



Confederation of Indian Industry  
125 Years - Since 1895

A U S T R A L I A  
E C O N O M I C  
S T R A T E G Y

india

australia

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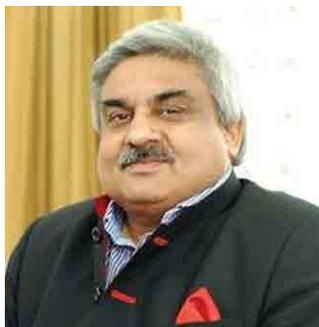
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# Foreword



## **Ambassador Anil Wadhwa**

Former Ambassador and Secretary (East),  
Government of India and Chair,  
Australia Economic Strategy Report

Over the past few years, India and Australia have discovered many commonalities to become close partners and have built a strategic partnership based on shared values and principles in a changed geo-political scenario. The governments of both countries have recognized that there is significant potential to further expand economic engagement in a broad range of areas, many of which will blossom in the future.

The Confederation of Indian industry (CII), in collaboration with KPMG has come out with the Australia Economic Strategy Report, which has been prepared as a response to the India Economic Strategy Report 2035 released by Australia in July 2018. The report, based on independent research and inputs collected from personal interviews of the team with the Ministries, governments, academia, think tanks etc., has identified potential areas of collaborations across sectors between the two nations. The report provides detailed recommendations and implementation strategies for expanding cooperation in those areas. I was privileged to lead the CII team in collaboration with KPMG in the preparation of this report.

A relative lack of awareness about business opportunities on both sides has resulted in large untapped potential in several key areas across the board in the two countries in trade as well as investments. In particular, both countries can benefit enormously from each other by cooperating in areas such as technology, innovation, natural resources and research and development.

The report identifies a number of other key opportunity areas between Australia and India in mining, services and startups, pharmaceuticals, health care and medical technologies, education and skills, agribusiness, infrastructure, power and renewable energy, railways, gems and jewelry, automotive spare parts, and tourism. The report is far reaching and futuristic, and also highlights opportunities in emerging areas like labour intensive services, defence, sports, textiles and textile designing, digital gaming and animation, water management and commercial ferries/shipbuilding, space and education technologies – all of which are expected to gain relevance in the future.

Following the outbreak of Covid 19 pandemic there will be a rethink on global value chains, and location of manufacturing catering to the specific needs of countries. India offers Australian investors a unique opportunity for diversification and use of the Indian market as a base for increasing exports and profits. The report, therefore, focuses on investment opportunities for Australian companies in India while also identifying the opportunities for investment by Indian companies in Australia in areas like mining and resources, renewable energy and agribusiness.

The implementation strategies in the key opportunity areas, as highlighted in the report, would serve as critical action points for policymakers and governments of both countries. While the success of the strategy would depend on the interest taken by industry and governments of the two countries, the strategy, if implemented and disseminated with care and diligence would greatly enhance bilateral ties and will lead to a fostering of growth and development of closer ties between the two countries.



## **Chandrajit Banerjee**

Director General  
Confederation of Indian Industry

The India-Australia bilateral relationship goes back a long way and has undergone significant evolution over the years. Both share a lot in common, underpinned by factors such as abundant natural resources, varied social and cultural factors, free press and a common British colonial past,

The Australian Economic Strategy report put together by the Confederation of Indian Industry (CII) with contribution from KPMG, led by Ambassador Anil Wadhwa, former Secretary (East), Ministry of External Affairs, presents a way forward to enhance the trade and investment relations between the two countries.

In an evolving global scenario hit by the Covid-19 pandemic, all nations are searching for new opportunities, including India and Australia. Although CII commenced on this report well before the onset of the contagion and some of the data and projections may undergo changes in the short to medium term, we believe that its larger findings are even more relevant in the current context and present a sound basis for expanding bilateral economic relations.

Both our countries face a common set of challenges, and the complementarity of resources, makes Australia a strategic partner for India to collaborate with. There is significant room to expand bilateral trade between the two countries, with many opportunities for India to expand its goods and services exports to Australia.

With its large demographic dividend, characterized by a higher share of the working age population, the Indian economy is expected to grow manifold in the future, leading to increased competition for its limited economic and natural resources. Australia, endowed with abundant natural resources, therefore could become a strategic partner for India's resource security agenda. The report highlights strategies that can help India secure and manage its resources in an effective manner.

With its strong focus on ease of doing business and developing its manufacturing sector through flagship programs such as Make in India, India is also open to investments and collaborations in areas such as mining, healthcare, pharmaceuticals, IT, defence, etc. The report looks at opportunities across these sectors and certain emerging areas such as labour intensive services, sports, textiles, space collaborations and education technologies.

The report also presents diverse implementation strategies across sectors as action points for Governments of the two countries, to realize potential opportunities in areas such as investing in existing mines, streamlining visa processes, addressing taxation concerns, among others.

Cumulatively all these factors will help strengthen the ties between the two countries, which in turn will greatly enhance India's growth prospects as well. CII looks forward to the unfolding agenda of cooperation with Australia and being actively engaged in achieving its potential.

A hand is shown in the foreground, reaching out towards a glowing network of nodes and lines that extends into the background. The nodes are small, bright circles, and the lines are thin, connecting the nodes in a complex web. The background is a dark, blue-toned space with some blurred lights, suggesting a digital or technological environment. The overall mood is futuristic and interconnected.

# Introduction

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The Australia Economic Strategy report has been prepared as a response to India Economic Strategy report 2035 released by Australia in November 2018. The report has been put together by the Confederation of Indian Industry (CII) team, led by Ambassador Anil Wadhwa, Former Secretary (East), Ministry of External Affairs, with contribution from KPMG in India. For ease of reference, each of the chapters related to focus areas contain a synopsis at the beginning and a set of recommendations at the end. Some chapters related to focus areas contain case studies which are relevant to the analysis, synopsis and recommendations. Chapter 7 contains implementation strategies for the report. An Executive Summary is also available separately. Projections in the report were put together in 2019, much before the onset of the Covid -19 pandemic and hence some of them may no longer hold true in the short to medium term. To the extent possible, a few projections/recommendations have been modified and updated just before finalisation of the report in May, 2020.



# Chapter 1

# Macroeconomic Overview

## Synopsis

Australia is the world's fourteenth largest economy with a nominal GDP of ~USD 1.3 trillion. Australia's robustness in business can be attributed to strong governance that results in a stable and transparent work environment. This is further augmented by research and development across sectors, which supports innovation and automation and reduces the dependence on labor.

India is a USD 2.7 trillion economy and the third largest economy measured in purchasing power parity (PPP) terms. The country represents a fast-growing consumer market, with an emerging start-up ecosystem driven by innovation and an entrepreneurial spirit.

India and Australia have more in common than what meets the eye. Both share the presence of free media, have multi-faceted cultural societal foundations and benefit from an abundance of natural resources. Additionally, both are liberal democracies and Commonwealth countries.

The potential to strengthen the relationship between India and Australia stems from the emergence of business opportunities in both countries. Furthermore, the current economic, political and business environment in both countries has created a platform to supplement collaborative efforts and discussions to give an impetus to trade and investment between the two countries.

## India & Australia – Geopolitical Developments and Strategic Relationship

Australia is the world's fourteenth largest economy. Its nominal GDP is estimated at USD 1.3 trillion<sup>1</sup>, accounting for 1.4% of the global GDP.<sup>2</sup> The economy has long been characterized by a stable growth trajectory arising from strong macroeconomic policy, structural reforms and a long commodity boom.

An understanding of essential opportunities and collaborations between India and Australia highlighted in this report, requires knowledge of Australia's economy, its history and its relationship with the rest of the world. This chapter will provide details on Australia's macroeconomic, demographic and geopolitical position and its trade and investment relations with the Western world and Asia. This chapter will also cover Australia's economic history and recent important events and the relevance of the current relationship between India and Australia in the context of Australia's growth strategy.

### Macroeconomic overview

Australia's Gross Domestic Product (GDP) has been growing at more than 3%, on average, each year since 1992.<sup>3</sup> Australia is currently in its 28th year of consecutive economic growth, implying that the country has remained recession free since 1992.<sup>3</sup> Having dodged the impact of the Asian financial crisis, the dotcom bust and the global financial crisis, Australia is the only country in the developed world to have achieved this feat. Australia's real GDP growth has been the highest among the developed economies. Further, the nation is expected to realize an average annual real GDP growth of 2.7% between 2019 and 2023.<sup>4</sup>

<sup>1</sup> Australia Bureau of Statistics, 5206

<sup>2</sup> Australia Benchmark Report 2020

<sup>3</sup> International Monetary Fund. World Economic Outlook - October 2018

<sup>4</sup> IMF's World Economic Outlook, October 2018

## India's macro economy and future growth structure

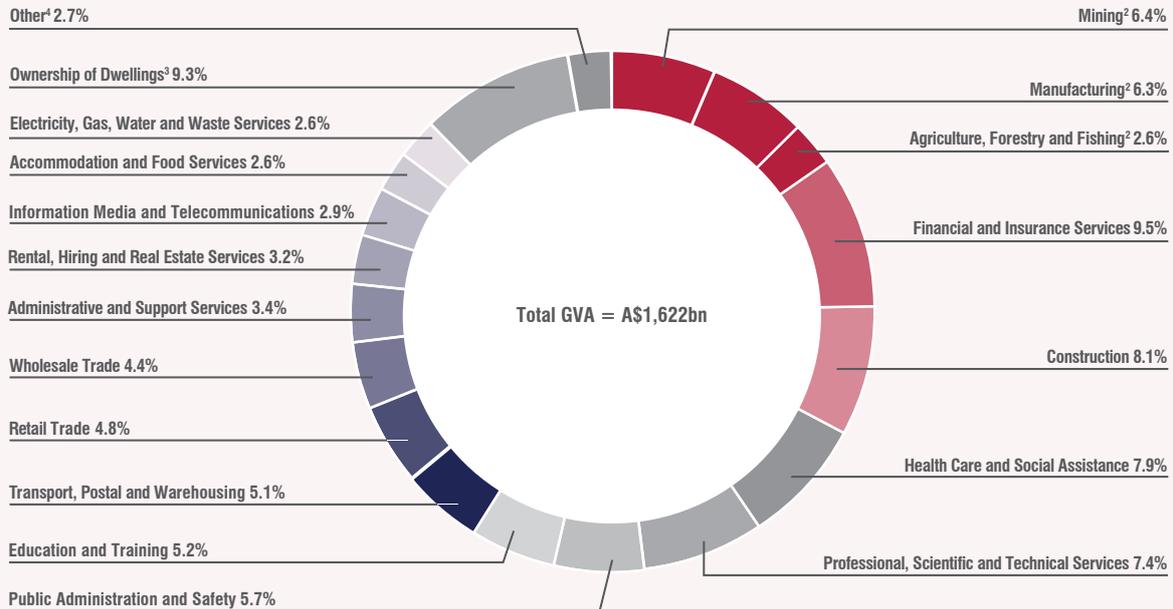


Often regarded as primarily a producer of agricultural commodities, minerals and energy, Australia is in fact a service-driven diverse economy, where services contribute approximately 75% of the GDP while industry and agriculture contribute approximately 22% and 3% respectively.<sup>5</sup> Within the services sector, the country's sophisticated financial and insurance service industries contribute the highest—approximately 9.5% of GDP.

<sup>5</sup> Australian Bureau of Statistics Cat. No. 5204.0 Table 5, Gross Value Added (GVA) by Industry, Chain volume measures

### AUSTRALIA'S REAL GROSS VALUE ADDED<sup>1</sup> BY INDUSTRY

Annual total ending June 2017-18, as a percentage to total industry



<sup>1</sup> Gross value added (GVA) measures the contribution to the economy of each individual producer, industry or sector.

<sup>2</sup> Goods comprise Agriculture, Manufacturing and Mining.

<sup>3</sup> Ownership of Dwellings is not classified as a Good or Service.

<sup>4</sup> Other includes: Arts and Recreation Services (0.9%) and Other Services (1.8%).

**Source:** Australia Benchmark Report, 2019, Austrade

The mining sector has been indispensable to the Australian economy, contributing approximately 6.4% of GDP. Australia is a key producer of gold, lead, zinc, nickel and iron ore. Australia also has the world's largest uranium and fourth largest black coal resources.<sup>6</sup> The key mining regions in Australia are in the states of Western Australia, Queensland and New South Wales.

The mining sector experienced an economic boom in the past decade, characterized by extraordinarily high prices and growing global demand. However, in the past few years, owing to completion of existing resource projects and relatively slow growth in new projects, mining investments have started to decline. The mining sector has now shifted its focus and contributes primarily to exports. Thus, the mining industry is largely export-oriented and since 2007-08, resource exports, including minerals, metals, coal and petroleum, have accounted for 55% of total exports.<sup>7</sup> All in all, the persistent high demand for resource exports, increase in prices of energy and other bulk commodities and favorable terms of trade have further supported the Australian economy.

<sup>6</sup> Geoscience Australia

<sup>7</sup> Minerals Council of Australia Website



Success in the mining space has resulted in prosperity for the states of New South Wales, Queensland and Western Australia and these three states cumulatively account for approximately 62% of population<sup>8</sup> and 66% of GDP.<sup>9</sup>

In addition to mining, the development of services sector has also resulted in economic growth of New South Wales and Victoria. Victoria contributes 23% to GDP and houses approximately 26% of population.<sup>8</sup> Together, the four regions account for approximately 90% of population as well as GDP.

In the period between 2007 and 2017, Australia's exports of goods and services grew from USD 184.80 billion to USD 294.64 billion in value terms.<sup>10</sup> In 2016, the services sector accounted for approximately 28% of Australia's exports. Besides energy and mining-related services, Australia is known globally for the quality of its education, tourism and financial services sectors. The services sector is also known for job opportunities, employing 4 out of 5 Australians.<sup>11</sup>

Australia has a workforce of 12 million people. Almost 40% of workers have a tertiary education qualification or advanced diploma. Australia has one of the highest labour productivity growth rates in the developed world, averaging a 1.7% increase every year over the past 20 years.

Unemployment in Australia has been on a declining trend. In 2017-18, unemployment rate remained between 5.4% and 5.6%. As labour supply in Australia has expanded to meet demand, there is low incentive for the Reserve Bank of Australia (RBA) to increase interest rates. Wage growth in Australia has witnessed a gradual increase and the growth of wages was 2.34% in 2018.<sup>12</sup> As of 2017, inflation throughout the country has remained low and steady at 1.9%.

Australia's robust free-market democracy has benefited from a Government that facilitates vibrant entrepreneurial development. As of 2019, the Government continues to lend support to the services sector and the overall economy by working towards the removal of redundant taxes and negotiating additional free-trade agreements.

## Geopolitical overview

Australia is an island nation between the Indian Ocean and the Pacific Ocean, situated in the Southern hemisphere. It is the world's largest island and smallest continent and the sixth largest country in the world after Russia, Canada, USA and Brazil.

Australia has two different types of climates. Northern parts of the country are tropical, with summers extending from November to April and winters from May to October. In contrast, southern parts of Australia experience a distinct summer from December to February and

<sup>8</sup> 3101- Australian Demographic Statistics, June 2018, Australian Bureau of Statistics, Austrade

<sup>9</sup> 5220, Table 1- Australian Bureau of Statistics, Austrade

<sup>10</sup> Statement of Monetary Policy, Reserve Bank of Australia, November 2018

<sup>11</sup> Department of Foreign Affairs and Trade Website

<sup>12</sup> Australian wage growth remains sluggish and that's unlikely to change anytime soon, 2019, Business Insider



winter from June to August. Owing to its size, Australia has diverse landscapes, namely, deserts in the central part of the country, tropical rainforests in the north-east and mountain ranges in the south-east.

Australia is an important trading nation and an active member of the United Nations and the Commonwealth of Nations. Australia is also a member of the Organization for Economic Co-operation and Development (OECD), the World Trade Organization (WTO), the Asia Pacific Economic Cooperation (APEC) and the G20.

Australia has eleven FTAs in force, with New Zealand, Singapore, the US, Thailand, Chile, the Association of South East Asian Nations (ASEAN), Malaysia, Korea, Japan, China and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). Australia has agreed to join the Regional Comprehensive Economic Partnership (RCEP). Currently, Australia is engaged in the Australia-European Union Free Trade Agreement, Australia-Gulf Cooperation Council (GCC) Free Trade Agreement, Australia-India Comprehensive Economic Cooperation Agreement, Environmental Goods Agreement, Pacific Alliance Free Trade Agreement, Regional Comprehensive Economic Partnership and Trade in Services Agreement (TISA).<sup>13</sup>

Australia's geographical location and relatively small population means that the country relies largely on shipping for its ocean trade and security activities. This has resulted in the development of close alliances with the UK and in recent times with the US for defense and economic activities.

At the start of the twentieth century, Australia identified more closely, both culturally as well as for trade with the UK and Europe. The UK was Australia's primary trading partner. As recently as the first half of the twentieth century, Australia viewed Asia with significant apprehension. Considering that Australia was attacked by Japanese forces during the Second World War and given the experiences of Asia during the Cold War years, these worries were further accentuated. It was not until the latter part of the twentieth century that Australia's misgivings about Asia began to fade and Australia realized the immense potential of Asia in the changing world. In 1950, the former Foreign Minister of Australia, Sir Percy Spender, said:

*“Geographically Australia is next door to Asia and our destiny as a nation is irrevocably conditioned by what takes place in Asia. This means that our future depends, to an increasing degree, on the political stability of our Asian neighbors, on the economic wellbeing of Asian people and upon the development of understanding and friendly relations between Australia and Asia...It is therefore in Asia and the Pacific that Australia should make its primary effort in the field of foreign relations.”*

Australia has been quick to understand that the center of economic gravity is gradually changing base from the Euro-Atlantic region to Asia. For the past several decades, Australia has focused its core strategic interests in Asia. In 1957, Australian Trade Minister, John McEwen signed a commercial agreement with Japan, which marked a significant milestone in Asian-Australian relationship. By the 1960s, Japan had replaced the UK as Australia's primary trading partner.

<sup>13</sup> Free trade agreements in force, DFAT website

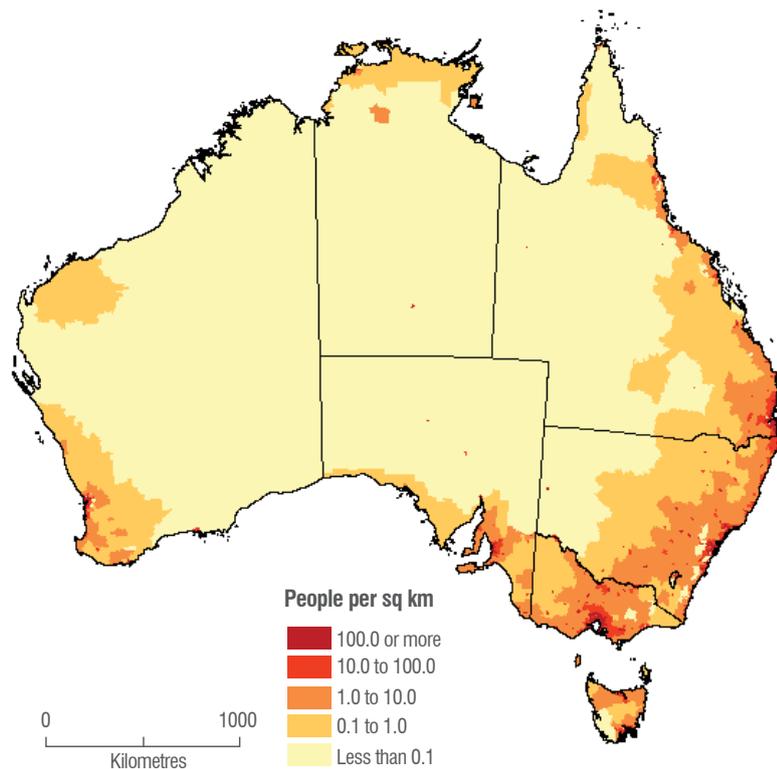


In the 1970s, Gough Whitlam, the then-Prime Minister of Australia, established diplomatic relations with China. Australia also provided significant support for China's entry into the World Trade Organization (WTO). In the 1980s and 1990s, Australia further enhanced relations with China under the Fraser and the Hawke-Keating Governments. This period also witnessed the establishment of Asia-Pacific centered institutions in which Australia played a prominent role. China has since emerged as Australia's largest export destination. Over the past decade, Australia's services exports, which include education and tourism, to China have grown at an average of 14%.<sup>14</sup> Apart from economic activity, the number of Chinese visitors to Australia have also increased to ~1.4 million from merely ~0.4 million visitors, a decade ago.<sup>15</sup>

Australia has traditionally bought most of its weapons from the US, making it Australia's major defense and security partner. In recent years, Australia's geopolitical situation has been characterized by a strong economic relationship with China and a continuing close, strategic relationship with USA.

## Demographic overview

POPULATION DENSITY BY SA2, Australia - June 2016



Source: ABS

<sup>14</sup> Trade Map

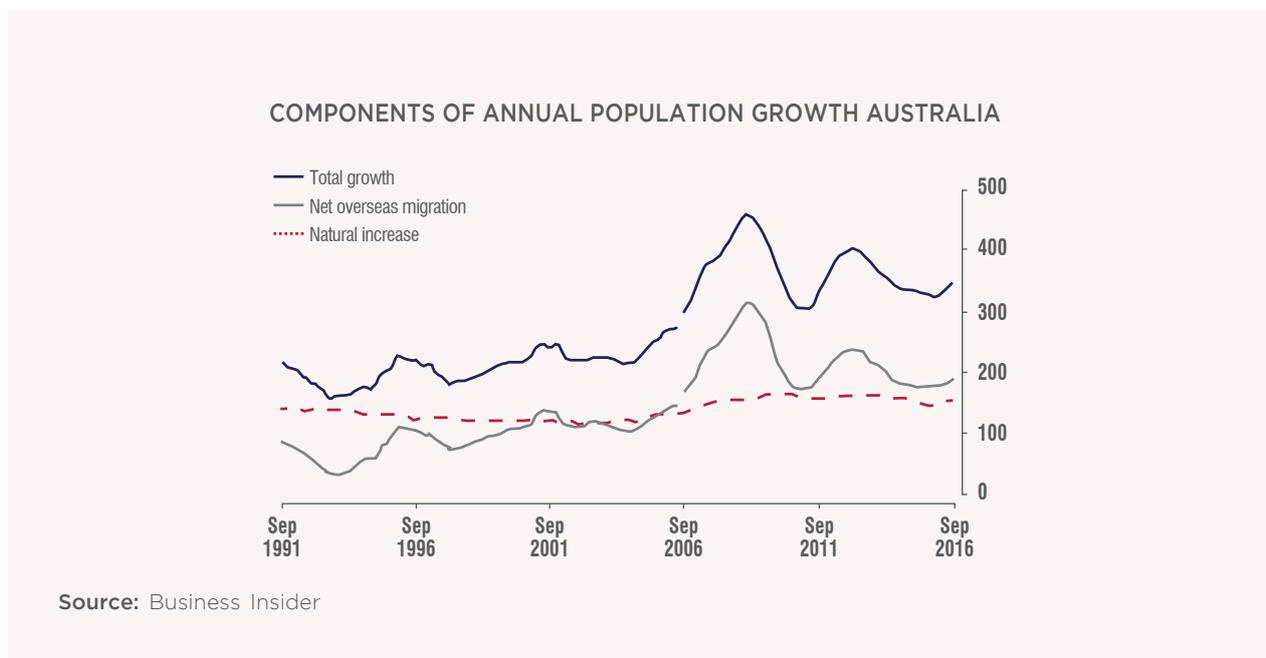
<sup>15</sup> More tourists in Australia now come from China than New Zealand, 2018, Quartz

English is the most common language spoken in Australia, followed by Mandarin, Arabic, Cantonese and Vietnamese. While Australia does not have an official language, English is the de facto national language. Australian English is spoken with a distinctive accent and lexicon and differs slightly from other varieties of English in grammar and spelling.<sup>16</sup>

Australia has a population of approximately 24 million. Approximately 85%<sup>17</sup> of the population resides in urban areas and around 70% of this population resides in the coastal cities of Sydney, Melbourne, Brisbane, Perth and Adelaide. Most of the central and western parts of the country comprise of desert areas that are sparsely populated.

Population density varies greatly across the country. Australia's population density, as of June 2016, was 3.1 people per square kilometer (sq. km). Among the states and territories, the Australian Capital Territory had the highest population density, at 171 people per sq. km, followed by Victoria (27), New South Wales (9.7) and Tasmania (7.6). The remaining states and territories all had population densities below the national average, with the Northern Territory having the lowest at just 0.2 people per sq. km.<sup>18</sup>

Melbourne is Australia's fastest-growing city along with Sydney and Brisbane. The city accounted for more than 70% of the country's population growth in financial year 2016-17.<sup>19</sup> Overseas migration has been a significant reason for population growth in the three aforementioned cities. The 2016 census of Australia also revealed a similar trend. Nearly half the population was born overseas or had at least one overseas-born parent. As per the 2016 Census, the most common countries of birth of the population in Australia were the UK (17.7%), New Zealand (8.4%), China (8.3%) and India (7.4%).<sup>20</sup>



<sup>16</sup> Census reveals a fast changing, culturally diverse nation, 2017, ABS

<sup>17</sup> Urban Population (% of total population), World Bank

<sup>18</sup> ABS 3218.0

<sup>19</sup> Melbourne, Sydney and Brisbane populations soar but growth drivers differ, 2018, ABC News

<sup>20</sup> Top 10 countries of birth for the overseas-born population since 1901, Parliament of Australia



Australia's per capita GDP is one of the highest in the world, at approximately USD 55,420 in 2019 (at 2019 prices).<sup>21</sup> Though the residents of Australia enjoy high standards of living and Australia consistently ranks high on several development parameters, challenges arising from gender gaps and from population ageing continue to exist.

In June 2017, there were 193,900 more females than males residing in Australia, with 12.2 million males and 12.4 million females. The sex ratio (the number of males per hundred females) was 98.4.<sup>22</sup> Women make up 46.9% of the workforce in Australia.<sup>23</sup> However, they are over-represented as part-time workers in low-paid industries and under-represented in leadership roles in the private and public sectors. Accordingly, only 25.4% of all employed people in Australia are women working full-time. The workforce participation rate among those aged 15-64 years is 73.5% for women and 82.9% for men.<sup>23</sup>

Further, as per the Australian Government's 2015 Intergenerational Report (IGR) projections, by 2054-55, the number of people in the age group 65 to 84 years will rise to 7.0 million compared to ~3.1 million in 2015. In order to sustain high levels of income and high standards of living, increased levels of productivity and participation of the population in the labour force is required. An ageing population will result in a significant amount of stress on health financing by increasing expenditure on age pensions and health care spending.

Immigration has been the largest contributor to the supply of working age population in Australia since the 1980s. Aged 15 years or over, migrants are typically younger than the resident population and therefore have significantly contributed to the workforce participation and productivity. While the screening process has been made stringent in the last few years, higher emphasis has been placed on skilled migrants since the 1990s. With continued participation from immigrants, the country may be able to resolve some issues arising from an ageing population.

## Australia's indigenous population

Australia was first inhabited by the Aboriginal people. As the original inhabitants of the country, the Aboriginal and Torres Strait Islander people have a distinctive place in Australia. It is estimated that the indigenous people first populated the southern continent over 65,000 years ago and immigrated through Southeast Asia from Africa.<sup>24</sup>

At the time of British colonization, there were an estimated 1.25 million individuals from the indigenous community.<sup>25</sup> The outbreak of smallpox at the time became the principle cause of the population decline of this community. The appropriation of land and water resources by the incoming colonizers added to their further decline. Despite the effects of disease, the spread of foreign settlement and customs, the indigenous community managed to survive well into the twentieth century. By the end of 1965, Aboriginal and Torres Strait Islander people were granted the same rights as non-indigenous Australians to vote in Australia's

<sup>21</sup> IMF

<sup>22</sup> ABS 3235.0

<sup>23</sup> Gender workplace statistics at a glance 2018-19, 2019, WGEA

<sup>24</sup> The spread of people to Australia, Australian Museum, 2019

<sup>25</sup> Aboriginal Australians, National Geographic, 2019



federal elections. Notably, a referendum for indigenous rights, passed in 1967, accounted for the inclusion of all indigenous Australians in the Commonwealth Parliament's power to legislate special laws for specific races and for electoral representation.

The Australian Government has taken several initiatives to secure the fundamental right of the Aboriginal people to retain their racial identities and lifestyles. In 1980, the Aboriginal Development Commission was established to promote the economic self-sufficiency of the aboriginal community.<sup>26</sup> This Commission assisted the community with land ownership, facilitation of business enterprises, seeking finance for housing and other personal needs. Increasingly, Governmental and non-Governmental organizations including land councils, community support groups, child care agencies, medical services, etc. have also extended their support to the indigenous community.

According to the 2016 census, the indigenous people comprised 2.8% of the total Australian

<sup>26</sup> Changing Policies Towards Aboriginal People



population (~0.65 million individuals).<sup>27</sup> Of those identified as indigenous, ~90% were of Aboriginal origin, 5% of Torres Strait origin and 4% of both descents.<sup>28</sup> New South Wales, Australian Capital Territory and Victoria had the highest population of Aboriginal and Torres Strait Islander people. Since 2011, the healthcare and social assistance industry has been the primary source of employment of the Aboriginal and Torres Islander people.

## Brief history and recent events

Australia enjoys a unique position in the Southern hemisphere. It has a long and rich history, given its multicultural society. Australia was a British colony until 1901 and remains a Commonwealth nation till date. Australia has six states and two territories. The levels of Government are the federal (commonwealth), state and local. The federal legislature consists of a 76-member upper house and a 150-member lower house. The Prime Minister (Head of Government) is chosen by the lower house and is always the head of the leading party or coalition. The major political parties in Australia are the Liberal Party, Labor Party, National Party and Australian Greens.

Until the 1970s, foreign investment in Australia was largely regulated. In 1975, the Government decided to deregulate foreign exchange and reduce tariffs to integrate Australia with the global economy. The tariff rates have fallen from 7% to less than 1% over the last 30 years. The fall in tariff rates has resulted in an increase in both merchandise imports and exports.<sup>29</sup> In the 1980s, the Australian dollar was floated resulting in tariff reductions flowing throughout the economy.

As a consequence of economic liberalization, overall employment rate in Australia rose by 72% between 1986 and 2016, with growth rates varying across sectors. While employment in the mining and services sectors grew, employment in agriculture and manufacturing sectors fell in the 30-year period.

In the mid-2000s, the global demand for commodities such as iron ore, coal and natural gas increased dramatically, whereas the supply of these commodities fell short. This resulted in a sharp increase in prices, mostly driven by rapid urbanization and development in China and other emerging economies.

This period of extraordinary rise in prices, known as the Mining Boom, lasted till around 2011-12. During this period, investment in mines and mining activities surged, employment increased and overall demand in the Australian economy showed a significant upward trend.

The end of the economic boom resulted in a drastic decline in mining investment, though net services exports such as tourism, education and business service exports had expanded over time.

<sup>27</sup> Australian Bureau of Statistics, 2071.0 - Census of Population and Housing: Reflecting Australia - Stories from the Census, 2016

<sup>28</sup> Aboriginal and Torres Strait Islander Population, ABS, 2016

<sup>29</sup> Australian trade liberalization by the Centre for International Economics, Australian Department of Foreign Trade and Affairs, October 2017



## Relationship between India and Australia

India and Australia have more in common than what meets the eye. Both are characterized by the presence of free media, have multi-faceted cultural societal structures and an abundance of natural resources. At a fundamental level, both are also liberal democracies that inherited a British colonial past. For many Indians, the perception of Australia has been shaped by cricket. Figures from Australian cricket remain extremely popular in India and for Australians too, India is on the radar predominantly because of cricket.

However, with the collective growth potential that both countries are known to hold, it would be unfair to base the relationship solely on cricket. The strategic partnership between the two countries is undergoing an overhaul and is rapidly changing for the better.

The relationship between the two countries is significantly determined by people-to-people ties between the two countries. The movement of Indians to Australia can be traced back



to the 19th and 20th centuries that witnessed movements of Indian settlers from Mauritius, Fiji, South Africa, British Guyana and the Caribbean to Australia.<sup>30</sup> A few Indians had also migrated directly from India to Australia due to the facilities set up by the East India Company.

In the later years of the 19th century, the labour demand in sugar plantations further incentivized Indians to migrate to Australia. The first Sikhs arrived in the country somewhere in the late 1830s. The Sikhs came from an agrarian background in India and thus, fulfilled their tasks as farm labourers on cane fields and shepherds on sheep stations well. Until the 1860s, Indians (mostly Sikhs), worked as merchants, industrialists and businessmen in Australia.<sup>31</sup>

From the 1860s onwards, cameleers, commonly called 'Ghans' were brought to Australia to help explore and settle Australia's vast arid interior. While the Ghans consisted mainly of Muslims from Afghanistan and its surrounds, a sizeable minority were Sikhs from Punjab. The Ghans set up camel-breeding stations and rest house outposts, known as caravanserais, throughout inland Australia, creating a permanent link between the coastal cities and the remote cattle and sheep grazing stations until about the 1930s, when they were largely replaced by the automobile.

The Australian Government had supported the independence of India from the British Empire and the admission of India as a Republic to the Commonwealth of Nations. Easing of restrictions in the post-war period contributed to the increase in Indian migrants to Australia.<sup>32</sup> The Colombo Plan, a bilateral initiative to enhance social and economic development of member countries in the Asia-Pacific regions and relaxation of restrictions on immigration, were in response to the growing demand for English-educated and technologically skilled workers.<sup>30</sup>

In the 1980s and 90s, Indian engineers and IT sector experts migrated from India for opportunities in the technology industry in Australia. In recent times, the number of migrants from India has increased from ~90,700 in 2000 to ~592,000 in 2018.<sup>33</sup> Indian migration to Australia has been influenced by the appeal of educational infrastructure available in the country. In 2018, Australia was ranked as the second largest destination for Indian students with 108,292 student enrolments from India during the year.<sup>34</sup> Moreover, the number of Indian tourists to Australia has also seen a dramatic upsurge. The new wave of Indian immigrants to Australia is highly educated and well-travelled. There has also been a significant increase in the frequency and level of political dialogue between India and Australia, especially after Prime Minister Narendra Modi's visit to Australia, in November 2014.

<sup>30</sup> The story of the Indian diaspora in Australia and New Zealand is 250 years old, 2018, Quartz India

<sup>31</sup> Indian hawkers; Museum Victoria

<sup>32</sup> Menzies on Tour, eScholarship Research Centre, The University of Melbourne

<sup>33</sup> Australian Bureau of Statistics, Austrade, 3412

<sup>34</sup> Indian students enrolling in Australia surged 25% in 2018, 2019, Times of India

**Table: Demographic Statistics of Indian Diaspora in Australia**

Indicative Parameter		Value in 2016
Indian-born Australian resident population		489,410
% increase of Indian born Australian resident population from 2011 census		54.2%
Median age of Indian-born Australian resident population		33 years
Median weekly income of Indian-born Australian resident population (Age 15+)		USD 785
Languages spoken by Indian-born Australian resident population	Punjabi	22.5%
	Hindi	21.7%
	English	15.6%
	Malayalam	8.9%
	Others	30.8%
% Indian-born Australian resident population by profession	Professors	30%
	Managers	11 - 12%
	Clerical & Admin	11 - 12%
	Commercial and Professional services	9 - 10%
	Technology & Trade	9 - 10%
	Machine operators & drivers	9 - 10%
	Labourers	9 - 10%
	Sales workers	7 - 8%

**Source:** Australian Government, Department of Home Affairs

The term 'Indo-Pacific' has become popular in Australian political circles, thus making India relevant to Australia's political and economic strategy. Increased political intervention in the past decade has improved the dynamics between the two countries. The two-way Prime Ministerial visits in 2014-15 provided a significant boost to this relationship. Prime Minister Narendra Modi's visit to Australia, in 2014, highlighted that Australia was no longer peripheral to India's interests. In recent years, the dialogue between the two countries in areas of security and defence, trade and investments and greater convergence on issues around the world has resulted in positive prospects for a strong partnership.

