaysia, has an MHTC Partners Membership, which recognizes health care facilities that offer "exemplary" services to international patients, based on various criteria, including accreditation. In addition to being recognized as such on

MHTC's medical tourism portal, the partners are provided marketing and exposure through MHTC's international marketing programs and fiscal incentives from the government.⁵⁴

Agartala, as also other NER cities, can plug into the medical tourism value chain in Guwahati (and other cities in India). It could also benefit from easing access for medical tourists in general.

To ease access for medical tourists, the government could take the following aspects into consideration:

1. *Visas.* The new Indian visa centers in Comilla and Brahmanbaria should ease access of patients from the adjoining Bangladeshi districts. However, for greater efficiency, extending e-visas to Bangladesh would help; easing access to Agartala specifically will then also require that e-visa collection be made possible at Agartala ICP. Allowing flexibility in using any mode of travel (air/road) as well as in entering and exiting through any land port or airport in NER, would help those who may want to combine a medical visit with tourism opportunities elsewhere in NER or India. For outpatient services, which do not require an overnight stay by patients or a medical visa, the Government of Tripura, with assistance from the Government of India, could consider a visa-on-arrival, issued at Agartala ICP, for 1 day, even if a short stay visa-on-arrival is not possible for security reasons. Alternatively, the Government of Tripura could consider an informal system of issuing a day pass, based on identification documents, and widely publicize it.
2. *Support services at the ICP.* Separate visa counters, or even priority at visa counters, at Agartala ICP for medical tourists could ensure faster clearance. It would also help to have special assistance counters at the ICP for medical tourists, which can provide information on hospitals, arrange within-city transportation, and offer other assistance. As the medical tourist inflow picks up, a shuttle service between the ICP and major hospitals would make the journey easier.
3. *High-frequency direct bus services between adjoining Bangladeshi districts and Agartala.* The possibility of such services could be explored.

Although female participation tends to be relatively high in the value chain, it tends to be lower in high-skill jobs such as doctors, particularly doctors with more specialized skills, in hospitals, and among management and business owners in hotels and travel companies. Several policy measures could address these gender gaps.

Policy measures to address the gender gap in medical education will go a long way in addressing the gender gap in employment opportunities as doctors. Interviews with women doctors indicated the importance of family support as well as guidance and mentoring from teachers at critical junctures in their lives (see box 4.3). Hence, there may be merit in putting in place measures, similar to those recommended by the Ministry of Human Resource Development, to increase the share of women in the Indian Institutes of Technology, India's premiere technical institutes, which are grappling with low enrollment of women (Times of India 2017). Such measures would require all state medical colleges to identify keen science students among meritorious girls in senior school in their respective catchment areas, to encourage them to become doctors. The plan for identified students would involve counseling them and their parents, helping them with coaching for entrance exams, and providing financial aid as necessary. It would be important to continue mentoring and coaching women through

their MBBS program and thereafter, to ensure that they opt for further studies. Interviews also indicated that good coaching is essential to clear the entrance exams, and parents often are reluctant to send their daughters to other cities for coaching, for reasons of safety and security. In that scenario, the government can play a role in helping female students access such classes from home, by encouraging reputed centers to provide coaching through video conferencing facilities or web-based classes.

Policy measures to aid women in taking on entrepreneurial roles can also help improve their share of appropriable margins. Two critical elements would be to ease access to finance, since women are often found to be more disadvantaged in this respect, as well as to provide mentoring services to women entrepreneurs. For instance, convalescent homes can possibly be set up by a cooperative of nurses. In addition to access to finance, such a group would likely need mentoring and hand holding to bring such a proposal to fruition.

ANNEX 4A

TABLE 4A.1 Availability of health care professionals, Northeast India

	INDIA	ASSAM	TRIPURA	MANIPUR	MEGHALAYA	MIZORAM	NAGALAND	SIKKIM
Per 1000 population, 2016:								
No. of allopathic doctors (1)/(6)	0.79	0.68	0.51	—	—	—	0.39	1.40
No. of AYUSH doctors (2)/(6)	0.60	0.07	0.07	0.00	0.10	0.03	1.00	0.00
No. of dental surgeons (3)/(6)	0.15	0.05	0.01	0.09	—	—	—	—
No. of registered nurses (4)/(6)	2.17	1.39	1.30	3.12	1.72	4.31	—	—
No. of pharmacists (5)/(6)	0.58	0.09	0.07	—	0.20	0.28	0.75	—
Memo items:								
No. of allopathic doctors (1)	10,07,277	22,356	1,996	—	—	—	801	893
No. of AYUSH doctors (2)	7,71,468	2,202	291	0	316	30	2,084	0
No. of dental surgeons (3)	1,97,772	1,804	38	284	—	—	—	—
No. of registered nurses (4)	27,78,248	46,105	5,041	9,837	5,624	5,138	—	—
Auxilliary nurse midwives	8,21,147	25,989	2,066	3,305	1,491	1,963	—	—
Reg'd nurses & reg'd midwives	19,00,837	19,869	2,827	6,532	3,967	3,175	—	—
Lady health visitors	56,264	247	148	—	166	—	—	—
No. of pharmacists (5)	74,1,548	3,095	257	—	647	330	1,553	—
Population ('000) (6)	12,83,000	3,3101	3,881	3,155	3,271	1,192	2,077	640

Source: Data on doctors, nurses, pharmacists from Medical Council of India, Ministry of AYUSH, Dental Council of India, Indian Nursing Council, Pharmacy Council of India as reported in National Health Profile 2017, Central Bureau of Health Intelligence, Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India; Data on Population from Central Statistical Organization.

Note: — = not available; AYUSH = Ayurveda, Yoga, Unani, Siddha, and Homeopathy.

(1) No. of doctors possessing recognized medical qualifications (under Indian Medical Council Act) and registered with State Medical Council or Medical Council of India up to 2016; data for Tripura obtained directly from the website of Tripura State Medical Council as it was not reported to Medical Council of India and was unavailable in National Health Profile 2017, and also added to the total number for India.

(2) No. of AYUSH (Ayurveda, Unani, Siddha, Naturopathy, Homeopathy) registered doctors as on 1.1.2016; no separate boards for registration of practitioners in Manipur and Sikkim and hence those states indicated as zero.

(3) No. of dental surgeons under Central/State Dental Councils as on 31.12.2016; data for Tripura obtained from the website of Dental Council of India as it was not reported in National Health Profile 2017, and also added to total number for India.

(4) No. of nurses as on 31.12.2015.

(5) No. of pharmacists as on 15.11.2016.

(6) Central Statistical Organization's (CSO's) estimate for March 2016; Tripura data is calculated using CSO's March 2015 figure as the base and applying the previous 2 years' average growth rate.

TABLE 4A.2 Selected health education infrastructure, Northeast India

	INDIA	ASSAM	TRIPURA	MANIPUR	MEGHALAYA	MIZORAM	NAGALAND	SIKKIM
Medical colleges (1)								
No. of colleges	462	6	2	2	1	0	0	1
Admission capacity ^a	62,685	726	200	200	50	0	0	50
AYUSH colleges (2)								
No. of undergrad colleges	544	4	0	0	0	0	0	0
Admission capacity	32,256	200	0	0	0	0	0	0
Nursing institutions (3)								
(a) Auxilliary Nurse Midwives (ANM)								
No. of institutions	1,986	27	3	8	2	3	2	1
Admission capacity	57,019	753	125	230	45	100	60	20
(b) General Nurse Midwives (GNM)								
No. of institutions	3,123	35	5	15	7	5	5	2
Admission capacity	12,5,762	1,084	220	460	195	140	160	50
(c) BSc - Nursing								
No. of institutions	1,831	11	4	7	2	2	1	2
Admission capacity	91,806	550	180	270	90	65	40	130
(d) MSc - Nursing								
No. of institutions	637	5	2	0	1	0	0	1
Admission capacity	12,390	91	22	0	10	0	0	25
(e) Post Basic BSc - Nursing								
No. of institutions	780	4	1	0	1	0	1	1
Admission capacity	24,865	115	20	0	30	0	20	50
(f) PBBDP - Nursing								
No. of institutions	311	3	0	0	0	1	0	0
Admission capacity	4,730	75	0	0	0	15	0	0

Source: Medical Colleges and AYUSH Institutes—Data from Medical Council of India, Central Council of Indian Medicine/Homeopathy/ Department of AYUSH as reported in National Health Profile 2017, Central Bureau of Health Intelligence, Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India; Nursing Institutes—Indian Nursing Council Website (<http://www.indiannursingcouncil.org/>)(Accessed Sep 7, 2017)

Note: BSc = Bachelor of Science; MSc = Master of Science; PBBDP = Post Basic Diploma Program.

a. Admission capacity in MBBS (Bachelor of Medicine, Bachelor of Surgery) program.

(1) Data for 2016–17.

(2) Data as on 1.4.2016.

(3) Data as on 31.10.2016.

TABLE 4A.3 Northeast India: Admission capacity for post-graduate degree (MD/MS) and super specialty degree (DM/MCh) courses, December 2016*Number of seats*

	INDIA	ASSAM	TRIPURA	MANIPUR	MEGHALAYA	MIZORAM	NAGALAND	SIKKIM
Post Graduate Degree Courses (MD/ MS):	21,091	339	30	159	18	—	—	22
Anaesthesiology	1,695	16	2	10	4	—	—	—
Aviation medicine/aerospace medicine	17	—	—	—	—	—	—	—
Bio-chemistry	589	16	—	9	—	—	—	2
Dermatology, venereology, and leprosy	573	7	—	4	—	—	—	—
Forensic medicine/forensic medicine and toxicology	381	10	1	5	—	—	—	—
General medicine	2,491	36	6	16	2	—	—	2
Hospital admn and community health admn	41	—	—	—	—	—	—	—
Immuno hematology and blood transfusion	60	—	—	—	—	—	—	—
Microbiology	823	18	1	6	3	—	—	2
Paediatrics	1,296	14	1	5	—	—	—	2
Physical medicine and rehabilitation	52	—	—	4	—	—	—	—
Physiology	779	18	—	10	—	—	—	3
Psychiatry	486	12	1	3	—	—	—	3
Radio-diagnosis/radiology	886	17	2	2	2	—	—	—
Radiotherapy	224	3	—	4	—	—	—	—
Social and preventive medicine/community medicine	856	13	3	8	—	—	—	2
TB and respiratory diseases/pulmonary medicine	360	2	—	2	—	—	—	—
Anatomy	767	18	—	8	2	—	—	—
Obstetrics and gynaecology	1,484	24	2	13	—	—	—	2
Ophthalmology	980	17	2	5	—	—	—	—
Emergency medicine	73	2	—	—	—	—	—	—
Pathology	1,384	21	1	8	3	—	—	—
Pharmacology	765	14	1	6	—	—	—	2
Nuclear medicine	29	—	—	—	—	—	—	—
Sports medicine	9	—	—	—	—	—	—	—
Transfusion medicine	12	—	—	2	—	—	—	—
ENT (ear, nose, throat)	655	12	3	6	—	—	—	2
General surgery	2,273	37	2	16	2	—	—	—
Orthopaedics	1,051	12	2	7	—	—	—	—

continued

TABLE 4A.3, *continued*

	INDIA	ASSAM	TRIPURA	MANIPUR	MEGHALAYA	MIZORAM	NAGALAND	SIKKIM
Post doctoral degree courses (DM/MCh):	2,216	19	—	3	2	—	—	—
Cardiology	315	2	—	—	2	—	—	—
Clinical pharmacology	24	—	—	—	—	—	—	—
Endocrinology	78	2	—	—	—	—	—	—
Gastroenterology	118	—	—	—	—	—	—	—
Neonatology	39	—	—	—	—	—	—	—
Nephrology	120	2	—	—	—	—	—	—
Neurology	219	2	—	—	—	—	—	—
Oncology (2)	89	—	—	—	—	—	—	—
Head and neck surgery	7	—	—	—	—	—	—	—
Cardiac - Anaesthesiology	43	—	—	—	—	—	—	—
Pulmonary medicine	25	—	—	—	—	—	—	—
Rheumatology	14	—	—	—	—	—	—	—
Cardio thoracic surgery	80	2	—	—	—	—	—	—
Cardio thoracic vascular surgery	104	—	—	—	—	—	—	—
Endocrine surgery	7	—	—	—	—	—	—	—
Neuro surgery	227	2	—	—	—	—	—	—
Plastic surgery	174	2	—	1	—	—	—	—
Surgical gastroenterology/gastrointestinal surgery	51	—	—	—	—	—	—	—
Surgical oncology (2)	81	1	—	—	—	—	—	—
Thoracic surgery	34	—	—	—	—	—	—	—
Urology/genito urinary surgery	210	2	—	2	—	—	—	—
Vascular surgery	9	—	—	—	—	—	—	—
Paediatric surgery	148	2	—	—	—	—	—	—

Source: Data from Medical Council of India as reported in National Health Profile 2017, Central Bureau of Health Intelligence, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India.