Though trade and investment between the two countries has increased in the last few years, bilateral business growth is yet to reach its full potential. Australian businesses have not fully explored the Indian market and perceptions about India are still stereotypical. This has resulted in below par investments into India. Indian businesses, in turn, have also not viewed Australia with the same zest as the US or Europe, testified by the fact that Australia does not feature in India's top 10 overseas direct investment destinations and rather surprisingly, is still seen as a small, highly regulated and distant market. These perceptions need to change.



With India's rapid pace of growth and Australia's collective strengths in global growth sectors, a concrete collaboration between them will serve to be beneficial to both the countries.

Since 2011, Australia and India have been negotiating a bilateral free trade agreement – termed the Comprehensive Economic Cooperation Agreement (CECA). The two countries have also been part of the Regional Comprehensive Economic Partnership (RCEP) negotiations, which was concluded at the Third RCEP leaders' summit held at Bangkok on 4th November 2019. India has communicated its intention to not participate in the RCEP in its current form. This development further necessitates a strong bilateral partnership for Australia and India to capture economic opportunities. With the existing federal Governments in both India and Australia now entering the second term, there is a strong reason to believe that this is perhaps the ideal time to conclude some of these discussions with concrete steps detailing the actions that are required by each partner.

### **Sector Representative Contribution: Australia India Youth Dialogue (AIYD)**

The Australia India Youth Dialogue (AIYD) was formed in 2011 to provide a sustainable platform for promising young leaders of Australia and India to meet on an annual basis, engage on issues of significance to the Australia-India relationship and foster an enduring partnership between the two countries. Each year, the AIYD brings together 15 young Australian leaders and 15 young Indian leaders from business, Government and civil society to discuss opportunities and challenges significant to the relationship.

The AIYD 2019 conference focused on how India and Australia can activate the youth multiplier to harness the potential of its young leaders to realize the economic potential of the relationship. The collective input of the distinguished AIYD participants and AIYD's business, Government and academic partners, established three fundamental themes to focus on in order to achieve a successful bilateral relationship:

- **Support education and cultural understanding as the foundation of meaningful engagement**
  - India should leverage the valuable cohorts of Indians who study or have studied in Australia
  - Australia will benefit from promoting a greater understanding of India
- **Collaborate in sectors of economic complementarity and shared challenges to drive outcomes**
  - Indian start-ups can have better access to the Australian market
  - Consider building linkages at primary school level
  - Promote people to people links through the area of sport
  - Promote health as another area for collaboration between the two countries.
- **Promote innovative ways of working together to generate new opportunities**
  - Build adjacent industry groups and incubate business ideas between the two countries to drive innovation

Young leaders from both countries have shown significant interest in collaborative opportunities. Additionally, this initiative will also help raise awareness of India and its people in Australia.



## Australia's growth strategy

In the coming years, life expectancy of Australians is slated to increase and there may be a smaller percentage of working age population. Australia may, therefore, not be able to rely solely on labour productivity for its future growth. Greater resources may be required to improve productivity by increasing capital expenditure and automation.<sup>35</sup> In recent years, the Government has stressed extensively on innovation, science and technology. In December 2015, the National Innovation and Science Agenda report was released by the Australian Government, which laid down a range of initiatives including assisting through capital and tax incentives to innovators and start-ups, increasing collaboration between the research and development sectors in Australia, encouraging women to take up careers in science and technology and tapping into research talent in schools and colleges.

While labour participation has remained high in Australia, the participation varies greatly for men and women. The Government has been committed to increasing participation of women in the workforce through initiatives such as Women's Economic Security Package, which targets boosting women entrepreneurship and parental leave packages.

With the nation's population growing at a rapid pace, Australia's large cities will face challenges without an adequate investment in infrastructure. Infrastructure has thus become one of the Government's key priorities. The Government proposed a ~AUD 75 million (~USD 50.3 million) 10-year national infrastructure plan, which includes commitment to construction of major airports and railway routes.

As the world grapples with environmental changes, Australia will also not be able to ignore the impact that climate change will have on its long-term economic planning and ecosystem.

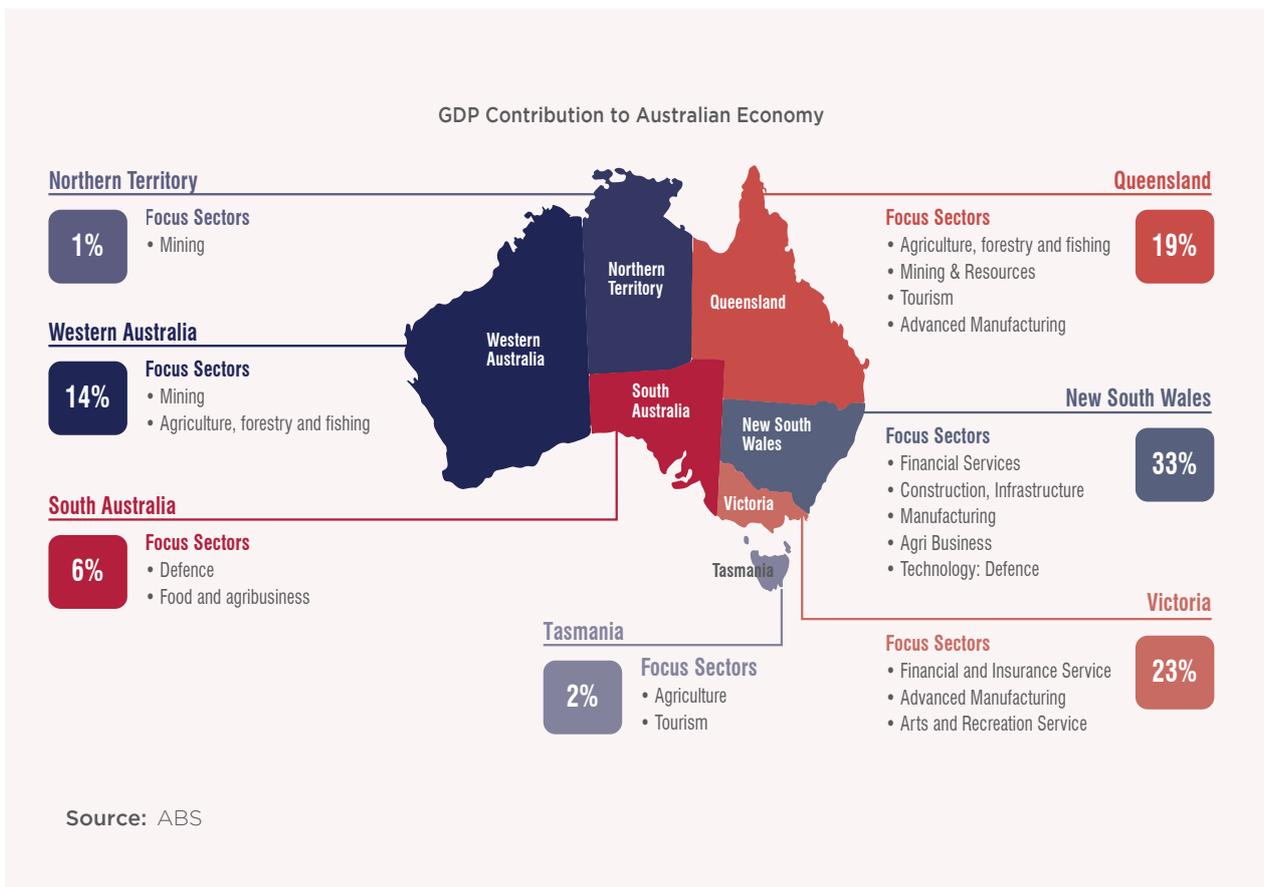
<sup>35</sup> Australia's economic future, an agenda for growth, 2016, report by Committee for Economic Development of Australia (CEDA)



For Australia, the key projected consequences of climate change are increases in temperature, greater number of droughts and an increase in tropical cyclones. Greater investment may be required to increase preparedness towards any unfavorable climatic changes.

Australia's economy continues to perform well. In the period between 1991-92 to 2017-18, 12 out of 19 key economic sectors have expanded by at least 3% per annum. The services sector has grown at an average annual growth rate of 3.4%, while the non-service sector has grown by 2.1%. Australia's technology-driven industries, such as information, media and telecommunications; and professional, scientific & technical services have grown by an annual average rate of about 5%, while financial/insurance services and health care and social services have grown at a rate of ~4.5% each.<sup>36</sup> Australia's resistance to global economic changes has ensured it a position of one of the world's most prosperous countries and Australia will try to protect and improve this position in the long term.

## Regional Distribution of States in Australia



<sup>36</sup> Austrade

## New South Wales (NSW)

One of Australia’s oldest states, NSW contributes the highest towards the country’s GDP with a 33% share, valued at USD 397 billion as of June 2018.<sup>37</sup> The state is home to about 7.95 million residents as on March 2018, highest amongst all states.<sup>38</sup> The state is touted as a cosmopolitan, cultural hub of the country with cities like Sydney and Newcastle.

NSW is a service driven economy, with a myriad of service industries established in the state. In recent years, there has been a thrust towards investment in public infrastructure in the state. The state Government has set aside about USD 89.7 billion for investment on public infrastructure till 2023. As a result, many investment opportunities in the area of rail and road infrastructure, smart city technologies and urban regeneration projects have emerged in the state.<sup>39</sup>

The Government is looking to advance two-way trade and investment with India in the following areas:

- A. Promote stronger educational links between NSW and India.
- B. Work towards restoring inbound tourism from India.
- C. Create stronger trade pathways in the sectors of food and beverage, and technology sectors.
- D. Support Indian investment and re-investment into NSW’s priority industry sectors
- E. Leverage the Sister-State Agreements between the Indian states of Gujarat and Maharashtra to strengthen business, cultural and government-to-government connections.

In addition to this, the NSW Government has entered into sister agreements with the states of Maharashtra and Gujarat in India. The agreement with Maharashtra focuses on collaborative work in specific areas such as water management and vocational education, while the agreement with Gujarat is centred around developing practical projects in education, skills and innovation, water and agribusiness. The New South Wales International Office in Mumbai promotes NSW as a destination for international investment; events and tourism; and a source of world-class products and services.

GDP Contribution to Australian Economy											
NSW priority sectors across India											
	Target investment into NSW				Support NSW exporters						
	Infrastructure	Professional Services	ICT	Mining	Professional Services	Infrastructure	Clean Technology	ICT	Mining	Education	Tourism
Maharashtra	✓	✓			✓	✓	✓	✓		✓	✓
Gujarat	✓			✓		✓	✓		✓	✓	✓
Delhi		✓	✓	✓		✓				✓	✓
Karnataka		✓	✓		✓			✓			✓
Andhra Pradesh		✓	✓			✓		✓		✓	✓
Tamil Nadu		✓	✓		✓			✓		✓	✓

**Source:** India Strategy NSW International Engagement Strategy

<sup>37</sup> ABS 5220.0, Australian National Accounts: State Accounts, 2017-18

<sup>38</sup> Population, 2018, NSW Government

<sup>39</sup> Infrastructure and Construction, NSW Government



## Victoria

Victoria is the second largest state economy in Australia with a share of about 23% (valued at AUD 424 billion, USD 284 billion) in the overall GDP of Australia in 2018.<sup>37</sup> The state houses about 6.6 million people, which constitutes 26% of the total population. Victoria has earned the reputation of a cosmopolitan state globally, housing most number of international offices of global companies compared to any other state in Australia.<sup>40</sup> Melbourne, Geelong, Ballarat and Bendigo have emerged as regional centres in the state.

The state has identified 12 sectors as priority sectors namely construction technologies; creative industries; defence technologies; digital technologies; international education; food & fibre; medical technologies and pharmaceuticals; professional services; retail, transport distribution and logistics; space technologies and the visitor economy.

The state of Victoria is home to the largest Indian population amongst all states in Australia. The state government has developed a structured approach towards building its relationship with India through the “Victoria India Strategy”. The approach undertaken to build this relationship is broadly structured as follows<sup>41</sup>:

1. Strengthening and celebrating personal connections, which would include: establishing, supporting and driving cultural precincts, cultural and creative industries, a pilot Victorian Young Leaders to India program resulting in an exchange of cultural knowledge between the two countries and deepening its understanding within communities and schools.
2. Creating new ways to work together, which would look at setting up Premier’s Victoria-India Relationship Dialogue, hosting the Australia India Youth Dialogue in Melbourne and appointing business ambassadors to build on the Victoria-India relationship.
3. Building knowledge and understanding of India across the Government and Industry involving the delivery of India Gateway Cultural Competency program, supporting the Australia India Institute in Melbourne, enabling Government and industry programs to achieve an enduring relationship between the state and India.
4. Investing towards building Victorian industry connect to India by strengthening Victoria’s in-market referral services to partners and fulfil targeted trade missions between Victoria and India.
5. Promotion and implementation of engagement across priority sectors: education, health, liveable cities and places, sport, etc.

The state has also entered into sister state arrangements with Indian states such as Maharashtra, Karnataka, Kerala, Telangana, Andhra Pradesh, Tamil Nadu and Delhi NCR.

<sup>40</sup> Victoria’s Trade Statement, Department of Economic Development, Jobs, Transport and Resources, 2017

<sup>41</sup> Victoria’s India Strategy: Our Shared Future, Victoria State Government

## Queensland

Referred to as the “Sunshine state”, Queensland is one of Australia’s most vibrant and diversified states. Due to the trends of population growth, resource investment boom and an increase in its LNG exports, the state’s economy has demonstrated a strong economic growth of 3.5% in FY18, which is above the national average.<sup>42</sup> Queensland has a large population of 5 million Australians, with its capital and largest city as Brisbane.<sup>42</sup> It has five of Australia’s eleven World Natural Heritage sites, including the Great Barrier Reef. Queensland is the country’s second largest market for tourism.<sup>42</sup>

Mining is an important contributor to the state’s economy and the state has the largest reserves of high-grade coal and bauxite in the world.<sup>42</sup> Apart from mining, the state’s strengths in construction, tourism, education and training, financial and professional services also contribute towards the state’s growing output.

Queensland is positioning itself to capitalize on investment opportunities across a broad range of sectors such as ICT, mining equipment and technology, life sciences, property and construction, aged-care, bio-futures, biomedicine, tourism, advanced manufacturing, aerospace, etc.<sup>43</sup> Backed by its Advancing Trade and Investment Strategy 2017-2022, Queensland is focusing on the development of new businesses and innovation. Moreover, Queensland has the lowest payroll tax in Australia, offering investors with ample cost-effective business opportunities.

In the past, the State Government of Queensland has taken initiatives to build stronger ties with India. The Government has set out an India Strategy with key focus areas including:

1. Increasing inbound and outbound tourism between countries
2. Supporting an increase in Queensland’s exports to India
3. Growing education and skill development exchanges with India
4. Exchanging expertise in mining and mining equipment, technology and agri-business
5. Inviting Indian investments towards Queensland’s healthcare services

In addition to this, in 2019, the Queensland Government signed an MoU for 3 years with the Government of India on mine safety.<sup>44</sup> This agreement focuses on implementing risk-safety management plans, modernizing R&D, providing training and seminars to reduce occupational risk and hazards involved in mining in India.

<sup>42</sup> Queensland Government Website

<sup>43</sup> Trade and Investment Queensland, Australia

<sup>44</sup> Cabinet approves signing of MoU between India and Australia on mines safety, Times of India



## Western Australia (WA)

Western Australia is the largest state in Australia, accounting for 33% of Australia's total land mass. The state's economy is primarily driven by the resources and mining services sector and the state contributes 14% (valued at AUD 259 billion, USD 171 billion) towards the country's GDP, as of June 2018. While ranked as the 2nd least populated state and home to 2.7 million Australians, the demographic profile of the state is expected to change with the development of mega infrastructure projects, especially in its capital city, Perth.<sup>45</sup>

The state also holds the Argyle mine that is the world's largest producer of diamonds by volume, which is scheduled to shut down in the year 2020.<sup>46</sup> The key industries are mining, agriculture, forestry and fishing.

With an abundance of resources, the state is a key exporter of minerals and petroleum for Australia. As the regional center for servicing mining projects, WA currently has 127 high-value export-oriented mining projects and a number of smaller quarries and mines that produce over 50 different commodities.<sup>47</sup>

The mining industry has driven the state's economy through improved investments in the mining sector during recent years. WA expects an increase in mining and petroleum investment through ongoing commitments made by major mining companies such as Gorgon LNG project, BHP's South Flank iron ore project, Fortescue Metal Group's Eliwana iron ore project, etc.<sup>47</sup> On account of the rising global demand for green power alternatives and new battery technology, the state is also expanding its production of lithium, vanadium and rare earths. The Exploration Incentive Scheme, initiated in 2009, now funded with USD 10 million annually (from July 2019) is expected to stimulate private sector resource exploration of new minerals and energy.<sup>48</sup>

WA has also been supported in its growth through advancements in new mining technologies. Perth is the epicenter for the technological change in the mining sector. In view of reducing over-reliance on particular sectors of the economy, the State Government of WA is seeking to diversify its economic activities to sustain economic growth. Thus, tourism, agriculture, international education and manufacturing, among other industries are expected to witness an increase in investment from the state.<sup>49</sup>

WA has a sister agreement with the Indian State of Andhra Pradesh to explore various trade opportunities, in addition to exchanging cultural ties.<sup>50</sup> Signed on December 2016, this agreement focuses on opportunities for collaboration in various key economic areas, including mining and mining services, agriculture and fisheries, energy production and distribution, higher education and vocational education and training.

<sup>45</sup> Population of Western Australia 2019, Population Australia

<sup>46</sup> Jewelers Are Already Nostalgic for the End of Pink Diamonds, 2018, Bloomberg News

<sup>47</sup> Government of Western Australia

<sup>48</sup> Government of Western Australia, Department of Mines, Industry Regulation and Safety

<sup>49</sup> Opportunity and growth in the frame with Diversify WA, Government of Western Australia

<sup>50</sup> Andhra Pradesh Government inks MoU with Western Australian Government, Economic Development Board, Andhra Pradesh Government

## South Australia (SA)

South Australia is the southern central state of mainland Australia, covering the largest arid parts of the country. The state comprises of less than 8% (-1.7 million) of the total population of the country, with 77% living in Adelaide, the state's capital city. The state is home to over 200 ethnic communities, thereby offering a diverse multicultural workforce.

SA's economy is dominated by food, agriculture and defence. The economy is currently transitioning from automotive manufacturing to services, innovation and knowledge-based industries. SA has invested in building infrastructure across defence, health, manufacturing, computing and innovation. Adelaide is the first and only GigCity in Australia, offering Australia's innovation incubators with high speed connectivity.<sup>51</sup>

The economy of SA is expected to be supported in its growth endeavor through increased investment in infrastructure, utilities, education and health facilities. The Government has announced a budget of AUD 11.9 billion (USD 7.9 billion) in infrastructure spending over four years, from 2019 to 2022.<sup>52</sup>

The Government of South Australia has a sister agreement with the State Government of Rajasthan in India to establish an International Centre of Excellence in Water and Resource Management (ICEWaRM) in Jaipur. This agreement was signed in November 2015, to facilitate development and innovation in water resource management, education, training and research in India. The University of SA also has a long list of MoUs with Indian universities such as IIT, Manipal, National Law School of India University, etc., for offshore teaching and research.<sup>53</sup> In 2016, Amity University in Noida and Jaipur have signed an agreement of collaboration with SA's Flinders University in the fields of biotechnology, nanotechnology, education, business and public health.<sup>54</sup>

## Tasmania (TAS)

Tasmania, the island state of Australia, has a share of 2% (valued at AUD 30.2 billion, USD 20.23 billion) towards the country's GDP, as of June 2018. Australia's smallest state, the island has a population of 0.5 million Australians.<sup>55</sup> The state's capital city is Hobart. The major industries of Tasmania are agriculture and tourism.

Tasmania is known for its supply of seafood that includes the wild abalone and crayfish. Crayfish, being one of the largest species of rock lobster in the world, is highly valued in the Northern Pacific market.<sup>56</sup>

The Government of Tasmania is inviting investments in tourism infrastructure, mining exploration, food processing, research in pesticide and bio-security, renewable energy, logistics, science, etc.

<sup>51</sup> Government of South Australia website

<sup>52</sup> Economic Outlook: South Australia

<sup>53</sup> University of South Australia

<sup>54</sup> Amity University Website

<sup>55</sup> Source: ABS

<sup>56</sup> Industry Reports



In 2016, Tasmania drafted a roadmap to strengthen its ties with South Asia, specifically India and Sri Lanka. This strategy lays focus on growing education and skill development exchanges with India, increasing tourism, improving exports of goods and services from the country and collaborating on technical expertise in aquaculture, energy, high-value manufacturing, etc.<sup>57</sup> It has identified New Delhi, Mumbai and Kerala as the target markets for collaboration.

A more up-to-date policy reference is available in the Tasmanian Trade Strategy 2019-2025, which identifies India as a priority market for focused /sector specific engagement.

## Australia Capital Territory (ACT)

The Australian Capital Territory is the federal territory of Australia, housing the country's capital city of Canberra. The territory is enclaved within the state of New South Wales. A large proportion of the territory's economy is concentrated in Canberra and is driven by the services sectors, particularly in the administration of federal and local governments. Several important federal institutions such as the Parliament of Australia, High Court of Australia, the Australian defence force army, Australian War Memorial etc are situated in ACT.

Education is the largest service export sector. ACT is one of the top places for collaborative R&D, given the presence of several education institutions such as the Australian National University, the University of Canberra, etc.

Canberra provides significant investment opportunities to investors. Moreover, the recent developments on its Smart City infrastructure, airport and its already established high-quality educational infrastructure make a strong case for investment potential. Furthermore, the Government is also supporting investments in space, satellite technologies, defence and cyber security, renewable energy, digital economy, healthcare and sport science, higher education and tourism infrastructure.<sup>58</sup>

The Government of Australia has laid out Canberra's International Engagement Strategy to provide global recognition to Canberra's potential as an international city.<sup>59</sup> This Strategy recognizes opportunities with India in the fields of education, tourism, ICT, health and sport science. It also seeks to resolve trade barriers to facilitate exports from Australia to India and increase investments into Australia.

<sup>57</sup> Tasmania: Prospectus for South Asia

<sup>58</sup> Invest Canberra, Canberra State Website

<sup>59</sup> Canberra's International Engagement Strategy

## Northern Territory (NT)

Northern Territory is an Australian Territory situated in the central-northern region of the country. The state's economy is characterized by a large public sector, abundant resources and a strong defence force. The economy has a relatively small population (~0.2 million)<sup>60</sup> and has a share of 1% (valued at AUD 26.2 billion, USD 17.5 as of June 2018) in the country's GDP. The state's capital city is Darwin.<sup>61</sup>

The defence industry contributes significantly to NT's economy with respect to direct and indirect employment opportunities.<sup>62</sup> The other key industries contributing to NT's economy are mining, agriculture, manufacturing, construction, etc. While the state's economic growth (2.7%) can be largely attributed to net exports of LNG, live animals, mineral ores and concentrates, the low private investment in construction have slowed down the pace of this growth.<sup>63</sup>

NT has several ongoing investments in both the public and private sectors. The USD 45 billion Ichthys Liquefied Natural Gas (LNG) project, moved from its initial phase to operational phase, has been responsible for increasing the territory's exports.<sup>63</sup> The Government has invested in several transformative projects to drive demand growth across a broad range of sectors, such as mining, energy, tourism, agri-business, space, international education and training.<sup>64</sup>

In an effort to increase engagement between India and NT, NT's Government has developed an NT-India market entry guide. This strategy lays down collaboration models with India in the fields of education, training, tourism, METs expertise, agri-business and water management.<sup>65</sup>

NT has a substantial indian population. The town of Alice Springs in the Northern Territory has a population of ~3,000 Indians in the town's population of 30,000 people. The hospital is the town's largest employer with majority of its employees from India.



<sup>60</sup> Population, The Northern Territory Economy

<sup>61</sup> NT goes it alone on \$400m ship lift, The Canberra Times

<sup>62</sup> Defence and Defence Support, The Territory

<sup>63</sup> Economic Growth, The Northern Territory Economy

<sup>64</sup> Expressions of Interest, The Territory

<sup>65</sup> NT-India Market Entry Guide



## Chapter 2

# Understanding the business environment



### Synopsis

This chapter will discuss the ease of doing business in Australia, with an emphasis on business culture and structure. In addition, the chapter also covers the Australian labour market in detail and analyzes how it impacts investment across sectors.

## Ease of doing business in Australia

The ease of doing business index reflects the extent of regulation and business environment that supports and protects the growth of business in a country, in comparison with other countries in the world. Australia has a favorable environment for carrying out business and has been ranked amongst the top 20 countries globally for ease of doing business in the last decade.<sup>66</sup> Australia was ranked 18th amongst 190 economies considered by the World Bank while determining the 'Ease of Doing Business' ranks for 2019.<sup>67</sup> Various factors that have directly or indirectly impacted the ability of Australia to nurture businesses in the country include:

1. **Macroeconomic environment:** Australia has a robust and resilient economy that has been continuously growing for 27 years at a CAGR of 3% each year. The economy has also remained recession free since 1992. Australia has a balanced economy owing to steady Government policies and institutions, a positive investment outlook as well as good trade relations with other countries.
2. **International trade:** Australia has emerged as an international hub for foreign investment with the 9th largest FDI inflows in the world valued at USD 48 billion in 2016.<sup>68</sup> However, carrying out business in Australia also requires extensive documentation and incurring high border compliance costs. Under the Doing Business Index for 2019, Australia is ranked 103rd in 'Trading across borders' as compared to USA (36th), Canada (50th) and Japan (56th).
3. **Banking and Financial systems:** The banking and financial system in the country has been resilient and stable owing to a high level of financial supervision by the Government. Local businesses are supported by easy access to credit facilities, but Indian businesses have found it almost impossible to get credit from local banks. Consequently, it is only the limited number of Indian banks, which are available to lend to Indian businesses in Australia. Commercial lending increased from USD 258 billion in 2010 to USD 364 billion in 2017.<sup>69</sup> Additionally, Australia has also emerged as the fourth largest pension fund market in the world valued at USD 1.9 trillion in 2018, with large investments in businesses routed through these superannuation funds.<sup>70</sup> Australia does not provide any assurance to investors for their capital protection. Corporate Tax rate is high and Fringe Benefit Tax rate is 97% which is one of the highest in the world. Insurance market is complex, expensive, and there are a number of hidden charges.
4. **Education and skill development:** Australia is home to a highly educated and skilled workforce that is employed across a diverse portfolio of industries. The workforce is also characterized by its diversity, hailing from different parts of the world (> 30% of the total people employed in the country). The services sector is the biggest employer of the Australian workforce (about 80%).<sup>71</sup>
5. **Strength of institutions:** As per the World Governance Indicators, Australia has a high quality of governance. It ranks in the top 10th percentile on most indicators including accountability, government effectiveness, quality of regulatory frameworks and control of corruption.<sup>72</sup> The judiciary is independent from the Government, which ensures quick and unbiased enforcement of laws and dispute resolution. Australia ranks 5th in the world for timely enforcement of contracts under the 'Doing Business' Indicators.

<sup>66</sup> Doing Business Reports 2008-2019, World Bank

<sup>67</sup> Doing Business 2019-Australia Profile Report, World Bank

<sup>68</sup> World Investment Report 2018 - Investment and New Industrial Policies, UNCTAD

<sup>69</sup> ABS statistics

<sup>70</sup> Australia has the Fourth Largest Pension Fund Assets in the World, 2019, Austrade



- 6. Infrastructure:** Australia has well-developed infrastructure with continuous and easy access to power, water, electricity, transportation and telecommunications-all necessary for modern economic activity and these facilities are at par with other large global economies.
- 7. Business Environment:** The Australian Government has been supportive of entrepreneurship and this support has resulted in the reduction in time taken for starting a business, lesser regulations on minimum capital requirements, etc. As a result of this, the number of new businesses started in the country increased from 281,553 in FY15 to 354,520 in FY18.<sup>73</sup> Further, business regulations are conducive to sole proprietorships as well as private companies. Australian businesses are traditionally risk averse, and this perhaps stems from the security of trading in natural resources. This has resulted in trade dependencies on traditional markets and a consequent reluctance to diversify. There is also high intent, but relatively low conversion of business plans, especially when it comes to diversification. Indian businesses, if they are new to the market, will therefore need to be persuasive and patient. The layers of government - federal, state and local can, at times, create multiple bureaucratic hurdles to cross in business, especially for foreign entities. Indian businesses, especially in the mining sector have found it extremely difficult and time consuming to get environmental clearances. Overall, Australian businesses are more process driven owing to a strong regulatory and social environment. The environment supports methodical and sustainable growth of businesses and consequently, there is a relatively low accountability of outcomes.

Despite the fact that Australia has put into place a theoretically tough regulatory/ approval system, many Indian investors in Australia felt that there is no guarantee for last mile approval. Sometimes, approvals were denied on flimsy grounds. Some businesses felt that day to day operations were also impacted due to delay in regular clearances. The practice of hiring a lobbyist to facilitate these clearances is therefore the preferred route of such businesses.

Transparency International released its corruption perceptions index in the beginning of 2020, where Australia is among 21 nations with perceived corruption worsening “significantly” over the past 8 years, even as the country is much better off than most on the corruption scale around the world. Its report of August 2020 ([https://transparency.org.au/wp-content/uploads/2020/08/TIA-position-paper\\_National-Integrity-Commission.pdf](https://transparency.org.au/wp-content/uploads/2020/08/TIA-position-paper_National-Integrity-Commission.pdf)) notes that many political scandals involving suspect “political donations, conflicts of interest and undue influence” erode public trust in politicians and calls for setting up a strong national integrity commission. TIA states that “While Australia still ranks among the world’s most corruption-free countries, for a number of years the very institutions that keep us honest have been sorely tested.

- 8. Innovation capabilities:** Australia has a well-developed research and development environment and the Government is increasingly supporting entrepreneurship by establishing incubator hubs across the country. The Australian Government’s innovation agenda is to promote growth and economic development through digital transformation of the industry and the economy.
- 9. Understanding of India:** Traditionally, Australian businesses had a limited understanding of Indian companies and business environment in India. USA, Europe, Japan, South Korea and China have been the preferred markets . This is changing rapidly due to the efforts of business associations and government to diversify and find new business partners.

Despite government legislation and sustained efforts against racism, a Scanlon Commission 2017 “Mapping Social Cohesion Report” carried out by Monash University found that 39% of respondents born in India reported having experienced discrimination in Australia. Some migrant Indians interviewed felt that executives in Banks or IT professionals often experience discrimination when they are informed that high net worth clients do not want to deal with Indians. In this sense, many of them were unable to reach their true

<sup>71</sup> Australia Benchmark report, 2017, Austrade

<sup>72</sup> Worldwide Governance Indicators, World Bank

<sup>73</sup> ABS 8165.0 Counts of Australian Businesses, including Entries and Exits

<sup>74</sup> Small Business in the Australian Economy Report 2016, Australian Small Business and Family Enterprise Ombudsman

potential, the experience was frustrating and challenging, thus making it impossible to cope with discriminatory practices

**10. Chinese influence in Australian institutions and Business:** According to a June 2020 analysis by Australian Strategic Policy Institute (ASPI), an independent think tank operatives from the United Front Work Department (UFWD) of the Chinese Communist Party are on a mission to infiltrate and influence almost every aspect of Australian life, from politics to business to the media. This has been done through funding, directing and supporting a mammoth number of communities, business and student organizations who rarely disclose their close links with China. A number of business entities with links to China have sought to build networks in politics at the state and federal level. Big businesses in Australia have also been targeted. These links are also a central component of China's legal as well as illegal technology transfer efforts from Australia.

## Trends in Business culture and structure in Australia

Small enterprises make up a large proportion of the businesses operating in Australia. These businesses contributed ~33% to Australia's GDP in FY14 while employing ~40% of Australia's workforce.<sup>74</sup> These contribute heavily towards exports as well, with about 44% of Australia's goods exports sourced from small businesses.

Geographically, NSW, Victoria and Queensland and the eastern states, house a large portion of the businesses operating in the country. This is a result of high concentration of financial capital, investments and Government support for these states.

## Labor market in Australia

The Office of the Fair Work Ombudsman (FWO) looks into the inspection and enforcement of labor laws in Australia. The labor market is regulated by the Fair Work Act (FWA), 2009. Businesses in Australia are required to follow a National Minimum Wage rate coupled with profession-based rewards to determine employee salaries, as introduced by the FWA. Other legislations and agencies overlooking labor activity in the country include the Safe Work Act, Superannuation Guarantee (Administration) Act 1992, Department of Education, Science and Employment as well as state level laws and agencies that are responsible for ensuring a fair and safe working environment for employees.<sup>75</sup>

While Australia offers a diverse, multi-lingual and skillful resource pool, the country's workforce is associated with a high cost. The Australian labor market also presents less flexible regulations specific to wage determination, hiring and firing practices and labor taxation.

The industrial policy in Australia has been transitioning towards promotion and adoption of innovative technologies and professional knowledge in businesses. The industry has shifted from being driven by agriculture, mining and manufacturing to services such as healthcare, education and trade, which has in turn shaped labor opportunities in the market. Over the years, the share of workforce in manufacturing has declined from about 15% in 1987 to 7% in 2017.<sup>76</sup> This change can be primarily attributed to a reduction in the demand for semi-skilled labor by the manufacturing sector in Australia as well as the use of automation instead of manpower. As per estimates of the Department of Jobs, employment in the manufacturing sector will further shrink by 4% till 2022.

Australia has one of the highest wage rates in the world as compared to other developed nations such as USA, Germany, France as well as developing nations such as Brazil. According to economists, the high wage rate, which has grown faster than labour productivity, can be attributed to the commodity boom that had cushioned the impact of the global financial crisis.<sup>77</sup>

There have been numerous cases where employers have been penalized for underpayment to labour. A relatively high rate of unemployment and high cost of labour are major reasons for this anomaly.

<sup>75</sup> Australia Profile, International Labour Organization

<sup>76</sup> Australian Jobs 2018, Department of Jobs and Small Business, Australia

<sup>77</sup> Why does Australia have such low wage growth?, 2018. HRD Magazine



# Chapter 3

## Focus sectors for enhancing Indian exports to Australia

### Synopsis

This chapter discusses the history of Australia's imports and exports of goods and services over the recent past and how its relationship has changed with its key trading partners across Europe, the US and Asia. This chapter also analyzes Australia's top imported goods and services and compares these with India's export strengths in goods and services to highlight the potential opportunities for India to improve its exports to Australia in both goods and services.

The bilateral trade in goods and services between the two countries was USD 23.3 billion in 2018. India can leverage its strengths in key commodities such as refined petroleum products, pharmaceuticals and bio-similars, passenger/ commercial vehicles, agricultural commodities such as rice and fruits, renewable energy, railway equipment, gems and jewelry, textiles, etc. to target a higher wallet share in Australia's goods imports. There is a significant room for growth of Indian services exports to Australia. India has the potential to increase its exports of goods and services to Australia from USD 5 billion in 2018 to USD 15 billion in 2025 and USD 35 billion in 2035. This would mean that India's goods exports to Australia could grow from USD 3.7 billion in 2018 to USD 10 billion in 2025 and USD 20 billion in 2035. This would also mean that India's service exports to Australia could grow from USD 1.7 billion in 2018 to USD 5 billion in 2025 and USD 15 billion in 2035.



Trade has always played a key role in the economic development of Australia. However, Australia's trade partners as well as the trade composition has undergone a significant change over the last 100 years.

During the early 1900s, Australia mainly imported commodities such as textiles, clothing, footwear, iron and steel, machinery, timber and sugar. Australia's merchandise imports grew from USD 3.9 billion to USD 9.6 billion during 1901 to 1944-45. UK was the major exporter of merchandise goods to Australia during this period and had a share of 40-60% of total imports of Australia.

Post the Second World War, petroleum oils and vehicles and parts were also added to the import mix. UK continued to be the key source of imports till it was replaced by USA in the 1970s.

USA continued as the largest source of imports to Australia until the 1980s, when Japan overtook it for a brief period of 3 years. USA again overtook Japan and remained as the largest import source for Australia until the mid-2000s, after which China took the lead position. Even today, China continues to be the largest source of imported goods to Australia.

Australia's imports from the world in 2018 stood at USD 235.5 billion<sup>78</sup>. The key commodities imported were petroleum and mineral oils, passenger and commercial vehicles, ships and floating structures and pharmaceutical products.

In case of exports, Australia mainly exported agricultural commodities from 1900s to 1950s. UK was the largest export partner of Australia during this period. Australia witnessed slow growth in exports from 1900s to 1950s due to its heavy dependence on the agriculture cycle, which was severely disrupted during the world wars.

Post the Second World War, Australia's exports of resources and manufactured products increased while that of agricultural commodities declined. Japan replaced UK to become Australia's largest export market during the 1970s. The Australian economy was deregulated in the 1980s, which led to a surge in Australia's exports. During the 1980s, Australia also witnessed a strong growth in exports of services with personal travel services and business services becoming the two key types of services that were exported.

China overtook Japan to become Australia's largest export partner in 2009-10 and continues to remain the largest export partner today. In 2018, Australia's exports to the world stood at ~USD 254 billion, with minerals, fuels, ores, gems & jewellery and meat being the key export commodities.

<sup>78</sup> UN Comtrade

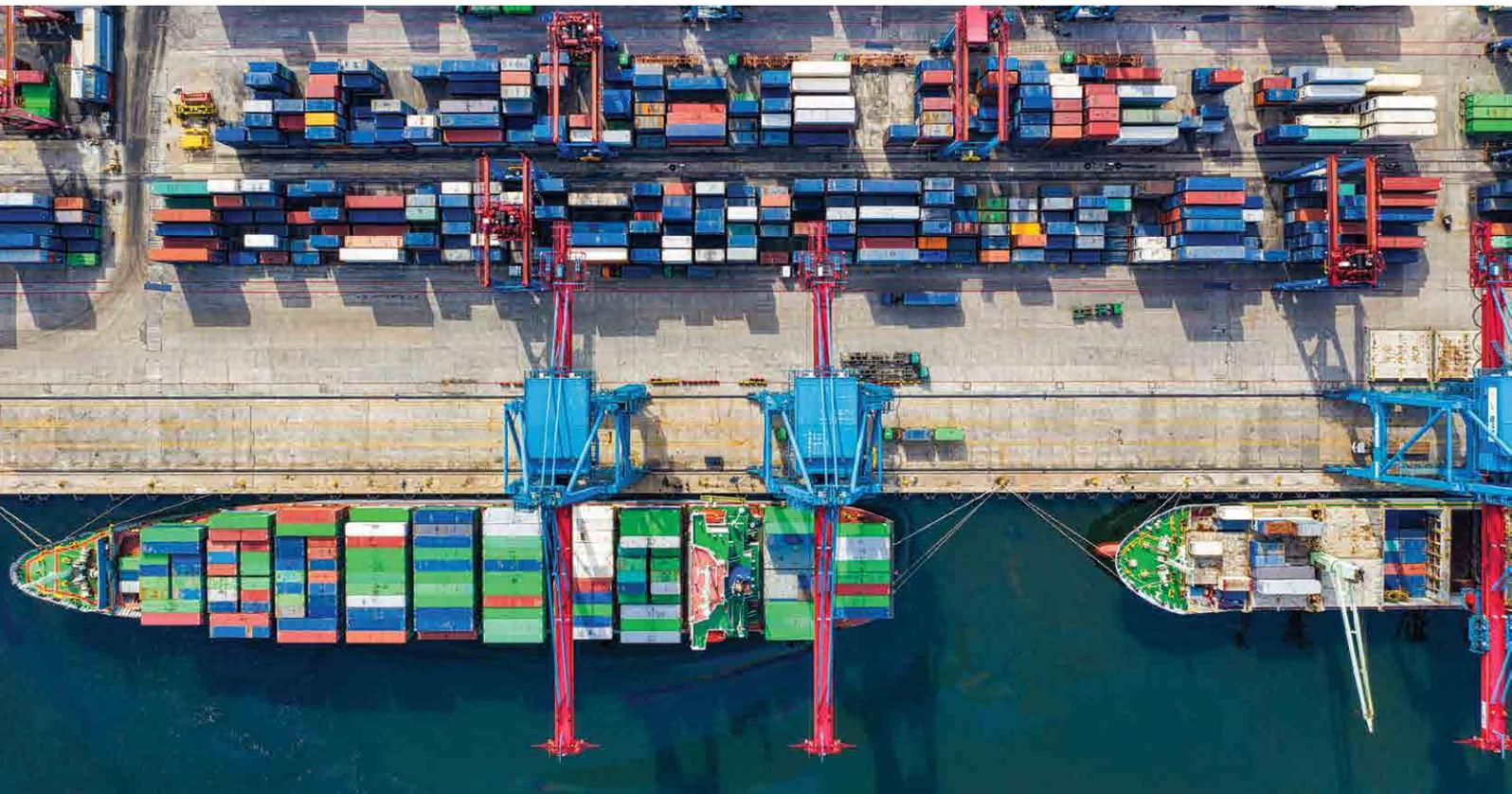


## India as a global manufacturing hub in the post-Covid 19 era

The outbreak of the novel Coronavirus in 2019 has led to a worldwide lockdown and an unprecedented halt in manufacturing operations across countries. This has resulted in a supply disruption that was beyond the preparedness that countries had in place for usual contingencies.

Over the past few decades, with increasing globalization, certain regions have emerged as the manufacturing hubs of the world. Multiple factors such as economies of scale, lower labor costs, access to technology, government support to industry, etc. have driven this trend towards concentration of manufacturing operations in select countries more than others. Growth in manufacturing has led to the development of new sea-routes for trade and consequently favorable sea-freight rates and in turn, further concentration of manufacturing. With the onset of this pandemic, the economic benefits of this strategy are being compared with the supply chain risks and consequent risk of a complete shutdown in operations that emerge from this approach. 'Diversification' is expected to gain increasing importance as an obvious risk mitigation measure over the decade.

The domino effect of the closure of auto industry, chemical and pharmaceutical plants, shipping and logistics in other countries were felt around the globe during early 2020. Consequently, several countries have started reducing their reliance on imports and also diversifying their sourcing centers to ensure business continuity. Several countries are expected to prioritize this geographic diversification of their supply chains. With the government focus on incentivizing 'Make in India' and focus on becoming the exporter to the world, India can leverage this opportunity to position itself as the ideal alternative manufacturing destination. India can also become a viable sourcing destination for the world.



## Trade of goods

### Overview of Australian imports from the world

The total value of goods imported by Australia stood at USD 235.5 billion in 2018. The key commodities imported by Australia are petroleum and mineral oils, passenger vehicles, ships, boats and floating structures, commercial vehicles, pharmaceutical products, gems and jewellery, mobile phones, communication apparatus, computers, pneumatic tyres. etc.

**Table: Key commodity imports by Australia from the world in 2018**

Products commodities	Imports (USD billion)	% of total Imports
Petroleum and mineral oils	29.9	12.7%
Passenger vehicles	16.7	7.1%
Commercial vehicles	7.5	3.2%
Gems and Jewellery	4.6	1.9%
Pharmaceutical products	4.4	1.9%
Mobile phones	4.3	1.8%
Communication apparatus	4.2	1.8%
Personal computers/laptops	3.7	1.6%
Pneumatic Tyres	2.1	0.9%
Digital processing units	2.0	0.8%
Antisera and immunological products	1.7	0.7%
Others	154.4	65.6%
<b>Total</b>	<b>235.5</b>	

**Source:** UN Comtrade Database

Australia imports majority of its crude petroleum and refined oil from refineries in South Korea, Japan and Singapore to fulfill its domestic consumption needs. The closure of many oil refineries in Australia, due to their high operating cost, has resulted in the decline of local production of refined petroleum from 750,000 barrels per day in 2001 to ~400,000 barrels in 2018-19. At the same time, the import of refined products has increased from ~100,000 barrels per day in 2000-01 to ~600,000 barrels per day in 2018-19. Currently, 51-53% of Australia's imported refined petrol comes from Singapore's refineries, 18% from South Korea and 12% from Japan. Asian refineries are extremely competitive in terms of production and transport costs. At the current import rate, Australia's refineries may become 100% reliant on imported petroleum by 2030.



The automotive industry, which was once a cornerstone of Australia's economy, has declined over the years. Majority of the car manufacturing companies, viz., Mitsubishi, Ford, Toyota and Holden (General Motors Subsidiary) have shut down their plants due to high production costs. However, they will operate as pure importers and wholesalers. A continued decrease in import duty to 5% in 2008, signing of multiple FTAs (primarily with USA and Thailand), high labor wages, low economies of scale and the global financial crisis have led to a decline of the automotive sector. Automotive production continuously declined to reach sub 300,000 vehicles in 2009 and a mere 98,632 vehicles in 2017<sup>79</sup>. The last car manufacturing facility (General Motors owned Holden) in Australia was shut in 2017.

Despite the closure of domestic production units, vehicle sales in Australia have been growing at 2.5% CAGR over the past two decades. The sales hit a record high in 2017 with 1,189,116 units sold, resulting in increased imports of passenger and commercial vehicles. Demand for sports utility vehicles (SUVs) and pick-up trucks has been increasing. In the passenger vehicles category, Australia mainly imports medium sized cars from Japan, South Korea, Germany and Thailand. A dominant trend in the passenger vehicles market is the decline of the large car segment with customers shifting to either the smaller, fuel-efficient vehicles or SUVs / pick-ups. The Australian passenger vehicle market is dominated by Japanese and Korean brands, with Toyota being the market leader followed by Mazda, Hyundai, Mitsubishi, Ford and Holden.

The growth in the Australian motor vehicle market has been driven by a strong demand for SUVs. SUV sales have grown at an extremely healthy rate of 10% CAGR over the last two decades, recording sales of 495,300 units in 2018. In the LCV market too, Toyota is the market leader followed by Mazda and Hyundai.

Commercial vehicles (including pick-up trucks) recorded a sale of 237,972 units in 2018. Australia mainly imports delivery trucks with Gross Vehicle Weight (GVW) < 5 tonnes from Thailand and Japan. After witnessing subdued sales between 2005 and 2015, sales have witnessed a revival with new investments in the mining sector and recovery in commodity prices. Toyota is the market leader in the pick-up market with its Hilux being the best-selling pick-up truck. Australia's heavy truck market is highly competitive with 16 brands accounting for sales of approximately 10,000 units sold annually. However, the three Japanese companies, i.e. Isuzu, Hino and Fuso, account for close to half of the market<sup>80</sup>.

In the gems and jewellery category, Australia mainly imports unwrought gold from Papua New Guinea, Japan and New Zealand. However, gold is also re-exported to other countries. In the communication apparatus category, Australia imports transmission-reception apparatus for TV, radio, etc. from China, Vietnam, USA and Malaysia. In the computers category, Australia imports computer data storage units and digital CPUs from China, USA, Singapore, Malaysia and Vietnam<sup>81</sup>.

<sup>79</sup> International Organization of Motor Vehicle Manufacturers

<sup>80</sup> Automotive Report Australia, November 2018, Economist Intelligence Unit

<sup>81</sup> The Observatory of Economic Complexity (OEC)

## Overview of India's goods exports to the world

### Trends in Indian exports

As of 2018, the value of India's goods exports to the world stood at USD 322.5 billion. India's goods exports witnessed a degrowth of ~8% during 2013-2016 due to a sharp fall in oil prices, fall in global trade, weak global demand and high concentration of India's exports in a few commodities. Petroleum products, which account for a high share of ~15% in India's overall goods exports, declined by ~26% during 2013-2016 due to slowdown in global demand and a fall in the global oil prices. Gems & jewellery exports, which constitute 11% share of the overall exports, also witnessed a decline of 2% during 2013-2016. However, India's exports revived in 2017 and continued to grow in 2018. Exports witnessed a growth of 11% during 2018, backed by growth in petroleum products, gems & jewellery and engineering goods.

### Key commodities exported by India to the world

The top ten commodities exported by India include petroleum products, gems & jewellery, pharmaceutical products, rice, prawns & shrimps, meat and passenger vehicles. The export of the top ten commodities amounted to ~USD 112 billion and accounted for ~35% of India's total exports in 2018.

**Table: Key commodities exported by India to the world in 2018**

Product commodities	Exports (USD billion)	% of total Exports
Petroleum and mineral oils	47.0	14.6%
Gems and Jewellery (diamonds, gold, silver and precious metal Jewellery)	36.6	11.4%
Pharmaceutical products	10.8	3.3%
Rice (Basmati and par-boiled)	6.8	2.1%
Shrimps and Prawns	4.4	1.4%
Meat	3.3	1.0%
Passenger vehicles	3.3	1.0%
Others	210.3	65.2%
<b>Total</b>	<b>322.5</b>	

Source: UN Comtrade Database

### Trade relationship with Australia

The bilateral trade of goods between India and Australia has strengthened over the years, growing at CAGR of ~9% from USD 12.5 billion in 2014 to USD 17.8 billion in 2018. India's goods exports to Australia grew at a CAGR of 10% from ~USD 2.6 billion in 2014 to ~USD 3.7 billion in 2018.



**Table: Key commodities exported by India to Australia in 2018**

Product commodities	Exports (USD billion)	% of total Exports
Petroleum and mineral oils (HSD, Kerosene)	0.82	22%
Metro passenger coaches	0.35	9%
Pharmaceutical products	0.23	6%
Diamonds	0.16	4%
Gems and Jewellery	0.11	3%
Textiles (t-shirts & kitchen linen)	0.06	2%
Rice (Basmati and par-boiled rice)	0.05	1%
Passenger vehicles	0.04	1%
Others	1.92	51%
<b>Total</b>	<b>3.73</b>	

**Source:** UN Comtrade Database

The key commodities exported from India to Australia include petroleum and mineral oils, pharmaceutical products, diamonds, gems & jewellery, metro passenger coaches, cotton textiles, rice and passenger vehicles. These commodities account for ~50% of India's goods exports to Australia.

### Petroleum and mineral oils

The growth in India's goods exports to Australia has been primarily driven by a rise in exports of petroleum & mineral oils (kerosene, high speed diesel, aviation fuel), which have grown at 23% CAGR- from ~USD 360 million in 2014 to ~USD 820 million in 2018<sup>82</sup>.

India's exports of petroleum products to the world stood at USD 47.0 billion in 2018. Although India is among the top five importers of crude oil in the world, it is also a major exporter of refined oil and other petroleum products such as high-speed diesel, aviation turbine fuel, light diesel oil, etc. Oil refining is one of the core industries in India, marked by the presence of "Maharatna" PSUs like ONGC, IOCL, BPCL and "Navratna" PSUs like HPCL, OIL and large private companies like Reliance Industries and Essar Oil. India has 19 public sector refineries and 3 private sector refineries, which have a total capacity of ~215 million metric tonnes/annum<sup>83</sup>. The Jamnagar refinery in India is the world's largest refinery with a capacity of 33 million metric tonnes/annum. India also takes advantage of its strategic location between crude oil exporting Middle-East nations and other Asian consumers to export refined oil and other petroleum products.

India contributes approximately 7% towards Australia's total imports of petroleum and mineral oils (excluding crude) of USD 19 billion<sup>84</sup>. India can leverage its strengths in this sector to increase its share in Australia's petroleum and mineral oils imports (excluding crude).

<sup>82</sup> UN Comtrade Database

<sup>83</sup> Ministry of Petroleum and Natural Gas

<sup>84</sup> HS code 2710; Trade Map

## Gems and Jewellery

India is the fourth largest exporter of key gems-rubies, sapphires, emeralds, diamonds imitation jewellery and pearls to Australia. India has developed the art of diamond cutting, gems polishing and jewellery designing through its rich history and cultural heritage. Gems and jewellery exported from India are internationally acclaimed for their designs and cuts. India is the world's largest cutting and polishing center for diamonds. The diamonds are imported, processed in India and re-exported. Gems & jewellery constitute a major portion of the India's goods exports to the world and exports were valued at USD 36.6 billion in 2018. Availability of high skilled labor, low costs, favorable policy environment and strong overseas demand for Indian jewellery from USA, UAE, China, Hong Kong, etc. are the key reasons for India's strong performance in gems and jewellery exports. Australia's total gems and jewellery imports stood at USD 6.6 billion in 2018, of which India's gems and jewellery exports were valued at USD 0.35 billion, representing a 5% share. India could target to increase its gems and jewellery exports to Australia by leveraging its strengths in this sector<sup>85</sup>.

## Pharmaceutical products

India's total exports of pharmaceutical products to Australia were valued at USD 0.29 bn, accounting for a low share of 4% in Australia's total pharmaceutical products imports of USD 8.17 bn in 2018<sup>86</sup>. Indian players predominantly operate in the generic drug segment. India is the largest supplier of generic medicines in the world, accounting for 20% of the global generic medicines supply by volume<sup>87</sup>. India's exports of pharmaceutical products to the world were valued at ~USD 10.8 billion in 2018. Availability of low-cost skilled labor and a diversified industry, which includes small and medium sized producers, have made India a hub for generic drug manufacturing. India is also emerging as a hub for manufacturing of biosimilars with leading companies such as Biocon, Glenmark pharmaceuticals and Zydus Wellness actively focusing on biosimilars<sup>88 89</sup>. India's biosimilars exports to the world stood at ~USD 51 million in 2017 and have a high potential for growth in the future<sup>90</sup>. With its strong capabilities in generics and biosimilars, India could significantly increase exports of these products to Australia.

## Rice and other agriculture commodities

India is the second largest exporter of rice to Australia after Thailand. While India's total exports of all rice varieties to Australia were valued at ~USD 0.054 billion, the exports of par boiled rice and basmati rice stood at ~USD 0.053 billion in 2019 (~98% share)<sup>91</sup>. India's share in Australia's imports of other varieties of rice-broken rice, brown rice, etc.- is low and stands at ~5%<sup>92</sup>. India is the second largest producer of rice in the world. Basmati rice and par-boiled rice are the major varieties exported from India. India's rice exports to the world stood at USD 6.8 billion in 2018. India's basmati rice has a high demand from Middle-Eastern countries, the UK and US. India can leverage its brand power and expertise in rice production to become the top exporter of basmati and par-boiled rice to Australia and also increase the exports of other varieties of rice.

<sup>85</sup> HS code 71; Trade Map

<sup>86</sup> HS code "30"; Trade Map

<sup>87</sup> Pharma exports up by 3 pc, The Economic times

<sup>88</sup> Understanding the biosimilars opportunity for Indian Pharma, The Economic times

<sup>89</sup> Surge of Indian Biosimilars Market Forecast In 2019, CPhI

<sup>90</sup> Biosimilars market in India; Current status and future perspectives, NCBI

<sup>91</sup> HS code 1006; TradeMap

<sup>92</sup> HS codes 100610, 100620, 100640; Trade Map



Apart from rice, India could also tap into the opportunity to increase its exports of other agricultural commodities. India is the largest producer of fruits - mangoes, bananas and papaya and vegetables - potatoes, onions and cauliflowers<sup>93</sup>. However, India constitutes a low share of ~0.3% in total fruits imports and ~3% in total vegetable imports of Australia<sup>94</sup>. India is also a notable exporter of meat and seafood to the world, with its total meat and sea food exports being valued at ~USD 10 billion in 2018. However, India's share of meat and sea food imports by Australia is <0.2%. India could leverage its strengths in each of these agricultural commodities and increase its exports.

## Rail equipment

In 2016, India exported metro-passenger coaches to Australia for the first time. The coaches were exported by Bombardier and Alstom who won contracts to set up metro projects in Melbourne and Sydney, respectively. Bombardier has invested about €33 million in its Indian manufacturing facility in Baroda and has orders to export 450 metro rail coaches to Australia in a two- and- a- half year period. Alstom will supply railway coaches for the Sydney project from its manufacturing units in South India. The companies have set up the manufacturing facilities in India to take advantage of the large pool of engineers and low labor cost. India currently constitutes ~29% share of the rail equipment imported by Australia and can target further increase in its railway equipment exports to Australia<sup>95</sup>.



<sup>93</sup> HS codes 08 for fruits and 07 for vegetables; Trade Map

<sup>94</sup> India is world's largest producer of Mangoes, Banana; Financial express

<sup>95</sup> HS code 86; Trade Map

## Passenger vehicles

India primarily exports cars with internal combustion engines of capacity 1,000-1,500 cc to Australia. A few top models exported from India include Ford Ecosport, Suzuki Baleno and Suzuki Brezza. India is a large automotive manufacturing hub due to availability of low cost labour and high domestic demand. India's passenger vehicles exports to the world were valued at USD 3.3 billion in 2018. India is Asia's third largest passenger vehicle market in the world with ~3.1 million<sup>96</sup> car registrations in 2018 and is dominated by large organized players such as Maruti Suzuki, Hyundai, Mahindra & Mahindra, Honda, Ford and Toyota. India's passenger vehicle exports to Australia currently account for only 0.4% of Australia's total passenger vehicle imports<sup>97</sup>. Indian companies can explore the opportunity of exporting pick-up trucks, which are witnessing high growth in Australia, and also target an increase in the exports of SUVs for the Australian market.

In addition to passenger vehicles, India could also tap into the opportunity of increasing exports of automotive parts and spares (including automotive tyres) to Australia. Pneumatic tyres are a part of the top ten imported commodities of Australia. Australia's total imports of automotive parts stood at USD 3.3 billion in 2018. Although India's exports of automotive parts to the world stood at USD 5.7 billion in 2018<sup>98</sup>, it has a low share of 0.7% in Australia's imports of automotive parts. India can leverage its ability to manufacture low cost automotive spare parts of international quality which meet Australian specifications to supply these products to Australia. Indian automotive spare parts and components manufacturers should work with Australian importers/ distributors to get themselves registered as a source of long- term supply.

## Textiles: T-shirts and Kitchen linen

Australia's total imports of t-shirts and kitchen linen from the world stood at USD 491 million in 2018. India was one of the leading exporters (3rd largest for t-shirts and 2nd largest for kitchen linen) of these products to Australia due to its ability to manufacture knitted jerseys, t-shirts and pullovers at low cost<sup>99</sup>. Australia also imports other textiles articles such as blankets, sacks, bedlinen, variety of apparel, etc., which are produced in India. India can, therefore, explore the opportunity to increase its current textile exports as well as other textile articles to Australia.

## Renewable energy equipment

Australia is increasingly focusing on generation of electricity through renewable resources such as solar power and wind power. India has a low share of 0.2% in Australia's total imports of solar modules/cells (USD 1.6 billion in 2018) and 0.03% share in Australia's total imports of wind turbines (USD 13.37 million in 2018)<sup>100</sup>. India has significant potential to export solar panels and wind energy equipment. Indian companies such as Tata Solar Power, BHEL and Indosolar manufacture solar cells while Suzlon, Gamesa, Vestas and General Electric India manufacture wind energy equipment. India can, therefore, explore the opportunity to increase its solar and wind power equipment exports to Australia.

<sup>96</sup> Economist Intelligence Unit

<sup>97</sup> HS code 87; Trade Map

<sup>98</sup> HS codes 8708, 401110, 401120, 401211, 401212; TradeMap

<sup>99</sup> HS codes 610910, 630260; Trade Map

<sup>100</sup> HS codes 8541, 841280030; Trade Map



## Key opportunities for India

- Indian exports account for a low share of 1.6% of Australia's total goods imports. India can leverage its strengths in key commodities such as refined petroleum products, pharmaceuticals and biosimilars, gems and jewellery, passenger and commercial vehicles and spares, agricultural commodities like rice and fruits, renewable energy and railway equipment to target a higher wallet share in Australia's goods imports.
- Australia's total imports of the key commodities exported by India from the world stood at USD 27 billion in 2018. Despite being a major exporter, India had a low share of 5% in Australia's imports of these commodities. The low wallet share, despite India's stronghold on the exports of these products, points towards a large opportunity gap that India can address.
- India has the potential to increase its goods exports to Australia from USD 3.7 billion in 2018 to USD 10 billion in 2025 to USD 20 billion in 2035.

## Trade in Services

### Overview of Australia's imports from the world

Australia's services imports from the world amounted to USD 65.5 billion in 2018, growing at 6% from 2014 to 2018. In 2018, travel services accounted for a majority of Australian imports with 50% share, followed by transport with 19% share and business services at 13% share.<sup>101</sup>

Table: Australia's service imports from the world in 2018

Product commodities	Imports (USD billion)	% of total Imports
Travel	33.0	50%
Transport	12.3	19%
Business services	8.6	13%
Use of IP	3.3	5%
Computer & information services	2.3	5%
Financial services	1.8	3%
Personal, Cultural & Recreational	1.4	2%
Others*	2.8	3%
<b>Total</b>	<b>65.5</b>	

Source: Australian Bureau of Statistics

<sup>101</sup> Australian Bureau of Statistics, Cat.5368.0.55.004

## Overview of India's exports to the world

India's services exports to the world were valued at ~USD 208 billion in 2018, witnessing a growth rate of 7% from 2014 to 2018. In 2018, telecommunications, computer and information services constituted a major portion of exports at 41% followed by business services at 19%, travel services at 14%, transportation services at 10% and financial services at 4%<sup>102</sup>.

**Table: India's service exports to the world in 2018**

Services	Exports (USD billion)	% of total exports
Telecommunication, computer and information services	86.3	41%
Business Services	39.1	19%
Travel	28.4	14%
Transportation	19.5	9%
Financial and Insurance services	7.5	4%
Others	27.2	13%
<b>Total</b>	<b>208.0</b>	

**Source:** Reserve Bank of India

India has been a service driven economy for decades and has been able to export its services to developed countries due to its ability to provide cost competitive and quality services. India has particularly witnessed tremendous success in the software services exports due to factors such as favorable Government reforms-establishment of SEZs, availability of a wide pool of engineers at low cost and a large English-speaking young population. These factors have led to the creation of a vibrant Information Technology-Business Process Management (IT-BPM) industry, marked by home grown IT giants like Infosys, TCS and Wipro, which have established India's credibility on the global platform. Software services exports have grown at 9-10% over the last five years and constitute ~75%<sup>103</sup> of the revenues for the IT-BPM industry in India.

## Trade relationship with Australia

The bilateral trade of services between India and Australia grew at 17% CAGR from USD 2.9 billion in 2014 to USD 5.5 billion in 2018. India is the 12th largest exporter of services to Australia and accounts for ~2.7% of Australia's total services imports from the world. India's services exports to Australia have increased from ~USD 1.1 billion in 2014 to ~USD 1.7 billion in 2018 by growing at ~12% annually. The growth during 2014 to 2018 has primarily been driven by an increase in computer and information services (16%), travel (13%) and business services (10%). Travel is the most exported service from India to Australia accounting for ~56% of India's total service exports to Australia in 2018 followed by business services at 23% and computer and information services at 17%<sup>104</sup>.

<sup>102</sup> Services Trade Data, Ministry of Commerce and Industry

<sup>103</sup> Nasscom

<sup>104</sup> Reserve Bank Of India



Table: India's service exports to Australia in 2018

Products commodities	Exports (USD billion)	% of total imports
Travel	0.97	56%
Business services#	0.40	23%
Computer and information	0.29	17%
Government goods and services	0.05	3%
Others*	0.03	1%
<b>Total</b>	<b>1.74</b>	

**Note:** #Business services includes technical and trade related, professional and management consulting, research & development, etc.

\*Others includes Financial services, Personal, Cultural and Recreational services, Insurance and Pension services, Transport, Charges for the use of Intellectual Property

**Source:** Australian Bureau of Statistics

### Key opportunities for India

- India accounts for only 2.7% of Australia's total services imports. The low wallet share indicates a huge room for growth. Further, in few sectors such as business services and travel services, India's export strength is well aligned with Australia's import needs, indicating a significant room for growth of Indian service exports to Australia. India needs to analyze the exact nature of Australian service needs and provide differentiated or cost-effective services to increase its exports.
- There is a strong case for enhancing Indian software service exports to Australia due to India's exceptional expertise in this sector and its low share of ~10% in Australia's computer and information service imports. India's IT-BPM (Information Technology-Business Process management) industry body, Nasscom, can identify sector wise needs of computer and information services in Australia and collaborate with IT-BPM companies in India to explore the opportunity.

## Future potential for India's exports of goods and services to Australia

By leveraging its strengths in key export commodities and services, identifying new avenues for increasing exports of goods and services and collaborating with the Australian Government to strengthen bilateral trade ties, India has the potential to increase its exports of goods and services to Australia from ~USD 5 billion in 2018 to USD 15 billion in 2025 and USD 35 billion in 2035.





## Chapter 4

# Potential Sectors for Investments

### Synopsis

This chapter analyses foreign investment into Australia, the key countries investing in Australia and the key sectors receiving the investments. The chapter also explores the key investments made by India into Australia, analyzes the key trends of Indian investment in various sectors in Australia and establishes the potential opportunity for India's investments to Australia. The chapter also analyses the key investments made by Australia into India and establishes the potential opportunity for investments from Australia into India.

## Overview of Foreign Direct Investment in Australia

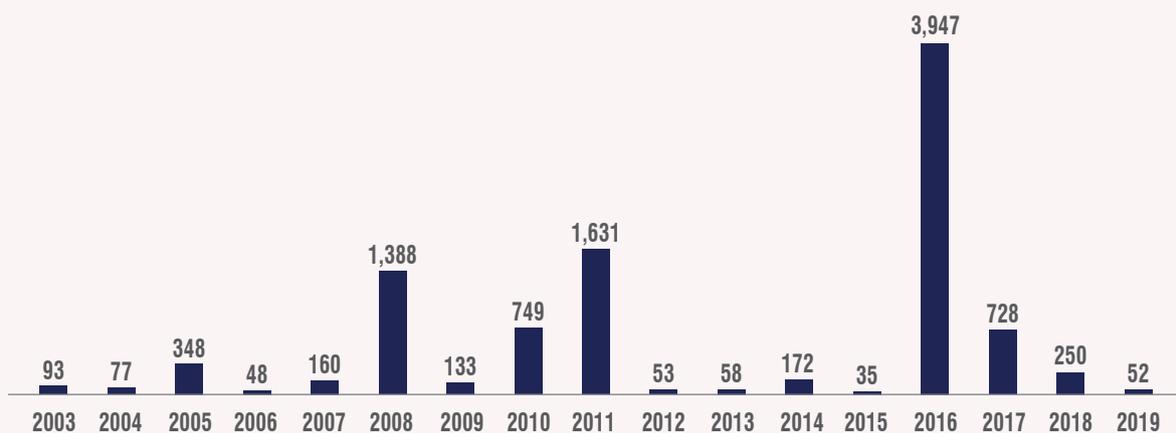
Australia is considered as an attractive investment destination in the world mainly on account of its extensive natural resource reserves, transparent regulatory system and strong focus on innovation and technology by the Government.

The cumulative foreign direct investment position in Australia stood at USD 648 billion as of 2018. The top five sectors, which had the highest inward FDI position as of 2018, were mining and quarrying (USD 245 billion), manufacturing (USD 72 billion), financial services (USD 72 billion), real estate services (USD 68 billion) and wholesale and retail trade (USD 38 billion).<sup>105</sup>

## Overview of Foreign Direct Investment outflows from India into Australia

India's total FDI in Australia (from 2003 to 2019) stood at USD 9.9 billion in 2019. India has invested in a total of 126 projects in Australia during 2003-2019. Renewable energy sector received the largest FDI (USD 6.08 billion) followed by coal, oil & gas (USD 873 million), software & IT services (USD 854 million), financial services (USD 462 million) and metals (USD 388 million).

FDI outflows from India into Australia from 2003 to 2019 in USD million



Source: FDI Intelligence by The Financial times

<sup>105</sup> ABS, Cat:53520, International Investment position, Australia: Supplementary statistics 2018, Table 15a and Table 15 b



### FDI by India into Australia by sector (2003-2019)

Sector	FDI in USD million
Renewable energy	6,083
Coal, oil & gas	873
Software & IT services	854
Financial services	462
Metals	388
Business services	189
Transportation & Warehousing	148
Automotive OEM	40
Communications	12
Hotels & tourism	2
Other sectors	869
<b>Total</b>	<b>9,921</b>

Source: FDI Intelligence by The Financial times

The top five cities in Australia, which received FDI from India between 2003 and 2019, are Ardrossan (USD 1.5 billion), Sydney (USD 650 million), Melbourne (USD 406 million), Bowen (USD 401 million) and Ipswich (USD 275 million).

### FDI by India into Australia by top cities (2003-2019)

City	FDI in USD million
Ardrossan	1,500
Sydney	650
Melbourne	406
Bowen	401
Ipswich	275
Brisbane	72
Adelaide	46
Perth	29
Canberra	10
others	6,532
<b>Total</b>	<b>9,921</b>

Source: FDI Intelligence by The Financial times

The top five Indian companies, which have invested in Australia by value of investment between 2003 and 2019, are Adani Green Energy (USD 889 million), Infosys Technologies (USD 200 million), Adani Enterprises Ltd. (AEL) (USD 180 million), Bank of Baroda (USD 104 million) and State Bank of India (USD 103 million).

**FDI in Australia by top Indian companies (2003-2019)**

Sector	FDI in USD million
Adani Green Energy	889
Infosys Technologies	200
Adani Enterprises Ltd (AEL)	180
Bank of Baroda	104
State Bank of India (SBI)	103
HCL Technologies	64
Ramco Systems	32
Mahindra Satyam (Satyam Computer Services)	29
Wipro Technologies	18
<b>Total</b>	<b>1,619</b>

**Source:** FDI Intelligence by The Financial times

In the recent past, several Indian companies have announced plans to invest in Australia. A few notable plans announced include investment in solar power by Sterling and Wilson and Adani Enterprises, opening of innovation centres by Infosys, service centres by HCL technologies and a Centre of Excellence by Ramco Systems.





### Examples of key announcements by Indian Companies for investment into Australia

Name of the Indian company	Details
<b>Sterling and Wilson</b>	Sterling and Wilson, a solar engineering, procurement and construction company plans to construct 500 megawatt photovoltaic plants in Australia by 2020 to reduce carbon emissions by ~750,000 tonnes annually.
<b>Adani Enterprises Ltd (AEL)</b>	Adani Enterprises, a multinational conglomerate company, plans to develop a new solar energy farm in Whyalla; the plant will generate 100MW, with a potential capacity of up to 140MW.
<b>Infosys Technologies</b>	Infosys, the Indian IT giant plans to open three innovation hubs in Australia before 2020.
<b>HCL Technologies</b>	HCL technologies, a software services and business process outsourcing provider, plans to open an IT service centre in Melbourne, which will act as its biggest base in Australia and New Zealand <sup>106</sup> .
<b>Ramco Systems</b>	Ramco Systems, provider of IT consulting services and products, announced that it would set up the Asia-Pacific centre of excellence for workforce innovation in Melbourne.

Source: FDI Intelligence by The Financial times

### Key opportunity for India

India's FDI into Australia stood at just USD 52 million in 2019. Australia offers investment opportunities across a wide spectrum of sectors such as mining, renewable energy, agri-business and technology. India can explore the investment opportunities across these sectors to tap the Australian market, export resources required for India's domestic consumption, or establish Australia as a base to export products across the world.