Note: — = not available; TB = Tuberculosis; MD = Doctor of Medicine; MS = Master of Surgery; DM = Doctor of Medicine; MCh = Master of Surgery.

(1) Includes “recognized” and “permitted” seats by Medical Council of India (MCI); “recognized” seats meet norms laid out by MCI; seats declared “permitted” by MCI are converted to “recognized” only after the institute scales up faculty, facilities, and infrastructure to meet MCI norms. A student from a “permitted” seat cannot claim the qualification on graduation, unless it has been converted to “recognized”

(2) Dr. B. Barooah Cancer Institute (BBCI) in Guwahati increased MCI-recognized seats in MCh-surgical oncology from 1 to 3 in 2017–18, and started offering 1 MCI-recognized seat in DM-oncology from 2017 to 2018.

TABLE 4A.4 Admission capacity and medical courses offered by medical colleges, Assam, FY2016-17

	ADMISSION CAPACITY - NUMBER OF SEATS (1)						TOTAL ASSAM
	GAUHATI MED. COLLEGE (GUWAHATI)	ASSAM MED. COLLEGE (DIBRUGARH)	SILCHAR MED. COLLEGE (SILCHAR)	JORHAT MED. COLLEGE (JORHAT)	TEZPUR MED. COLLEGE (TEZPUR)	FAKHRUDDIN ALI AHMED MED. COLLEGE (BARPETA)	
Year of inception	1960	1947	1968	2010	2014	2012	
Management of college	Govt	Govt	Govt	Govt	Govt	Govt-society	
Undergraduate degree (MBBS)	156	170	100	100	100	100	726
Post graduate diploma	22	32	7	—	—	—	61
Post graduate degree (MD/MS)	136	110	71	18	—	—	335
Anaesthesiology	6	5	5	—	—	—	16
Aviation medicine/aerospace medicine	—	—	—	—	—	—	—
Bio-chemistry	5	6	3	2	—	—	16
Dermatology	4	2	1	—	—	—	7
Forensic medicine	3	2	3	2	—	—	10
General medicine	17	12	7	—	—	—	36
Hospital admn and community health admn	—	—	—	—	—	—	—
Immuno hematology and blood transfusion	—	—	—	—	—	—	—
Microbiology	7	4	4	3	—	—	18
Paediatrics	4	7	3	—	—	—	14
Physical medicine and rehabilitation	—	—	—	—	—	—	—
Physiology	8	5	2	3	—	—	18
Psychiatry (2)	5	3	2	—	—	—	10
Radio-diagnosis/radiology	6	5	6	—	—	—	17
Radiotherapy (3)	—	1	—	—	—	—	1
Social and preventive medicine	6	4	—	3	—	—	13
TB and respiratory medicine	2	—	—	—	—	—	2
Anatomy	6	6	4	2	—	—	18
Obstretics and gynaecology	13	8	3	—	—	—	24
Ophthalmology	6	8	3	—	—	—	17
Emergency and critical care medicine	2	—	—	—	—	—	2
Pathology	7	7	7	—	—	—	21
Pharmacology	3	5	3	3	—	—	14
Nuclear medicine	—	—	—	—	—	—	—
Sports medicine	—	—	—	—	—	—	—
Transfusion medicine	—	—	—	—	—	—	—
ENT (ear, nose, throat)	6	3	3	—	—	—	12
General surgery	15	14	8	—	—	—	37
Orthopaedics	5	3	4	—	—	—	12

continued

TABLE 4A.4, *continued*

	ADMISSION CAPACITY - NUMBER OF SEATS (1)						TOTAL ASSAM
	GAUHATI MED. COLLEGE (GUWAHATI)	ASSAM MED. COLLEGE (DIBRUGARH)	SILCHAR MED. COLLEGE (SILCHAR)	JORHAT MED. COLLEGE (JORHAT)	TEZPUR MED. COLLEGE (TEZPUR)	FAKHRUDDIN ALI AHMED MED. COLLEGE (BARPETA)	
Post doctoral degree (DM/MCh)	18	—	—	—	—	—	18
Cardiology	2	—	—	—	—	—	2
Clinical pharmacology	—	—	—	—	—	—	—
Endocrinology	2	—	—	—	—	—	2
Gastroenterology	—	—	—	—	—	—	—
Neonatology	—	—	—	—	—	—	—
Nephrology	2	—	—	—	—	—	2
Neurology	2	—	—	—	—	—	2
Oncology (3)	—	—	—	—	—	—	—
Head and neck surgery	—	—	—	—	—	—	—
Cardiac anaesthesiology	—	—	—	—	—	—	—
Pulmonary medicine	—	—	—	—	—	—	—
Rheumatology	—	—	—	—	—	—	—
Cardio-thoracic surgery	2	—	—	—	—	—	2
Cardio-thoracic vascular surgery	—	—	—	—	—	—	—
Endocrine surgery	—	—	—	—	—	—	—
Neuro-surgery	2	—	—	—	—	—	2
Plastic surgery	2	—	—	—	—	—	2
Surgical gastroenterology/GL surgery	—	—	—	—	—	—	—
Surgical oncology (3)	—	—	—	—	—	—	—
Thoracic surgery	—	—	—	—	—	—	—
Urology	2	—	—	—	—	—	2
Vascular surgery	—	—	—	—	—	—	—
Paediatric surgery	2	—	—	—	—	—	2

Source: Website of Medical Council of India; data retrieved on Sep 5, 2017.

Note: — = zero; MBBS = Bachelor of Medicine, Bachelor of Surgery; MD = Doctor of Medicine; MS = Master of Surgery; DM = Doctor of Medicine; MCh = Master of Surgery; TB = Tuberculosis.

(1) Includes “recognized” and “permitted” seats by Medical Council of India (MCI); “recognized” seats meet norms laid out by MCI; seats declared “permitted” by MCI are converted to “recognized” only after the institute scales up faculty, facilities, and infrastructure to meet MCI norms. A student from a “permitted” seat cannot claim the qualification on graduation, unless it has been converted to “recognized.”

(2) Lokopriya Gopinath Bordoloi Regional Institute of Mental Health (Tezpur) also offers 7 (2 in 2016–17, increased to 7 in 2017–18) MCI-recognized seats in MD-Psychiatry.

(3) Dr. B. Barooah Cancer Institute (BBCI) in Guwahati also offers MCI-recognized seats: 2 in MD-radiotherapy (since 2013), 3 in MCh-surgical oncology (1 starting 2016–17, and 2 more starting 2017–18), and 2 in DM-medical oncology (starting 2017–18).

TABLE 4A.5 Admission capacity and medical courses offered by medical colleges, Tripura, FY2016–17

	ADMISSION CAPACITY - NUMBER OF SEATS (1)		
	AGARTALA GOVERNMENT MEDICAL COLLEGE (AGARTALA)	TRIPURA MEDICAL COLLEGE AND DR. BRAM TEACHING HOSPITAL (AGARTALA)	TOTAL TRIPURA
Year of inception	2005	2006	
Management of college	Govt	Trust	
Undergraduate degree (MBBS)	100	100	200
Post graduate diploma	—	—	—
Post graduate degree (MD/MS)	25	5	30
Anaesthesiology	2	—	2
Aviation medicine/aerospace medicine	—	—	—
Bio-chemistry	—	—	—
Dermatology	—	—	—
Forensic medicine	1	—	1
General medicine	4	2	6
Hospital admn and community health admn	—	—	—
Immuno hematology and blood transfusion	—	—	—
Microbiology	1	—	1
Paediatrics	1	—	1
Physical medicine and rehabilitation	—	—	—
Physiology	—	—	—
Psychiatry	1	—	1
Radio-diagnosis/radiology	2	—	2
Radiotherapy	—	—	—
Social and preventive medicine/ community medicine	3	—	3
TB and respiratory medicine	—	—	—
Anatomy	—	—	—
Obstetrics and gynaecology	2	—	2
Ophthalmology	2	—	2
Emergency and critical care medicine	—	—	—
Pathology	—	1	1
Pharmacology	—	1	1
Nuclear medicine	—	—	—
Sports medicine	—	—	—
Transfusion medicine	—	—	—
ENT (ear, nose, throat)	2	1	3
General surgery	2	—	2
Orthopaedics	2	—	2
Post doctoral degree (DM/MCh)	—	—	—

Source: Website of Medical Council of India; data retrieved on Sep 5, 2017.

Note: — = zero; MBBS = Bachelor of Medicine, Bachelor of Surgery; MD = Doctor of Medicine; MS = Master of Surgery; DM = Doctor of Medicine; MCh = Master of Surgery; TB = Tuberculosis.

(1) Includes “recognized” and “permitted” seats by Medical Council of India (MCI); “recognized” seats meet norms laid out by MCI; seats declared “permitted” by MCI are converted to “recognized” only after the institute scales up faculty, facilities, and infrastructure to meet MCI norms. A student from a “permitted” seat cannot claim the qualification on graduation, unless it has been converted to “recognized.”

NOTES

1. With a population of ~400,000, Agartala is the second most populous city in NER after Guwahati (~957,000), per Census 2011 (<http://www.census2011.co.in/city.php>).
2. *Patients Beyond Borders* website (accessed May 29, 2019), <https://patientsbeyondborders.com/medical-tourism-statistics-facts>.
3. *Patients Beyond Borders* website (accessed May 29, 2019), <https://patientsbeyondborders.com/medical-tourism-statistics-facts>.
4. These include India; Singapore; Thailand; Malaysia; the Republic of Korea; Japan; Taiwan, China; Israel; and the United Arab Emirates in Asia; Poland, Hungary, the Czech Republic, and Turkey in Europe; South Africa in Africa; the United States in North America; and Mexico, Brazil, Costa Rica, and Cuba in South America and Central America.
5. Prior to 2014, the Ministry of Tourism reported MTA data based on declaration of “medical treatment” as “purpose of visit” on disembarkation cards filled by arriving tourists. These data likely underestimate the number of MTAs, as they depend on tourists arriving in India disclosing “medical treatment” as the “purpose of visit” on their disembarkation cards—for instance, nonresident Indians combining treatment with visits to the family back home would likely not be included in the foreign tourist arrival data. In 2014, with the discontinuation of the practice of filling disembarkation cards, the Ministry of Tourism reported foreign tourist arrivals based on “visa type”—MTA data were based on the issuance of M-category visas, a special visa introduced for medical tourists in 2007. Despite including medical attendants, who were not reported separately although they were issued a separate MX-category visa, these data likely underestimate MTAs. For instance, the data do not include those who travel with the Overseas Citizenship of India visa (16.7 percent of foreign tourist arrivals in 2014) and who may be seeking medical services while in India; there may be others traveling under a tourist visa for medical treatment, especially given the reported difficulties in obtaining an M-category visa (see *International Medical Travel Journal* 2016).
6. See Government of India (2017) for a breakdown by discipline of the estimated number of nonresidents availing health services in India through medical tourism and telemedicine in 2015–16.
7. Average savings (percent of U.S. costs) are in the range of: 65–80 percent for Malaysia; 50–75 percent for Thailand; 40–55 percent for Taiwan, China; 30–45 percent for the Republic of Korea; and 25–40 percent for Singapore (*Patients Beyond Borders* website, accessed May 29, 2019, <https://patientsbeyondborders.com/medical-tourism-statistics-facts>).
8. There are 38 Indian hospitals accredited by the Joint Commission International (website accessed on May 27, 2019, <https://www.jointcommissioninternational.org/>). The Joint Commission International is the international arm of the Joint Commission, which oversees the standard setting and accreditation for U.S. hospitals.
9. NABH is a constituent board of the Quality Council of India, a nonprofit autonomous society established by the Government of India to set up an accreditation structure in the country. NABH was set up in 2006 to establish and operate an accreditation program for health care organizations in India. There are 612 Indian hospitals accredited by NABH (website accessed May 27, 2019, <http://nabh.co/frmviewaccreditedhosp.aspx>).
10. Five percent of all doctors in the United States are of Indian origin (Nicolaidis 2011).
11. For example, India’s Apollo Group has a hospital in Bangladesh (Dhaka) and one in Oman (Muscat); it is also a major player in the telemedicine network set up by the Government of India in Africa (<http://www.apollotelehealth.com:9013/ATNF/panAfricanProject.jsp>; accessed May 27, 2019).
12. Ministry of Tourism’s website, <http://tourism.gov.in/marketing-development-assistance-scheme-promotion-medicalwellness-tourism>.
13. Government of India’s *Passport Seva* website, <http://passportindia.gov.in/AppOnlineProject/online/visaServices>.
14. <https://indianvisaonline.gov.in/evisa/tvoa.html>, accessed May 27, 2019.
15. Averages for Singapore (2013), China (2011), and Malaysia (2011) are from the Global Health Observatory data repository on the World Health Organization’s website (accessed September 4, 2017), <http://apps.who.int/gho/data/node.main.A1444>.
16. (1) The Gauhati Medical College and Hospital offers 18 seats in nine super specialties—two seats each in plastic surgery, pediatric surgery, cardiothoracic surgery, urology, neurosurgery, neurology, endocrinology, cardiology, and nephrology; website (accessed September 4, 2017),

- <http://gmchassam.gov.in/#>. (2) The Regional Institute of Medical Sciences in Imphal offers three seats in two super specialties—two seats in urology and one seat in plastic and reconstructive surgery; website (accessed September 4, 2017), <http://www.rims.edu.in/secure/academic/>. (3) The North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences in Shillong offers two seats in cardiology.
17. For details, see the website of the National Board of Exams, <http://www.nbe.edu.in>.
 18. Auxilliary Nurse Midwives and General Nurse Midwives (GNM) programs in nursing are diploma courses of duration 2 and 3.5 years, respectively, where the former is meant for grassroots-level multipurpose health workers. Bachelor of Science (BSc) in Nursing is a 4-year degree program. The post-basic BSc also confers a BSc degree, but is aimed at those who opted for the GNM diploma program. The MSc in Nursing is a 2-year post-graduate degree program that allows specializations such as cardiothoracic and vascular surgery, critical care, oncology, neurosciences, and others. The post-basic diploma program is a 1-year diploma program open to registered nurses (after the GNM program, BSc Nursing, or post-basic BSc Nursing) to allow specialization.
 19. Field interviews conducted with hospitals in Guwahati and Agartala in June 2017 for this study.
 20. At the time of the field visit in June 2017, at least three more hospitals were expected to come up: Health City (300 beds), Excelcare Hospital (200 beds), and a hospital venture with the Henry Ford Health System (600 beds) (<http://thechicagonewsjournal.com/business/madison-street-capital-serves-as-exclusive-advisor-to-prithvi-group-in-hospital-venture-with-henry-ford-health-system>). As of June 4, 2019, the former two had been set up and become operational.
 21. It has plans to invest more in Assam in the next 3 years through a chain of high-end health care and holistic wellness infrastructure, including a super specialty hospital in Jorhat (Assam) and a cancer hospital in Guwahati (*Medical Buyer* 2017).
 22. This is provided the seats are taken—in 2015 and 2016, there were no takers for the two MCh seats in cardiothoracic surgery at GMCH (based on interviews and data provided by GMCH).
 23. BCCI recently initiated oncology super specialty courses recognized by the Medical Council of India: MCh surgical oncology in 2016 (one seat in 2016, which was increased to three in 2017) and DM medical oncology in 2017 (two seats).
 24. Private teaching hospitals grant degrees called Diplomate of National Board (DNB)—in broad specialty, which is equivalent to MD/MS, and in super specialty, which is equivalent to DM/MCh. In Assam, DNB broad specialty is offered by, for instance, Downtown Hospital (Guwahati) in general medicine; general surgery ear, nose, and throat; orthopedics; and family medicine, and by Sri Sankaradeva Nethralaya (Guwahati) in ophthalmology.
 25. The estimates should be considered indicative only, since they are not based on an administered survey.
 26. In interviews, the hospital claimed that it did not make any explicit efforts toward attracting medical tourists; patients came based on positive word-of-mouth about its high-quality /low-cost services, compared with many other hospitals in India.
 27. 120 beds operational, as of June 2017.
 28. Based on interviews in June 2017 with hospitals, medical colleges, paramedical and nursing schools, and the State Directorate of Medical Education in Agartala.
 29. For example, in the United States, the annual volume of robotic surgery procedures has exceeded 500,000 since 2015 (Chen 2017).
 30. Website of the Dubai Health Authority, <https://www.dxh.ae/about-us/patient-protection-plan/>.
 31. Although opportunities in this segment will remain limited for medical tourism that entails people crossing borders to receive treatment, as defined in this paper, e-commerce opportunities in medical services will expand.
 32. Companies engaged fulltime in the business of medical travel. Such companies can streamline the search process for patients by matching their needs with the availability of expertise in various hospitals. They can make the whole process more convenient for medical tourists by packaging medical care, including pre- and post-recuperative procedures, with travel and tourism activities (International Trade Centre 2014).
 33. In January 2019, bids were approved for two international air routes: Guwahati-Dhaka and Guwahati-Bangkok (*LiveMint* 2019).
 34. Nationals of Myanmar are eligible for e-visas.

35. Based on interviews, cancer surgery typically requires patients to stay in the hospital for about 2 weeks; radiotherapy, which typically involves 25–30 fractionated sittings, over a duration of 1.5 months, can be carried out as outpatient services; and chemotherapy, which typically needs at least six cycles, with intervals of 3–4 weeks over a duration of 4–6 months, can also be carried out as outpatient services.
36. All the data provided here are indicative only. They are based on employment data provided by a subset of hospitals that were interviewed in Guwahati during June 2017. The hospitals include multispecialty hospitals that offer long-duration complex services like cancer care and organ transplants, along with other medical services, as well as stand-alone integrated cancer hospitals (with all cancer facilities under one roof, including radiation oncology). They also include private and public sector hospitals.
37. According to the All-India Survey of Higher Education (AISHE) 2015–16, women account for 87 percent of the total enrollment in nursing courses in stand-alone nursing institutions listed on the AISHE portal (63 percent response rate among listed nursing institutions) (Government of India 2016).
38. An interview in June 2017 with one private university offering nursing, paramedical, and other technical courses in Guwahati revealed that in its paramedical stream, women accounted for 40 percent of enrolled students in the diploma courses and 40–70 percent in the various degree courses (Bachelor of Science).
39. In AISHE 2011–12, the share of women stood at 39 percent at the MD level, 30 percent at the MS level, 12 percent at the DM level, and 5 percent at the MCh level.
40. For instance, there are often concerns expressed about the possibility of a two-tiered health system, where foreign patients would have access to sophisticated private hospitals with a high staff-to-patient ratio and expensive medical equipment, whereas the local population would only have access to basic, under-sourced health facilities. To alleviate that risk, for instance, the government can ensure that a certain proportion of medical tourism revenues is spent on health care for the local population, and a certain proportion of beds in private hospitals is reserved for the local community at zero cost. Another concern is that it would cause an internal brain drain, pulling away health professionals from the public sector. But a country's own private patients are likely to do that as well, and perhaps more so, as a study on Thailand shows (Pachanee and Wibulpolprasert 2006). For a detailed discussion, see Smith, Alvarez, and Chanda (2011).
41. Per India's cancer country profile, 2014, on the World Health Organization's website, http://www.who.int/cancer/country-profiles/ind_en.pdf?ua=1.
42. The ICMR report is based on data for 2012–14 from 27 Population-Based Cancer Registries in India, of which 11 are in NER. The top seven cancer registry areas among males and the top four among females, ranked by age-adjusted rates of cancer incidence, fall under the registries in NER; Assam's Kamrup Urban District (within which Guwahati falls) ranks fourth in cancer incidence among males and third among females. For more details, see Indian Council of Medical Research (2016).
43. Per Bangladesh's cancer country profile, 2014, on the World Health Organization's website, http://www.who.int/cancer/country-profiles/bgd_en.pdf?ua=1.
44. For details, see the website of the Government of Assam's Department of Health & Family Welfare, <http://www.nrhmassam.in/docs/atalamrit/GovtNotifGuidelinesOnAAA.pdf>.
45. BCCI initiated MCh surgical oncology in 2016 (one seat only in 2016, which was increased to three in 2017) and DM medical oncology in 2017 (two seats).
46. To put things in perspective, it is estimated that India has only 2,000 oncologists, while it needs thrice as many (see Money Control 2015). Very few institutes in the country offer MCI-approved super specialty courses in oncology—there are only 89 seats in DM oncology and 81 seats in surgical oncology in the country (table 4A.2 in the annex).
47. Hospitals and diagnostic centers attracted foreign direct investment of US\$4.2 billion between April 2000 and December 2016 (India Brand Equity Foundation 2017), and health care as a whole has seen an increase in transaction value (private equity and venture capital), from US\$94 million in 2011 to US\$1,275 million in 2016 (NATHEALTH and PricewaterhouseCoopers 2017).
48. https://ncog.gov.in/NEIDS_SCHEME_NOTIFICATION.pdf.
49. In Bangladesh, Indian Visa Application Centres are available in Dhaka, Chittagong, Sylhet, Khulna, Barisal, Mymensingh, Rangpur, Rajshahi, Jessore, Comilla, Brahmanbaria, Noakhali, Satkhira, Bogura, and Thakurgaon (the last six were added in January 2019). There are no visa fees, except a visa processing fee of Tk 800 (US\$9–US\$10) charged by the

- State Bank of India's Indian Visa Application Centre (website accessed May 27, 2019; <http://www.ivacbd.com/For-Bangladeshi->).
50. For Thailand, see Alberti, Giusti, and Papa (2014); for Malaysia, see the website of the Malaysia Healthcare Travel Council (<https://www.mhtc.org.my/about-us/>).
 51. The Holiday Inn built on the campus of the Cleveland Clinic (Cleveland, OH, the United States) has rooms that have more electric sockets than usual to accommodate patients who may need to plug in respirators or other equipment; the lobby-level café has tables positioned at different heights to accommodate patients in wheelchairs (*Post and Courier* 2017). The InterContinental Hotel built opposite the Texas Medical Center (Houston, TX, the United States), which houses one of the largest cancer centers, has wheelchair-friendly rooms and elevators—even in details such as access to closets, light controls in the rooms, and elevator buttons (<https://www.ihg.com/intercontinental/hotels/us/en/houston/houit/hoteldetail>).
 52. Some Indian hospitals allow their MRI machines to be used 24/7, sometimes charging lower prices at night, when the machines would normally be idle, to incentivize patients to get scans done at inconvenient times (Govindarajan and Ramamurti 2013).
 53. Website of the Dubai Health Authority (accessed February 6, 2019), <https://www.dxh.ae/about-us/patient-protection-plan/>.
 54. Stringent criteria are employed for participation in the MHTC Partners Membership Program—as an ordinary or elite partner. Elite partners are accredited by internationally recognized health care accreditation agencies like the Joint Commission International, Malaysian Society for Quality in Health, and Australian Council on Healthcare Standards; ordinary partners possess at least one accreditation from an international health care accreditation body and are selected by a committee comprising representatives from the private sector and the government that evaluates the standards of their service and medical care (MHTC website (accessed February 4, 2019), <https://www.mhtc.org.my/services/mhtc-partners/>).