### Constraints faced by Indian banks

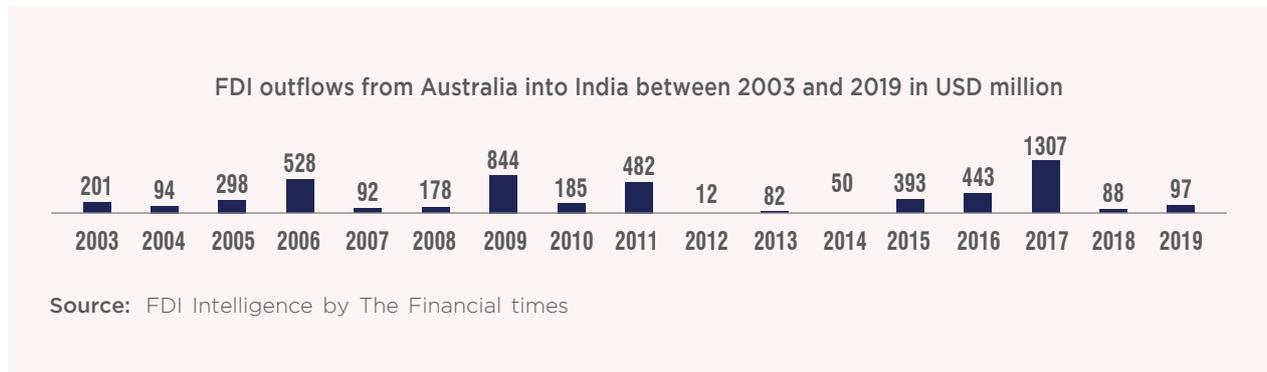
Indian companies are required to pay withholding taxes in Australia on borrowing from their Indian parent. This leads to an increase in their cost of lending to Indian companies including banks wanting to invest in Australia.

The State Bank of India has been denied the status of an Approved Security Provider under the Financial and Performance Management Standards 2009 (FPMS). As per FPMS 2009, minimum long-term credit rating of A-/A3 from an approved credit rating agency is required. SBI has not been allowed to get the status on account of a lower rating of BBB- which is due to the lower sovereign rating of India and not due to any company specific issues. However, SBI is India's largest public bank and is only one of the three banks recognized as Domestic Systematically Important Banks (D-SIBs) by the Indian Government. Under Section 41 of the FPMS, the Treasurer can provide exceptional approval to SBI as a security provider. The two Governments should resolve this issue as it could greatly improve the ease of funding requirements of new Indian businesses operating in Australia.

<sup>106</sup> HCL will open a 150-person Melbourne office in 2019,ARN

## Overview of Foreign Direct Investment outflows from Australia into India

Australia's total FDI into India (from 2003 to 2019) stood at ~USD 5.4 billion in 2019. Australia has invested in a total of 116 projects in India during 2003-2019. Coal, oil & gas sector received the largest investment (USD 1.0 billion) followed by financial services (USD 797 million), metals (USD 713 million), communications (USD 242 million) and business services (USD 196 million) between 2003 and 2019.



**FDI by Australia into India by sector (2003-2019)**

Sector	FDI in USD million
Coal, oil & gas	1,021
Financial services	797
Metals	713
Communications	242
Business services	196
Food & Beverages	188
Software & IT services	139
Electronic components	90
Medical devices	67
Textiles	8
Other sectors	1,914
<b>Total</b>	<b>5,375</b>

**Source:** FDI Intelligence by The Financial times

The top five cities in India, which received FDI from Australia are Mumbai (USD 721 million), Bangalore (USD 654 million), New Delhi (USD 392 million), Chennai (USD 391 million) and Pune (USD 360 million).



Table: FDI by Australia into India by top cities (2003-2019)

City	FDI in USD million
Mumbai	721
Bangalore	654
New Delhi	392
Chennai	391
Pune	360
Khambhat	345
Bhiwadi	280
Jamshedpur	193
Hyderabad	57
Others	1,982
<b>Total</b>	<b>5,375</b>

Source: FDI Intelligence by The Financial times

The top five Australian companies, which have invested in India by value of investment between 2003 and 2019, are LOGOS India Logistics Venture (USD 1.29 billion), Australia and New Zealand Banking Group (ANZ) (USD 210 million), BlueScope Steel (USD 203 million), Telstra Telecommunications (USD 154 million) and Cochlear (USD 67 million).

FDI in India by top Australian companies (2003-2019)

Sector	FDI in USD million
LOGOS India Logistics Venture	1,294
Australia and New Zealand Banking Group (ANZ Bank)	210
BlueScope Steel	203
Telstra Telecommunications	154
Cochlear	67
IDP Education	31
Mastersoft	25
Australian Retail College (ARC)	16
Atlassian	12
Auto Ingress	10
<b>Total</b>	<b>2,022</b>

Source: FDI Intelligence by The Financial times

Although Australian business attitude is driven more by trade and less by investments in the recent past, several Australian companies have announced plans to invest in India. A few notable plans announced are investment in logistics development projects by LOGOS India Logistics Venture, opening of innovation centres by Telstra Telecommunications, opening of a research lab by Auto Ingress and establishment of production facilities in India by Cavalier Brewing and UNIBIC Foods.

**Examples of key announcements by Australian companies for investments into India**

Name of the Indian company	Details
<b>LOGOS India Logistics Venture</b>	Logos India Logistics Venture raised USD 800 million to invest in logistic development projects across India. The venture is planning to open a new logistics facility in Bangalore.
<b>Cavalier Brewing</b>	Cavalier Brewing, a beer manufacturer, plans to establish a brewery facility with production capacity of 10 million litres per year in partnership with India based Chancery Hotels at Bangalore.
<b>Auto Ingress</b>	Auto Ingress, a provider of automatic entry solutions, plans to establish a research lab at its new plant in Maraimalai Nagar, India to cater to Indian, Asian and Middle Eastern markets.
<b>Telstra Telecommunications</b>	Telstra, a telecommunications carrier, plans to open an innovation and capability centre in Bangalore to address the shortage of tech talent in Australia <sup>107</sup> .
<b>UNIBIC Foods India</b>	UNIBIC Foods India is planning to invest in a new manufacturing facility in central India to cater to the North and East markets in India.

Source: FDI Intelligence by The Financial times

**Key opportunity for India**

India being one of the fastest growing emerging economies, offers attractive opportunities across a wide range of sectors such as mining, agri-business, technology, infrastructure, tourism and manufacturing. Australian companies can invest in resource mining and exploration in India, supported by robust domestic demand and favourable Government policies. India has a vibrant start-up environment catering to the evolving needs of its population, therefore, offering investment opportunities for Australian investors. In agri-business, the Mega Food Parks, sanctioned by the Indian government, present attractive investment opportunities for Australia. In the recent past, Australia’s largest superannuation fund, Australian Super made a USD 1 billion investment commitment to the National Investment and Infrastructure Fund of India (NIIF), a wealth fund set up by the Government of India. With increasing population and growing urbanization, the infrastructure projects in India are expected to surge, presenting attractive investment opportunities for Australian infrastructure companies and infrastructure funds. Australian companies can also utilize the low cost labour available in India and cater to the domestic as well as global demand by setting up manufacturing facilities for mining equipment, medical devices, sports equipment, food processing equipment, automotive spare parts, agricultural equipment, ferries and ships, and renewable energy equipment as well as battery cells.

<sup>107</sup> Telstra to launch Innovation and Capability Centre in Bangalore to source tech talent, Start-up Daily



# Chapter 5

## Focus Sectors

### Synopsis

Australia has a strong history in mining, which has been a significant contributor towards the country's economy for decades. The country has significant reserves of mineral resources such as iron ore, gold, zinc, nickel, copper, etc. and has a well-developed Mining Equipment, Technology and Services (METS) sector.

Australia, as a mining superpower, presents several opportunities for India to collaborate with, be it adoption of best technological practices from Australia or investments in sector specific resources including lithium, coking coal, iron ore, copper, cobalt, critical minerals, etc. that are relevant for India's ambitions of becoming a manufacturing and export hub.

The following opportunities have been identified in resources:

- Entering into offtake agreements/equity participation/joint ventures with companies engaged in exploration and mining of critical minerals; including lithium and rare earths and key mineral resources in Australia
- Increasing LNG imports from Australia
- Collaborating and investing in Mining Equipment, Technology and Services (METS)
- Exploring collaborative models with Australian research centers/institutes
- Manufacturing of cost-effective METS equipment in India

## 5.1 Mining and Resources

### Australian Mining Industry

Australia is endowed with an abundance of mineral deposits and mining has been a prime contributor to the Australian economy. Mining contributed ~7.6% to the Australian GDP in FY18.<sup>108</sup> Australia is one of the top five producers in the world of 20 key commodities that include gold, bauxite, coal, iron ore, rare earth minerals, mineral sands, zinc, lead, etc. Since FY08, mining has held approximately 50-60% share of Australia's total exports of goods<sup>109</sup> and as of 2019, the mining sector employs around 238,000 people.<sup>110</sup>

#### History and current scenario



The mining industry in Australia has a history of more than 200 years, during which the sector has experienced multiple periods of heightened economic prosperity, which have shaped the Australian economy. The first mining episode that occurred in Australia was in the 1790s, when coal was mined in the South-eastern part of Australia, near Newcastle in New South Wales. Lead was the first metal to be mined in Australia in 1841, in Adelaide, soon after which copper mining began in Australia. During the 1850s, Australia experienced its first

<sup>108</sup> Australia Bureau of Statistics, no. 5204

<sup>109</sup> Australia Bureau of Statistics 5302 and 5368

<sup>110</sup> Labor Market Information Portal, Australian Government



mining boom called the 'Gold Rush' with the discovery of gold in the state of Victoria. Gold mining attracted many immigrants and Australia produced a notable portion of the world's gold in the 1850s, leading to considerable economic progress of the country<sup>111</sup>. The second mining boom occurred in the late 19th century, when mines were established for copper and gold in Queensland and Western Australia; iron in South Australia; silver, lead and zinc in New South Wales. This led to a further increase in the immigration inflow and boosted economic activity in the country. After this period and during the early 20th century, Australia witnessed a decline in mining activity with fewer minerals being unearthed. However, the country experienced another mining boom during 1960s and early 1970s, when the Pilbara iron ore region was developed in Western Australia and new metals such as bauxite (aluminum metal ore), nickel, tungsten and uranium were discovered. The fourth mining boom occurred during the 1970s and early 1980s due to the increase in energy costs especially that of oil, gas and steaming coal. Post these four significant mining periods, the years between 2003-2012 witnessed a surge in mining activity due to the unanticipated rise in prices of commodities like iron ore and coal, which was caused by a surge in demand from China and other Asian countries. MNCs and small companies that had made initial investments in mines in Australia made higher profits, given that the global demand for iron ore, LNG, metallurgical and thermal coal was at an all-time high.



The period of boom ended after 2013, owing to the slowdown in China's economic growth coupled with a large supply of minerals in the market by big players such as Rio Tinto, BHP Billiton, Fortescue Metals and Vale. While the sector grew at ~12% CAGR from 2008-2013, the growth has slowed down to ~6% over the last five years.<sup>112</sup> However, with commodity prices rising again, there is anticipation of growth in investments and interest within this sector.

<sup>111</sup> The Early Mining History of Australia's Most Famous Goldfields, 2018

<sup>112</sup> Australia Bureau of Statistics

## Mining industry structure

The mining sector in Australia includes mining of coal, copper, gold, iron ore, nickel ore, oil and gas extraction, petroleum, lithium, among other minerals, in addition to mining equipment, technology and services (METS). Australia has the largest reserves of gold, lead, iron ore, uranium and the second largest reserves of bauxite and coal.

Commodity	Unit	Economic Demonstrated Resources	World Ranking for Resources	% of World Resources	Mine Production	World Ranking for Production	% of World Production
<b>Minerals</b>							
Iron Ore	Mt	49,588	1	29	858.0	1	38
Rutile	Mt	33	1	50	0.3	1	42
Zircon	Mt	79	1	67	0.6	1	31
Lead	Mt Pb	35	1	40	0.5	2	9
Lithium	kT Li	2,730	3	18	14	1	41
Gold	tAu	9,830	1	17	288.0	2	9
Zinc	Mt Zn	64	1	28	0.9	3	7
Nickel	Mt Ni	19	1	24	0.2	5	9
Bauxite	Mt	6,005	2	22	82.2	1	31
Copper	Mt Cu	88	2	12	0.95	5	5
Cobalt	kT Co	1,164	2	14	Na	5	4
Silver	kT Ag	89	2	16	1.4	5	5
Diamond (Industrial)	Mc	116	3	18	14.0	2	24
<b>Energy</b>							
Uranium	kT U	1,270	1	29	6.3	3	10
Brown coal	Mt	76,508	2	24	63.3	5	6
Black coal	Mt	70,927	4	10	566.3	4	7
Gas	Bn cu m	2,400	14	1.2	153.5	7	3.8
Oil	Mb&b/d	2.4		0.1	490,000		0.5

**Mc** = million carats; **t** = tonne; **kT** = kilotonnes; **Mt** = million tonnes; **Bn cu m** = billion standard cubic meters; **Mb** = million barrels; **b/d** = barrels per day

**Source:** Austrade, Australia Benchmark Report 2018

## State Wise Profile (important mining states)<sup>113</sup>:

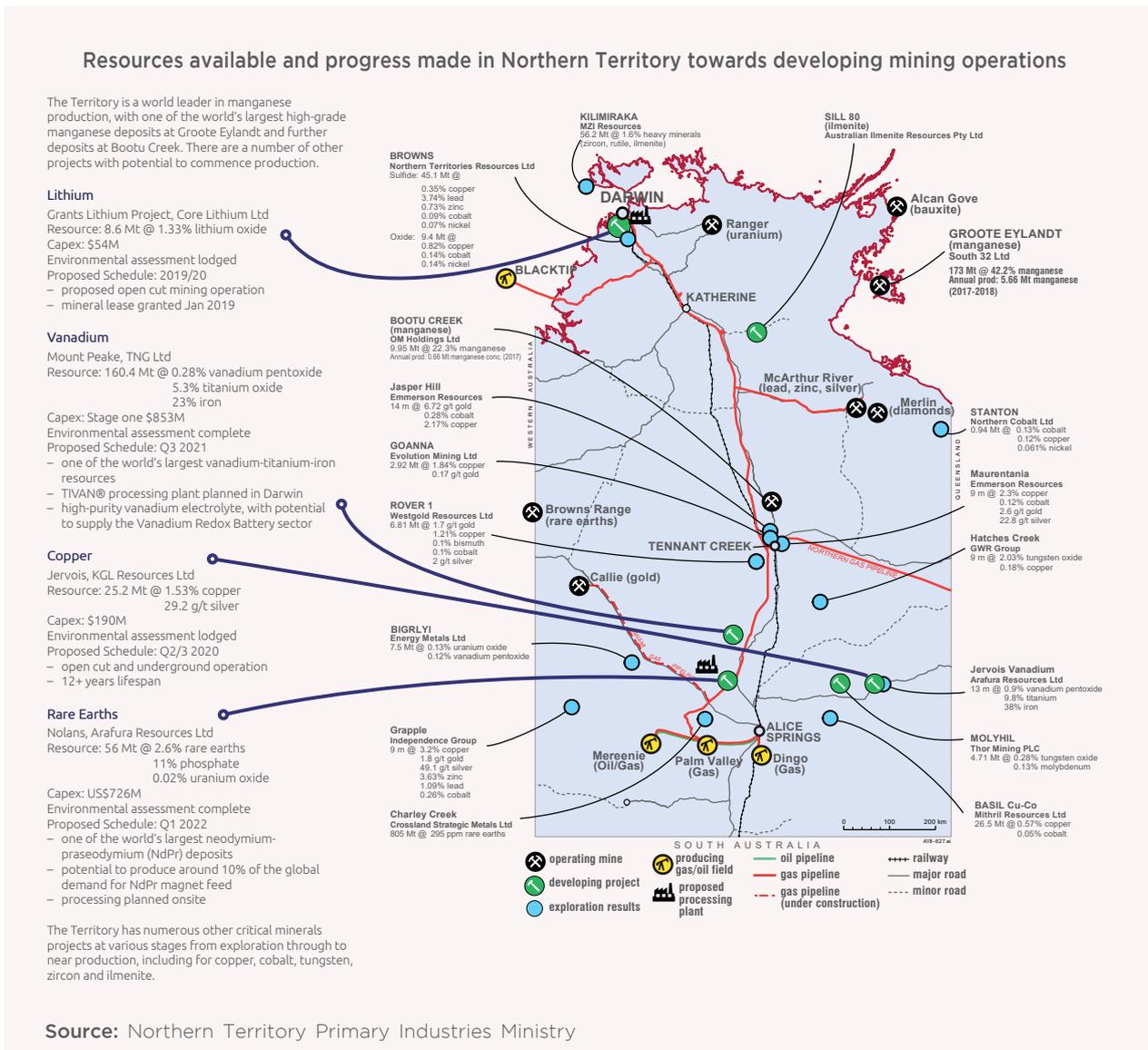
The important mining states in Australia are New South Wales, Queensland and Western Australia. In 2017, there were over 300 operating mine sites in Australia, of which approximately 33% were situated in Western Australia, 25% in Queensland and 20% in New South Wales.

<sup>113</sup> Geoscience Australia



Two chief commodities mined by volume included coal (90 mines) and iron ore (29 mines).<sup>113</sup> The prime minerals mined in each state are as follows:

- Queensland: The state has major deposits of coal (61% EDR), bauxite (53% EDR), lead (61% EDR), zinc (60% EDR) and silver (58% EDR).
- Western Australia: The state holds a large share in the deposits of iron ore (92% EDR), bauxite (44% EDR), gold (43% EDR), nickel (95% of EDR), diamond (98% EDR), Ilmenite (54% of EDR)
- New South Wales: NSW has significant deposits of coal (36% EDR).
- South Australia: Copper is mainly found in South Australia as the state contributes ~65% to the copper EDR.
- Northern Territory: Barring the states of Queensland and NSW, which have already established their footprint in the mining sector, the state of Northern Territory (NT) is emerging as a hub for mining and exploration activities owing to the abundant resources found in the state. The State Government of NT is offering competitive tax options for businesses, which are not subject to any land tax in the jurisdiction, as opposed to other Australian states.

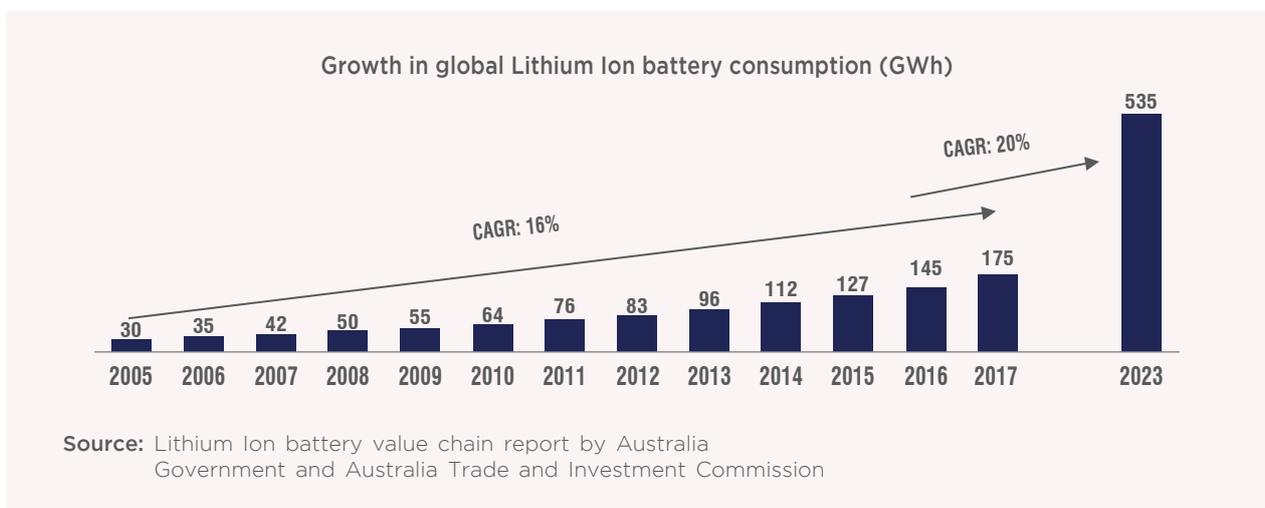


## Background of selected mining commodities in Australia

### Lithium, Cobalt and Nickel

#### The growth story

Globally, the demand for electric vehicles (EVs) is expected to witness a dramatic increase over the next decade. The International Energy Agency (IEA) estimated the global electric vehicle fleet size to be over ~5.1 million in 2018. IEA forecasts the number of EVs around the world to exceed 130 million by 2030. China is expected to be the epicenter of this demand; the country is and will continue to be the world's largest EV market through 2040.<sup>114</sup> The key component of EV is its battery, which uses lithium, cobalt and nickel, thereby increasing the demand for these commodities.



## Lithium

### Australia's potential

Australia has the third largest reserves of lithium in the world with an Economic Demonstrated Resources (EDR)<sup>115</sup> of 2,730 kilo tonnes, as of December 2016. Although Australia accounts for 18% of the world's resources, behind Chile and China, it was the largest producer of lithium in the world in 2016, with production of 14 kilo tonnes, accounting for 41% of the global lithium production.<sup>116</sup> Talison's Greenbushes project, which is the world's largest and highest-grade lithium spodumene deposit, contains 34% of Australia's lithium EDR.<sup>117</sup>

Currently, a majority of Australia's spodumene in concentrate form is exported to China for processing, from where it is sent to Japan and Korea for manufacturing battery packs. Although China itself accounts for only 6% of global spodumene production, it accounts for 89% of lithium refining, 75% of electro-chemical processing, 50% of battery cell production and 20% of battery pack assembly.<sup>118</sup>

<sup>114</sup> Geoscience Australia

<sup>115</sup> EDR implies Economically Demonstrated Reserves

<sup>116</sup> Australia's identified mineral resources 2017, Table 3

<sup>117</sup> Australia's Identified Mineral Resources 2018, Geoscience Australia

<sup>118</sup> The lithium-ion battery value chain, Austrade



In response to the growing demand for battery materials, the production of lithium hydroxide is forecasted to overtake that of lithium carbonate in the next five years. Lithium hydroxide increases the performance and lifespan of the battery compared to lithium carbonate and is produced in a two-step process, in which lithium brines are first processed into lithium carbonate and then into lithium hydroxide. In contrast to this dual process, mining of spodumene from hard rock allows producers to directly process this matter into hydroxide at a lower cost.

The Australian industry believes that the quick and economical processing of Australia's large spodumene deposit into lithium hydroxide is preferable to the processing of brine into lithium carbonate by all battery manufacturers. Therefore, even while South American deposits of brine have been recognized as the most economical source for lithium carbonate, Australia's hard-rock spodumene is presented by Australian companies as a superior source for lithium hydroxide. In addition to addressing the growing preference for lithium hydroxide, lower political, business and legal risks in Australia make the country a reliable source of raw materials.

### **Key companies investing in Australia's lithium mining**

There are several Australian and global companies investing in lithium mining, which include Pilbara Minerals, Galaxy Resources Limited, Mineral Resources Limited and Tianqi.

Pilbara Minerals, an Australian company, is developing Pilangoora Lithium-Tantalum project in Western Australia. Having completed the first stage, the project is expected to increase the spodumene lithium concentrate production to 800,000 tonnes per annum after the completion of the second stage of the project. The company had sent its first offtake shipment to partners in North Asia, thereby reaching a key milestone of commercialization of the product in 2018.

Galaxy Resources is a global company, which operates the Mt Cattlin mine for lithium spodumene production in Western Australia. The ore has a production capacity of 180,000 tonnes per annum.

Mineral Resources Limited operates two mines, namely the Wodgina mine and the Mt Marion Lithium project in Western Australia. In 2018, Mineral Resources formed a JV with Albermale Corporation - the US based specialty chemical company, in which Albermale acquired a 50% stake for USD 1.15 billion<sup>119</sup>. Albermale has also signed the exclusivity agreement with Mineral Resources and will get access to 750,000 tonnes of lithium spodumene concentrate that is produced by the mine. The Mt Marion Lithium project is also a JV wherein Mineral resources has 43.1% stake, Neo Metals Limited has 13.8% stake and China's largest lithium producer, Jiangxi Ganfeng Lithium Co. Ltd has 43.1% stake<sup>120</sup>.

Chinese lithium producer, Tianqi, is constructing a lithium processing plant in Kwinana in Western Australia at an investment of USD 500 million. The plant is expected to be commissioned towards the end of 2019 with a capacity of 48,000 tonnes per annum of high purity, battery-grade lithium hydroxide.<sup>121</sup>

<sup>119</sup> Australianmining.com

<sup>120</sup> Mineral Resources Limited Website

<sup>121</sup> Lithium-Ion Battery Value Chain, Austrade, December 2018

## Opportunity for India

Lithium is the key component of lithium ion batteries, which are used for various applications such as smartphones, tablets, electric cars, buses, motorcycles and airplanes and as battery storage in laptops, stationary items and power tools.

The Indian Government's initiatives such as the National Electric Mobility Mission Plan 2020, to promote a shift from internal combustion vehicles to EVs, is expected to increase the demand for electric vehicles in India. This initiative is expected to result in growth in demand for lithium ion batteries from ~2.9 GWh in 2018 to ~132 GWh by 2030<sup>122</sup>, which implies an approximate demand of 10 million tonnes (0.09 kg per kwh of li-ion) of lithium for usage in cells of the batteries. In light of these factors among others such as the Government schemes including FAME (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) and raising awareness on the use for cleaner fuels, the Indian market for lithium ion batteries is expected to grow at a CAGR of about 29% between 2018 and 2023.<sup>123</sup> Organizations such as NITI Aayog are also playing a key role in shaping India's electrification plans. Several inter-ministerial committees have been set up to look at various demand and supply initiatives, charging infrastructure and last mile connectivity.<sup>124</sup> Furthermore, India is also home to about 2.5 million e-rickshaws, which use inferior quality of batteries that eventually need to be replaced.<sup>125</sup> Previously, India depended on other countries like China, South Korea and Taiwan for sourcing lithium ion batteries due to the lack of manufacturing setups within the country. However, recently many companies such as Tata Chemicals<sup>126</sup>, Exide, Exicom, Amaron, Amara Raja Batteries, Mahindra Electric, including companies in the auto and power sectors are considering manufacturing these batteries domestically in India. As the domestic demand for Li-ion battery picks up in India, manufacturing the li-ion cells itself would become feasible in the country.

Increasing investments by different companies in Australia's lithium mining industry, rising global and Indian demand for lithium and favorable Government policies for promoting EVs in India make a strong case for Indian mining companies to invest in Australia's lithium exploration and mining companies. Moreover, through a direct or joint investment, India can secure access to Australia's deposits, while Australia can secure an import partner.

Furthermore, this investment will lead to opportunities for Indian firms, looking to set up manufacturing facilities for batteries in the automotive and power sectors, to collaborate with Australian mining companies for technology and other minerals required in the production of lithium ion batteries. Australian companies should be encouraged to invest in India in the E-Mobility program, processing of lithium and production of lithium ion batteries.

<sup>122</sup> Lithium-Ion battery recycling presents a \$1,000 million opportunity in India, Economic Times, 2019

<sup>123</sup> India Lithium-Ion Battery Market - Growth, Trends and Forecast Report, 2018, Research and Markets

<sup>124</sup> Spearheading India's Mobility Transformation - In conversation with Amitabh Kant, Auto Futures, 2019

<sup>125</sup> Companies line up plans for lithium-ion batteries production, Economic Times, December 2018

<sup>126</sup> Tata Chemicals may make lithium-ion cells, Mint News, July 2019



## Cobalt

### Australia's Potential

Australia is home to the second highest reserve of (1.2 MT) cobalt after the Democratic Republic of Congo (DRC). Australia accounts for 16.9% of the world's total reserves of cobalt.<sup>127</sup> DRC supplies more than half of the world's cobalt demand with about 64,000 MT. However, due to the constant political uproar experienced by DRC, Australia has positioned itself as an attractive investment location for setting up cobalt mines.

### Key companies investing in Australia's Cobalt mining

A number of companies such as Aeon Metals, Clean TeQ, Australia Mines Limited, etc. have started exploring different locations within Australia to set up cobalt mines.

Aeon Metals has been conducting exploration as well as infill drilling activities and has completed a preliminary technical and economic study on the potential viability of the Vardy Zone within the global Walford Creek Resource in Queensland. Post the study, the resource estimates were upgraded; cobalt resources identified have been upgraded from 18 million tonnes to 19.8 million tonnes.<sup>128</sup>

Clean TeQ is a firm that explores mineral resources in New South Wales. In June 2018, the company released a feasibility study stating that its "Sunrise nickel-cobalt-scandium" project has an initial 25- year mine life and ore resources sufficient for 40 years. Further, the production rate for various minerals was estimated to be at 450,871 tonnes of nickel, 84,007 tonnes of cobalt and 250 tonnes of scandium oxide. The firm has laid down a target of commencing operations from mid-2019.<sup>129</sup>

Australia Mines Ltd released feasibility studies for "Sconi cobalt-nickel-scandium" project in North Queensland in November 2018, revealing that the project would require a capital inflow of ~AUD 1,350 million (USD 905 million). The average annual production of the project is estimated to be 8,496 tonnes of cobalt sulphate; 53,301 tonnes of nickel sulphate; and 89 tonnes of scandium oxide along with an initial mine life of 18 years.<sup>130</sup>

### Opportunity for India

In the first nine months of 2017, India imported cobalt worth USD 3.2 million from Congo, making India the second largest importer after China, which imported USD 1.2 billion worth of cobalt in the same period.

Cobalt has been identified as the main component of the lithium ion battery required for EVs in addition to lithium. This is expected to develop interest in investments towards cobalt mining along with lithium. As a result, Indian companies as well as the Government can look at engaging into partnerships with Australian mining companies. Public companies like Nalco, HCL, MECL and others, as well as private companies that are assessing opportunities in this sector, can look at Australia as a potential option for sourcing these minerals on a long-term basis.

<sup>127</sup> USGS Mineral Resources Program

<sup>128</sup> Aeon Metals press release

<sup>129</sup> Australia Investing News, Clean TeQ website

<sup>130</sup> Australia Mines Limited website, Australiamining website

## Nickel

### Global Scenario

Nickel has been historically used primarily to produce stainless steel. With the growing EV demand, the demand for nickel is expected to rise. EVs could also use batteries with nickel-manganese-cobalt (NMC), which has the potential to further fuel the demand for nickel. Currently, the global nickel demand stands at USD 20 billion. This figure is expected to be supported by the growth in EV penetration. Many countries have made a commitment to banning modes of transportation that causes emissions. The UK and France have committed towards banning fossil fuel car sales by 2040, India has announced plans that every car sold by 2030 would be an EV vehicle and China, the largest automobile market in the world, has planned to ban gas vehicles, to achieve pollution targets. Global economies in this sector are transitioning to adopting environmentally conscious policies.

### Australia's potential

Australia ranks at the top worldwide in terms of nickel resources, with 24% of the world's known economic nickel resources situated in the country, followed by Brazil at 13% and Russia at 10%. The EDR of Nickel in Australia stood at 18.5 MT, in 2016, with Western Australia as the leading holder of the resource at 96% and Queensland holding the remaining reserves. The country is also the 5th largest producer of nickel in the world.

### Key companies Investing in Australia's Nickel Mining

Companies such as BHP, Independence Group and Western Areas are increasingly investing in nickel mining.

BHP is continuously working towards nickel exploration and mine development and has plans to set up a battery grade nickel sulphate plant in Western Australia. The Venus deposit in Western Australia houses more than 200,000 tonnes of nickel reserves. The firm is targeting commencement of operations at the plant from April 2019 with a capacity of 100,000 tonnes of nickel sulphate. The firm is also looking at doubling the capacity with a potential second stage expansion in the works.<sup>131</sup>

Independence Group owns the Nova nickel-cobalt copper sulphide underground mines in the Fraser Range located in Western Australia. The mine site was discovered in 2012 while commercial operations commenced in July 2017. In FY18, the mine produced 22,258t of nickel and 9,545t of copper. The firm is exploring further to target resource extensions beyond the current identified area.<sup>132</sup>

Western Areas owns the Forrestania mining project and is home to two high grade nickel mines i.e. Flying Fox and Spotted Quoll. The project is expected to produce 20,500 - 22,000 tonnes of nickel concentrate in FY19. Western Areas commenced operations of the two mines in 2006 and 2007 respectively.<sup>133</sup>

<sup>131</sup> Thomson Reuters

<sup>132</sup> Independence Group website

<sup>133</sup> Western Areas website



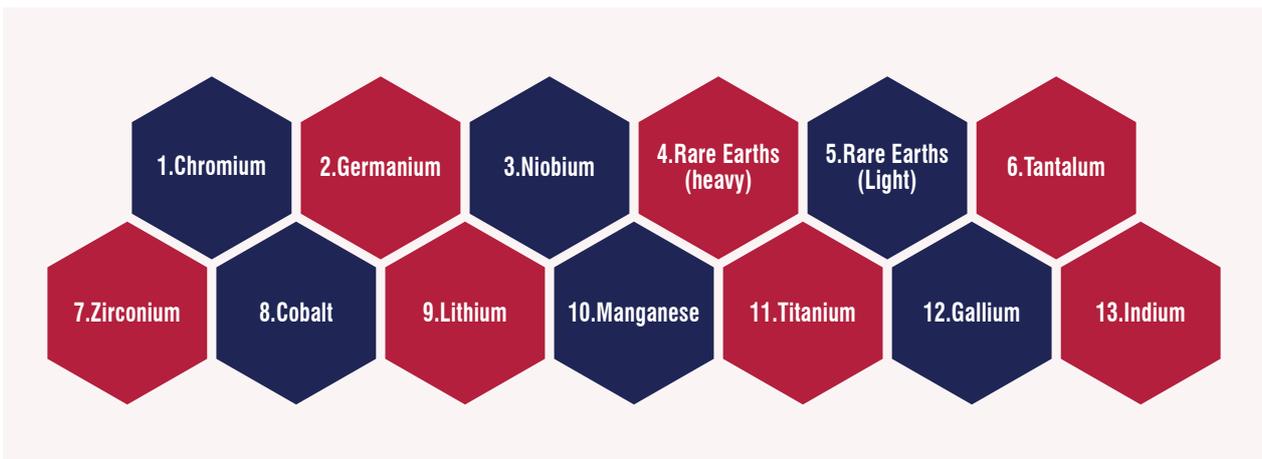
## Opportunity for India

India does not host any primary resources of nickel and is, therefore, largely dependent on imports. However, nickel sulphate crystals, a by-product of copper production, is found in India. The annual pure nickel demand in India was estimated to be 45,000 MT. In FY17, imports of nickel ore and concentrates stood at 1,062 tonnes, primarily from Guinea and Australia. Australia accounted for about 25% of the import of nickel and concentrates in FY17. India will continue to depend on imports of nickel till the technology for utilizing nickel from Odisha can be commercially established.<sup>134</sup> Indian companies can form a JV or evaluate greenfield opportunities for nickel mining in Australia to meet India's growing nickel consumption.

## Critical Minerals Required in India vs their supply in Australia

India's Critical Minerals Strategy has identified 49 minerals that will be vital for India's economic growth. Australia has reserves of 21 of these critical minerals that could prove complementary to India's requirements.

Of the 21 critical minerals on India's list, Australia has identified the following 13 minerals as 'High Potential Geological Opportunities':



Of these thirteen minerals, ten are currently imported in India, with the exception of zirconium, manganese and titanium, where there is some domestic supply available in limited proportions.

Apart from these, Australia also has reserves of eight other critical minerals, which include the following:



Of these, India is 100% import dependent for all except graphite and magnesium.

<sup>134</sup> Nickel, Indian Minerals Yearbook 2017

Many rare-earth minerals, including neodymium and dysprosium, are required in the manufacturing processes of electric motors and other end-use products, which are essential for India to secure its manufacturing requirements. In 2016, India imported USD 3.4 million worth of rare earths, of which USD 3.3 million was imported from China, followed by Hong Kong and South Africa.<sup>135</sup> According to the Indian Mines Bureau, India has a total consumption of ~31.9 tonnes of rare earths that is expected to grow in the near future<sup>135</sup>. In India's effort to secure a supply of rare earth minerals, Australia can be a key trading partner.

The Australian Government is keen to develop its critical minerals sector and is encouraging international investments in this sector to increase downstream processing activities. Several critical minerals typically co-exist and require separation using extensive chemical processes. Hence, the economics of processing critical minerals is very different than that of bulk commodities. Additionally, the critical mineral markets are highly monopolistic and have complex value chains. The complexity of value chains, high investment overhead for processing and small markets imply that only a handful of companies and countries can participate in any one critical material market.