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5 Opportunities for Bangladesh

SANJAY KATHURIA AND PRIYA MATHUR

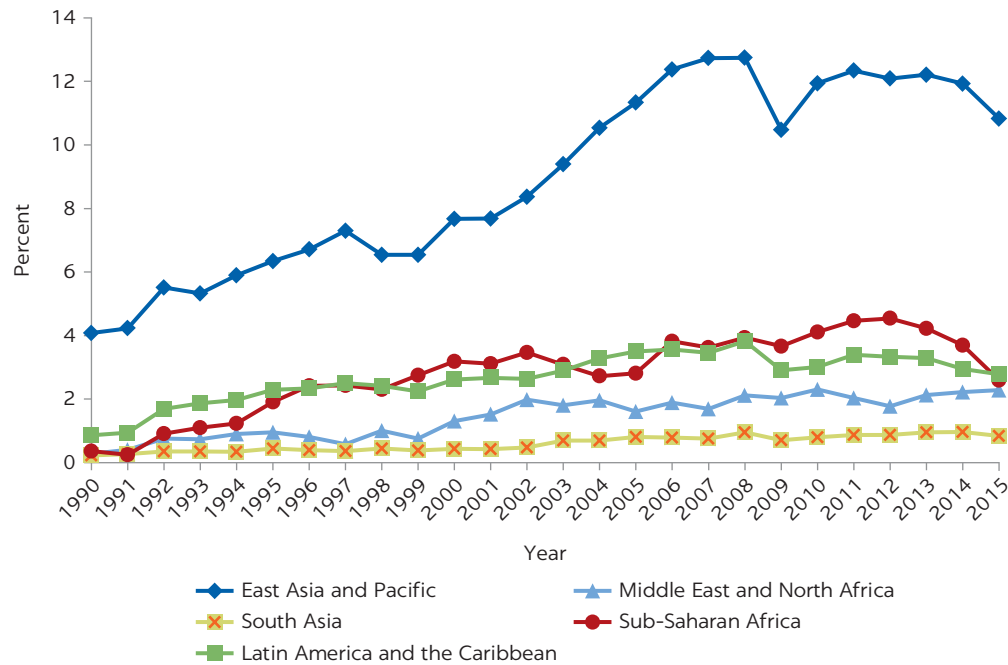
ABSTRACT This paper is part of analytical work done by the World Bank on strengthening inclusive cross-border value chains in Northeast India, in support of the implementation of the World Bank-supported North East Rural Livelihoods Project (NERLP). Government of India’s “Act East Policy,” and its “Neighborhood first” policy has spurred deepening cooperation with South Asian neighbors, with greater momentum in the Bangladesh-Bhutan-India-Nepal sub-region, and especially with Bangladesh. This has put the spotlight on Northeast India and Bangladesh, given their strategic location at the center of the sub-region as well as at the crossroads of South Asia and South East Asia. The Government has been investing heavily in improving connectivity within the North Eastern Region of India, and between the region and Bangladesh as well as other neighboring countries. Bangladesh can leverage these developments for its own gains—gains for its consumers as well as gains for its firms. Even as Bangladesh pursues trading opportunities across the world for maximum gains, it needs to consider more fully growth opportunities at its doorstep. This paper focuses on new opportunities that are emerging for Bangladesh as a result of improving connectivity and emerging value chains in Northeast India, and presents some initial ideas for consideration.

BANGLADESH UNDERUTILIZING GROWTH OPPORTUNITIES IN SOUTH ASIA

Trade has played a key role in reducing poverty across the globe. Furthermore, trade with neighbors has been leveraged by some of the most successful economies in East Asia, Europe, and North America. However, in South Asia, the potential of intraregional trade continues to be underutilized—intraregional trade accounts for a little more than 5 percent of South Asia’s total trade, compared with 50 percent in East Asia and the Pacific and 22 percent in Sub-Saharan Africa. The picture does not alter when gross domestic product (GDP) is

FIGURE 5.1

Intraregional trade as a share of regional GDP



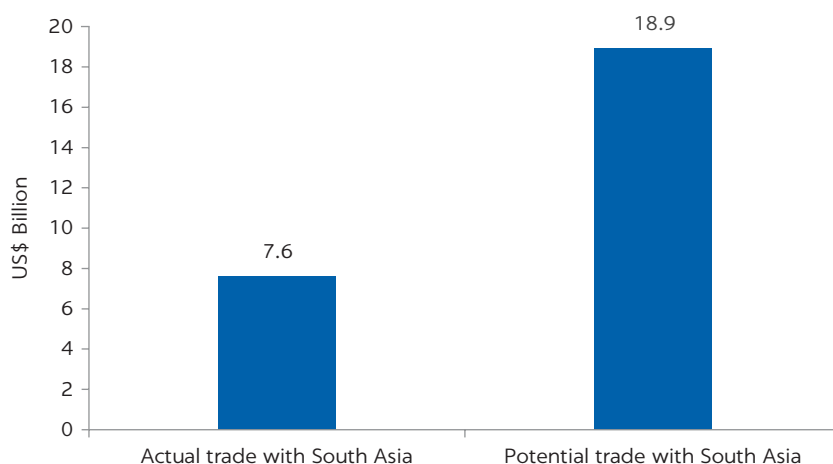
Source: Calculations based on data from UN Comtrade (United Nations Commodity Trade Statistics Database), Statistics Division, Department of Economic and Social Affairs, United Nations, New York, <http://comtrade.un.org/db/>; WDI (World Development Indicators) (database), World Bank, Washington, DC, <http://data.worldbank.org/products/wdi>; WITS (World Integrated Trade Solution) (database), World Bank, Washington, DC, <http://wits.worldbank.org/WITS/>.

the denominator. As a share of regional GDP, trade in South Asia is less than one percent, compared to almost 11 percent for East Asia and the Pacific, and 2.6 percent for Sub-Saharan Africa (figure 5.1).

A recent World Bank report systematically documents how South Asian countries have trade regimes that discriminate against each other, thus offsetting the positive impact of geography and proximity (Kathuria 2018). The same report uses a gravity model¹ to show that total goods trade within South Asia could have been worth \$67 billion rather than the actual trade of only \$23 billion in 2015. The gap has been expanding, from only \$7 billion in 2001 to \$44 billion in 2015, partly because of the significant acceleration in GDP growth in South Asia relative to the world over that period.² The big gap between actual and potential trade can be largely attributed to the gap in bilateral trade between Bangladesh and India and between India and Pakistan, the three largest economies in the region.

For Bangladesh, actual trade with South Asia is less than half of its potential, as predicted by the gravity model used in the World Bank report (figure 5.2). The gap of about US\$11.3 billion (13 percent of Bangladesh's global trade) arises from significant under-trading with India (US\$10 billion), Pakistan (US\$ 540 million), and Sri Lanka (US\$ 420 million).

Even as Bangladesh pursues trading opportunities across the world for maximum gains, as do most countries around the globe, it will benefit from closer attention to growth opportunities in its immediate neighborhood. This imperative becomes stronger given that South Asia continues to be the most rapidly growing region in the world since 2015.

FIGURE 5.2**Trade between Bangladesh and South Asia, 2015**

Source: Based on gravity model estimates in Kathuria 2018.

This paper showcases regional growth opportunities for Bangladesh, focusing on emerging opportunities in the North Eastern Region (NER) of India, comprising the eight Indian states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. Government of India's (GoI's) "Act East Policy," and its "Neighborhood first" policy, which have spurred deepening relationships with neighbors, especially Bangladesh, have placed Bangladesh and NER centerstage. GoI is also investing heavily in improving connectivity within NER, and between NER and Bangladesh as well as other neighboring countries. This paper presents some initial ideas on how Bangladesh can leverage NER's improved connectivity and emerging value chains for its own welfare gains.

The next section documents the developments in NER's connectivity and deepening relationship with neighbors in the sub-region, particularly with Bangladesh. The subsequent section presents some initial thoughts on how Bangladesh can benefit from NER's improved connectivity and related developments. The last section highlights constraints that may need to be addressed for Bangladesh to maximize gains from regional opportunities presented by NER, and puts forth some policy considerations.

CONNECTIVITY IMPROVEMENTS AND RELATED DEVELOPMENTS IN NER

The eight states that collectively comprise NER are among the states that have lagged in India's growth and development. Yet, NER is a region with a lot of promise. It has abundant natural resources, such as oil and gas, coal, and limestone; water resources and hydroelectric potential; tropical forests with rich biodiversity; and a salubrious climate with various agroclimatic zones. NER also possesses strong human resources—a high share of youth (ages 15–24 years) in the population, high literacy rates, and relatively high female participation in the workforce (Kathuria and Mathur 2019). Indeed, NER flourished as a trade and commerce hub, and was one of the most prosperous regions of the country as part of undivided Bengal, before the division of the Indian subcontinent in 1947 (Government of India 2008, 4).

As part of the undivided province of Bengal in pre-partition India, NER was well-connected to markets in India and the rest of the world. Global trade was conducted through the Port of Chittagong in present-day Bangladesh and the Port of Kolkata in present-day India, which were connected to the region through a network of inland waterways, provided by the Brahmaputra-Barak River Systems and their tributaries, roads, and railways. The Dibrugarh (present-day Assam, India)—Chittagong railway line was one of the first railway line in Asia. The establishment of the first tea garden in 1835 initiated the rapid spread of tea gardens and tea exports from the region. The foundation for early industrial activity was laid with the discovery of oil and establishment of an oil refinery in Digboi in Assam in 1890. Missionaries laid the groundwork for spreading literacy in the region.

NER's growth and development trajectory changed with the division of the subcontinent. This division caused the interruption of inland water, road, and railway communications through Bangladesh and the loss of access to the Port of Chittagong, the gateway to East Asia and Southeast Asia. NER virtually became an island, connected to the rest of India only through the narrow 27-km-wide Siliguri Corridor, or Chicken's Neck. NEI's access to the Port of Kolkata became more circuitous and cumbersome. Today, a consignment of goods from Agartala (Tripura) must travel 1,600 km through the Siliguri Corridor to reach Kolkata, while it would need to travel less than 600 km through Bangladesh to reach the same destination, and even better, only 200 km to reach the nearby Port of Chittagong in Bangladesh. The disruption of connectivity following partition minimized NER's natural advantages and prevented it from fulfilling its potential.

However, recent developments in NER and within the greater Bangladesh-Bhutan-India-Nepal (BBIN) sub-region hold a new promise of unlocking NER's economic potential by improving market access. GoI's "Act East" policy has replaced its "Look East" policy to make India's engagement with the Association of South East Asian Nations (ASEAN) more proactive. GoI, in recent years, has also accorded top priority to the regional integration agenda under its "Neighborhood First" policy, recognizing that regional integration, or lack thereof, has significant implications for India's economic development. With these policy initiatives, NER has become central to the implementation of India's "Act East" policy and its regional integration efforts in the BBIN region, given its strategic location at the crossroads of India, Bangladesh, Nepal, Bhutan, Myanmar, and beyond to East Asia. These initiatives have manifested in an upsurge in investments in improving connectivity in NER, as well as deepening sub-regional cooperation in BBIN region, especially between India and Bangladesh. Like NER, Bangladesh too is a critical connector between South Asia and ASEAN, as well as a key player in the BBIN sub-region.

Improving connectivity in NER

The Government of India has been vigorously supporting a host of initiatives to improve connectivity within NER, between NER and the rest of India, as well as between NER and neighboring countries. Investments are being made in expanding and upgrading the road and rail network, activating waterways, and making more airports operational.³ In every state in NER, the average time to reach the nearest city has been cut from more than 3 hours in 2000 to 1 hour in 2015 (Srinivasan 2019).

Road connectivity

The government has been pursuing a large-scale program to develop road infrastructure in NER. Investments are being made to upgrade the state highways into national highways, with emphasis on connecting district headquarter towns in NER, under the Special Accelerated Road Development Program for the North Eastern Region (SARDP-NE).⁴ The central master plan for road connectivity in the region aims to upgrade all national highways to four lanes and connect all state capitals and sub-divisional headquarters by all-weather roads. In an effort to improve NER's connectivity with the rest of India, the 670 km long stretch of the East-West Corridor⁵ between Srirampur on the West Bengal/Assam border and Silchar (Assam) is being converted into a four-lane highway. The Trans-Arunachal Highway is under construction to enhance east-west connectivity within NER.⁶

There are three emerging corridors that will enhance NER's connectivity with neighboring countries—the Trilateral Highway, linking Manipur in NER to Thailand via Myanmar, the Kaladan multimodal project, connecting Mizoram in NER to Sittwe port in Myanmar, and the Bangladesh-China-India-Myanmar (BCIM) Corridor, connecting India and China, via Myanmar and Bangladesh.

Rail connectivity

GoI has been implementing an aggressive program to develop the railway network in NER. The ongoing expansion of rail connectivity in NER can be a potential game changer. The network expansion in NER offers the prospect of high-speed rail connectivity between the Chinese city of Kunming in Yunnan province and Kolkata in India via Mandalay in Myanmar and Dhaka in Bangladesh.

The existing network in NER is mostly broad-gauge. The focus of investments within NER has been on expanding the broad-gauge network to include all states; there are also plans to develop rail links with neighboring countries. All NER states are now connected to the broad-gauge network, and broad-gauge lines are being extended to reach state capitals (or nearby towns). Besides the capital of Assam (Guwahati), the capital of Tripura (Agartala) is now connected by broad-gauge line.

Plans are also underway to connect India and Bangladesh through rail links. Work is ongoing on the 15 km stretch between Agartala and Akhaura (Bangladesh). Once completed, this will substantially reduce the rail distance between Agartala and Kolkata, from the present 1,590 km to 499 km, if transit via Bangladesh can take place. In addition, work is also likely to be completed by the end of 2019 on the 114 km broad-gauge track from Silchar (Assam) to Agartala (Tripura), and thereafter to the border town of Sabroom (Tripura), from which the Port of Chittagong in Bangladesh is merely 75 km away. Already, the track has reached Udaipur (Tripura), and the Silchar-Udaipur track has been operational since January 2017.

Between India and Nepal, there are two railway lines in operation: Raxaul-Sirsiya and Jaynagar-Janakpur. India and Nepal have plans to connect by rail New Jalpaiguri (India) to Kakarbhitta (Nepal), Jogbani (India) to Biratnagar (Nepal), Nautanwa (India) to Bhairahawa (Nepal), and Nepalganj Road (India) to Nepalganj (Nepal).

There is no rail link between India and Bhutan at present. However, the Government of India has identified five potential rail links: Kokhranjhar (Assam) to Gelephu (Bhutan), Pathsala (Assam) to Nanglam (Bhutan), Rangiya (Assam) to Samdrupjongkhar (Bhutan), Banarhat (West Bengal) to Samtse (Bhutan), and Hasimara (West Bengal) to Phuentsholing (Bhutan).

There is no rail link between India and Myanmar. A survey is being conducted to lay railway lines between Imphal, the capital of Manipur, and Moreh (Manipur), which is located on the India-Myanmar border. In Manipur, work is presently ongoing on the 84 km Jiribam-Tupul section of the railway project, and it is likely to be completed by 2020. Thereafter, the railway line will reach Imphal.

Significant developments in railway connectivity that are expected by 2020 include (1) Imphal (Manipur) will be connected to the broad-gauge railway network; (2) Agartala (Tripura) will be linked with Kolkata (West Bengal) via Bangladesh; (3) Guwahati (Assam), Silchar (Assam), and Agartala (Tripura) will be connected with the Port of Chittagong (Bangladesh); and (4) all the state capitals in NER will have broad-gauge links. Other regional connectivity projects include the resumption of railway line construction between Imphal (Manipur) and Moreh (Manipur), on the India-Myanmar border; extension of Indian railway lines into Nepal, at various points in addition to Birgunj, which is already connected; and connection of Bhutan and India by railway.

Inland waterways connectivity

IWT has great potential for significant cost saving in transportation in NER.² Since 1988, the stretch of the Brahmaputra River in Assam from Sadiya to Dhubri (891 km) on the India-Bangladesh border has been declared as National Waterways 2 (NW-2). However, only shallow draft barges can move along NW-2, due to low navigability. Additionally, night operations are not possible in some parts along the river. However, night navigation aids have recently been installed between Silghat and Dhubri (440 km).⁸ Differential Global Positioning Systems stations were set up at Dibrugarh, Silghat, Jogighopa, and Dhubri to enable safe navigation.

Ongoing investments in the waterways should help strengthen cross-border connectivity, particularly with Bangladesh. A stretch of the Barak River (121 km) from Lakhimpur (Assam) to Bhanga (Assam) on the India-Bangladesh border has been declared as National Waterway 6 and is being improved, mainly through dredging of the fairway.

At the regional level, IWT services between India and Bangladesh are governed by the Protocol on Inland Water Transit and Trade (PIWTT), which allows movement of cargo from Haldia/Kolkata (West Bengal) to Karimganj/Guwahati (Assam) in NER and vice versa via Bangladesh. PIWTT was recently renewed to run until March 31, 2020 and has a provision for automatic renewal. Improvements are underway in Bangladesh and India to improve several IWT terminals, including the Ashuganj river terminal in Bangladesh. Ashuganj has road links and customs facilities for transit cargo to NER via the Akhaura (Bangladesh)-Agartala (Tripura, India) land border and links to the Port of Chittagong.

To enhance inland and coastal waterway connectivity between the two countries for trade and cruise movements, India and Bangladesh signed several other agreements in 2018, among them: (1) an agreement to use Chattogram (Chittagong) and Mongla Ports in Bangladesh for movement of goods to and from India, (2) a standard operating procedure for movement of passenger and cruise vessels on the inland protocol route and coastal shipping routes, and (3) an addendum to the PIWTT between India and Bangladesh for inclusion of Dhubri in India and Pangaon in Bangladesh as new ports of call. These initiatives are complemented by the India-Bangladesh Coastal Shipping Agreement,

which was signed in June 2015. The agreement provides for direct connectivity between sea ports in Eastern India and Bangladesh. Taken together, these initiatives provide a much more flexible system for transport and logistics that can only benefit NER.

Air connectivity

The terrain of NER has historically made air transport connectivity more necessary, as overland transport links are costly and unreliable. All the states are connected by air, although some, like Meghalaya and Sikkim, have no airports that can handle wide-bodied aircraft. Within NER, Guwahati is the preeminent hub and has links to Bhutan and Thailand.² Often there is no direct connectivity between other state capitals except through Guwahati. In some cases, travel from one state to another is via Kolkata, which is the main gateway to the rest of India and the outside world.

Several facilities are under development across the region. The Sixth Sectoral Summit of North East Council on Air Connectivity set a target of “operationalizing up to 50 airports/airstrips in the NER by the end of the Eleventh Five Year Plan, and providing up to 600 flights per week within the region, by using the appropriate type of aircraft, making the required improvements in existing airports/airstrips in a time-bound manner” (Government of India 2007). A new airport at Pakyong (Sikkim) opened in September 2018 as the first greenfield airport in NER; other ongoing projects are at Itanagar and Tawang, in Arunachal Pradesh.

The Government of Assam has been trying to develop air connectivity between Guwahati and neighboring countries under the Ministry of Civil Aviation’s UDAN III scheme. Under the scheme, in January 2018, bids were finalized for the Guwahati-Dhaka and Guwahati-Bangkok routes (LiveMint 2019). And Spice Jet launched air cargo services from Guwahati to Hong Kong SAR, China, in January 2018.

Deepening cooperation with neighbors

The connectivity initiatives in NER are complemented by the growing sub-regional cooperation among Bangladesh, Bhutan, India, and Nepal, especially the deepening relationship between India and Bangladesh. The (B)BIN Motor Vehicles Agreement, which was signed between Bangladesh, Bhutan, India, and Nepal in June 2015, aims to allow vehicles registered in these countries to travel through each other’s sovereign territories.¹⁰ This will do away with the need for transshipment of goods at the border, saving time and money—currently, transshipment is not needed only between India and Nepal.¹¹ Transit through Bangladesh could be a game-changer for NER—due to the shapes of the borders in the region, Bangladesh could serve as a transit country for trade between NER and the rest of India, as also for Nepal and Bhutan, just as NER could serve as a transit region for Bangladesh to reach markets in Nepal and Bhutan, or even South East Asia. A pilot carried out by logistics company DHL in November 2015 showed that cargo movement from Kolkata to Agartala in NER would become extremely time- and cost-effective if routed via Bangladesh, instead of the circuitous route through the Siliguri Corridor, cutting the travel distance by more than 1,000 km (DHL 2016).

Economic ties between India and Bangladesh have been on the upswing with deepening relationships in trade, and various sectors such as energy

and waterways. The deepening relationship has been cemented with the signing of several bilateral agreements during the visit of Prime Minister Narendra Modi to Bangladesh in June 2015 and the visits of Prime Minister Sheikh Hasina to India in April 2017 and October 2018. Given the shared border of 1,880 km between NER and Bangladesh, deepening cooperation between the two countries can provide further impetus to NER's growth and development, and, as this paper argues, to Bangladesh's growth prospects as well.

As mentioned above, connectivity investments are being made to improve road and rail connectivity between the two countries; and the PIWTT along with the Coastal Shipping Agreement, along with the Agreement that grants access to the Ports of Chittagong and Mongla in Bangladesh to India for shipping goods to and from NER will improve waterways connectivity. Together, these agreements and measures will enhance connectivity, while lowering transportation costs and time, for goods flowing to and from NER. Under the PIWTT, transshipment of cargo has already begun through the Port of Ashuganj, a river port, and the Akhaura Land Customs Station in Bangladesh to the NER state of Tripura.