Australia has initiated separate talks with the US, Japan and Korea over the development of critical minerals projects in an effort to diversify global critical mineral supply chains. Australia has also recently signed a Memorandum of Understanding on Cooperation in the Field of Mining and Processing of Critical and Strategic Minerals with India. These mechanisms of cooperation focus on how best to help projects in access to financing and securing long-term supply deals, cooperation on research and development and efforts to develop resilient global critical mineral supply chains. Australian based mining company, Lynas Corporation Ltd., is the world's largest rare earths mineral supplier and processor, after China. While China contributes 85% of the global production of high-purity rare earth minerals, Lynas produces the subsequent 15% for the world. Lynas has strategically partnered with the US to build upon its processing segment. Similarly, Australia can collaborate with India in setting up plants to process its rare-earth minerals in India.

Due to India's high dependency on imports of critical minerals and the need for an effective strategy to source the rare earth minerals, it is important for India to collaborate with Australia in this area.

Australia offers a secure and reliable political environment, adequate resource endowments and processing technologies along with transparent Government frameworks. Furthermore, Australia has always shown an active interest in engaging with India. India's focus on resource security and Australia's commitment towards developing the critical minerals sector, should pave the way for a long-standing supply and investment relationship between India and Australia, which will be beneficial to both countries.

### **Case Study: Securing critical minerals: Ongoing collaboration of Khanij Bidesh India Ltd. (KABIL) with the Australian Government**

KABIL is a joint venture firm of National Aluminium Company Ltd (Nalco), Hindustan Copper Ltd. (HCL) and Mineral Exploration Company Ltd (MECL). KABIL has been interacting with the Australian Government to identify possible collaboration opportunities and strategic investments in mineral assets such as cobalt and lithium. KABIL will be instrumental in ensuring a consistent supply of critical and strategic minerals to the Indian market through identification, acquisition, exploration, development, mining and processing of critical and strategic minerals overseas, and to build future partnerships with Australia.

<sup>135</sup> India scrambles to look overseas for rare earths used in EVs, Nikkei Asian Review, 2019

<sup>136</sup> Australia in talks to boost rare-earth supply outside China, The Straits Times, 2019



## Coal

### Growth of the sector in Australia

The coal industry in Australia witnessed rapid growth between 1960 and 1986 due to the establishment of the Joint Coal Board and the conciliation labor tribunal. Australia began exporting coking coal, used in steel production, to Asian countries such as Japan, South Korea and Taiwan and benefitted substantially from the growth of these markets. With the expansion of the industry, Australia developed a competitive advantage because of cost competitive operations and improved efficiencies such as the emergence of the open-cut mining technique. Between 1987 and 2003, the entry of Indonesia and China in the coal industry increased global competition. Indonesia gradually became Australia's principal competitor for the thermal coal market in Asian countries. In 2017, Australia exported 372 million tonnes of coal, with thermal coal accounting for 200 million tonnes.<sup>137</sup> As defined in Australia, Black Coal can also be used to produce electricity.

### Australia's potential

Australia has emerged as a global leader of brown coal resources (second largest in the world) and black coal resources (fourth largest in the world). Brown coal is used for electricity generation (thermal coal) and black coal is used to produce coke (metallurgical or coking coals), which is used in blast furnaces to produce iron or steel.

In 2017, Australia had 10% of black coal and 24% of brown coal of the total global resources, respectively.<sup>138</sup> Dependence of the steel sector on imported coking coal will remain constant in the foreseeable future. Australia is presently the single largest source of coking coal imports for India. Coal found in Australia has high demand because of its high energy content and fewer impurities. This coal can be readily used in high efficiency-low emission power plants and steel mills.

### Recent investments in Australian coal industry

Rio Tinto's decision to exit coal mining to focus on iron ore, copper, bauxite and aluminum operations led to a number of deals in the Australian coal sector.

The Greens introduced a Coal Prohibition (Quit Coal) Bill 2019 that mandated the prohibition of mining, burning and the export and import of thermal coal in Australia. The bill specifically listed the phasing out the export of thermal coal by 2030, prohibition of the establishment of a new coal mine or coal-fired power station and the burning of coal after January 2030. The Bill, however, was not passed, and lapsed upon dissolution of Parliament in 2019.

EMR Capital, a private equity firm and Indonesia's PT Adaro Energy bought the Kestrel Mine in Queensland from Rio Tinto for USD 2.25 billion (AUD 2.9 billion). In 2017, the mine produced 0.84 million tonnes of thermal coal and 4.25 million tonnes of hard coking coal.<sup>139</sup>

Rio Tinto also sold its coal mine in Hail Creek and Valeria coal development project to Glencore for USD 1.7 billion. The Hail Creek mine had 601 million tonnes of mineral resources and 142 million tonnes of marketable reserves at the end of 2017. It produced 4.1 million tonnes of thermal coal and 5.3 million tonnes of hard coking coal. With this acquisition, Glencore, which is already the world's biggest exporter of thermal coal, will now have a bigger stake in metallurgical coal.<sup>140</sup>

<sup>137</sup> Australian coal exports set new record in 2017, 2018, Australia Mining

<sup>138</sup> Australia's identified mineral resources 2018, Geoscience Australia

<sup>139</sup> Rio sells Kestrel coal mine for \$US2.25b to EMR Capital, Adaro Energy, AFR

<sup>140</sup> Rio Tinto agrees sale of Hail Creek and Valeria to Glencore for \$1.7 billion, Rio Tinto



In September 2017, Yancoal acquired Rio Tinto's wholly-owned subsidiary, Coal & Allied Industries, for USD 2.69 billion. In 2015, the mine produced more than 13 million tonnes of thermal coal and semi-soft coking coal.<sup>141</sup> As a result of this acquisition, Yancoal Australia Ltd and Yanzhou Coal Mining Limited, which is the controlled entity of the Chinese Government holding 78% stake, along with Glencore will dominate exports of Australian thermal coal.

Mitsubishi sold its 31.4% stake in Clermont coal mine located in Queensland to GS Coal, a 50:50 Glencore-Sumitomo joint venture. Clermont is a large-scale open-cut operation, with an annual production capacity of around 12 million metric tonnes of thermal coal.<sup>142</sup> Furthermore, Australia provides a stable legal framework that is amenable to foreign direct investment in coking coal assets.

### **Key geopolitical developments**

As part of the Paris Climate Change Agreement in 2015, several countries pledged to decrease their greenhouse gas emissions and limit the increase in global temperatures to 1.5 degrees Celsius above the pre-industrial levels. Amidst growing pressure from global environment groups and Governments, a number of global banks and financiers, such as Standard Chartered, HSBC, Deutsche Bank, BNP Paribas, Barclays, etc. have decided to either entirely stop funding or decrease their exposure in coal investments.

Moreover, Japanese financial institutions, which have been at the top of the list in terms of global financial institutions funding new coal-fired power plant developments, too, have taken significant steps to exit coal. ITOCHU, Sumitomo Mitsui Trust Bank, Marubeni Corp, Mitsui & Co and Mitsubishi Corp have all announced their intentions to exit the thermal coal sector.

### **Regulatory challenges in Australia**

Australia's banks are facing increasing pressure from environmental and progressive activist groups to stop funding new coal projects and to honor their public commitments to the Paris Agreement. Despite this backlash, the current Government's new power generation underwriting program aims to fund generation projects, which include upgrading of coal generators and other greenfield and brownfield projects, which use conventional sources of energy (fossil fuels).

In February 2019, a court in Australia denied permission to develop a new coal mine in Hunter Valley, New South Wales as the mine was expected to generate high greenhouse emissions, causing environmental pollution.

The situation with India's Adani Group is a classic example of the opposition from environmental activists and the public. Adani Enterprises began acquiring the Carmichael coal mine and railway project in 2010 with efforts directed towards completing environmental and technical studies and gaining approvals.<sup>143</sup> Though the Australian Government had initially supported this project, soon after this investment, the Carmichael mine faced heavy opposition and it was conveyed to Adani that the mine was expected to cause severe damage to the Great Barrier Reef in addition to generating massive greenhouse gas emissions. These factors led the Adani group to downsize the investment from the initial planned value of AUD 16.5 billion to AUD 2 billion (USD 11 billion to USD 1.3 billion). The planned production was also reduced from 60 million tonnes/ year to 27.5 million tonnes/ year in the first phase of operations.<sup>144</sup> In November 2018, after the main Australian banks refused to fund the project, Adani Enterprises self-financed the scaled down version of the mine with the aim of gradually ramping up production over time to 27.5 million tonnes per annum. The group has finally received all

<sup>141</sup> Rio Tinto completes divestment of Coal & Allied Industries Limited for \$2.69 billion, 2017, RioTinto

<sup>142</sup> Glencore makes move on Mitsubishi coal assets, 2018, Australian Mining

<sup>143</sup> Adani website

<sup>144</sup> Adani scales down plans, to self-finance Oz project, The Economic Times, 2018

<sup>145</sup> News Articles



clearances in 2019 and expects to start shipping coal from the mine by FY21.<sup>145</sup> The example of Adani, Jindal Steel and Power Ltd (which has invested in mines in New South Wales) and several other Indian Companies - many of whom have faced delays in environmental and other clearances - has prompted a rethink on strategy in investing in Australia by Indian companies in this sector, who now may have to resort to take equity stakes in already operating mines whose regulatory approvals are in place.

### **Sector Representative Contribution: Adani in Australia**

- Adani is the largest Indian investor in Australia and has already made ~USD 1 billion direct investment in Australian projects.
- Adani has selected Townsville in North Queensland as its regional headquarters for the Carmichael Mine and Bowen for port and rail. Adani Australia currently engages more than 300 work-force across its businesses.
- Adani is involved in green-field mining and rail projects (Carmichael Project) and is also operating a well-established major port at Abbot Point in Northern Queensland. In addition, Adani has developed a 65MW solar farm in regional Queensland.

### **Carmichael Project**

- The Carmichael Project is based in Galilee in Western Queensland. This Basin has one of the world's largest coal reserves and produces high quality coal.
- Adani Australia embarked on an investment into development of this mine in 2010.
- The Carmichael Project involves the construction of a thermal coal mine in the Galilee Basin and a 200km multi-user rail line linking the mine site with the existing rail network to Abbot Point Port.

### **Carmichael Coal Mine Production per Annum**

- The Carmichael mine will produce 10 million tonnes of coal per annum in stage one.

### **Carmichael Rail Network**

- The Carmichael Rail Network is being built to support the transfer of coal from the Carmichael mine to the Port of Abbot Point.
- The Carmichael Rail Network will be approximately 200km long, connecting to the existing rail network to provide a seamless freight transport connection between the Carmichael mine to the Port of Abbot Point.
- The Carmichael Rail Network was recently redesigned to link into the existing rail network, reducing costs and accelerating project development. The narrow-gauge rail will ensure the capability to manage the Carmichael mine's 10 million tonne yearly production rate.

### **Abbot Point Operations**

- Located north-west of Bowen in Queensland, the Port of Point Abbot is Australia's most northerly coal port, with near 200 direct employees including contractors. The port is operated by Abbot Point Operations Pty Ltd (APO), a company of the Adani Group.

### **Adani Renewables Australia**

- Adani Renewables Australia is striving to be a leading supplier of renewable energy in Australia.

- The business currently has 300MW of solar power projects under development: Rugby Run Solar Farm, located near Moranbah in Queensland and a second solar project 10km from Whyalla in South Australia.

### **Rugby Run Solar Project**

- The Rugby Run Project located near Moranbah in Queensland is under construction and with commissioning from December 2018.
- Rugby Run Solar Farm will supply 65 MW of renewable power in phase 1, with the capacity to expand up to 170 MW.
- Adani has sold 80% of the energy generated through a power purchase agreement. The balance 20% will be sold on the spot market.
- More than 247,000 panels have been installed, which will generate 185,000 MWh of power each year from stage one.

### **Whyalla Solar Project**

- The Whyalla Solar Project is located approximately 10 km from Whyalla, in South Australia.
- Development approval was granted in September 2017, with pre-construction approval granted in August 2018.
- Adani Renewables Australia is currently in commercial negotiations for power purchase agreements.
- Whyalla Solar Farm will deliver up to 140 MW of renewable power and generate up to 300,000 MWh of power each year.





## Opportunity for India

India imports ~227 million tonnes of both thermal and coking coal to meet its domestic demand. 85-87% of coking coal requirements in India are expected to be imported till FY23, as a consequence of the growth in production of steel in India.<sup>146</sup>

Australia's total export of coking coal in 2018 was 382 million tonnes. Of this, the largest export was to the following:

- Japan, which declined from 119 million tonnes to 116 million tonnes
- China, which declined from 91 million tonnes to 87 million tonnes
- India, which increased from 45 million tonnes to 48 million tonnes

India's imports from Australia have therefore been growing.

A comparison of unit rates for Australian exports to the top 3 destinations shows that world average is USD 123/T. The unit rates for Japan are USD 119/T, China is 114/T, whereas India is at USD 153/T. Historically, India's coal imports from Australia have been at higher rates than Japan or China possibly due to coal quality differences. Even the 4th largest importer of coal from Australia, South Korea, has a better import rate at USD 112/T.<sup>147</sup>

Given India's high dependency on Australia for its coking coal requirements (48 million tonnes) and in order to sustain the imports from Australia at the current levels, better rates should be negotiated between India and Australia for coking coal imports. The Indian Government should evaluate setting up an organization for centralized procurement of coal to cater to majority (60-70%) of the Indian requirement. This will enable Australian export companies to offer volume discounts and offer competitive rates more in line with the rates offered to other countries.

Therefore, from the point of view of enhancing raw material security, India can secure its long-term coking coal supplies from Australia partly by acquiring equity stakes in coal assets and partly by entering into short/ long term contracts. Moreover, Coal India Limited can play a significant role in the acquisition, development and operation of coking coal assets in Australia to assist in importing the required produce to India.

## Opportunities in Coal Mining

Opportunities in coal mining identified by the Ministry of Power, Ministry of Coal (MoC), NTPC and Coal India Limited are as follows:

- Adoption of best technological practices of Australia with respect to coal mining for the benefit of thermal power plants in India.
- Adoption of best practices of Australia with respect to real time on-line monitoring of coal quantity and quality supplied to the thermal power plants
- Adoption of best practices of Australia with respect to fly-ash management and noise-less operation of thermal power plants

## Iron Ore

### Growth of the sector in Australia

Up till 1960, Australia believed that it lacked adequate resources of iron ore for domestic use and hence put up trade restrictions on the export of iron ore. In 1960, with the discovery of large iron ore deposits at Mount Whaleback and exploration efforts of the Bureau of Mineral Resources (now Geoscience Australia), iron ore mining started picking up pace. Australia started selling iron ore, initially to Japan and later to China, to become one of the biggest global suppliers of the metal. Australia is the world's largest iron ore exporter, exporting 829 million tonnes in 2017.<sup>148</sup>

<sup>146</sup> Coal imports to remain hot, 2018, CRSIL

<sup>147</sup> UN Trade Map

<sup>148</sup> Global iron ore market well supplied, growth in production ahead – reports, 2018, Mining [dot] com

## Australia's potential

In 2016, Australia had 49,588 million tonnes of EDR115 of iron ore, accounting for 29% of global iron ore reserves. With mine production of 858 million tonnes in 2016, Australia accounted for 38% of the global iron ore production. This makes Australia the number one ranked nation in both resources and production of iron ore.<sup>149</sup>

## Recent investments in Australian iron ore industry

In 2018, Australia's three biggest iron ore miners, BHP, Rio Tinto and Fortescue, announced plans to develop mines in the same region, indicating a strong future global demand scenario.

In June 2018, BHP along with Mitsui and Itochu invested USD 3.4 billion into South Flank project in Western Australia. The Yandi mine, which is going to be shut down, will be replaced by the South Flank project, which is scheduled to become operational by 2021, with a minimum life of at least 25 years. The project is expected to produce 80 million tonnes of iron ore a year, which is equivalent to almost one third of BHP's current production in the Pilbara region.<sup>150</sup>

Rio Tinto is expected to develop its most technologically advanced mine after receiving permission from regulatory authorities for a USD 2.6 billion investment in the Koodaideri iron ore mine, Western Australia. The mine will have a capacity of 43 million tonnes/annum after completion.<sup>151</sup>

Fortescue Metals Group has committed USD 1.27 billion (AUD 1.7 billion) to build a new iron ore mine in Western Australia called Eliwana. The new mine will replace Firetail mine, which is nearing the end of its life. The mine is expected to produce 30 million tonnes/annum and will have an overall capacity of 50 million tonnes/annum with a life of ~24 years.<sup>152</sup>

Other key recent investments in iron ore industry are in the table below:

Prime iron ore investment projects					
Operator	Mine/Deposit	USD million	Mtpa	Fe (%)	Start-up
<b>Recently Completed</b>					
CITIC Pacific	Sino Iron	8,571.43	24	66	2013
BHP	Jimblebar	2,714.29	35 (55)	63	2013
Rio Tinto	Nammuldi	1,571.43	10	62	2014
Hancock Prospecting	Roy Hill	9,785.71	55 (60)	61	2015
Rio Tinto	Silvergrass	241.43	10 (20)	62	2017
<b>Under construction or committed</b>					
Rio Tinto	Billiard South	84.29	-	59	2019
Mt Gibson	Koolan Island (Restart)	69.29	5	63	2019
BHP	Port Hedland Tug Haven 200	-	-	-	2019
FMG	Eliwana	1,198.57	30	60	2020
Rio Tinto	Dampier Port Upgrades	50	-	-	2020
BHP	South Flank	3,357.14	80	62	2021
Rio Tinto	Robe Valley Mesa B,C & H	928.57	-	62	2021
Rio Tinto	West Angelas Deposits C & D	571.43	-	62	2021

<sup>149</sup> Applying geoscience to Australia's most important challenges, Australian Government

<sup>150</sup> Mitsui to Develop South Flank Iron Ore Mine in Australia, Mitsui & Co., 2018

<sup>151</sup> Rio Tinto approves \$2.6 billion investment in Koodaideri iron ore mine, 2018, Rio Tinto

<sup>152</sup> FMG green lights \$1.7b Eliwana with 500 jobs to come, 2018, The West Australia



Under consideration					
Brockman	Marillana	1,507.14	25 (37)	61	2019
BBI Group	Balla Balla Port & Rail	4,000	50	-	2020
Todd Corp.	Balla Balla Mine	1,428.57	6	58	2020
Atlas	Corunna Downs	35.71	4	57	2020
FMG	Iron Bridge (Stage 2)	1,264.29	15	67	2021
Rio Tinto	Koodai deri	2,142.86	40 (70)	60	2021
FMG	Nyidinghu	n/a	30 (45)	58	2021
BC Iron	Buckland	672.86	8 (15)	58	2021
Rio Tinto	Western Turner Syncline 2	214.29	7	62	2022

**Source:** Western Australia Iron Ore Profile, January 2019 – Government of Western Australia, Department of Jobs, Tourism, Science and Innovation

## Key geopolitical developments

As China is the largest global consumer of iron ore, Australia has increased its share in the Chinese iron ore imports from 43% in 2010 to 62% in 2018.<sup>153</sup> This increase in share is due to a large increase in iron ore production by mining giants such as BHP Billiton, Rio Tinto and Fortescue Metals Group in Western Australia. Chinese steel production is heading for a slowdown and many analysts believe that Australian exports to China, that have peaked, will either stabilize or slightly decline going into the future.

With its exit from the coal industry, Rio Tinto has shown a growing focus in iron ore mining with increasing investment in new projects and expansion of current projects in Australia.

## Opportunity for India

The demand for iron ore in India has been increasing. Though domestic iron ore production was strong in 2017, the domestic supply growth is expected to slow down. This is on account of shutting down of mines in Odisha (with capacity of 20 million tonnes) due to non-payment of fines by the miners<sup>154</sup> and the cancellation of 88 renewed mining leases in Goa.<sup>155</sup> Further, despite having enough reserves to be self-sufficient in iron ore, Indian iron ore miners face challenges in extracting the complete value from a mine due to illegal mining, Government bans, higher domestic freight cost, lack of infrastructure and lack of economies of scale.<sup>156</sup> Another key factor that can potentially lead to an increase in iron ore imports is the increase in production of steel where iron ore is used as a key raw material for making steel. A few established Indian steel manufacturers, such as JSW Steel, are looking at expansion of existing facilities, which will lead to an increase in the iron ore requirement in India.<sup>157</sup>

All these factors have led to a gradual increase in imports of iron ore over the last 3 years to reach 8.6 million tonnes in FY18. It is further expected to increase by 60% in FY19 and to reach 15 million tonnes<sup>158</sup>.

<sup>153</sup> Iron ore's contribution to Australia's prosperity has peaked, say experts, 2018, Financial Review

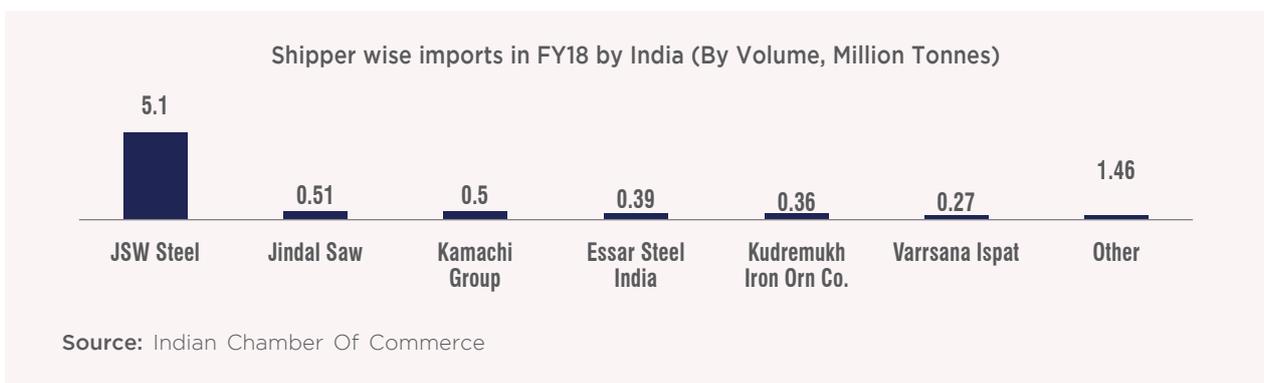
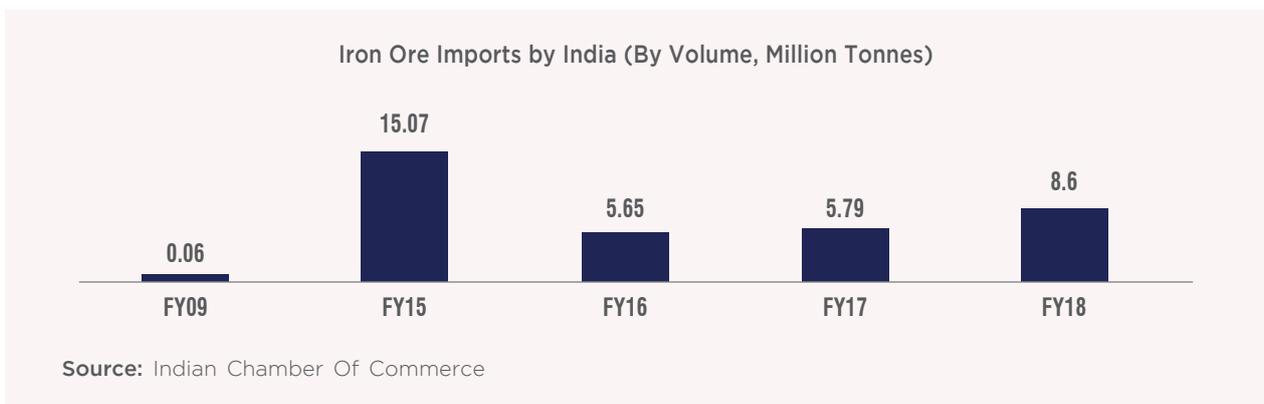
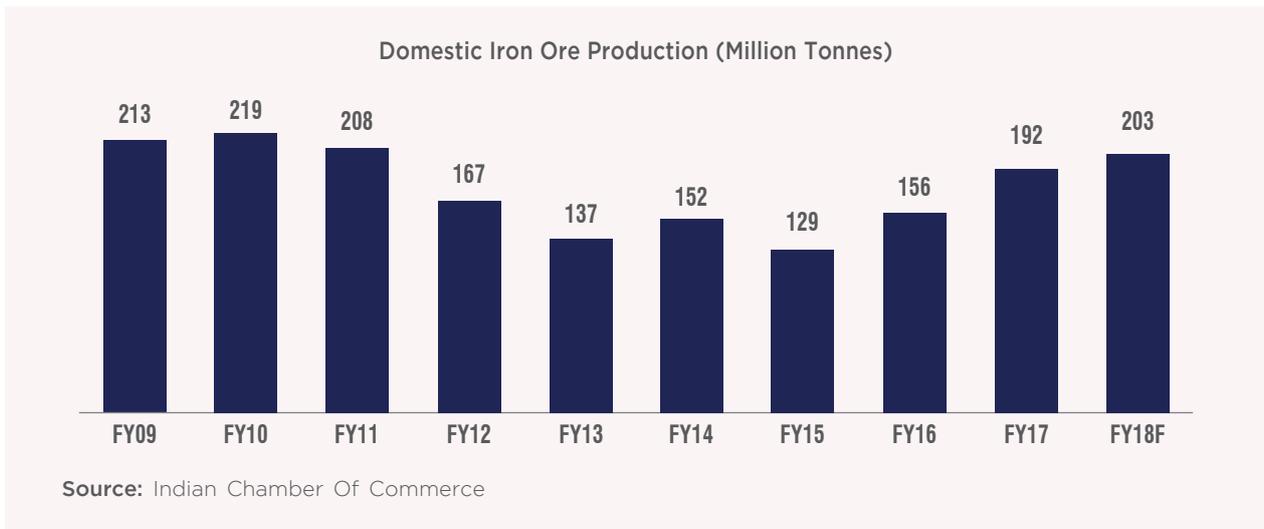
<sup>154</sup> Non-payment of fines to shut off 20 mn tonne iron ore capacity in Odisha, 2018, Business Standard;

<sup>155</sup> Supreme Court cancels iron ore mining leases of 88 companies IN Goa, 2018, The Economic Times

<sup>156</sup> Indian Metals and Mining, Indian Chamber of Commerce

<sup>157</sup> SteelMint group-Events

<sup>158</sup> Business Standard



Given the fact that Australia accounts for about 28% of the global iron ore reserves with EDR of 49,588 million tonnes,<sup>159</sup> Indian iron ore miners could evaluate opportunities in Australia to meet domestic demand as well as increase their iron ore exports.

<sup>159</sup> Australia Benchmark Report 2018, Austrade



## Copper

### Growth of the Sector in Australia

Copper was first discovered in Australia in 1842 in South Australia.<sup>160</sup> This led to an influx of miners who developed copper mining across the region, which is now called the “Copper Coast”. In the 1860s, South Australia was referred to as the “Copper Kingdom” as it had some of the largest copper mines in the world. In 1975, the Olympic Dam mining site was discovered and 20 years later, Olympic Dam became the second-largest copper producing region in Australia after Mount Isa.

The exports of copper ores and concentrates (metal content) from Australia grew at a CAGR of ~6%, from 400kt in 2007 to 531kt in 2012. This was mainly due to the rapid increase in construction, infrastructure and manufacturing activity in China.<sup>161</sup>

Australia is the fifth largest producer of copper and is home to 12% of the world’s economic resources of copper after Chile.<sup>162</sup> As of 2016, the country had 34 operating mines and its annual production stood at 948 Kt. The country exported 1,817 kT of copper ore and concentrates to the world in 2018.

### Australia’s potential

Australia has a high grade of copper, well-established supply chains and infrastructure, an abundance of world-class geological data as well as a highly skilled and progressive exploration sector. Australian companies can be valuable contributors to the global supply chain. In terms of regulations, South Australia provides strong Government support and is known to be a low risk jurisdiction for conducting mining activities.

### Recent investments in Australia

BHP plans to significantly increase its copper production by 75%, from 200,000 tonnes/annum to 350,000 tonnes/annum, at its Olympic Dam site. The company is considering an investment of ~USD 3 billion for the project. The company also invested more than USD 600 million in FY18 into copper operations with focus on underground infrastructure and above ground processing operations.<sup>163</sup> OZ Minerals extended the life of its Prominent Hill copper mine to 2030, after securing a 2% increase in underground ore reserves. This enabled the company to continue its production of 3.5-4 mtpa till 2030. The company is expected to focus on a series of project developments in 2019.<sup>164</sup>

### Key geopolitical developments

In 2018, copper prices were volatile and were dragged down by geo-political uncertainty. The threat of the US imposing tariffs on Chinese goods further fueled uncertainty. China is one of the key importers of Australian copper and the economic developments in China have a crucial bearing on the prices of copper. Since China is expected to fuel the demand for copper in the future, the prices, given the risks, are expected to increase.

<sup>160</sup> Australian Government, Geoscience Australia

<sup>161</sup> Production, Geoscience Australia

<sup>162</sup> Austrade, Australia Benchmark report, Geoscience Australia

<sup>163</sup> BHP seeks 75% copper growth project at Olympic Dam, Australian Mining, 2019

<sup>164</sup> OZ Minerals pushes for major project growth in 2019, 2019, Australianmining website

## Opportunity for India

The Indian copper demand is met through copper ore production from the Indian mines as well as imported metal ores. India has limited copper resources (~1.8% of the world copper reserves) as compared to countries such as Chile (22%), Australia (11%) and Peru (10%).<sup>165</sup>

Mining of copper in India is mainly covered by Hindustan Copper Limited (HCL) and other private players such as Hindalco Industries and Sterlite Industries that import copper concentrates. These three players primarily dominate the copper market in India. While HCL is the only vertically integrated player in the country, Hindalco and Sterlite have port based smelting and refining plants. Further, India's refined copper supply in 2018 was adversely affected by the decision to shut down Vedanta Sterlite's copper plant in Tuticorin, which accounted for 48% of the country's output. Thus, India's refined copper output is forecasted to drop to 540kt in FY19 from 843kt in FY18, which may require it to import copper.<sup>166</sup>

As a result, there exists an opportunity for India to invest in existing mines in Australia to cater to the growing domestic as well as global demand. Indian copper mining companies and end-user companies could explore the option of acquiring a stake in Australia's copper mines to cater to India's growing demand.

## Unconventional gases and LNG

### Australia's Potential

Australia has large reserves of unconventional gases. These gases include tight gas, coal seam gas and shale gas. Australia has 35,905 PJ (33 Tcf) EDR of coal seam gas, 65,529 PJ (60 Tcf) sub EDR and is also estimated to have a large base of unexplored coal seam gas reserves. The life of the reserves as per the existing production rates is expected to be 150 years.<sup>167</sup> Coal seam gas production accelerated in the 2000s and today, constitutes 12% of the gas production in Australia.

Shale gas production is in the nascent stage and is an upcoming industry. Australia is estimated to have a total shale gas EDR of 437 Tcf, equivalent to the amount of domestic gas that could be used in Australia for 400 years.<sup>168</sup> It has been estimated that the shale gas resources present in Australia are two times that of the traditional energy resources. Majority of the shale gas reserves are expected to be present in Canning basin of Western Australia, ~235 tcf.

### Opportunity for India

India's production of crude is small as compared to its energy demand. With energy demand growing in future, the use of unconventional gases can assist India in meeting its energy needs. Indian energy companies can explore the opportunity of equity investments/joint ventures with Australian companies to obtain unconventional gases to cater to India's growing needs.

India has set a target to raise the share of natural gas in the overall energy sector to 15% by 2030, from 6.2% currently in order to reduce the share of hydrocarbon fuels. India thus offers a large energy market and Australia is rich in natural resources such as LNG, which

<sup>165</sup> Ministry of Mines, Annual Report, 2018-19

<sup>166</sup> Indian Metals and Mining Report, EY, June 2018

<sup>167</sup> Geoscience Australia

<sup>168</sup> US EIA, EIA/ARI World Shale Gas and Shale Oil Resource Assessment



is complementary to India's 'gas- based economy' agenda. India imports ~22 MT of LNG. Total imports have grown from 14 MT in 2014 to 22 MT in 2018, at the CARG of 12%. India currently imports ~1.44 million tonnes of LNG from Australia. India also imports ~10.7 million tonnes of LNG from Qatar under two long term contracts. Besides Australia and Qatar, other suppliers for LNG include Nigeria (3 million tonnes), Angola (1.4 million tonnes) and Oman (1.1 million tonnes).

Australian prices for imports of LNG have historically been the highest at USD 416/T as compared to USD 394/T from Qatar, USD 344/T from Nigeria and USD 397/T from Angola. This was partly due to non availability of a terminal on the East Coast of India to receive LNG from Australia. Until now, Australian LNG was being shipped to India's West coast and hence was pricier as compared to LNG from Qatar, partly due to logistics costs. Australian LNG deposits are located in Western Australia and Northern Territory. With the development of Ennore and later other ports on the East Coast of India, there could be an opportunity to ship LNG from Australia. Australian companies could then look at India for supplying LNG at lower prices than what is supplied to other countries as a possible diversification strategy.

There is also significant potential for technical collaborations between the two countries on conventional gases such as liquefied petroleum gas, fuel oils, petrol, diesel, kerosene, asphalt base and others.

## **Mining Equipment, Technology and Services (METS) Industry**

### **Australia Potential**

Australia provides the best in class Mining Equipment, Technology and Services (METS). Australia has perfected mining technology, required to perform mining efficiently in tough conditions, while ensuring high productivity of mines within stipulated environmental standards. A stable socio-political scenario, presence of skilled professionals and consistent growth in the economy has resulted in high demand for Australian METS from various countries across the world.

Australia is home to numerous METS companies, which provide innovative and technologically advanced services to the mining industry, most of which are SMEs. Some of the prime companies operating in the industry are Dingo Software, Micromine, GroundProbe, UGM and RUS mining, Orica, etc.

The METS industry also has a leading industry body called Austmine, with more than 560 corporate members including companies, subcontractors, software vendors, original equipment manufacturers, technology companies and support services. Austmine supports and promotes the METS sector by encouraging innovation, facilitating collaboration among various stakeholders and providing growth opportunities.

Additionally, METS Ignited, an industry-led growth center for the METS sector, has also undertaken initiatives to improve productivity and research in Australia's MET sector. In collaboration with Austmine, CSIRO, the federal Department of Industry, Science, Energy and Resources and the Queensland Government, METS Ignited developed the METS 10 Year Sector Competitiveness Plan, in 2016, to spearhead innovation and development across Australia's mining industry.<sup>169</sup> This plan aims to extend collaborative opportunities, bilateral relationships and commercial opportunities within the global mining ecosystem to position Australia as the hub for mining innovation.

<sup>169</sup> Launch of a national plan for a globally competitive Australian METS sector at IMARC

## Case Study: Successful Collaboration between Core Resources and Glencore Technology

METS Ignited has recognized successful collaborations between METS companies, researchers, miners and other vital stakeholders through its inaugural METS Ignited Collaboration Award. In 2016, the Australian METS company, Core Resources partnered with Glencore, a multinational mining and commodity trading company to commercialize the Albion Process, a new technology necessary for processing refractory ores. As winners of the award, the two partners had installed the Albion treatment plant for recovering gold at its GeoProMining (GPM) Project in Armenia. This plant is recognized to have increased gold recovery by over ~60% and extended the lifespan of the mine by 10 years. Accordingly, this collaboration is a testament to opportunities for expanding business, markets and export potential between Australian METS suppliers and other global mining companies. This is especially applicable to global mining companies seeking to treat lower grade and complex refractory ores. Furthermore, this project highlights the scope for commercializing innovative solutions within the mining industry.

**Source:** Core Resources website

## Opportunity for Indian mining industry in METS

The Indian mining sector has scope for further development. Its contribution to India's GDP is stagnant at 2.5% for the past ten years.<sup>170</sup> With increasing growth and domestic demand for mining resources and activities, India faces a pressing need to increase productivity in its mining sector.

In line with this growing demand, Coal India Limited(CIL) is poised to grow from a 607 Mt to a 1 Btcompany within the next few years. For successful implementation of this growth prospect, CIL will be required to adopt the best of technology and management practices followed in the global coal mining industry including state of the art equipment and services for production of coal.

The Indian mining sector needs improvements and further development in certain areas, which include:

- High ash content in coal: Indian coal has higher ash content, which reduces the power generated in thermal power plants. The ash content in Indian coal is 25-45%<sup>171</sup> when compared to Australian coal, which has an ash content of 12-20%, creating a need for beneficiation and coal washeries.
- Inadequacy of equipment: Most of the mine developer-cum-operators (MDOs) rely on small scale equipment and require large scale technology.
- Shortage of skilled labour: India has a requirement of skilled mining engineers who are required to support the sophisticated mining equipment.
- Thermal power plant inefficiencies: The technology used in thermal power plants is sub-optimal with average efficiencies of 31-33%.

<sup>170</sup> Press note on provisional estimates of annual national income, 2018-19 and quarterly estimates of gross domestic product for the fourth quarter of 2018-19, Government of India

<sup>171</sup> High ash content, Ministry of Coal, PIB, 2018



- Environmental and safety concerns: India has inadequate clean coal technology, thereby contributing to pollution.

As India's mining sector continues to grow, owing to rapid modernization and infrastructure development, the requirement of mining equipment, technology and services will increase across the value chain. Australia has the potential to address all the aforementioned challenges that India faces with its cutting-edge technology, sustainable mining practices, geo-scientific research techniques and skilled workforce.

Australia offers a wide range of METS products and services, which have been highlighted below:

Indicative Parameter	Value in 2016
Core engineering design and project management	<ul style="list-style-type: none"> <li>• Engineering services, process and mechanical design</li> <li>• Asset and resources management</li> <li>• Mining engineering and contracting</li> <li>• Mine Planning</li> <li>• Mineral analytical and processing services</li> <li>• Project and contract management</li> <li>• Closure, reclamation and remediation</li> <li>• Mapping services</li> <li>• Mine site design and construction</li> </ul>
General support services	<ul style="list-style-type: none"> <li>• Education and Training</li> <li>• Safety and health systems and services</li> <li>• Recruitment and HR solutions</li> <li>• Research and development</li> <li>• Finance services</li> </ul>
Consulting services	<ul style="list-style-type: none"> <li>• Mining Consulting</li> <li>• Consulting geologists and engineers</li> <li>• Metallurgical geo technologies and environmental services</li> </ul>
Information technology equipment and related services	<ul style="list-style-type: none"> <li>• Information management systems</li> <li>• Software</li> <li>• Communication systems</li> <li>• Automation</li> <li>• Simulation and remote communications</li> <li>• Ground control equipment and supplies</li> <li>• Satellite communication</li> </ul>
Contract Operations	<ul style="list-style-type: none"> <li>• Engineering contractors</li> <li>• Contract mining and mining services</li> <li>• Alluvial mining and mineral sands operations</li> <li>• Drilling services</li> </ul>
Specialized technology	<ul style="list-style-type: none"> <li>• Analytical laboratories and supplies</li> <li>• Exploration and supplies</li> <li>• Mining instrumentation</li> <li>• Strata reinforcement technology</li> </ul>

Core mining and processing equipment	<ul style="list-style-type: none"> <li>• Bulk material and mineral handling and processing</li> <li>• Open cut, hard rock and underground mining</li> <li>• Specialized vehicles</li> <li>• Drilling, blasting and rock-breaking</li> <li>• Earth moving</li> <li>• Surface mobile</li> <li>• Water management</li> <li>• Electric power</li> <li>• Coal beneficiation</li> </ul>
General equipment and components	<ul style="list-style-type: none"> <li>• Supply of parts</li> <li>• Equipment modifications and improvements</li> <li>• Related components and consumables</li> </ul>
Other services	<ul style="list-style-type: none"> <li>• Equipment and component supply and servicing</li> </ul>

**Source:** Mining Equipment, Technology and Services Report by Australian Government, Australian Trade Commission

Australian firms operating in the METS sector are competitive across the mining supply chain and are flexible across different commodities. Australia has a competitive edge across various supply chain areas such as exploration, mine development and mineral processing, engineering, environmental management, mine safety, R&D and education & training.

The mine-developer-cum-operator (MDO) model is popular in India, where the entire responsibility of developing a mine is subcontracted to a contract miner, who operates the mine on behalf of the mine owner. The key players in this segment include Essel Mining and Industries Limited (EMIL), Thriveni Earthmovers, Sainik Mining and Allied Services, AMR India Limited, JSW Energy, Adani Enterprises, etc. Indian MDOs/ miners can invest in Australian METS companies to form joint ventures in order to tackle challenges of low productivity and quality to access advanced Australian technology and best practices.

In addition, India can also manufacture and export mining equipment to meet excess demand from Australia. The availability of labour at a reasonable cost, combined with a host of Government initiatives for manufacturing, make India an extremely attractive manufacturing destination. There are known examples of select Australian companies that have invested in setting up plants in India for manufacturing equipment to meet the Australian demand for specification pressure vessels for the oil industry. These companies use Australian technical expertise to manufacture such equipment to meet Australian as well as global oil and gas industry demand. Additionally, Indian manufacturers of mining and heavy equipment including Ashok Leyland, BEML, HEC, Eicher, L&T etc. can also similarly benefit from collaborations with the METS industry in Australia through Australian companies such as Austmine. This will further support the “Make in India” initiative of the Government of India.

Given that the Neyveli Lignite Corporation India Limited (NLCIL) has a broad base of knowledge in depressurization of ground water aquifer for lignite mining and the workings of specialized mining equipment such as Bucket Wheel Excavator and belt conveyors, NLCIL’s expertise could be applied in the brown coal basin of Australia.

For instance, Coal India Limited is currently engaged with Australia via a government to government initiative with CSIRO (Commonwealth Scientific and Industrial Research Organisation) on capacity development in Coal Mine Methane (CMM). CIL has also procured orders for equipment and services from Australian companies related to GPS based fleet management systems in OC mines (Leica Geosystems), slope stability monitoring in overburdened dumps through ground probing radar (Ground Probe), mine planning and design software (Minex, Surpac, Vulcan), explosives (ORICA), Dust suppression solutions (COOEE DUSTBLOC),



underground diesel vehicles (Valley Longwall). Currently, discussions on procurement of other products such as dumper turntable, in-motion dumper weigh bridge, screening attachment in shovels etc. are in progress.

### **Case Study: Coal India Limited's Engagement with CSIRO**

Central Mine Planning and Design Institute (CMPDI) had executed an MoU with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Australia in 2013 for a period of five years. A team from CMPDI visited CSIRO in 2015 to identify possible collaborative areas in the field of clean coal technologies. In 2018, the MoU was renewed for a further period of ten years to encourage programs of exchange and collaboration in areas of mutual interest to both organizations.

Under the aegis of the MoU, a project titled "Capacity Building for CMPDI CBM Lab" was undertaken and its progress is as follows:

- CMPDI established a state-of-the-art Coalbed Methane (CBM) lab that can carry out parametric studies for resource estimation and reservoir characterization for CBM and Shale gas.
- In 2016, a Science and Technology (S&T) Project titled "Capacity building for extraction of CMM Resource within CIL Command areas" was approved by the Ministry of Coal under the S&T funding, which is jointly implemented by CMPDI and CSIRO.
- The CSIRO Project Team visited CMPDI periodically in the years 2017 and 2018. The CSIRO team assisted CMPDI to draw the required technical specification for laboratory equipment under this S&T project. On completion of procurement, further activities of the project are expected to be undertaken.

### **Case Study: Collaboration on Underground Coal Gasification**

India-Australia Energy Security Dialogues have been held for the development of Underground Coal Gasification (UCG) in India. Australian companies, such as Carbon Energy Limited, etc. were asked to explore opportunities in India in view of the recent UCG policy of the Government of India. A meeting was organized by Austrade with representatives from Australia and India, in which Carbon Energy Limited shared their outcomes of Key Seam UCG Technology, developed at a UCG Trial Project at Queensland. It was agreed that in view of the constitution of Inter-Ministerial Committee (IMC) for the development of UCG blocks, the Indian proponent may approach the Australian developer to extend technology after the awarding/finalization of blocks. Opportunities within the field of Underground Coal Gasification can be further explored by both the countries.

Since 2019, the Government of India has planned significant diversification and induction of technology in coal mining. The Government is also planning to introduce private sector in the coal mining sector in India. Underground Coal Gasification (UCG) is one such technique that has generated significant interest from the Government. UCG is a method of converting coal still in the ground to a combustible gas that can be used for various uses, including power



generation. UCG presents several advantages to conventional coal mining in the form of reduced mining and transportation along with reduced environmental impacts. UCG requires significant capital investment and technological upgrades to ensure commercial viability.

Mining is one of the riskiest and most hazardous occupations in the world. The safety standards of India's mines, though not as stringent as the standard operating Procedures (SOPs) adopted in Australia, have been progressively improving and the Directorate General of Mine Safety (DGMS) has been responsible for carrying out initiatives for mine safety and mine inspection in India. DGMS is also working on safety codes for protection of contract and temporary mine workers. Despite these efforts, inadequate infrastructure and lack of training and awareness have put 251,700 employees in the sector at a significant safety risk. Australian companies such as AusDrill, have extensive programs focusing on mine safety and training. Thus, India could enhance its capacity for training in MET skills and occupational safety by collaborating with such Australian companies. For this purpose, India and Australia have been making progress towards such collaborative models and in early 2019, a MoU was signed between DGMS and Safety in Mines Testing and Research Station (SIMTARS) for cooperation in occupational safety. SIMTARS is a commercial business unit of the Queensland Government Department of Natural Resources, Mines and Energy, which provides a range of services to improve safety and health across the mining industry.

There is also a requirement of skilled manpower for mining operations in Australia. In Australia, mining operations are highly mechanized. The skill sets of Indian workforce can be mapped with the Australian workforce to enable Indian workforce to find adequate employment at Australian mines. Post their exposure to mechanized mining in Australia, these skilled resources can dramatically improve productivity and safety standards in India.

### **Opportunity for Australian investment in India in METS**

As per Invest India, the market for Earth-moving and mining machinery in India is valued at USD 3.3 billion. The mining equipment market has been growing in the last few years. The demand for mining equipment in the country is largely driven by increased coal mining along with an increase in quarrying and infrastructure projects. The government has laid extensive focus on upgrading this sector by permitting 100% FDI via the automatic route and through programs such as National Capital Goods Policy, 2016. This sector in India thus presents significant opportunities for Australian investors across the mining value chain that include enhancement of skill development in installing, operating and manufacturing advanced extraction technologies as well as investing in advanced drilling, sensing, sorting and processing technologies.

### **Sector Representative Contribution: Access Petrotec & Mining Solutions**

Access Petrotec, established in 2009, is a Perth-based Australian company that offers engineering services and equipment solutions to the oil and gas, mining and infrastructure industries. The company was founded by two entrepreneurs, Peeyush Mathur and Vinod Gupta, who migrated from India to Perth. Within the mining industry, Access Petrotec offers a range of customized equipment packages including pressure vessels, skid mounted process equipment, submersible pumping systems, chemical dosing skids, air compressors and dryers, nitrogen plants, material handling systems and lube oil skids.

Access Petrotec provides an ideal mix of cost-effective manufacturing based on their facilities set up in India and compliance with the International standards of engineering. In India, in partnership with Baroda Equipment & Vessels, they manufacture high-quality cost effective pressure vessels, heat exchangers and other process equipment. Access Petrotec also buys a range of submersible pumps, sold under the 'Darling' brand in India for mine dewatering, waste water applications, etc.

In addition, they have also collaborated with Techpro Engineers Private Ltd in Kanpur to provide tailor-made equipment solutions to their clients.



In 2016, Access Petrotech also expanded its operations in the renewable energy sector through the establishment of a new subsidiary company, Australian Energy Storage (AES), in India. Since 2017, AES has run a small-scale assembly line for its battery packs in Vadodara. Further, AES has identified the Indian cities of Vadodara, Ahmedabad, Indore, Jaipur, Gurgaon, Kolkata, Jamshedpur and Agartala as its prime target for its e-rickshaw battery solutions (selected based on high demand and usage of E-rickshaws).

## Collaboration with Australian federal bodies and universities

Australia has the reputation of developing leading edge, new equipment and services for the mining sector. The country is home to best-in-class institutions such as the Commonwealth Scientific and Industrial Research Organization (CSIRO), National Science agency, universities and centers of excellence. Technical collaborations between Australian mining research centers and universities hosting research on Indian mining, as well as private Indian mining companies, could provide significant upgrades to India's mining sector, in terms of infrastructure, technology and expertise. Australia has several research centers and university excellence programs where their corresponding Indian counterparts can extend collaborative fronts. These institutes/ universities include Geoscience Australia, Australian Centre for Geo-mechanics, Mining Research Centre at the University of Wollongong (UOW), Mining & Energy Research Centre at The University of Adelaide, Minerals and Energy Research Institute of Western Australia (MERIWA), Sustainable Mineral Institute at The University of Queensland, etc., amongst others.

### Case Study: CSIRO

The Commonwealth Scientific and Industrial Research Organization is an established Australian Federal Government agency recognised globally for its scientific research. Adding a significant value to the Australian economy, CSIRO plays a crucial role in developing strong research network and infrastructure relevant to the Australian Industry Growth Centers. Headquartered in the Australian Capital Territory in Canberra, this federal scientific research organization commenced its operations 104 years ago in 1916.<sup>172</sup> CSIRO is driven by its mission to arrive at solutions using innovative science and technology tools. It has numerous projects across various fields including space, infrastructure, health and biosecurity, data science, agriculture, mineral resources, etc. It is the country's catalyst of innovation, holding 1800 patents and having started over 150 companies. Its key patented technology is in the following fields - plant genetics and modification, polymers, sensors and devices, medical fields, batteries and gas capture and processing.<sup>173</sup>

Some of its most notable achievements historically include the invention of wireless network (Wi-Fi), plastic banknotes, extended wear contact lenses, aerogard insect repellent, RAFT polymerization for applications ranging from adhesives to biosensors, extra nutritious strain of barley called BARLEYmax, etc.<sup>174</sup> Additionally, CSIRO's most recent achievements have been in cybersecurity, ocean research, renewable energy, computer gaming for medical diagnosis, agri-tech, etc.<sup>175</sup> Moreover, the organization's innovation system, independently reviewed by ACIL Allen in 2018, was estimated to have delivered an equivalent of more than AUD 3.2 billion (USD 2.14 billion) per year in impact to the nation, forecasted to extend its benefits to AUD 9 billion (USD 6.03 billion) per year.<sup>176</sup>

<sup>172</sup> CSIRO

<sup>173</sup> Delivering Innovation and Science Excellence, CSIRO website

<sup>174</sup> Our Top 10 Inventions, CSIRO website

<sup>175</sup> News Releases, CSIRO website

<sup>176</sup> The Impact and Value of CSIRO Research 2018

CSIRO can be an essential partner in strengthening ties between India and Australia. CSIRO offers a central platform to the Indian Government and corporates to access information and subject matter expertise on technologies that are ready to be commercialized. Furthermore, they also offer opportunities for investments by providing access to niche projects that are underway. Multinational companies such as Boeing, BHP Billiton, Monsanto etc. have already invested in CSIRO's research programs.

### **Case Study: Geological Survey of India (GSI) and Geoscience Australia**

India's total land area is 3.28 million sq. km. and the GSI has marked 0.57 million sq. km. as areas of Obvious Geological Potential (OGP) for minerals. According to the Ministry of Mines, in the case of surface minerals, 100% of the OGP area in India has been mapped while for deep-seated minerals, only 22% has been mapped up to March 2018. Australia has approximately 95% of its area fully mapped. Most of the exploration activities in India are carried out only at the surface (up to a vertical depth of 100m). Rapid erosion of surface ore bodies means that India needs to work on discovering its potential mineral deposits up to a depth of 1,000-2,000 metres.

India is yet to develop its expertise and technological capabilities in exploring and extracting deep set minerals. India has thus partnered with Geoscience Australia, Australia's federal agency for research in the fields of geoscience and geospatial data and launched 'Project Uncover' to fully unlock the country's mineral potential. In 2016, GSI had undertaken two pilot projects with Geoscience Australia for exploration of concealed and deep-seated mineral deposits. The first project covered parts of Aravalli and Bundelkhand Cratons in Rajasthan, Madhya Pradesh and Uttar Pradesh and the second project was across Western and Eastern Dharwar Cratons in parts of Andhra Pradesh and Karnataka. This project has revealed significant information on possible mineral systems and also increased the possibilities of exploring the surrounding areas for concealed copper mineralization. The first phase of the project was completed in April 2020 and the project has now been extended for a period of 24 months. During the second phase, Geo Science Australia will undertake a technical review of GSIs Regional Mineral Targeting Projects, chemical laboratory procedures/ methodologies and offer support on proposed national mining programmes. Further, a preliminary engagement is also underway for a similar collaboration between the Commonwealth Scientific and Industrial Research Organization (CSIRO); Mineral Exploration Corporation Ltd. (MECL), Curtin University of Western Australia and KhanijBidesh India Ltd. (KABIL). Exploring India's geological cover, investigating India's lithospheric architecture by carrying out deep seismic reflection surveys (DSRS), resolving 4D geodynamic and metallogenic evolution and detecting and characterizing the distal footprints of ore deposits are the main agenda points of the project. Australian experts can also assist their Indian counterparts with the latest software and know-how to use the equipment and understanding the process of obtaining and analyzing data.

**Source:** News Articles; Exploration and Mining: Opportunities in India, Ministry of Mines



Indian mining companies can also collaborate with Commonwealth Scientific and Industrial Research Organization (CSIRO)<sup>177</sup>, an independent Australian federal Government agency responsible for scientific research, on their various mining research projects to leverage technologies and to scale up research. CSIRO offers a central platform to the Indian Government and corporates to access information and subject matter expertise on technologies that are ready to be commercialized. Furthermore, they also offer opportunities for investments by providing access to niche projects that are underway.

### Case Study: CSIRO and SCCL

Singareni Collieries Company Ltd. (SCCL) is the only mining company in Southern India, supplying coal to major power utilities such as TSGENCO, APGENCO, KPCL and MAHAGENCO. It is also a known supplier of coal to cement, captive power plants, steel and other small and medium sector units. In 2019, SCCL signed an agreement with CSIRO and Safety in Mines Testing and Research Stations (SIMTARS) for assistance in mine safety and technology. SCCL has further collaborated with Australian firms specializing in this field to expand its current coal production from ~68 million tonnes to ~100 million tonnes over the duration of 7 years.

**Source:** SCCL for increasing coal production seeks cooperation from Australia for the purpose, The Hindu, 2019

### Case Study: CSIRO and NMDC

Australia and India are both crucial iron ore producing countries. Both these countries are attempting to challenge the declining ore supply and the majority of available supply is laden with goethite, an impure mineral. In their attempt to challenge this, National Mineral Development Corporation (NMDC) in India and CSIRO in Australia signed a research agreement on the exploration of complex iron ore processing in 2018. This research collaboration served to offer extensive insights on complex iron ore processing using energy efficient dry processing techniques. Through this project, CSIRO is promoting an exchange of knowledge and skills with India's iron ore and steel producers. A successful execution of this project is expected to increase the industry's productivity. Post the signing of this agreement, NMDC held a one-day workshop on "Processing of Complex Geothitic Iron Ores" for teaching various cutting-edge iron ore processing techniques ranging from iron ore characterization, beneficiation, geo-metallurgy and agglomeration processes. Other workshops have also been held in Brisbane and Jamshedpur.

<sup>177</sup> CSIRO: Mining and Manufacturing

Curtin University's Western Australia School of Mines' has a mining operations training program, which is one of the top ranked mining programs in the world. Australia also has other universities whose mining programs feature amongst the top 20 in the world, namely, University of Queensland, University of New South Wales (UNSW Australia), University of Western Australia, University of Melbourne and University of Adelaide.<sup>178</sup> India can explore collaboration with these institutes, both at the corporate as well as at the Governmental level.

## Recent Chinese and Japanese investments

### Investments by China

Mining was the largest sector for Chinese investments in 2017 attracting investments worth AUD 4.6 billion (USD 3.1 billion). The investments were driven by a ~AUD 3.4 billion (USD 2.3 billion) coal mining deal and continuing investment focus in lithium.

China has been increasingly focusing on lithium related projects, which is a primary material in batteries used in electric vehicles and renewable energy storage. Some recent investments include:

- In 2017, Talison Lithium, which has 51% of its ownership with Tianqi Lithium, invested ~AUD 320 million (USD 214 million) to double the capacity of the Greenbushes Lithium mine, which supplies ~40% of world's Lithium.
- Tianqi Lithium made a strategic decision in 2016 to diversify lithium processing away from China. To build processing capabilities in Australia, it made a ~AUD 400 million (USD 268 million) investment for construction of a large-scale processing plant in Kwinana, Western Australia with annual production of 48,000 tonnes of lithium hydroxide.
- Tianqi Lithium has also invested ~AUD 700 million (USD 469 million) in a lithium hydroxide processing plant in Western Australia. Tianqi made an initial investment of ~AUD 400 million (USD 268 million) in 2016 for an initial production capacity of 24,000 tonnes per year. This ~AUD 300 million (USD 201 million) facility is expected to be completed in 2019.
- In 2015, Jiangxi Ganfeng Lithium made an ~AUD 18.54 million (USD 12.4 million) investment in Australian Lithium mining company Neometals.
- Baosteel Resources/ Aurizon Holdings made an ~AUD 910 million (USD 610 million) investment in Aquila Resources Limited, which has assets with copper, zinc and gold deposits.

### Investments by Japan

From the 1960s, Japanese investments have pioneered the growth of Australia's mining and resources sector. Investments across the Pilbara Region in Western Australia, the Hunter Valley in New South Wales and the Bowen Basin in Queensland, opened these regions to the global markets.

Some recent key investments by Japanese players include:

- Toyota Tsusho Corporation acquired a strategic stake in Orocobre, a Lithium mining company, for ~AUD 292 million (USD 196 million). The investment will primarily be used for the expansion of the Olaroz project to increase the annual capacity from 17,500 tonnes of LCE to 42,500 tonnes of LCE. Tsusho will also secure a long-term supply of lithium products to cater to the growing market demand.

<sup>178</sup> QS university rankings



- Japanese trading house Mitsui has signed a take-off agreement with Kidman Resources, which has a 50% stake in the Earl Grey lithium project at Mount Holland, 400 km east of Perth. Kidman aims to start production in second half of 2019 and plans to ship the concentrate to the lithium hydroxide refinery at Kwinana.
- Japanese trading house, Sojitz and the Japan Oil, Gas and Metals National Corporation provided ~USD 250 million in capital to help Lynas, the world's only major rare-earth producer after China, to boost its production of rare earth minerals.
- Inpex corporation, Japan's largest oil and gas exploration and production company, is leading a USD 45 billion liquefied natural gas (LNG) project in Icythys, Western Australia. Japan shipped its first LNG cargo in 2018 and production in the project has reached its full capacity of 8.9 million tonnes a year in 2019.

### Implications for India

Key economies such as China and Japan are actively investing in Australia's resources to meet the potential demand for their domestic consumption. India with its population of 1.3 billion<sup>179</sup>, GDP of 2.7 trillion and an expected growth of 6-7% over next five years would need to collaborate and invest in Australia's mining of resources to meet its growing domestic needs.

### Encouraging investments by Australian companies in Indian mining industry

India too has a vast potential in its domestic mining industry. India has abundant mineral resources and is the key producer of many minerals. In 2017, India was ranked as the fifth largest producer of iron ore, fourth largest coal producer and third-largest chromium producer. India is also a key producer of bauxite, manganese ore and other smaller minerals such as talc, steatite and barytes. Mining sector contributed ~2.5% of India's nominal GVA in FY18, 14% of India's overall exports and 30% of India's overall imports<sup>180</sup>.

High public spending on infrastructure-railways, metro projects, roads and ports, growing urbanization-100 smart cities planned by 2020 and stable medium-term outlook in the automotive industry is expected to lead to high demand for mineral resources in India.

Further, the Government of India has taken measures to ease the mining regulations to attract foreign investments in India. Some of the key measures taken by the Government are:

- 100% FDI under the automatic route has been permitted in the coal mining sector.<sup>181</sup>
- Adoption of transparent, seamless and simplified procedures to grant mineral concessions and to facilitate exploration processes. E-Governance, IT enabled systems, awareness and information campaigns have been incorporated<sup>182</sup>.
- Facilitation of clearances through an online public portal in a time-bound manner. Further, state Governments will endeavor to auction mineral blocks with pre-embedded statutory clearances<sup>182</sup>.
- Proposed a long-term export import policy to provide stability and incentivize private sector to invest in large scale mining activity<sup>182</sup>.

The mining sector in India is expected to witness major reforms over the next few years owing to the Make in India campaign, Smart Cities Program, rural electrification, renewable

<sup>179</sup> World Bank

<sup>180</sup> Coal sector gets nod for 100% FDI; The Economic times

<sup>181</sup> National Mineral Policy 2019, Government of India, Ministry of Mines; The point is applicable only for non-fuel and non-coal minerals

<sup>182</sup> National Mineral Policy, 2019 approved by Cabinet, Press Information Bureau, 2019

energy projects under the National Electricity Policy as well as as increase in infrastructure development. With robust growth in domestic demand and favourable Government policies, the mining sector presents opportunities for Australian companies to invest in resource mining and exploration in India.

In the face of the ongoing COVID-19 pandemic, several reforms were announced by India's Finance Minister to revive the Indian economy in mid-May 2020. Commercial mining of coal by the private sector will now be permitted. This will be carried out on a revenue sharing mechanism rather than a fixed rupee/tonne regime. Further, an investment of INR 500 billion (USD 7.14 billion) has been proposed for coal shipment infrastructure, including mechanized transfer of the fuel from mines to railway sidings in India.

### Recommendations

- The Indian Government and the private sector should evaluate entering into offtake agreements/investments/joint ventures with Australian mining assets / mining companies to secure access for India's critical mineral requirements and across resources such as coal, iron ore, copper, gold, potash, phosphate etc.
- The Indian Government should evaluate setting up an organization for centralized procurement of coal to cater to majority (~60-70%) of the Indian requirement which could be a demand aggregation for Government and private imports. This will enable Australian export companies to offer volume discounts and offer competitive rates in line with the rates offered to other countries.
- Indian institutes / corporates and Government bodies should encourage partnerships with Australian institutes to facilitate joint research and training and knowledge transfer programs in the following areas: Mine safety and technology applications, mine exploration and mapping in India, student exchanges between Indian institutes such as IIT-ISM and Australia's mining universities, encouraging two-way consultation programs for specific mining applications and issues.
- Encourage Australian companies to invest in the mining and METS sector in India.



## Technology and Services Synopsis

The technology and services industry is one of the fastest growing industries in Australia. India has an extensive resource base of individuals with highly specialized digital technology skills, which provides India an opportunity to actively participate in Australia's private and government sectors. It also allows for collaborative opportunities in emerging areas such as Industry 4.0.

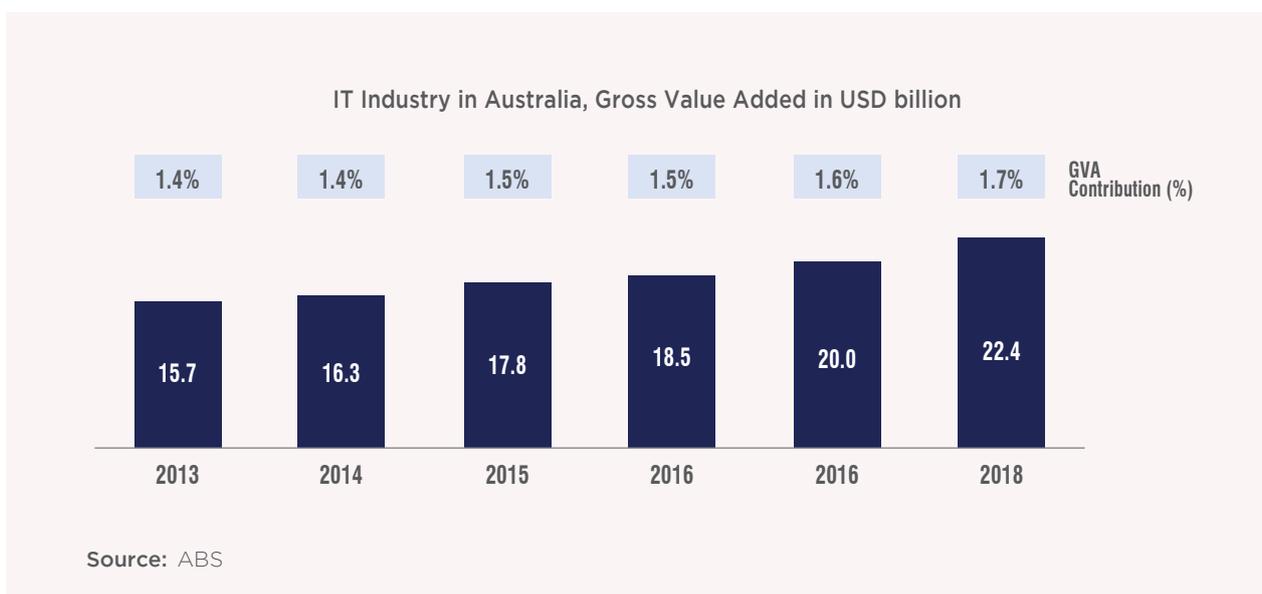
The following opportunities have been identified for this sector:

- Increasing participation of Indian companies in Australian government projects.
- Encouraging setting up of Global Innovation Centres (GICs) of Australian companies in India.
- Collaborating in areas such as cyber-security.
- Providing India's high-quality product-based IT offerings to Australia.
- Collaborating to further develop fin-tech capabilities in both countries.
- Collaborating with Australia in technologies and expertise in SME lending and screening.
- Enhancing cooperation in start-ups.

## 5.2 Technology and Services

### Overview of the Australian IT industry

Australia was one of the earliest countries to recognize the advantages of a technologically connected economy and was quick to adopt an e-Government strategy. The Australian Government laid out a Digital Transformation Agenda in 2016, which focused on providing more accessible digital services to individuals and businesses. The Australian Government, in 2018, released “Vision 2025: We will deliver world-leading digital services for the benefit of all Australians”, prepared by the Digital Transformation Agency (DTA), which set out to place Australia amongst the top 3 digital Governments in the world.<sup>183</sup> This resulted in rapid innovation and digitization across Australian industry and Government that has fueled the growth of the information technology services industry in the country. Value add from the sector to the Australian economy grew at ~7% between 2012 and 2017 to reach USD 22 billion in 2017.<sup>184</sup> Australian Department of Industry, Science, Energy and Resources (DISER) has also come out with “Australia’s Tech future” document. The information technology industry in Australia is dynamic and has evolved from providing basic software technology and support services to advanced technologies such as cloud computing, data analytics, cyber security, automation, etc. The Australian government has also developed an AI Ethics framework, AI Technology Roadmap, AI Standards Roadmap, and a National Block Chain Roadmap. Australian authorities have engaged with NITI Ayog in India and have discussed attractive opportunities in AI and Blockchain (research, commercial and governance/ responsible development) and use of emerging technologies.



One of the key trends driving growth of the Australian industry is that enterprises are increasingly spending on availing IT services than on developing in-house capabilities. This has resulted in a rise in IT spending across public and private sectors in Australia. For example, the use of cloud services has increased as enterprises prefer availing cloud services over owning their own physical servers. Australian enterprises, like their global counterparts, are also gradually switching from traditional enterprise software to using cloud-based SaaS applications.

<sup>183</sup> Simple, clear and fast public services, Digital Transformation Agency, Australian Government

<sup>184</sup> Australian Bureau of Statistics



Melbourne, Sydney and Brisbane are the three largest IT hubs in Australia. Melbourne is home to more than half of Australia's top technology companies and the state of Victoria has 8,000+ IT businesses including companies such as IBM, Microsoft and Intel.<sup>185</sup> Sydney has numerous technology start-ups. Brisbane's technology start-up space is also growing owing to significant efforts undertaken by the Queensland Government to scale up the sector.

Australia's prominent listed software companies include Link Administration Holdings, Atlassian, Iress Limited and Technology One. However, their scale is much smaller when compared to global giants such as Apple, Microsoft, etc., as well as Indian IT multinationals operating in Australia.

Large listed software companies in Australia<sup>186</sup>

Name of Company	Revenue (2018) (USD million)
Link Group	856
Atlassian	874
Iress	332
Technology One	213

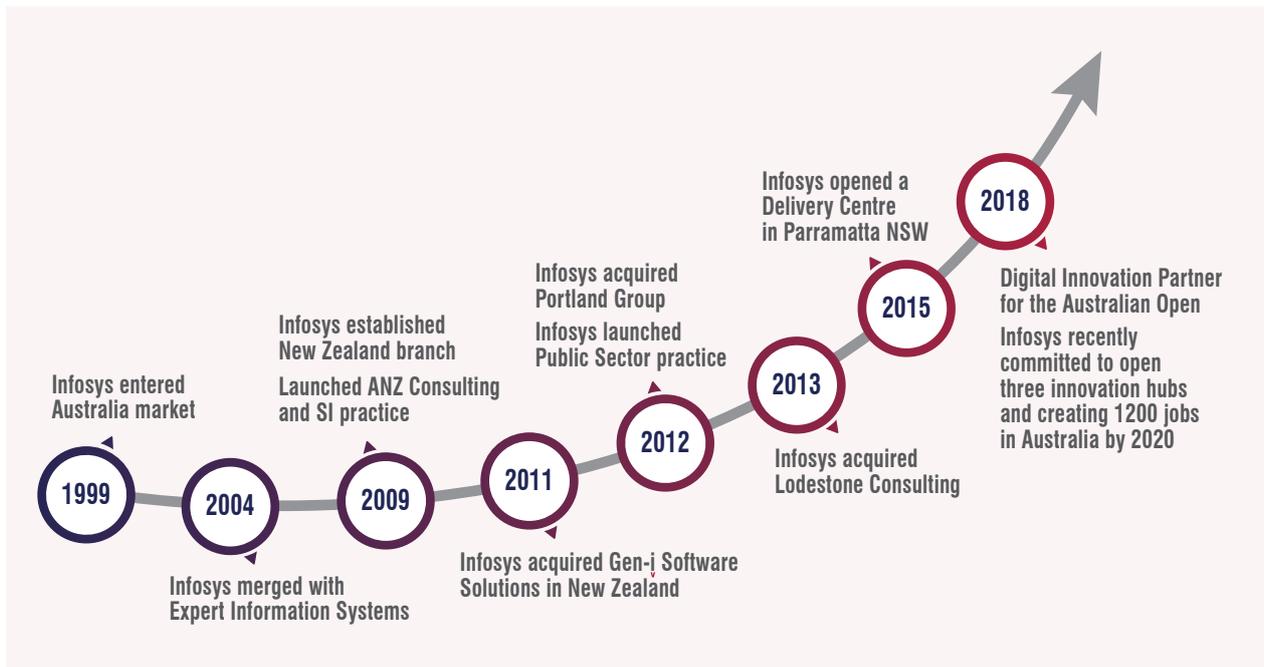
Indian IT companies have been present in Australia for more than a decade. Companies like Tech Mahindra, Infosys, Wipro, TCS, HCL, Cyient, Capgemini and NIIT have a strong presence in the country. Initially, these companies employed a cost reduction strategy where services were outsourced to India. However, these companies are gradually shifting focus from traditional IT offerings to business-driven IT by developing expertise in new age technologies such as cloud computing, analytics, etc. Wipro has set up three centers in Sydney, Melbourne and Adelaide to expand its operations in Australia and to capitalize on the talent pool and infrastructure provided by the country. Wipro is also planning to set up an innovation centre in collaboration with Swinburne University of Technology in Melbourne to conduct research in Artificial Intelligence (AI) and machine learning for applications in digital health and smart cities. In 2010, Infosys partnered with Telestra to create an emergency alert system, which was adopted across Australia. TCS was chosen to be the IT services partner by AGL Energy to implement a SAP solution in order to transform AGL's billing processes and services; the project won SAP customer Award of Excellence in 2012.