The Governments of India and Bangladesh have stressed that coordinated infrastructure upgradation of Land Customs Stations and Integrated Check Posts is an urgent need. The upgrades will smooth the flow of goods across the border. The Agreement on Bilateral Cooperation between the Bureau of Indian Standards and the Bangladesh Standards and Testing Institution (BSTI), which will facilitate compliance with and recognition of each other's standards, will further ease the flow of goods. In April 2017, the Food Safety and Standards Authority of India agreed to recognize testing and certification by BSTI for imports of 21 Bangladeshi food products into India.¹² The equivalence granted by the Food Safety and Standards Authority of India to BSTI in this case means that imports of such products, if accompanied by a BSTI certificate, will only be subject to risk-based sampling for testing by India. Prior to this, traditionally, imports of such products were tested in India at laboratories that may have been at a distance from the border, resulting in higher costs to traders due to waiting time for test results.

BANGLADESH CAN LEVERAGE NER'S CONNECTIVITY IMPROVEMENTS AND RELATED DEVELOPMENTS FOR ITS OWN GAINS

Connectivity investments in NER and related developments as well as other global trends are now playing up very favorably for NER. The latter include growing incomes, leisure spending and consumer awareness in India and neighboring countries; a rising preference for fresh, healthy, safe, environmentally-friendly, and socially responsible products; and the growing role of services in manufacturing, increasing demand for skilled resources. Together, these developments can help NER showcase its strengths in agriculture and services such as education and medical tourism, leveraging its organic or near-organic crop growing conditions, clean air, and high female labor force participation (Kathuria and Mathur 2019).

Neighboring countries can leverage connectivity improvements and opportunities in developing value chains in NER for their own welfare gains. The following sections reflect on how Bangladesh can benefit from

these developments. Possible opportunities for Bangladesh include: welfare gains for consumers; new growth openings for firms; participation of its logistics service providers in NER value chains and mutually beneficial transit arrangements between India and Bangladesh.

Regional opportunities for improving consumer welfare in Bangladesh

Bangladeshi consumers can gain through access to another source of imports in their immediate vicinity, possibly with a cost advantage due to proximity to source, and access to a greater variety of goods and services.

For example, NER, with its various agroclimatic zones, can provide a variety of fresh horticulture produce such as fruits, vegetables, and spices to consumers in Bangladesh. NER's topography, climate and soil properties yield a variety of spices that are valued for their intrinsic properties and high content of active ingredients. For instance, the Naga chilies from Mizoram and the Bhut Jolokia chilies from Assam are high in capsaicin content, and Lakadong turmeric from Meghalaya is high in curcumin. Furthermore, with the relatively low penetration of chemical fertilizers and pesticides in the region, much of NER's horticulture produce is organic or near-organic in nature.

Fresh horticultural products from NER can go toward meeting food requirements of Bangladesh, which is a net importer of food, including fruits, vegetables, and spices (table 5.1). Already, various horticultural products from NER reach Bangladesh, with informal exports far exceeding formal exports. In 2012–13, formal exports of fresh fruits and vegetables and spices from NER to Bangladesh amounted to US\$4.8 million¹³; informal exports of these products may have far exceeded the formal exports.¹⁴ As food control is tightening around the world, including in South Asia and Bangladesh (Jensen 2019), and consumers are becoming more quality-conscious, NER value chains geared towards high quality fresh produce could service demand for “quality-conscious” Bangladeshi consumers who value “freshness” (see chapters 1 and 2 of this book), with proximity to the producing region providing a potential cost advantage.

Similarly, in the case of services, such as medical services, Bangladeshi patients could benefit from NER's medical tourism industry, given Bangladesh's current position as the top-ranked source of medical tourists to India, and its geographic and cultural proximity to NER. Bangladesh contributed 35 percent of India's estimated medical tourists of 460,000 and 55 percent of India's estimated medical tourism revenues of US\$620 million in 2015–16 (Government of India 2017).

TABLE 5.1 Bangladesh's food trade, 2015

US\$, millions

	FRUITS & VEGETABLES (1)	SPICES (2)	ALL FOOD ITEMS (3)
Bangladesh's food imports (A)	991.9	215.7	6,870.9
Bangladesh's food exports (B)	168.7	24.2	789.0
Net food imports (A)—(B)	823.1	191.5	6,081.9

Sources: Calculations based on data from the United Nations Commodity Trade Statistics Database, <http://comtrade.un.org/db/> and World Integrated Trade Solution, <http://wits.worldbank.org/WITS/>.

Note: Under Standard International Trade Classification (SITC) Rev. 3: (1) vegetables and fruits are defined as SITC 05: Vegetables and fruit; (2) spices are defined as SITC 075: Spices; and (3) all food items are defined to include SITC 0: Food and live animals (excluding SITC 00: Live animals and SITC 08: Feedstuff for animals), SITC 111: Non-alcoholic beverages, n.e.s., and SITC 4: Animal and vegetable oils, fats, and waxes.

In NER, Guwahati (Assam) is fast emerging as a medical services hub for patients from rest of Assam and NER, with rapidly expanding medical services and private sector participation in the hospital sector. In June 2017, apart from many private nursing homes, Guwahati had several private hospitals—more than 10 private hospitals with bed capacity of 100 or more, of which at least seven hospitals have bed capacity of 200 or more; at least three new hospitals with 200 or more beds were expected to come up in the city (see chapter 4 of this book).¹⁵ A notable development has been the recent foray made by two well-known private corporate hospital chains with strong presence in the rest of India—Narayana Hrudayalaya (with a 286-bed hospital) in 2013, and Apollo (with a 220-bed hospital) in 2016. Along with increasing private sector participation, specialized services such as cardiac surgery, and orthopedic surgery as well as complex services such as cancer care are also expanding in Guwahati. The Government of Assam too is investing heavily in complex services like cancer care in the public sector, which, through creation of a more supportive eco-system, also bodes well for provision of such services in the private sector. Further, a medical services and medical tourism hub in Guwahati can differentiate itself from other such destinations, by leveraging NER's strengths in service-orientation of its people—as reflected, for example, in the large presence of NER natives in nursing and hospitality sectors (hotels, restaurants, airlines) in India and a widespread acknowledgement of their soft skills (see chapter 4 of this book).

Bangladesh witnesses a large outflow of patients to Indian cities such as Kolkata and New Delhi, as well as countries such as Singapore, Thailand and Malaysia for availing medical treatment in specialized as well as complex medical services. In this scenario, a medical tourism hub in NER can provide another choice of destination to Bangladeshi patients who choose to travel abroad for treatment—a destination which is closer to home and more familiar, and which differentiates itself in terms of patient-centric compassionate care. Further, India is reputed for providing quality medical services, with a cost advantage over developed countries and other Asian competitors,¹⁶ and NER may offer the same or better cost advantage for patients, as compared to Kolkata and other Indian medical tourism destinations (see chapter 4 of this book).

Growing connectivity of NER, within and beyond to neighboring countries, could also be leveraged by Bangladesh to get easier access to products and services from beyond NER—Bhutan, Nepal, Myanmar, China and beyond.

Regional opportunities for growth of firms in Bangladesh

NER presents many greenfield opportunities for Bangladeshi firms, who can access inputs from across the border, invest in a range of product/service options that could include or lead to creation of regional value chains. Such investments can also help NER value chains and businesses to scale up.

Firms in Bangladesh could benefit from access to NER for sourcing possibly cheaper and a greater variety of inputs, as well as for selling products, with the possibility of access through NER to markets beyond. For example, horticultural produce from NER could be used as inputs into Bangladesh's vibrant food processing industry, while processed foods can be exported to NER and beyond; some of this is already taking place. Bangladeshi firms could also consider going another step forward to secure a steady supply of inputs by investing in NER's farm sector, given the relative scarcity of land in Bangladesh, to

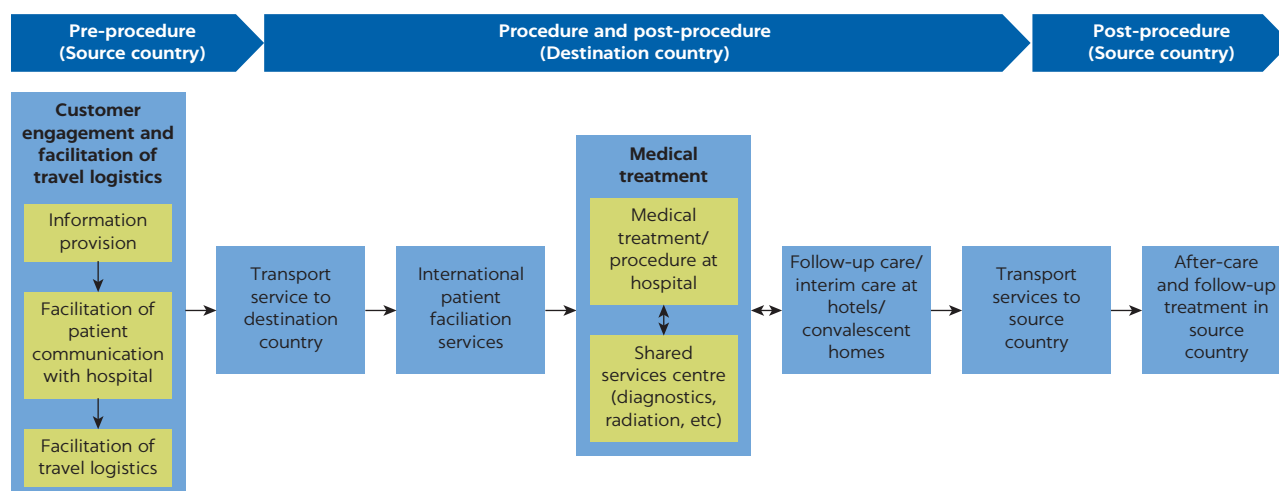
meet the food requirements of a growing population. They could similarly consider investing in processing plants in NER, sourcing some inputs locally, and then selling in NER as well as re-exporting to Bangladesh—PRAN foods, one of the largest food and beverage companies in Bangladesh, has already made a foray here by setting up a plant in Tripura.

Bangladeshi firms could also consider investment in NER businesses and value chains as a learning experience. For mature firms like PRAN foods mentioned above, NER has served as a testing ground for its expansion to more competitive markets in the rest of India and elsewhere in the world. The Chaudhary Group of Nepal has also benefited from the learning afforded by its production and distribution in NER.¹⁷

For other firms, investment in NER through joint ventures with more mature firms could serve as a means of knowledge transfer and skills upgradation in their facilities in Bangladesh. For instance, in NER's medical tourism industry (see chapter 4 of this book), Bangladeshi hospitals can partner with more advanced destination hospitals to participate in the initial diagnostics before the patient travels abroad for the medical procedure as well as the after-care after patients return home—with a greater role for Bangladeshi hospitals in the value chain for long-duration complex services like cancer care and organ transplants, where aftercare and patient monitoring is required for a much longer period of time (figure 5.3). They can also consider entering into a deeper partnership through joint ventures with destination hospitals in NER, which would allow knowledge transfer to take place so that the procedure stage can also eventually be taken up by hospitals in Bangladesh itself. An example of such a fruitful partnership, where hospitals across borders create value together, is provided by the Peace Clinic Initiative between India and Pakistan. Launched in 2013, the Initiative connects Dr. Ziauddin Hospital in Karachi, Pakistan, to Apollo, Medanta, and Fortis Hospitals in India. Initially, a virtual outpatient clinic was set up at the Karachi Hospital for Pakistani

FIGURE 5.3

Value chain: Medical tourism in long-duration complex services



Source: Based on interviews and secondary research.