<sup>185</sup> Opportunities- TechCity Melbourne, Invest Victoria

<sup>186</sup> Company Annual Reports

### Sector Representative Contribution: Infosys in Australia

- Australia and New Zealand together comprise the second largest region for Infosys globally. This region has experienced consistent growth in revenue since its inception.
- Infosys established its initial presence in the region in 1999.
- Across Australia and New Zealand, Infosys partners with clients enable them with an AI-powered core that helps prioritize the execution of change and empower businesses with agile digital at scale to deliver unprecedented levels of performance and always-on learning agenda to help clients drive their continuous improvement.
- In late 2018, Infosys announced a digital innovation partnership with Tennis Australia to provide new digital experiences for Australian Open fans and players. Infosys also launched several initiatives to accelerate digital leadership for their clients in Australia and to shrink the digital skills gap in the region with the commitment to create 1200 jobs and open three innovation hubs by 2020
- The evolution of business is shown as below:



### Sector Representative Contribution: Wipro Australia

Wipro has been a pioneer of new age, disruptive and transformative innovations. Its presence in Australia has been firming up with a multitude of transformational programs that have been successfully delivered over the years in both the private as well as public sectors. Wipro employs 2000+ employees in Australia and has investments in all major cities including Sydney, Melbourne, Brisbane, Canberra and Perth. The company recently launched a delivery center in Paramatta primarily in support of their Government sector, road & maritime services client for cloud transformation services.



Wipro serves over 60 clients in Australia across diverse industry segments, with at least a third listed in the top 100 ASX. Wipro's acquisitions in the Australian region include Syfte in 2018 (Digital Design), Designit in 2014 (Digital Transformation), ATCO I-Tek in 2014, Promax Applications Group in 2013 (Trade promotion planning, management and optimization solutions space).

Wipro's partnership with universities includes Wipro-Swinburne Innovation Centre launched in December 2016 that will use cognitive computing, predictive analytics and next-generation digital technology to improve the economic, social and environmental dividends for society.

### **Key opportunities for India-Australia collaboration**

India's IT sector is much larger in scale in comparison with Australia's IT sector. The sector is driven by exports, which contribute to ~75% of Indian IT revenues.<sup>187</sup> The industry is evolving from being a back-end outsourcing services provider to becoming a hub for digital solutions. A collaboration between India and Australia can not only help develop niche skill sets and talent pools but also improve digital solutions provided globally.

### **India and Australia can collaborate to strengthen their capabilities in cyber security**

Rise in connectivity, digital transactions, volume and nature of personal data has globally increased the vulnerability to cybercrime and the need for stricter cyber security measures. Australia is ranked amongst the top 10 nations in the world for the strength of its cyber security framework.<sup>188</sup> As per a Cisco study, Australian organizations tackle some of the highest volumes of cyber security alerts in the Asia Pacific region.

Australia has a strong legal and organizational framework for cyber security governance in the country. The Australian Cyber Security Centre (ACSC) provides cyber security advice and assistance to Australian Governments, businesses and individuals. The Australian Government, in 2017, also set up AustCyber as an independent organization responsible for growing the Australian cyber security ecosystem, conducting research, building a pipeline of cyber security professionals and exporting Australia's cybersecurity capability. AustCyber also provides funding to industry led cyber security programs.<sup>189</sup> Australia's Cyber Security Strategy 2020 includes a commitment to work with businesses to consider legislative changes that set a minimum cyber security baseline across the economy. Australia's work with industry will include multiple reform options, including alignment with international cyber security standards and support for Australia's digital economy and facilitate digital trade. However, the country faces a significant shortage of cyber security professionals. The country's current pipeline meets only 7% of the cyber security expertise needed at the moment.<sup>190</sup> As per a survey by Intel Security, 88% of Australian IT decision-makers believe that there is a significant lack of cyber security skills within their organizations as well as in Australia.<sup>191</sup>

<sup>187</sup> Industry Performance: 2018-19 and what lies ahead, Nasscom Report

<sup>188</sup> Global Cyber security index, 2018 , ITU

<sup>189</sup> AustCyber

<sup>190</sup> Australia only has 7 percent of the cybersecurity expertise that it needs, 2018, CSO

<sup>191</sup> Australia hardest hit globally by cyber security skills shortage, 2016, CIO

<sup>192</sup> India aiming to be among top 10 of UN's Cybersecurity Index: Gulshan Rai, 2018, Business Standard

In India, although the Government has become stricter with its cybercrime policies and while the overall cyber security environment has strengthened, there is still room for improvement. India aims to be ranked amongst the top 10 countries in the world on the Global Cyber Security Index, where it currently ranks 23rd among 166 countries.<sup>192</sup> The National Cyber Security Policy, in 2013, was developed to build a secure and resilient cyberspace for India's citizens and businesses. The Indian Government also approved a national framework to enhance cyber security in Indian cyberspace under which the National Security Council Secretariat would be the nodal agency. Though there are various Government agencies assigned with different responsibilities such as the Indian Computer Emergency Response Team (CERT-India), National Technical Research Organization and the Ministry of Home Affairs, India is working towards a strong independent body for its cybersecurity ecosystem. The country needs an estimated 3 million professionals.<sup>193</sup>

A Framework for operational collaboration on Cyber Security between CERT-India and CERT Australia was signed in 2015 for 5 years. In June 2019, officials of the two countries have also discussed Australia's telecommunications sector security reform and Australia's approach to 5G.

### **Case Study: History of collaboration between India and Australia on cyber security**

India and Australia have already collaborated on cyber security in multiple ways. The first India-Australia Cyber Policy Dialogue, in 2015, was held in New Delhi. CERT-India and CERT-Australia signed a framework for operational cooperation on cyber security to promote efficient coordination in exchanging information on cyber threat, in responding to incidents, along with identifying opportunities to work together to exchange information on cybercrime and on law enforcement measures.<sup>194</sup>

In 2017, a six-member Australian cyber security delegation visited India to seek partnership with Indian IT companies and to provide the Indian companies with modern cyber security capabilities. The delegation visited Chennai, Bengaluru, Mumbai and New Delhi and included senior executives from the University of Melbourne and the Swinburne University of Technology. The purpose of the visit was for Australian companies to scale and access the Indian market and to provide advanced cyber-security capabilities to Indian companies.<sup>195</sup>

In 2017, Queensland University of Technology (QUT) and the Indian Institute of Technology, Madras signed an agreement to jointly participate in applied research in information security. Further, in 2019, at the Global Investors meet held in Chennai, it was decided that the Australian state of Queensland, will partner with IIT-Madras in assisting India draft a Cyber Security policy.<sup>196</sup>

<sup>193</sup> India needs 3 million cyber security professionals right now: IBM, 2018

<sup>194</sup> Joint Statement: Inaugural India-Australia Cyber Policy Dialogue, 2015, Indian Ministry of External Affairs

<sup>195</sup> India- Australia cyber security, a win-win partnership, 2017, ANI

<sup>196</sup> Queensland University of Technology, IIT Madras to undertake joint applied research, 2017, The Economic Times



## Areas of collaboration in cyber security

One of the key areas of collaboration is to address the skill shortage faced by both countries. As per AustCyber's Sector Competitiveness Plan, Australia will face a shortage of 18,000 cyber security professionals by 2026.<sup>197</sup> There is also an opportunity for technology institutes from both countries to partner with agencies such as AustCyber to create vocational as well as specialized degrees in cyber security. Indian banks, financial institutions, health and insurance companies, among other industries in India can also partner with Australian educational institutes to establish global centres of cybersecurity excellence in India that will not only train professionals but also develop innovative cyber security solutions in India. There is also potential for India to invest in the Australian cyber security sector to leverage sector expertise and provide services to global customers.

## India's product- based IT service offerings in Australia

Software-as-a-service (SaaS) application is one of the fastest growing verticals of cloud-based services in Australia. Australian industry is increasingly switching to cloud-based SaaS products instead of traditional on- premise enterprise products. There are over 1,600 SaaS start-ups in Australia providing services ranging across multiple sectors such as banking, consumer, healthcare and retail, covering business functions such as sales and marketing, accounting, operations management, finance, human resources, etc.

The IT landscape in India is gradually changing. For almost thirty years, the Indian IT sector was dominated by service companies that were engaged in delivering outsourcing services at low prices. However, in recent years, the Indian software-as-a-service (SaaS) ecosystem has witnessed heightened activity with the emergence of new and growing start-ups that have been disrupting the Indian and global markets. India's SaaS industry is maturing to become the SaaS hub of the world and the Indian market is expected to grow to USD 10 billion by 2025.<sup>198</sup> There are over 8,000 SaaS start-ups in India.<sup>199</sup> Indian SaaS start-ups have the ability to service global clients, especially in the US and in Europe, remotely on a cost-effective basis. Indian SaaS companies have also received funding from a host of global investors over the years such as:

- Accel Partners (Freshdesk, Hotelogix, Mobstac, Mindtickle, Chargebee, Zettata)
- Blume Ventures (Zipdial, Hotelogix, Mettl, FrameBench, WebEngage, Mobstac)
- Nexus Venture Partners (Druva, Indix, Unmetric, TargetingMantra, Genwi, Helpshift)
- Norwest Venture Partners (BlueJeans, CRMnext, Act-On, Capillary Technologies, Attune)
- Sequoia Capital (Druva, Capillary Technologies, Knowlarity, Practo)<sup>200</sup>

<sup>197</sup> AustCyber's Sector Competitiveness Plan, 2018, The Business Standard

<sup>198</sup> Why Indian SaaS Start-ups Are Set To Rule The World, 2017, Forbes

<sup>199</sup> Tiger Global looks to invest in five SaaS firms in May, 2019, Live Mint

<sup>200</sup> The SaaS Juggernaut: Advantage India, iSpirt

### SaaS companies in India

Year	No. of SaaS companies founded	No. of SaaS companies funded	Funding/Investment (USD million)
2010	264	14	14
2011	315	33	33
2012	522	62	62
2013	605	77	77
2014	826	100	100
2015	1128	160	160
2016	465	157	157

Source: Tracxn

Indian SaaS companies offer several advantages to meet Australia’s digital transformation requirements. As compared to an American SaaS company, its Indian counterpart requires 2 to 2.5 times lesser capital to generate similar amounts of revenue. Further, while Australia faces staff shortages, India is growing stronger in the number of IT professionals and engineering graduates that it adds to the pool of developers and product managers for SaaS companies. India also has a large number of experienced consultants from the BPO and IT industries that have deep domain knowledge and critical understanding of the field. Thus, the large demand for SaaS products in Australia provides tremendous opportunities for Indian SaaS companies looking for global expansion.

### Case Study: Freshworks in Australia

Freshworks is an Indian cloud-based customer support platform that was founded with the mission of enabling companies to provide high quality customer service. In November 2018, the company raised USD 55 million in a deal that valued the six-year-old venture at USD 700 million. Freshworks provides a centralized dashboard bringing all customer communication points such as email, web chat, phone and social media channels together at a single place, allowing their 50,000 global enterprise customers to manage all their customer support centrally. Freshworks started its Sydney office in 2015. It has 30 staff members and services ~8,000 clients in Australia and New Zealand.<sup>201</sup> In 2018, Freshworks opened its first Asia-Pacific data centre to meet clients’ data sovereignty and privacy requirements. Freshworks in Australia surpassed 5,000 customers in 2016.<sup>202</sup>

<sup>201</sup> AIndian software provider unveils fresh data centre in Australia 2018, Australian Trade and Investment Commission

<sup>202</sup> Freshdesk Now Serves More Than 5000 Customers in Australia, 2016, Freshworks



## Sector Representative Contribution: Tata Consultancy Services in Australia

TCS entered Australia over 30 years ago to work closely with a number of key Australian companies. Over the years, TCS's presence in Australia grew with the growth of IT in the country. TCS's blue-chip clients include top 8 of the 10 ASX companies. TCS also serves all major banks, telcos and airlines for the region. TCS focuses on verticals, such as banking, finance and insurance and, mining, energy and utilities, as well as telecommunications and retail, travel & transportation. In Australia, TCS is focusing special attention on strategic growth areas using their Business 4.0 theme, which was launched in 2018. They build bespoke teams around clients' domain and technology requirements. The company's flagship global banking product, a suite of world-class solutions for banks, capital market firms and insurance companies - TCS BANCs - was developed in Sydney. The Cyber Security Cooperative Research Centre (CRC), the University of New South Wales, Western Sydney University and the University of Melbourne are core participants in TCS's academic alliance program, which brings together experts from the start-up, research and corporate worlds to collaborate on innovation and solutions for TCS's customer base worldwide. TCS has over 100 clients in Australia with 40+ clients being from the global customer base. In addition, the TCS Community Innovation Program has pledged and delivered USD 2 million of in-kind technical services and solutions to Australian not-for-profits since 2015. TCS's GoIT suite of programs are investing in the Australian technology workforce of the future and providing students with critical pathways during primary, secondary and tertiary education milestones. TCS has partnered with the Department of Foreign Affairs & Trade (DFAT) and Australian Universities under the New Colombo program to provide 30 Australian students a 4-week internship in India by 2020. By July 2019, 39 students had completed this program with further groups planned in the next few quarters.

## Access to Government projects for Indian IT companies in Australia

Approximately 324.4 million transactions are carried out with the Government each year in Australia via traditional channels. Each face to face transaction in Australia with the Government costs AUD16.9 (USD 12.07), whereas postal transactions and telephone transactions cost AUD12.79 (USD 8.57) and AUD 6.60 (USD 4.42) per transaction, respectively. Digital transactions, on the other hand, cost ~AUD 0.40 (USD 0.27) per transaction. In short, face to face transactions cost 42 times more than digital transactions whereas postal and telephone interactions cost 32 times and 16 times more than digital transactions respectively.<sup>203</sup> Further, according to a survey of almost 1,200 Australian consumers, 61% had used the internet for transactions with local, state or federal Governments. While 29% of these users were satisfied with their experience, 58% had faced issues with the online service.<sup>204</sup>

The Australian Government has an annual ICT spend of AUD 6 to 7 billion (USD 4 - 4.7 billion), of which 28% (~AUD 2 billion) is towards outsourced IT services and 27% is towards the purchase of software and hardware. However, as per the Department of Finance's ICT Trends reports of 2015-16, ~44% of the applications used by the Government are over 10 years old. Moreover, only 9% of the total expenditure is towards transformational projects.<sup>205</sup> Hence, there is considerable opportunity for Indian tech-based companies to provide innovative digital solutions and work with the Australian Government to upgrade and modernize their digital infrastructure and applications.

<sup>203</sup> Australia's digital transformation agenda, Department of Communication, Australian government,

<sup>204</sup> Choice and convenience drive 'digital first' success, Australian Postal Corporation, Insight paper, 2016

<sup>205</sup> ICT trends report 2015-16, Department of Finance, Government of Australia

However, the key Government projects in Australia are still predominantly handled by American IT companies such as IBM. IBM has entered into AUD 1 billion (USD 670 million) five-year agreement with the Australian Government to provide IT hardware, software and services. This arrangement also provides for Australia's Digital Transformation Agency (DTA) to conduct a joint innovation program with IBM's Melbourne-based research and development team. IBM and DTA will jointly research to prioritize blockchain, quantum computing and AI for the Australian government. In the past, the Australian Government also had similar arrangements with SAP and Microsoft.<sup>206</sup> Further, Accenture also has several consulting agreements with the Federal Government, which are worth AUD 230 million (USD 154.1 million) starting in 2016 for IT management and implementation services. This also includes contracts worth AUD 157.9 million (USD 105.8 million) for the Department of Defence and AUD 52.2 million (USD 35.0 million) for the Australian Tax Office.<sup>207</sup>

#### Largest IT based services suppliers to the Australian Government (2012-13 to 2016-17)

Supplier	Number of contracts (IT based service contracts)	Value of contracts (USD million)
IBM	692	1530.2
Fujitsu	1092	686.7
Abacus Innovations	133	638.4
Data#3	1689	630.7
Hewlett Packard	1517	426.6
Oracle Corporation	674	380.5
Accenture	127	346.7
Datacom Systems	336	304.3
SAP Australia	284	276.7
Dell	1457	239.5
Unisys	61	227.4
CSC	171	218.9
Dimension Data	1225	218.8

**Source:** Australian National Audit Office (ANAO)

Indian companies such as Infosys, TCS, Polaris, Wipro, etc. have a significant presence in Australia, which when combined with the Australian Government's focus on digital transformation, provide a large number of opportunities to Indian companies. There is a shortage of IT professionals in Australia and the Government is resorting to hiring contract employees as well as outsourcing functions to meet the skill gaps. Given the large-scale reskilling of Indian IT personnel and the size of the talent pool in India, Indian companies can make sound partners to help facilitate the Australian Government's digital transformation agenda. However, Indian IT players face

<sup>206</sup> IBM Signs AU\$1 Billion Technology Partnership with Australian Government, 2018, Cloudscene

<sup>207</sup> New Accenture boss Bob Easton throws down gauntlet to big four on digital, 2016, Australian Financial Review



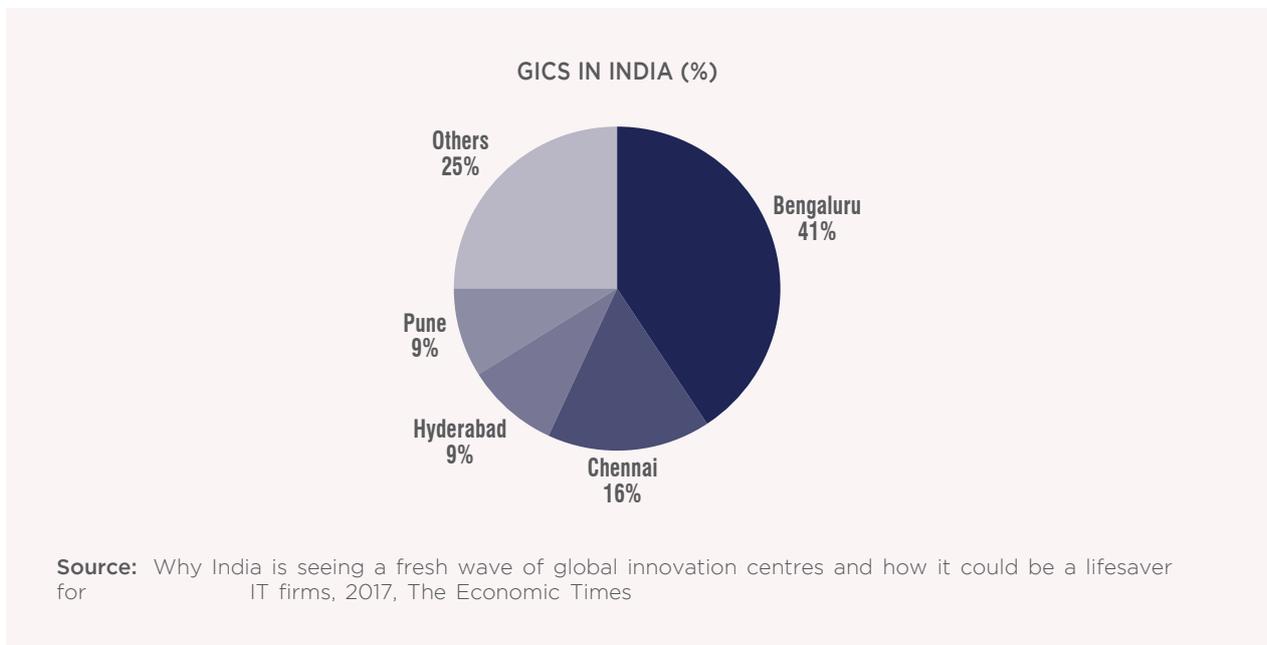
stiff challenges in securing Government contracts from global giants such as IBM, SAP, etc. There is a requirement for a mind set change by the Australian governmental agencies and departments. There have also been concerns over cyber security and data privacy measures adopted by Indian companies which are largely unfounded.

In order to improve the relationship between the Australian Government and Indian industries, India can host industry workshops and roadshows in Australia with various departments as well as state governments. Industry bodies can also help in working with the Australian government and improve the perception of Indian IT companies as global organizations.

### Global Innovation Centres (GICs) in India

Australia faces deficits in key digital skills such as data management and analysis, cyber security, cloud computing, artificial intelligence and software design. This deficit is due to the limited local supply of current professionals.<sup>208</sup> Australia created 63,000 new tech jobs in the period between 2015 and 2018 and the industry forecasts suggest that Australia will require an additional 100,000 tech workers by 2023.<sup>209</sup> Given the skill shortage in Australia and the need for constant reskilling of its IT professionals, many Australian companies are setting up innovation centres in India for their global operations. This set up is also beneficial for Australia from the perspective of the costs incurred. These innovation centres provide value added and support services as well as undertake constant research and innovation to optimize operations, product and service delivery, customer management and other functions of the organizations.

The Indian Global In-house Center or GIC landscape has witnessed significant evolution over the last 20 years. GICs are offshore centers, where high quality and scalable IT and support services are sourced by companies. India currently has around 1,100 GICs with 800,000 employees, which generate ~USD 23 billion in revenue.<sup>210</sup> 68% of GICs in India are from the US, whereas 24% are from Europe.



<sup>208</sup> Australia's Tech Future, Australian Government

<sup>209</sup> Digital leadership requires an additional 200,000 Australian tech workers, ACS

<sup>210</sup> Global In-house Centers in India, 2017

Bangalore is amongst the top 5 destinations for global multinational companies to set up innovation centers. Indian talent continues to attract international firms to rapidly expand their global in-house centres (GICs) in the country besides setting up new ones including multinationals from Australia.

Telstra has opened an Innovation and Capability Centre in Bangalore in 2019 to leverage the availability of software engineers and IT professionals in India.

Newcrest Mining, one of Australia's largest gold mining companies, has collaborated with Tata Consultancy Services (TCS) to set up a capability centre in India that will build capabilities in areas such as engineering, research and development, industrial process control, data analytics, IoT and asset management to explore opportunities in core business areas such as ore processing, predictive targeting, production optimization, etc.<sup>211</sup>

Further, Rio Tinto, in partnership with IT firm iGATE Patni, has opened an innovation centre in Pune, India, to speed up development of mining technologies. The Rio Tinto innovation centre (RTIC) will build digital technologies for mining operations. Rio Tinto plans to employ about 300 workers, including skilled engineers, in the new centre to address technological requirement from across the company's operations.<sup>212</sup>

ANZ also has an innovation hub in Bangalore that provides technology development, support on operations and shared services to the Australian banking company globally. It employs more than 5,000 people.

India accounts for ~45% of the Global Centres in the world located outside a home country. Leading MNCs have more than 35% of their technology workforce operating out of their India center.<sup>213</sup> Locating GICs in India is an attractive option for Australian companies seeking to advance their capabilities in exploiting big data for competitive advantage as well as digital technologies that support the front office and drive business growth. GICs in India are well equipped to meet new age digital demands.

Additionally, in terms of growth in data, India is outpacing the developed markets and consequently the demand for data centers is growing at 25% CAGR. Data centers outsourcing market in India is pegged at close to USD 2 billion and is projected to grow to reach USD 5 billion by 2023-24. India is on its path to becoming the biggest hubs for co-location data centers globally. Even the cloud market is growing at 40% and significant investment has gone into supporting this growth and building next generation infrastructure. Australian companies can utilize this existing data center infrastructure in India to support their Global Innovation Centers.

The Covid-19 pandemic has highlighted the need for speedy and effective adoption of technologies such as cloud, automation, virtualization, cybersecurity and has subsequently increased the demand for skilled workforce. As large Australian enterprises re-evaluate their strategy for sourcing, de-risking, digitization and talent acquisition in the post pandemic era, India has an opportunity to encourage and invite large Australian enterprises to set-up Global Capability Centers in India. Companies such as Rio Tinto and AnZ, with active presence in India via GCCs, can share their learnings and experiences of setting up operations in India with their peer group in Australia. This further highlights the need to improve university tie-ups and industry dialogue between the two countries.

## **Collaboration between India and Australia on analytics / cloud technology services**

### **Data Analytics and Cloud technology services in Australia**

The adoption of cloud computing is growing rapidly for Australian businesses. In 2013-2014, only 19% of the Australian businesses adopted cloud services and this number increased to

<sup>211</sup> Newcrest collaborates with Tata Consultancy Services to create Innovation and Digital Operations Centre, 2018, TATA Consultancy Services Ltd.

<sup>212</sup> Rio Tinto opens innovation centre in India, 2012

<sup>213</sup> Global In-House Centres, NASSCOM

<sup>214</sup> Cloud computing adoption in Australia is booming, 2017



31% by 2015-2016.<sup>214</sup> Australian businesses are growing to think “Cloud First” i.e. development of applications and infrastructure to be hosted over the cloud instead of physically owned servers. The Australian Government is also migrating to cloud databases as part of its digital transformation. As a result, Australia increasingly requires the presence of technology specialists with cloud computing skills. As per a survey of 50 IT chiefs in Australia cloud security, project migration, DevOps were some of the skills most in demand in the country.<sup>215</sup>

In addition to cloud, the emergence of big data has given rise to data analytics solutions. Australians have an additional requirement of data specialists to support this growing sector in the country.

### **Data Analytics and Cloud technology services in India**

As per a NASSCOM report, the public cloud services market in India is expected to reach USD 7 billion in 2022 from its current size of USD 2.5 billion in 2018. It is the second largest and fastest-growing cloud services market in Asia Pacific, after China. Apart from global majors such as Google, Alibaba, Amazon and Microsoft, India is building a generation of homegrown cloud computing services companies like NxtGen (AI development through its DevCloud), ESDS (hosting managed services) and CntrlS (data center services).<sup>216</sup> India has availability of skilled talent with deep domain knowledge. One of the key focus areas of cloud service providers in India is training for requisite cloud skills. India is expected to witness a demand of more than a million cloud computing roles by 2022 with skill requirements in DevOps, software-as-a-service, infrastructure-as-a-service, automation and software-defined network.<sup>217</sup>

Artificial intelligence and big data analytics are disrupting industries such as automotive, healthcare, banking and finance and retail. Indian big data analytics sector is expected to grow by eight times to reach USD 16 billion by 2025 from USD 2 billion in 2016. There are over 600 companies in India offering big data analytics, majority of which are start-ups.<sup>218</sup> These offerings can be further developed in collaboration with Australia.

### **Collaboration between India and Australia**

India and Australia both have high demand for cloud services and big data analytics. One of the most important areas for collaboration between the two countries is skill development. In India, NASSCOM has plans to collaborate with several universities and colleges along with leading IT companies, such as Wipro and Tech Mahindra, to provide relevant skills to around one million employees. The purpose of this initiative is to meet the skill requirements for qualified professionals under the Future Skills programme, over a period of five years. Australian Universities have also undertaken several initiatives to encourage digital skill development. For example, Adobe has established digital initiatives and symposiums throughout Australia, including a world-first strategic partnership with Swinburne University of Technology, to assist in the university’s digital transformation. The students are offered various courses such as digital analytics, search marketing, social media marketing and video marketing.<sup>208</sup>

Australian and Indian universities as well as companies in the cloud and data analytics industry can thus collaborate to provide joint training and university programs for digital transformation and skill development. Cloud and big data companies in India and Australia can collaborate to scale up and utilize resources and skills that could mutually benefit both countries.

<sup>215</sup> Cloud skills shortage holding back some Aussie businesses, 2017, CIO

<sup>216</sup> India’s Booming Cloud Market Is Set To Be Worth \$4.1 Billion By 2020 -- Here’s Why, 2018, Forbes

<sup>217</sup> India to see over 1 million cloud computing job roles by 2022: Report, 2018, The Economic Times

<sup>218</sup> Nasscom: Big data analytics to reach \$16 billion industry by 2025, Insights Success

## Collaboration between fintech industries of India and Australia

### Fintech in Australia

Fintech activity in Australia has witnessed rapid growth. The sector has grown from just USD 51 million in 2012 to USD 600 million in 2016<sup>219</sup> and is further expected to grow at a CAGR of more than 70% to reach AUD 4.2 billion (USD 3 billion) by 2020.<sup>220</sup> Australia has ~700 fintech companies<sup>221</sup> and the fifth highest fintech adoption rate (37%) after China, India, the UK and Brazil.<sup>221</sup>

Sydney and Melbourne are the most prominent fintech hubs in Australia. Sydney houses ~60% of Australia's fintech companies. This could be attributed to Sydney's large population and availability of accelerator and incubator programs. While not as large as the fintech sector in Sydney, Melbourne is also making significant efforts to establish itself in fintech. The State Government of Victoria has called for "experienced innovation hub operators" to set up a financial hub in Melbourne.<sup>222</sup>

### Fintech in India

India has developed a vibrant fintech sector owing to a large market base, innovative start-up landscape and favorable regulatory and Government policies. The fintech software market in India is expected to reach USD 2.4 billion by 2020 from USD 1.2 billion in 2016.<sup>223</sup>

The adoption of fintech in the country has been rapid, driven by a surge in e-commerce, use of smartphones and growth in internet penetration. The launch of Government initiatives such as Smart Cities and Digital India have created infrastructural support for the sector. The Government has also extensively promoted the use of digital payments and introduced several tax incentives for fintech start-ups and merchants accepting digital payments. The Reserve Bank of India (RBI) has encouraged the development of fintech sector by providing several incentives. RBI has granted approvals to multiple entities for setting up payments, small finance banks and also launched the "Unified Payments Interface" to boost digital payments in India.

Consequently, the number of fintech start-ups in the country has increased by 3 times, reaching 2,050 in 2018 from 737 in 2015. Mumbai and Bengaluru have emerged as leading fintech start-up hubs. Further, fintech start-ups have created a wave in the start-up market and have managed to generate sizeable funding from private equity players and venture capitalists.<sup>224</sup> The sector has witnessed a massive surge in investments, from USD 247 million in 2014 to USD 4.3 billion in 2017.<sup>225</sup>

### Opportunities for collaboration in fintech

Both India and Australia host a dynamic and rapidly growing fintech environment. Both countries can therefore have knowledge and technology sharing agreements to foster

<sup>219</sup> Australia's fintech start-ups did better in 2016 raising cash than the rest of the world, 2017, The Business Insider

<sup>220</sup> Fintech Market Growth to Add A\$1 Billion New Value to Australian Economy by 2020, Australian FinTech

<sup>221</sup> Industry Report

<sup>222</sup> The two Australian cities that have built global reputations as fintech hubs, The Business Insider

<sup>223</sup> Fintech in India by KPMG & Nasscom

<sup>224</sup> India's fintech start-ups soared 3X during 2015-18; second highest globally, says report, 2019, Financial Express

<sup>225</sup> KPMG Pulse, quartz.com



innovation and enable mutual growth. Australia has similar collaborations with other countries. For instance, Australia and the UK signed the UK-Australia Fintech Bridge to increase collaboration between Governments and fintechs for improved trade flows and collaboration on regulation and policy.<sup>226</sup> Further, in December 2017, FinTech Australia and FinTech Indonesia signed a memorandum of understanding for mutual growth of fintech in both countries. In addition, Australia is also a part of an Asia-Pacific FinTech Network, launched by nine fintech associations across the Asia Pacific. The agenda of the organisation is to co-organise events, webinars, seminars and workshops to exchange information about recent events and to connect start-ups with corporates and investors.<sup>227</sup> Australia and India could also collaborate and launch mutually acceptable digital wallets. Similar initiatives have been launched in other countries such as Singapore, where Prime Minister Narendra Modi recently launched three Indian mobile payment applications, namely BHIM, RuPay and the SBI app. India's RuPay digital payments system was linked with Singapore's 33-year old Network for Electronic Transfers (NETS), which enabled RuPay users to make payments at all of NETS acceptance points across Singapore.

Australia also has a well-developed and digitally enabled SME lending sector. Australia has companies like 'Moula', which use AI based real-time credit decisioning service and leverage machine learning capabilities to predict the probability of the SME being able to pay back its loan. Successful applications can result in business loans of up to USD 500,000 being made available in 24 to 48 hours, whereas the process through a traditional bank takes around 10-14 days.<sup>228</sup> India could leverage on Australia's technologies and expertise in SME lending and screening for its own growing SME lending sector.

A key challenge faced by Australian fintech start-ups is the limited size of fintech talent pool. Australia can address this concern by sourcing human capital from India. India is home to a large number of young graduates with software expertise who can be trained to meet Australian fintech start-up requirements.

### Case Study: BlazeClan in Australia

BlazeClan is an Indian cloud consulting and management services company. BlazeClan opened an office in Sydney in 2017 to service clients across Australia and New Zealand. BlazeClan is an Amazon Web Services (AWS) Premier Consulting Partner company. BlazeClan helped to migrate the Bombay Stock Exchange's paper trading application to cloud. The organisation has large international clients that include Mondelez International, Dominos, Viacom 18 and Cox & Kings. The company already has offices across the ASEAN region (Malaysia and Singapore), Europe (Belgium), the US and Canada, along with a sales presence and primary delivery centre in India.<sup>229</sup>

### Opportunity for Australian investments into India in Fintech

Investments in fintech in India almost doubled to USD 3.7 billion in 2019 from USD 1.9 billion in 2018. Fintech in India has become an attractive destination for foreign investments owing to a large market base and favourable government policies. Fintech in India is under the purview

<sup>226</sup> UK-Australia FinTech Bridge, Australian Government

<sup>227</sup> Nine Associations Join Forces to Launch 'Asia-Pacific FinTech Network', 2019, Regulation Asia

<sup>228</sup> Using AI to enhance financial services: lessons from Australia's Moula

<sup>229</sup> Indian cloud-consulting company opens Australian office, Australian Trade and Investment Commission

of India's banking regulator, the Reserve Bank of India (RBI). In 2016, the RBI permitted 100% FDI under the automatic route in certain financial services subject to other regulations. Global companies such as Walmart, Amazon, Google, Paypal, Visa and Mastercard have made substantial investments in the fintech space in India. Foreign investments in this sector are further expected to grow as the sector has significant potential owing to the country's large population. This thus presents significant opportunities for Australian VC firms and investors to explore growth opportunities in this sector.

## Start-up Environment

### Australian start-up Environment

Australia has developed a vibrant start-up environment. Multiple factors such as strong economic performance, establishment of start-up hubs, government incentives and excellent infrastructure facilities have contributed to the development of a rapidly growing start-up environment.

The number of start-ups in Australia increased from 954 to 1,465 between 2015 and 2018. Majority of the start-ups are based out of New South Wales, which is home to ~44% of the Australian start-ups, followed by Victoria, which hosts ~14% of the country's start-ups.

A number of start-ups, such as Atlassian, Envato, 99designs, Spacer, Vinomofo, Freelancer and Campaign Monitor, have transformed into successful business ventures. The key industries in which start-ups have established themselves are ecommerce, fintech, internet software and services, healthcare and autotech.<sup>230</sup> Australian start-ups received a funding of AUD 3.5 billion (USD 2.3 billion) in FY18, which included investments from foreign investors and global funds such as Sequoia, Accel and Index Ventures.<sup>230</sup>

The Australian Government has also launched initiatives to aid the growth of its start-up industry. Key initiatives launched by State Governments were the establishment of start-up hubs such as 'The Sydney Start-up Hub', 'The Precinct' and 'The Capital' in Brisbane and Melbourne. Additionally, the Government, in its Mid-Year Economic and Fiscal Outlook (MYEFO) 2018-19, has continued to provide a greater push to small and medium sized businesses by providing tax relief to businesses with turnover below ~ AUD 50 million (USD 33.5 million). Further, the Government also has plans to establish specific funds such as the Australian Business Securitization Fund and private sector-owned Australian Business Growth Fund to provide funding to small businesses.