Note: Long-duration complex services refer to medical services such as cancer care and neurological treatments where patients are required to stay in the destination, in hospitals and/or hotels, for more than 2–3 weeks, and often for months, and where treatment requires skills of several doctors of various specializations and others on the team (such as technicians proficient in operating expensive and sophisticated medical equipment), making coordinated team skills more important than the individual skills of one doctor.

patients to consult with Indian doctors. Subsequently, under the same Initiative, Indian hospitals have collaborated with the Karachi hospital to work together on patients who need liver and kidney transplants. In the pre-procedure stage, the initial diagnosis and assessment of transplant needs are done at Dr. Ziauddin Hospital by local doctors, and Indian doctors who are available through the online outpatient clinic or during camps held periodically by visiting doctors from India. The patient travels to India for the transplant procedure, if required. Patient monitoring and aftercare on returning to Pakistan are provided by Dr. Ziauddin Hospital. Doctors at the Karachi hospital have received training in pre-procedure and post-procedure care at the partner Indian hospitals. From time to time, joint surgeries are conducted at the Karachi hospital with the collaboration of doctors from both countries.

Opportunities for gains through participation in logistics services and transit arrangements

Bangladesh and NER can also both gain from improved scope and efficiency of logistics infrastructure and transit arrangements. Movement through Bangladesh, connecting NER with West Bengal and other Western states of India, and use of Bangladeshi ports can improve NER's access to markets, reducing transportation costs and time, and making NER products more competitive. At the same time, NER value chains can create business opportunities for Bangladeshi logistics providers—transporters, providers of port services, etc. Further, reciprocal arrangements through India, especially NER, and use of emerging corridors that connect NER with neighboring countries can allow Bangladeshi firms easier access to markets for sourcing inputs or selling products in the BBIN region, Myanmar and beyond. For greater efficiency gains, Governments could consider allowing vehicles from the other country to cross borders, doing away with the need for transshipment of goods at the border, and opening up the logistics services market in NER to Bangladeshi operators, and vice-versa.

The benefits to Bangladesh of seeking transit arrangements through NER can also be seen in case of services, for example, energy. Bangladesh is already drawing power from India—India is supplying 660 megawatts of power to Bangladesh by linking power generation in the states of West Bengal and Tripura to Bangladesh; much more is in the offing. However, Bangladesh can see greater gains by connecting to the larger energy market in the BBIN sub-region, which includes access to the cleaner and cheaper hydropower from Bhutan and Nepal. This will need transit arrangements through NER and other parts of India, which are already being discussed between the Governments of the BBIN region (see Beckman 2018).

CONCLUSION: CONSIDERATIONS FOR POLICY MAKERS FOR MAXIMIZING GAINS

Bangladesh is missing out on growth opportunities in its South Asian neighborhood—its goods trade with South Asia could be more than double its current trade. While it pursues trading opportunities across the world, it should also consider growth opportunities at its doorstep. This imperative becomes stronger given that South Asia continues to be the most rapidly growing region in the world since 2015. NER represents one such opportunity in its immediate

neighborhood—where it is perhaps better placed than any other subregion, or state in India, to trade, invest and create new regional value chains.

Government of India's (GoI's) "Act East Policy," and its "Neighborhood first" policy, which has spurred deepening relationship with neighbors, especially Bangladesh, has placed Bangladesh as well as NER centerstage. GoI is also investing heavily in improving connectivity within NER, and between NER and Bangladesh as well as other neighboring countries. Bangladesh can leverage these developments for its own gains. This paper presents some initial ideas on how Bangladesh can leverage NER's improved connectivity and emerging value chains for its own welfare gains. These include: opportunities for improving welfare of Bangladeshi consumers through access to possibly cheaper and greater variety of goods and services; growth opportunities for Bangladeshi firms through access to markets in NER (and beyond through NER) for sourcing cheaper and greater variety of inputs as well as for selling finished products, as well as through the prospect of learning for more demanding markets; and opportunities for gains through more efficient logistics services and transit arrangements.

In order to take full advantage of the potential growth of, and investment opportunities in, the NER of India, Bangladesh will need to take action to improve cross-border movement of goods, services and investment. This could involve easing restrictions on outward foreign direct investment (FDI), and reducing a major constraint to export growth and diversification, that is, high rates of tariff and para-tariff protection. These will need to be combined with other cross-border actions/agreements between Bangladesh and NER/India on transit arrangements, investment in logistics, mutual recognition of product standards and testing, and other related aspects on connectivity. More details are provided below.

1. *Addressing challenges to FDI.* Intraregional FDI in South Asia has been constrained by various factors. These include overall investment climate issues in South Asia, as well as political undertones that constrain intraregional FDI.¹⁸ A key constraining factor is the restrictive visa policy, which restricts movement of people across borders in South Asia, adversely impacting FDI as well as trade in goods and services. FDI is also constrained by restrictions on outward investment, as in the case of Bangladesh (box 5.1).

BOX 5.1

Outward investment restricted in Bangladesh

In Bangladesh, capital account restrictions in the economy prevent transfer of resident-owned capital for investment in other countries. Investment abroad is subject to close scrutiny and prior approval of the Bangladesh Bank. There have been few instances of outward investment from Bangladesh—the central bank has

in recent times given permission for some cases, examining the merit of such projects on a case-to-case basis. Per the FERA amendment in 2015, the scope of overseas investment is strictly limited to those investors who are in the export business; other potential investors are effectively excluded.

Source: Staff research.

- *Liberalizing Outward Investment from Bangladesh.* FDI policy in Bangladesh needs to go beyond case-by-case approval toward gradual easing of regulations, as was done by India, to allow Bangladeshi firms to grow beyond their borders. Many firms in Bangladesh now have global aspirations, which is good not only for the firms but also for the country. FDI restrictions impose a severe constraint on these aspirations.
 - *Easing Access to Visas.* To provide for seamless travel of people, easy access to visas is also critical. Even though Government of India has been setting up new visa processing centers all over Bangladesh,¹⁹ which is the main source of tourists as well as medical tourists to India, and could be the largest potential source for NER, Bangladesh is not part of the e-visa regime that India has in place for most other countries. Allowing the collection of e-visas at key land ports in NER would further aid business travel, leisure tourism and medical travel to Guwahati or other NER cities.²⁰ The visas issued to Bangladeshi tourists mention port of entry/exit (by air or road), which can be limiting.²¹ Liberalizing visa rules to allow flexibility to use any mode of travel (air/road) as well as entry/exit through any land port in NER would allow business persons and patients to combine work or treatment with tourism, if they so wish.
1. *Tackling Bangladesh's anti-export bias.* Bangladesh's tariff policy has become increasingly complex and protectionist since 2008. The growing use of paratariffs has meant that total protection rates are effectively twice the nominal customs tariffs. In FY 17, average import tariffs, including paratariffs, stood at 25.6 percent (Kathuria 2018), which is very high by standards of comparators, and especially of competing countries like Vietnam and Indonesia. Bangladesh's tariffs also have wide variations across and within sectors, which enables rent-seeking and leads to distortions in resource allocation. The consumer goods sector is overly protected, and there is a growing wedge between input and output tariffs. All this leads to a regime that enables higher profits in domestic production compared to exports, and hence reduces export growth as well as diversification. It will be important for Bangladesh to address the anti-export bias in its trade regime in order to build its export competitiveness and diversify and create job-oriented growth (Sattar 2019). While trade and tariff reforms are urgently needed, they will need to be carefully calibrated, with due attention to potential job losses and enabling workers to find jobs in growing sectors.
- *Reducing Sensitive Lists.* Bangladesh has a long sensitive list under SAFTA—987 products for Least Developed Countries (LDCs) and 993 products for non-LDCs (at the 6 digit level under HS 2007 classification), which covers 46 percent of Bangladesh's imports from South Asia. Under the sensitive list for non-LDCs, it has 19 “animal products” (comprising mostly food products) (HS codes 01-05), 34 “vegetable products” (HS codes 06-15), and 44 “food stuffs” (HS codes 16–24; excluding 27 items under HS code 22 “Beverages, spirits and vinegar” and HS code 24 “tobacco and manufactured tobacco substitutes”). Among the 34 “vegetable products,” a category which includes fruits, vegetables and spices, there are several horticulture products of interest to NER-Bangladesh trade such as oranges, pineapples, ginger and turmeric.²² Sensitive lists need to be pruned in a time-bound manner, so that consumers and producers can benefit.
 - *Eliminating Paratariffs.* Average import tariffs in Bangladesh almost double, if paratariffs are taken into account—from 13.3 percent to 25.6 percent in FY17

(Kathuria 2018). This has not changed in the last budget of June 2019 (Sattar 2019). Bangladesh will benefit from a systematic and structured phase-out of its paratariffs (see Kathuria and Malouche 2016).

2. *Reducing Trade Costs.* High costs of trading stem from poor transportation infrastructure, inefficient logistics services, or cumbersome customs and border procedures. The average level of trade costs is 20 percent higher between country pairs in South Asia than between country pairs in the Association of Southeast Asian Nations.²³ It costs more to trade between some countries in South Asia than with, say, Brazil.²⁴ High trade costs adversely impact the competitiveness of products, and thus discourage trade. Addressing high trade costs needs an effort along several fronts.²⁵
 - *Promoting Multi-modal Logistics.* This can help lower costs by exploiting the comparative advantages of each mode. The multi-modal approach has to be supported by appropriate policies, especially on transfer of risks and liabilities across modes.
 - *Ensuring Interoperability of Transport Systems.* Developing facilities for interoperability of transport systems will enable seamless movement of traffic across borders, reducing time and costs of transportation. While Bangladesh and India have the three main modes of surface transport (road, rail and air) between them, there are few facilities where traffic can be transferred between them. Currently, for instance, there are differences in vehicle axle load limits between India, Bangladesh, Myanmar, and Thailand. Similarly, railways in the region have a combination of meter and broad-gauge lines. The (B)BIN MVA provides one of the building blocks for uninterrupted traffic flows within the South Asia region. However, in addition to such agreements, it is important for the countries to negotiate complementary reforms, for instance, in road signage, driver training, insurance, and related dimensions.
 - *Improving Trade Facilitation.* Seamless movement of traffic across borders will require efforts along several dimensions, such as: allowing cargo vehicles to cross borders, creating adequate space for transloading until such a system prevails, aligning and widening access roads and creating adequate parking space on both sides of the border crossing point, allowing processing of split consignments, introducing a system of pre-arrival processing of documents, and synchronizing border opening hours on the two sides. Training is necessary for border officials and private sector users (customs brokers, transporters, traders, laborers) on the current trade policy between the two countries and associated processes, as a recent World Bank report has also highlighted (Kathuria 2018).
 - *Modernizing Private Sector Logistics Practices.* The private sector could be encouraged to invest in handling facilities and warehouses. One of the major sources of inefficiency at the border posts is the use of manual labor to transload cargo from the trucks of one country to those of another. This process could be made more efficient, especially for the major shippers, by adopting the use of pallets²⁶ and deploying mechanized means for the transfer, such as forklift trucks.
 - *Opening up the Logistics Market.* Opening up the logistics services market in NER to Bangladeshi operators, and vice-versa can improve efficiency of logistics services, especially once the railway connectivity to the Port of Chittagong is completed. This will facilitate the smooth clearance and movement of containers from the port to and from destinations across NER.

- *Introducing a Through-Transit System.* The current practice of transloading cargo from the trucks of one country to the trucks of the other country at border points, except between India and Nepal, is inefficient. The same applies to railways, where locomotives have to be changed. The recently adopted (B)BIN MVA provides a framework (not yet operational) for Indian traffic to cross from the rest of India to the NER states across Bangladesh, which would drastically reduce the travel distance. A functional through-transit system between the countries of South Asia and between South Asia and the countries of the Association of Southeast Asian Nations has the potential to transform the trade facilitation environment in the region. A practical transit solution on a few identified road corridors with significant traffic potential is required.
 - *Expanding air connectivity.* The efficiency of air travel services can impact trade in goods and services. Transport of high-value, low-volume goods, such as some high-value horticulture products, and trade in services, such as tourism, health care, and education, often depend on air travel services. Moreover, the efficiency of air travel for business people can also affect Foreign Direct Investment, and, ultimately, trade in goods and services. While there are regular flights between India and Bangladesh, there are currently no direct flights between NER and Bangladesh. The Government of Assam recently announced that Guwahati will be directly connected to several countries in the region, while promising to provide viability gap funding (*The Economic Times* 2018); in January 2019, bids were approved for two routes: Guwahati-Dhaka and Guwahati-Bangkok (LiveMint 2019).
3. *Dealing with Real and Perceived Nontariff Barriers.* Traders across South Asia often complain about nontariff barriers, which create noise and exacerbate the trust deficit. While some complaints are genuine and related to real non-tariff barriers, such as port restrictions, many complaints arise from lack of information on regulations and standards and inadequate infrastructure for measuring and certifying quality, rather than protection by the importing country (Kathuria 2018). Addressing real and perceived nontariff barriers will help reduce the frictions in trade and ease access to inputs and consumer goods for Bangladeshi exporters/producers and consumers, respectively.
- *Removing Port Restrictions.* In case of NER-Bangladesh trade, addressing any existing port restrictions, which have often been cited by both India and Bangladesh as a cause for concern, would be important to enable free flow of goods across borders. At the Tenth Meeting of the India-Bangladesh Joint Working Group on Trade in June 2016, India cited port restrictions as one of the key reasons for the small amount of exports to Bangladesh through the Agartala-Akhaura Integrated Check Post; while Bangladesh cited similar problems in exporting to India from, for instance, the Dawki-Tamabil customs station (Ministry of Commerce and Industry, India, and Ministry of Commerce, Bangladesh 2016). In a positive move, in July 2018, Bangladesh lifted restrictions on nine items through the Agartala-Akhaura ICP—rubber latex, bamboo-based products, broomstick flowers, soyabean seeds, spare parts of CNG-run vehicles, dry fish and maize (Business Standard 2018).²⁷
 - *Spreading Awareness about Import Regulations.* Another constraint that can come up in trade of fresh horticulture produce is the lack of awareness about need for and procedures relating to pest risk analysis (PRA) on agricultural products, which can create perceptions of nontariff barriers, as was

discovered through a survey of exporters done in Bangladesh, Nepal and India for Kathuria (2018). Information campaigns among exporters and importers to spread awareness about PRAs can help. Requests for PRAs in the region could also be fast-tracked under South Asian Free Trade Area (SAFTA) or other bilateral forums.

- *Boosting Quality Infrastructure and Promoting Use of Equivalence and Mutual Recognition Agreements.* Future food trade in the region will depend on developing a regional model for food control that allows the authorities to tighten food control while allowing trade to flow seamlessly. Instead of relying on 100 percent inspection and testing of imports or on testing facilities at the border, international best practice suggests the use of trade facilitation tools like harmonization, equivalence, and mutual recognition for import control. Indeed, India, represented by the Food Safety and Standards Authority of India, is currently experimenting with the introduction of practices such as equivalence and mutual recognition. In April 2017, the Food Safety and Standards Authority of India agreed to recognize testing and certification by BSTI for imports of 21 Bangladeshi food products into India.²⁸ The notification means that imports of the 21 products already tested in Bangladesh will only be subject to risk-based sampling for testing by India. Unfortunately, as of July 2018, this agreement had not facilitated imports into India—the low capacity, waiting times, and high fees may prompt exporters to let their products be tested on the Indian side of the border (Jensen 2019).

NOTES

1. Gravity models are based on the idea that geographically proximate countries tend naturally to trade more with each other in the absence of barriers to trade.
2. The gap would be larger if trade in services was taken into account. Further, the gravity approach does not take into account dynamic effects, and to that extent, it underestimates the trade gap.
3. This sub-section draws from Kunaka and De (2019) in Kathuria and Mathur (2019).
4. SARDP-NE has been planned in two phases, A and B, and, including the Arunachal Pradesh Package of Roads and Highways, covers about 10,141 km. Phase A of SARDP-NE and the Arunachal Package cover 6,418 km. Phase A has been completed, while the work for phase B is ongoing. See <http://mdoner.gov.in/infrastructure/sardp-ne>.
5. This corridor originates/ends in the state of Gujarat in West India.
6. This is being constructed under the SARDP-NE Arunachal Package.
7. Based on data from the Ministry of Shipping (2018), the cost of transportation by the IWT mode is lower than that for rail and roads. Freight for rail is estimated at Rs 1.36/tonne-kilometer (Tkm), whereas it is Rs 2.50/Tkm for roads and Rs 1.06/Tkm for IWT.
8. Day navigation aids have been installed on the entire waterway from Dhubri to Sadiya /Orumghat (891 km).
9. Drukair, Royal Bhutan Airlines, connects Guwahati to Paro (Bhutan) and Bangkok (Thailand).
10. Bhutan has since decided to defer its entry.
11. Indian vehicles can go into Nepal and vice versa (see <https://www.cgibirgunj.gov.in/page/detail/179>, accessed April 10, 2019). In case of India and Bhutan, currently, trucks from India are allowed only until the border where the goods are then transloaded into Bhutanese trucks, but heavy-duty trucks from India carrying large equipment, which local trucks do not have the capacity to carry, are permitted into Bhutan (The Daily Star 2015; Subba 2017).
12. “Orders and Guidelines on Imports of Food Articles,” Food Safety and Standards Authority of India, New Delhi, <http://fssai.gov.in/home/imports/order-guidelines.html>.
13. In 2012–13, NEI’s exports to Bangladesh were Re 9,150.1 million (or about US\$168.2 million at the annual average exchange rate of Re 54.4 per US\$), while NEI’s exports of fresh

- ginger, fresh citrus, fresh oranges, fresh tomatoes, fresh pineapples, bananas, and tamarinds were Re 260.16 million (or about US\$4.8 million) (based on Customs data from the Export-Import Bank 2015).
14. Nath (2012) provides estimates of informal trade between the state of Tripura in NEI and Bangladesh based on a survey carried out in September–December 2011 and February 2012. The study notes that perishable items, like jackfruit, ginger, oranges, betel nuts, and so forth, are exported to Bangladesh through formal and informal routes, but the value is 100 times more through the informal route. According to this study, although formal exports from Tripura to Bangladesh in 2010–11 amounted to Re 170 crore, informal exports stood at Re 195 crore per month. Informal exports comprised a variety of products, which also included agricultural and horticultural products. The same study estimates that while formal imports from Bangladesh to Tripura in 2010–11 amounted to Re 256 crore, informal imports on a monthly basis stood at 70–90 crore. The informal imports included, among other products, food products like household grocery items, juices, and fish.
 15. In June 2017, at least three more hospitals were expected to come up—Health City (300 beds); Excelcare Hospital (200 beds); and a hospital venture with the Henry Ford Health System (600 beds) (<http://thechicagonewsjournal.com/business/madison-street-capital-serves-as-exclusive-advisor-to-prithvi-group-in-hospital-venture-with-henry-ford-health-system>). As of June 4, 2019, the former two had been set up and become operational.
 16. Average savings (percent of U.S. costs) are in the range of: 65–80 percent for Malaysia; 50–75 percent for Thailand; 40–55 percent for Taiwan, China; 30–45 percent for the Republic of Korea; and 25–40 percent for Singapore (*Patients Beyond Borders* website accessed May 29, 2019, <https://patientsbeyondborders.com/medical-tourism-statistics-facts>)
 17. See Chaudhary (2016), chapter 18 on the globalization of his noodles brand, starting from his first noodles plant outside Nepal in Assam.
 18. See Kathuria and Malouche (2016) for a discussion in the context of Bangladesh.
 19. Indian visa processing facilities are now available in 15 Bangladeshi cities—Dhaka, Chittagong, Sylhet, Khulna, Barisal, Mymensingh, Rangpur, Rajshahi, Jessore, Comilla, Brahmanbaria, Noakhali, Satkhira, Bogura, and Thakurgaon (last 6 have been added in January 2019). There are no visa fees, except a visa processing fee of Tk 800 (US\$9–10) charged by the State Bank of India's Indian Visa Application Centre (website accessed May 27, 2019; <http://www.ivacbd.com/For-Bangladeshi->)
 20. E-visas can be applied for online and collected on arrival at 28 designated airports, including Guwahati, and five designated sea ports in India (<https://indianvisaonline.gov.in/evisa/tvoa.html>, accessed May 27, 2019).
 21. In June 2017, this policy was relaxed to allow Bangladeshi nationals to enter/exit India through any of 24 international airports, including Guwahati, and two land ports, Benapole (Bangladesh)—Haridaspur (West Bengal, India) and Darshana (Bangladesh)—Gede (West Bengal, India) (Indian High Commission, Bangladesh, 2017). However, this relaxation does not apply to the various land ports in NER.
 22. https://www.bangladeshtradeportal.gov.bd/kcfinder/upload/files/Bangladesh%20Revised%20Sensitive%20List%20%28Phase-II%29%20for%20Non-LDCs_HS%202012.pdf; accessed June 4, 2019.
 23. Trade costs are directly inferred from observable bilateral and intranational (domestic) trade data and can vary depending on the underlying assumptions. The World Bank report follows the database guidelines that advise using the database to compare across country pairs or across time and avoid stand-alone interpretations of the data on single pairs. For the detailed methodology, see ESCAP–World Bank Trade Cost Database, United Nations Economic and Social Commission for Asia and the Pacific, Bangkok; World Bank, Washington, DC, <http://www.unescap.org/resources/escap-world-bank-trade-cost-database>.
 24. For example, average trade costs are 56 percent higher between Bangladesh and Nepal than Bangladesh and Brazil, and they are 84 percent higher between Sri Lanka and Nepal than Sri Lanka and Brazil (Kathuria 2018).
 25. These suggestions draw from Kunaka and De (2019).
 26. A pallet is a unit loading device that is a portable, horizontal, rigid platform used as a base for operations in logistics. In other regions, pallets are widely used in logistics as

a convenient way to facilitate the storage, stacking, handling, and transportation of goods.

27. Bangladesh also lifted some restrictions from other ports on the India-Bangladesh border, including other ports in NER. See Government of Bangladesh 2018.
28. “Orders and Guidelines on Imports of Food Articles,” Food Safety and Standards Authority of India, New Delhi. <http://fssai.gov.in/home/imports/order-guidelines.html>.

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ECO-AUDIT

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It is widely agreed that, over the past decade, accelerating infrastructure investments in India's North Eastern Region (NER) and neighboring countries, along with connectivity agreements with Bangladesh, hold immense promise for unlocking NER's economic potential. Other global trends, such as the growing incomes and consumer awareness in India and neighboring countries; a rising preference for fresh, healthy, safe, environmentally friendly, and socially responsible products; the growing role of services in manufacturing; and increasing demand for skilled resources are also very favorable for NER. Together, these developments can help NER showcase its strengths in agriculture and services, thereby developing value chains in these sectors, which will lead to sustainable, better-paying, job opportunities for the people of NER.

In this context, the World Bank, in consultation with stakeholders—government, private sector, and academia—analyzed two cross-cutting constraints that are encountered across all value chains and sectors in NER: connectivity and logistics, and product standards and quality infrastructure. These are discussed in *Playing to Strengths: A Policy Framework for Mainstreaming Northeast India* (Kathuria, S., and P. Mathur, eds., 2019, World Bank). This volume is a companion piece to that report; it analyzes four value chains—fruits and vegetables, spices, bamboo and related products, and medical tourism—and provides an assessment of how Bangladesh can benefit from NER's increasing connectivity and growth prospects. The sector studies emphasize the need to reorient the supply base in NER toward serving the changing global demand and puts an explicit focus on women as well as the bottom 40 percent of the workforce. In light of the mutual benefit offered by economic exchange, improvements in connectivity offer a win-win opportunity for NER and Bangladesh.