The Federal and State Governments have also launched several initiatives in the form of financial and business aids. The Federal Government launched the "Entrepreneur's Programme" initiative to help businesses through support in incubation, funding, business management and commercialization. Other initiatives include R&D tax incentives and funding support by organizations such as CSIRO. New South Wales provides customer, market and channel support to new businesses by connecting them to key stakeholders and providing funds. Victoria Government launched an agency called 'LaunchVic' to assist start-ups with funding and growth initiatives.

Australian universities are also investing in the entrepreneurship programs by hosting over 73 start-up programs.<sup>231</sup> Some of the notable programs include RMIT Activator and UNSW's Founder 10X that provide seed funding support.

<sup>230</sup> Start-up Muster report 2018

<sup>231</sup> Australia's start-up ecosystem is booming and universities are jumping in, 2018



## Indian Start-up environment

India ranks among the top five start-up ecosystems in the world along with the US, China, the UK and Israel.<sup>232</sup> India also has the third largest number of unicorn start-ups in the world after US and China, hosting 18 out of 250+ unicorns in the world.<sup>233</sup> The ecosystem has scaled up significantly in recent years on account of rising consumption, emergence of entrepreneurial and technology talent and increased internet and smartphone penetration, resulting in higher demand for online services. From technology platforms to enterprise SaaS solutions, Indian start-ups have grown from being mere emulators of global technologies to now being innovators and trend setters. Bengaluru is home to the largest number of start-ups in India, hosting 25% of the Indian start-ups followed by Delhi & NCR at 21% and Mumbai at 14% respectively. Technology is the key growth driver with 1,200 new tech start-ups being added in 2018. The key tech verticals are enterprise software, fintech, healthtech, marketplace and edtech.<sup>234</sup>

The total funding received by start-ups in India has increased by 108%, from USD 2 billion in 2017 to USD 4.2 billion in 2018. The key investors include global PE funds and corporates such as Sequoia, SAIF Partners, Softbank and Alibaba. The start-up system has also witnessed the emergence of new investment models in the form of crowd funding and crowd-lending platforms.

The Government of India launched the 'Start-up India' initiative in 2016 to empower start-ups through incentives such as tax exemptions, faster exit mechanisms, higher incubation centres, simpler patent filing and USD 1.4 billion corpus fund.

The State Governments, too, have maintained a policy focus on start-ups by allocating a funding corpus, supporting incubators and start-up hubs and establishing mentor pool to offer guidance. Some of the initiatives include provision of incubation spaces by Karnataka and Tamil Nadu, 'T-hub' initiative by Telangana, mentorship programs by Chattisgarh, Uttar Pradesh and Kerala.

India is home to a number of prestigious institutes such as Indian Institute of Technology (IIT) and Indian Institute of Management (IIM). These institutions have various incubator and accelerator programs, which offer mentoring and business expertise to run the start-ups. There are over 200<sup>233</sup> incubators and accelerators in India, as well as centers and institutes such as iCreate (International Centre for Entrepreneurship and Technology), AngelPrime, Start-up Village and Indavest.

## Opportunities to collaborate in the start-up environment

### Indian start-ups could look at Australia as test market for global expansion

Market testing is a critical process, especially for a start-up with new products and innovations. A thorough assessment is especially essential in tech start-ups where new players enter and disrupt the industry every day. Many Indian start-ups are looking to expand globally, with better margins and returns from international markets as key reasons. While the US is arguably one of the pioneers in technological advancement, the sheer enormity and complexity of the market does not render it as the most ideal to test a product. Australia, on the other hand, while being a multi-faceted market like the US, is still comparatively small enough for a product to scale up, though less dramatically, for global expansion. Several companies such as Citibank, Coca-Cola and even KFC test their products in Australia.<sup>235</sup> Further, Australia has various start-up support policies and grants to promote entrepreneurship. Australia's similarities

<sup>232</sup> Unlocking the real value of India's start-up ecosystem, 2016, Live Mint

<sup>233</sup> India Start-up Ecosystem, 2018 by NASSCOM

<sup>234</sup> Start-ups in India see 108% growth in funding in 2018: NASSCOM, 2018, The Economic Times

<sup>235</sup> Why Australia is the best place in the world to launch a start-up, 2018, AFR



with Western countries and a relatively small population size make it highly suitable for Indian start-ups to test their business products. One of India's premier ride-hailing service, Ola, chose to launch itself internationally first in Australia.

### **Sector Representative Contribution: Ola's international expansion - leading the way in the future of mobility**

One of India's most successful start-ups, Ola, is conquering mobility on a global scale. With its headquarters in Bengaluru, India, the transportation network company now operates in 169 cities across 4 major markets, India, Australia, New Zealand and the UK, with Australia as Ola's first international market.

The Australian market was specifically selected by Ola due to its stable economy, ease of doing business, legal framework based on Commonwealth foundations and its diverse, cosmopolitan and progressive culture. Ola launched in Australia in February 2018 and has rapidly expanded to cover operations in 7 major metropolitan cities across Australia, Melbourne, Sydney, Canberra, Brisbane, Gold Coast, Perth and Adelaide.

Today, Ola employs over 3,000 people and provides almost 2 million rides a day around the world. In Australia, Ola has more than 50,000 registered drivers serving the needs of its users.

By harnessing the power of technology to connect people with matching needs - drivers with under-utilised vehicles and consumers with difficulty in finding transport, Ola is able to offer unique on-demand rideshare services, which are affordable, convenient and personalised. Ola's focus on customer experience and safety of its services has also seen it being the first rideshare company in the world to develop an emergency feature in its mobile app, which allows passengers to call for emergency services at the touch of a button. Other safety features that Ola has developed and launched include the ability to track route deviations in real-time and an automated alert system for emergency contacts listed in the app. In addition, a dedicated 24x7 customer support team, which provides support for any issues experienced by users during their ride, regular enhancements and updates to the Ola customer app to improve customer experience and weekly new user promotions have made Ola a preferred rideshare provider in Australia.

### **Australian start-ups could explore the opportunity to enter the Indian market for growth opportunities**

India has a large market and is expected to witness high economic growth over the next decade. This, coupled with supportive Government policies and a vibrant start-up environment, makes it an attractive destination for Australian entrepreneurs. Australian start-ups can benefit from the active investment environment in India and can scale up their businesses to address the needs of a growing market. Australian start-ups can set up their infrastructure in India and benefit from the investment environment and the technical workforce in the country.

With India moving aggressively towards digital banking, Australian fintech start-ups have the opportunity to enter the Indian market and collaborate with Indian financial institutions including banks, payment platforms, NBFCs and other financial services firms to expand their operations.



## India can help fill current talent gap in Australian start-up ecosystem

The need to hire global talent has been one of the key concerns of the Australian start-up community. According to recent statistics, 86% of Australian start-ups are looking to hire international talent.<sup>236</sup> To address the shortage of talent in Australian-based start-ups, Australia and India can collaborate to fill the talent gap in the Australian start-up ecosystem. India has various technology and business institutes that produce millions of skilled professionals every year. India is home to a wide base of talent pool with technical as well as business skills. Every year, a large share of Indian engineering and business management personnel migrate internationally for better employment prospects. Indian professionals are also more likely to consider moving to Australia if visa regulations and documentation is made easier. The partnership will generate employment opportunities for Indian professionals as well as help Australian start-ups to fulfill their talent deficit. The two Governments can take this forward through discussions.

## Joint research initiatives to boost the start-up culture in both countries

Australia's Federal Government has set up Cooperative Research Centers (CRCs) that function as key bodies in Australia for scientific research. These bodies support alliances between industry and researchers. Australia has 215 established CRCs that operate across various sectors such as manufacturing, mining and infrastructure, agriculture, information and social services, environmental and medical service sectors.<sup>237</sup> They provide successful applicants with access to grant funds for up to 10 years to resolve industry issues through research programs and partnerships. These CRCs have produced several successful innovations in Australia. This year, CRC awarded Fivecast Insight, known to be the world's first data collection and threat-analysis platform for law enforcement and national security, and Bushfire and Natural Hazards CRC, known for its innovative public safety campaigns, for their innovative excellence in the application and use of research.<sup>238</sup> Collaborations between the CRCs and Indian research bodies, as well as industries can be carried out. They can collaborate on sharing industry knowledge and solutions on various common emerging sectors such as medical technologies, agricultural technology, educational technology, advanced manufacturing, etc. Furthermore, India and Australia can also organize joint entrepreneurship programs for start-ups such as research parks that could increase research and development collaborations between start-ups of both countries.

India and Australia have together set up the Australia India Strategic Research Fund (AISRF) that is a platform for bilateral collaboration in science. It is jointly managed and funded by the Governments of both countries and involves around 100 top universities and research institutions from both countries. The AISRF is Australia's largest international science collaboration fund. This program has been extremely successful, having supported over 240 projects, workshops and collaborative activities in key areas of priority to India and Australia, since 2006. Their key focus has been on scientific and technology projects entailing marine science and energy storage, etc. or biotechnology such as plant genomics neurodegenerative diseases. They have also undertaken projects analyzing challenges to agricultural productivity and food security. The AISRF has been one of the most successful India Australia collaboration stories.

Greater focus on such collaborations, especially with India-centric research solutions, can be facilitated across the two countries. The two countries should set up a joint innovation and start up fund with each country contributing USD 20 million each on an equal basis over a 5-year period.

<sup>236</sup> A statistical profile of the typical Australian start-up, 2017, Business Insider

<sup>237</sup> A Overview of CRC Program, Cooperative Research Centres Association

<sup>238</sup> Excellence in Innovation Awards 2019, Cooperative Research Centres Association

### Case Study: NSW-India Partnership

New South Wales, the start-up capital of Australia is seeking to actively collaborate with India to create jobs in tech and advanced manufacturing sector. New South Wales is home to 44% of Australia's start-up founders. India, at its current pace, is expected to develop 10,500 start-ups by 2020.<sup>239</sup> In 2018, NSW initiated a USD 1.58 million, 2-year partnership to introduce NSW's upcoming entrepreneurs and start-ups to India. India is known for its well-developed ICT talent, which will provide NSW businesses access to high quality technology expertise. NSW has collaborated with Mumbai based accelerator, Zone Start-ups, to gain access to the Indian market, talent and knowledge. This partnership aims to strengthen Australia and India's position in the global start-up ecosystem by fostering bilateral trade and investment across various industrial centers.

**Source:** New South Wales and India ink \$1.6 million partnership to create futuristic tech jobs, 2018, The Times of India

### Case Study: InQ Innovation Global

InQ Innovation Global has set up operations in the Sydney Start-up Hub and has also established offices in India and UAE. The organization focuses on providing the most relevant services, like incubators, co-working spaces and a global connecting platform for innovation and launch pad activities, to start ups. InQ has successfully helped many Indian start-ups connect with Indian start-up programs like Start-up India, Atal Innovation Mission and Technology Business Incubators such as t-Hub, iCreate, Forge Accelerator, Kerala Start-up Mission, etc. The organization has also identified potential future collaboration opportunities with Indian companies in sectors similar to those identified in the Indian Economic Strategy such as AgriTech, Healthcare Tech, EduTech, FinTech and Resources Tech.

**Source:** Engagement Framework Outline for Australia - India Start-up & Innovation Eco-System Draft Report, InQ

### Australian start-ups could explore the opportunity to enter the Indian market for growth opportunities

In 2020, Hyderabad based incubator T-Hub announced a partnership with Sydney based technology incubator inQ Innovation in order to provide opportunities for Indian start-ups to scale up in the Australian market. T-Hub also aims to offer reciprocal opportunities for Australian startups interested in identifying business opportunities in India. In the recent years, Indian startups have diversified with transformative technologies across a wide range of sectors such as healthcare, fintech, transportation, hospitality, food delivery etc. As per data from Tracxn, in the period between September 2018 to September 2019, India's startups attracted domestic as well as foreign investments of ~USD 12.3 billion. Attractive valuations along with favourable government policies, growth opportunities and India's improved position in the Ease of Doing Business index have rendered India as one of the safest and most attractive investment destinations in the world. Australian investors should be encouraged to explore investment opportunities in the Indian start-up market.

<sup>239</sup> India will be home to 10,500 start-ups by 2020: Nasscom, 2016, The Economic Times



## Challenges faced by Indian IT companies in Australia

A common challenge faced by IT companies in Australia is the gap between the demand and supply of workforce. Historically, Indian IT companies used the 457 visa in Australia that allowed employers' sponsor skilled foreign talent to work in Australia for a period of up to 4 years. The 457 visa was replaced by a new temporary visa by the Australian Government. The new program has two categories i.e. a short-term visa for 2 years and a medium-term visa for 4 years that is awarded to address irreparable skills shortages. However, the resource supply gap requires faster visa approvals and streamlining of processes. The increase in restrictions and consequent increase in timelines for visa approvals have resulted in increased expenditure for companies. For instance, from 2018, employers operating in Australia are now mandated to pay the Skilling Australia Fund (SAF) levy on the TSS 482 visa for overseas workers. There is currently no fiscal support (as tax breaks or tax credits) offered to sponsoring entities. Further, in case of a pre-mature disengagement from employment or premature closure of any project due to business needs, companies have to wait/ track the refund of the SAF levy. Indian companies have therefore suggested that a charge be levied on annual basis. If duration of stay of the said employee is longer, the SAF can be repaid in the next year. Indian companies have also suggested the creation of a guided mechanism to access these funds to offer trainings within the company.

Current regulations require that individuals being sponsored for the 482 visa demonstrate their proficiency in English language. The proficiency can be demonstrated by undertaking and obtaining the pre-defined scores in the following tests: International English Language Testing System (IELTS); Occupational English Test (OET); Test of English as a Foreign Language internet-based test (TOEFL iBT); Pearson Test of English (PTE) Academic test; Cambridge English: Advanced (CAE) test.

Industry Association NASSCOM has requested the Australian authorities that applications that are filed as Intra Company Transfers (ICT) be exempted from this requirement and IT sector be exempt from this requirement. Indian companies have also suggested the acceptance of social media, especially LinkedIn as a valid channel to advertise jobs. At present, the policy of Labor Market Testing (LMT) does not permit this in Australia and other stringent measures under the LMT policy are creating challenges for delivering appropriate resources in a timely manner.

Moreover, a time lag of greater than three months to obtain visas has significantly affected businesses with local talent shortages.

A collaboration in this regard can help effective participation from both countries. Investments in building workforce capabilities can help develop an ecosystem for tackling this issue. The solution lies in introducing an intermediate term visa with lesser documentation requirements and shorter processing timelines by Australia which will increase project profitability and execution speed for Indian IT companies collaborating in Australian projects. This needs to be discussed by the two Governments.

Indian companies have raised concerns over double taxation issues faced by them. Indian IT companies providing services to Australian clients, at times, provide a part of these services by deploying services of their teams located in India. The Australian tax authority (ATO) treats the income earned in these services as 'royalty' and levies taxes on it under Article 12(3)g of the Double Taxation Avoidance Agreement between India and Australia. This follows a Federal Court of Australia ruling to treat such payments as 'Royalties'. Additionally, these companies are also required to pay taxes in India as the services are rendered from India. Relevant ministries in India along with the Industry Associations such as NASSCOM need to resolve this issue of double taxation faced by Indian IT companies offering services in Australia with the Australian authorities to facilitate appropriate credits.

Indian companies also face challenges in accessing government projects particularly at the Federal level in Australia. India could initiate discussions followed by a structured engagement between the two countries to evaluate opportunities as well as understand compliances required to participate in Australian Government projects. This will provide an opportunity for Indian companies to showcase their high-quality offerings to the Australian Government.

## Recommendations

- Relevant Ministries in India and Industry Associations such as NASSCOM, along with the Australian taxation authorities, need to resolve the double taxation issue faced by Indian IT companies offering services in Australia, to facilitate appropriate credits and resolve the issues.
- Introduction of an 'intermediate term' visa with a duration between the Subclass 400 visa and the Subclass 482 visa coupled with lesser documentation requirements and shorter timelines for processing will be helpful for collaboration in the technology and services sectors.
- Under the Start-up India program, joint entrepreneurship programs for start-ups should be organized and facilitation centers such as research parks, incubator precincts, etc. should be established to provide a boost to the start-up environment. Australia has a precedence of successfully establishing such precincts and can collaborate with Indian Government in this regard.
- The State Bank of India (SBI) has not been allowed the status of an Approved Security Provider under the Financial and Performance Management Standards 2009 (FPMS). The two Governments should actively resolve this issue of an approval for SBI since SBI not getting the status of an Approved Security Provider significantly affects funding requirements of new Indian businesses operating in Australia.
- The Government of India should create an ecosystem that is conducive for Australian start-ups looking at investment in India to tap into the Indian market.
- India should encourage Australian Venture Capital firms and investors to explore opportunities in the fintech sector.



## Pharmaceutical and biotech sector

### Synopsis

India is one of the largest exporters of pharmaceutical products and biosimilars to the world, supplying ~20% of the global generic medicines in volume terms.

However, India's pharmaceutical exports constitute just ~4% of Australia's imports.<sup>240</sup> Indian companies can therefore target to increase their exports to the Australian market.

The following opportunities have been identified for this sector:

- Increasing exports of Indian pharmaceutical products and biosimilars to Australia
- Collaborating in clinical trials
- Promoting traditional Indian medicines and practices such as yoga and ayurveda in Australia

<sup>183</sup> SHS code 30; Trade Map

## 5.3 Pharmaceutical and biotech sector

### Overview

#### Australia

The pharmaceutical sector in Australia is well established and is supported by a well-developed knowledge and technology base in the country. Australia makes up about 1% of the pharmaceutical sales globally, making it the 12th largest pharmaceutical market in the world. The pharmaceutical sector in Australia includes biotechnology and medical research companies, pharmaceutical manufacturers, wholesalers and distributors. About 150 companies, both foreign and local, operate in the pharmaceutical sector in Australia and employ about 40,000 people, with about 40% of them engaged in manufacturing. The country is a net importer of medicines, primarily from the US, Germany, Switzerland, Ireland and the UK.<sup>241</sup> The Pharmaceutical Benefits Scheme (PBS) under the National Medicines Policy, provides access to subsidized medicines for all medicare card holders in Australia. The country is also home to a small but thriving biotechnology sector. To strengthen the sector, the Government established the Medical Research Future Fund (MRFF) with a funding of AUD 20 billion (USD 14.29 billion).<sup>242</sup>

The competitive landscape of the pharmaceutical sector in Australia is dominated by foreign firms selling patented drugs. Most multinationals, such as Pfizer, Novartis and Sanofi are represented in Australia through local subsidiaries. For instance, AstraZeneca, Eli Lilly, Merck & Co and GlaxoSmithKline manufacture locally in the country. Local producers, on the other hand, tend to focus more on generic drugs. Leading domestic generic drug firms include Sigma Pharmaceuticals, Australia Pharmaceutical Industries and Alphapharm.

Australia is a heavily regulated market. The Therapeutic Goods Administration (TGA) regulates the import-export and supply of medicines in Australia. The body oversees the supply of all medicines such as OTC, generic medicines as well as vaccines. TGA approves medicines based on quality, safety, efficacy and availability. Further, the TGA grants the license to manufacture therapeutic goods for local manufacturers. For manufacturers located in other countries, a GMP clearance is required to be granted by the TGA.<sup>243</sup> The regulatory process is generally speedy for products that have already received approvals from regulatory bodies in the US and Europe.

#### India

The Indian pharmaceuticals market has emerged as a reliable source of affordable and qualitative medicines for the world. The Indian pharmaceutical market has been valued as the tenth largest in the world and is also the third largest producer of medicines in the world (10% of world production).<sup>244</sup> Generics constitute about 75% of the Indian market. India is a net exporter of pharmaceuticals with about 55% of the exports directed towards developed nations such as USA and the UK.<sup>245</sup> Biosimilars have also grown in India. Indian regulations for biosimilars, unlike many other emerging markets, have matured such that they are consistent with regulations in other countries. This has made it easier for Indian products to gain traction in international markets.

Australia was the 13th largest destination for Indian pharmaceuticals exports in 2019-20 with total exports amounting to USD 274 million. India is the ninth largest exporter of pharmaceutical products to Australia.<sup>246</sup> The Australian market is dominated by incidence of non-communicable diseases such as neuropsychiatric conditions (33%), cancer (17%), respiratory diseases (15%) and cardiovascular diseases (13%). The demand for traditional AYUSH products i.e. Ayurveda, Yoga, Unani, Siddha and Homeopathy has also increased considerably in the last few years in Australia.

<sup>241</sup> Healthcare in Australia Report, EIU

<sup>242</sup> Medical Research Future Fund, MRFF, Department of Health

<sup>243</sup> Overview of supplying therapeutic goods in Australia, Australian Government, Department of Health

<sup>244</sup> India Emerges As Top Five Pharmaceuticals Markets Of The World, Business World; EIU Report

<sup>245</sup> Pharma exports up 3 pc to \$17.3 billion in 2017-18, The Economic Times

<sup>246</sup> Regulatory and Market Profile of Australia, Pharmaceuticals Export Promotion Council of India



## Impact of Covid-19 on India's Pharmaceutical Sector

India is dependent on China (~70%) for pharmaceutical raw materials such as APIs. With the onset of the novel corona virus pandemic, India experienced shortage of raw materials during the first quarter of 2020. This led to supply chain disruptions and limited the ability of Indian pharmaceutical companies to meet their customer demand (both domestic and foreign). Due to the criticality of the sector and its strategic relevance especially in a pandemic scenario, India is likely to increase its domestic production of APIs. This will also help reduce its imports from China, minimise price fluctuations and improve profitability of the Indian companies. While the current lockdown is expected to create supply disruptions in the short-run, pharmaceutical manufacturing has been exempted from this lockdown. Pharmaceutical companies backed by government incentives are now determined to improve the overall capacity of APIs to constrain ongoing shortages. Moreover, key representatives in the pharmaceutical industry and NITI Aayog are expected to undertake speedy approvals for pharmaceutical infrastructural developments through a slew of measures such as rapid clearance from relevant ministries, tax exemptions and subsidies to secure and ramp up the supply of APIs within the country. As recent as in March 2020, the Indian Government approved a budget of USD 394 million for building infrastructure for three bulk drug parks in the country.

India is the largest supplier of generic drugs (by volume) to the world. The country supplies low cost generic drugs to millions around the globe and currently has over 250+ U.S. Food and Drug Administration and Medicines and Healthcare products Regulatory Agency (MHRA UK) certified plants. Given the shortages experienced globally in the procurement of APIs for niche drugs from China during the current pandemic and China's ongoing struggles with drug and PPE quality issues, India has an opportunity to establish itself as the alternative source for pharmaceutical imports for countries within the developed economies of the world such as North America, EU as well as other economies such as South East Asia, Latin America, Australasia and Africa. While India was itself under a nation-wide lockdown, it was able to send shipments of drugs such as HCQ to 55+ coronavirus hit countries such as US, Afghanistan, Bhutan, Bangladesh Nepal, Maldives, Mauritius, Sri Lanka and Myanmar, etc. to meet their requirement at a critical time during the current pandemic. Australia can partner with India to address this need of the global pharmaceutical supply chain caused by the pandemic and not just look at India as an alternative source of drug imports but also as a potential partner to co-develop drugs for supplying to the world.

## Opportunities for collaboration

This sector has already witnessed a few academic collaborations in the past. For example, the Indo-Australian Career Boosting Gold Fellowships (IACBG Fellowships) that has supported 28 fellows so far. The IACBG Fellowship was a joint initiative between the Department of Biotechnology of India and the Government of Australia in inviting Indian PhD scholars to partake in a collaborative research on Agriculture or Medical Biotechnology at the University of Australia. Similarly, the PhD Fellowship Programme of IITB-Monash Research Academy has also lent support to 65 students in the field of biotechnology. An extension of support to these fellowship programmes can further solidify the groundwork of ongoing research in the field of biotechnology.

## Case Study: Indo Australian Biotechnology Fund (IABF)

This fund was set up for bilateral collaboration between the Governments of India and Australia in the field of science and biotechnology in 2006. This collaboration has successfully implemented 57 projects and 10 workshops in the areas of healthcare, agriculture and bio energy over the last 14 years. A large number of students have also been trained under exchange programs through this initiative. The fund invites joint research proposals (known as rounds) in a decided priority area of research. Recently, the 12th Round of calls were announced in the areas of Cancer therapeutics/ theranostics; Genomic and precision medicine; and Pest-resistant crops. The IABF fund continues to facilitate Indian and Australian access to the global science and technology system.

It would be appropriate to have a special call on Covid-19 as the 13th Round after finalizing priority areas of research with mutual consent of the Australian Funding partner of Department of Biotechnology (DBT).

## 1. Collaboration on Vaccine Development

The Covid-19 pandemic has highlighted the urgency for international scientific collaborations in research and development, manufacturing equipment and identifying treatments to face such global health emergencies. Exchange of knowledge and skill sets on these fronts can help overcome hindrances in innovation and provide support to public health at a global scale.

In April 2020, Australia's Griffith University and Hyderabad-based Indian vaccine manufacturer, Indian Immunologicals Ltd (IIL), entered into a research collaboration to develop a vaccine for the novel coronavirus. Both enterprises are committed towards developing an affordable vaccine that can offer strong cellular and antibody immune responses against the virus. The vaccine is also expected to offer long-lasting protection with a single-dose administration. IIL and Griffith University have previously worked together to develop the Zika virus vaccine, which is currently at the pre-clinical toxicology testing stage. Additionally, this scientific collaboration can lay the foundation for future collaborations in areas such as manufacturing personal protective equipment (PPE), ventilators etc.

## 2. Generics and Biosimilars

Biosimilars and generic drugs are alternatives to branded medicines. They are generally cheaper than their branded counterparts, mainly on account of differences in development and registration costs. There are minor differences in generic drugs and biosimilars. While the active ingredients of generic drugs and branded medicines are the same, biosimilars are highly similar to the branded product, except for small differences in clinically inactive components.

The generics market accounted for USD 3.2 billion out of the USD 17 billion pharmaceuticals market in Australia in 2017.<sup>241</sup> The market for biosimilars in Australia is growing and is estimated at USD 2.6 billion in 2017.<sup>247</sup> Healthcare spending in Australia has also been increasing rapidly growing at 6-7% in recent years, higher than the decade average of 4.5%.<sup>248</sup>

<sup>247</sup> Key Figures on Biosimilars, Generic and Biosimilar Medicines Association

<sup>248</sup> Australia Institute of Health and Welfare, Growth in health spending at 5 year high driven by Government spending



The increasing healthcare and pharmaceutical costs, especially with an ageing population, have put additional pressure on the Government to regulate healthcare budgets in Australia. Currently, Pharmaceutical Benefits Scheme (PBS) covers ~90% of the pharmaceutical costs in Australia.<sup>246</sup> As a result, there is not much incentive for the end consumer to prefer a generic drug instead of a branded one. In 2010, only 19.5% of prescriptions suggested by a doctor in Australia contained the molecule name instead of a brand name, as compared to 83% for the UK.<sup>249</sup> Australians tend to be loyal to particular brands and generic medicines are still catching up in Australia. The PBS has thus been stressing on application of generic drugs and biosimilars rather than their branded equivalents, which is an internationally proven approach to reduce pharmaceutical expenses. The usage of biosimilars provides greater access for patients to life changing medicines at low cost. The Generic and Biosimilar Medicines Association (GBMA) in Australia has also been set up to promote the growth of generic and biosimilar medicines industry.

Prices of generic drugs in Australia remain higher than those in the UK, New Zealand and specified provinces in Canada. Some medicines in Australia are as much as 3.7 times higher as compared with international prices.<sup>250</sup> India is a manufacturing hub for generic medicines and biosimilars. India supplies ~20% of the global generic medicines in volume terms.<sup>251</sup> The prices of generic drugs manufactured in India are lower than in other countries on account of availability of labour and other resources at a lower cost. While India exports to Australia, its pharmaceutical exports constitute just ~4% of Australia's imports.<sup>252</sup> The TGA has adopted many guidelines under the European Medicines Agency (EMA) for regulating standards for quality, non-clinical and clinical data requirements for biosimilarity, etc. This opens up a market for Indian companies, already compliant with EMA guidelines, currently operating in the biosimilar and generics space, to export to Australia.

Indian pharmaceutical companies have found it difficult to increase exports to Australia substantially in view of preference for branded drugs manufactured in developed markets like UK, USA, etc. even though they may be compliant with EMA guidelines and may have been already registered in the USA market. However, Indian companies such as Glenmark Pharmaceuticals has recently received approval from the TGA to sell one of its products in Australia in collaboration with Seqirus, owned by CSL, an Australian pharmaceutical group.

Indian pharmaceutical companies should engage with the Government and chambers of commerce to ensure that a forum is set up to exchange views and clarify procedure for registration and sale of pharmaceuticals, generics and biosimilars of Indian origin in the Australian market in order to facilitate Indian exports in this sector.

### Case Study: Mylan and Biocon

Global pharmaceutical giant Mylan has a partnership for biosimilars with Biocon, a Bangalore based Indian company. The partnership has resulted in significant success in getting approvals for biosimilars in Europe and the US. Biocon and Mylan's fulphila (trastuzumab), a biosimilar of Neulasta indicated to minimize febrile neutropenia while cancer patients undergo chemotherapy, was approved by the US, FDA in June 2018.<sup>253</sup> This is the first India originated biosimilar that received approval in the US.

<sup>249</sup> Prescribing generic drugs will reduce patient confusion & medication errors, 2017, Business Standard

<sup>250</sup> Strong Growth for Global Generics Market, 2017, AJP

<sup>251</sup> Pharma exports up 3 pc to \$17.3 billion in 2017-18, The Economic Times

<sup>252</sup> HS code 30; Trade Map

<sup>253</sup> India poised to become 'one of the largest clinical trial hubs,' says CRO, Outsourcing Pharma

The Indian Government has also sought to ensure that approvals in the country are consistent with regulations in other countries to make it easier for Indian companies to gain approval in other jurisdictions. In 2012, India's Central Drugs Standard Control Organization published regulatory guidelines for biosimilars, with revisions in 2016. India has also benefitted from these well aligned regulatory formats as many manufacturers in other emerging markets are facing the problem of limited regulatory maturity, which has delayed emergence of biosimilars in those countries.

### 3. Clinical Trials

Rising time and cost of research and clinical trials in Australia has opened up opportunities for Indian clinical research companies to collaborate with Australian drug manufacturers. This collaboration can be on medical research and clinical trials to expedite timeline from research to the market for Australian medicines. This can increase the research efficiency of Indian clinical research companies and also provide access to advanced Australian pharmaceutical companies. Clinical trials can be conducted in India at almost half of the cost incurred in developed countries like the US, UK, Germany, etc. There has been a significant rise in clinical trials conducted in these countries especially in India.

Central Drugs Standard Control Organization (CDSCO) is the central regulatory body governing clinical trials in India. CDSCO has recently introduced regulatory reforms such as online submission of clinical trials and reduced timelines for the approval of clinical trials. Updating clinical trials' results in online registry and online availability of minutes of subject expert committee meetings have reduced the overall timeline of clinical trials in India and increased transparency. The average time for obtaining approvals for clinical trials has reduced from 6 to 7 months in 2016 to 4 months in 2018.<sup>254</sup> Outsourcing of the administrative parts of research, as well as regulatory and ethics filings, to India can significantly save time and expenses incurred on clinical trials.

India offers a large and diverse genetic pool of patients for clinical trials. Given the difficulty in sourcing patients for clinical trials in developed countries, the concept of expanding the pool of available patients in emerging countries, combined with the overall cost savings, positions India well to conduct clinical trials. The emergence of chronic diseases such as cancer, diabetes, cardio vascular system (CVS) and central nervous system (CNS) disorders may drive demand for newer therapies. Moreover, as the Indian oncology community increasingly uses genomic testing for its patients, India will offer tremendous opportunities in contributing data for global oncology trials.

India has the highest number of FDA-approved manufacturing plants outside the U.S. With increasing focus on constraining healthcare costs, India's low-cost manufacturing capabilities are advantageous.<sup>255</sup> Indian contract clinical research and drug discovery companies can collaborate with Australian pharmaceutical companies to expedite the research process and move to becoming a clinical research hub for global pharmaceutical companies. This shall also give an impetus to the patented pharmaceutical market in India and raise the number of patents filed by Indian companies in the future, possibly lowering the cost of patented drugs, which are typically imported into India.

<sup>254</sup> India poised to become 'one of the largest clinical trial hubs,' says CRO, Outsourcing Pharma

<sup>255</sup> Conducting Clinical Trials In India: Opportunities And Challenges, Clinical Leader

## Case Study: Aurigene

Aurigene is an Indian Drug Discovery Services company and a reputed scientific collaborator in India, based in Bangalore, Hyderabad and Kuala Lumpur. The company has a fully integrated drug discovery infrastructure ranging from hit generation to pre-clinical development. Aurigene collaborates with mid to large pharmaceutical companies, biotechs and academic partners for full discovery programs, stand-alone services for various therapeutic areas, biologies and chemistries. Their initial collaborations were in the US and the UK, with companies such as Novartis and Ranbaxy.

Aurigene has partnered with several academic labs in Australia for small molecule FTE chemistry services. The Adelaide General Hospital is working with the University of Melbourne, which is supervising the trials. Aurigene is also working with companies in Australia to jointly conduct clinical trials. The initial study and preparation of the clinical trials is done in Australia. While Australia has the adequate infrastructure and relatively simple regulatory procedure for conducting clinical trials (due to its decentralized nature, where the authority is given to the local investigator), India possesses trained and capable medical researchers.



## 4. Ayurveda and Traditional Medicine

The emerging trend of using alternative and complementary medicines is picking up in Australia. With greater acceptance and uptake by Australians, alternative medication has witnessed growth in demand in Australia. Currently, the sector is valued at AUD 4.9 billion (USD 3.3 billion) in the country covering various segments such as vitamin and dietary supplements, sports nutrition, herbal/traditional products and weight loss products.<sup>256</sup>

<sup>256</sup> Australia's Complementary Medicines Industry Snapshot 2018, Complementary Medicines Australia

The Ministry of AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha, Sowa Rigpa and Homoeopathy), Government of India, in cooperation with Quality Council of India has developed accreditation standards certified by the National Accreditation Board for Hospitals and Healthcare Providers (NABH) for Ayurveda Hospitals. These standards measure the quality and safety aspects of care delivered to patients. In addition, the Ministry of AYUSH has also developed Standard Treatment Guidelines and has taken utmost care to ensure high standards of quality of services, treatment, infrastructure as well as medicine for Ayurveda Hospitals.

In order to promote alternative treatments in Australia, insurance coverage policies, in collaboration with the Ministry of AYUSH, may also be provided by Australian agencies for Ayurvedic treatments taken by Australian citizens in India.

In 2019, the All India Institute of Ayurveda (AIIA), under the Ministry of AYUSH, signed an MoU with Western Sydney University, Australia. This MoU has been entered into with the aim to promote collaboration in research and formulating guidelines to integrate principles of Ayurveda with modern medicine. The institutes have also committed to identify specific areas for collaboration in education and research, while ensuring appropriate quality standards are met. This collaboration is expected to combine best practices of traditional medicine and modern medicine that will further contribute scientific evidences for the global medical community.<sup>257</sup>

## Recommendations

- Government of India should encourage Australian companies to evaluate India as a low-cost manufacturing location for biosimilars and generic drugs.
- Government of India should promote India as a cost competitive location for carrying out clinical trials.
- Indian authorities should strive to obtain Australian regulatory approvals for Indian traditional medicines in order to gain approval for sales in the domestic market.
- A Working Group dedicated to cooperation on traditional Medicine may be constituted between India and Australia with representation from Government officials, regulatory bodies and scientific bodies etc. from both countries.

<sup>257</sup> All India Institute of Ayurveda (AIIA) signs MoU with Western Sydney University, Australia, 2019, Press Information Bureau



## Healthcare

### Synopsis

The healthcare system in Australia is highly specialized and focuses on tracking the background and history of patients through disease coding and data analysis with a strong emphasis on preventive care and early disease detection.

India's strengths in tertiary healthcare and low-cost manufacturing as well as Australia's expertise on research and development in med-tech and bio-tech offer opportunities that could benefit both countries:

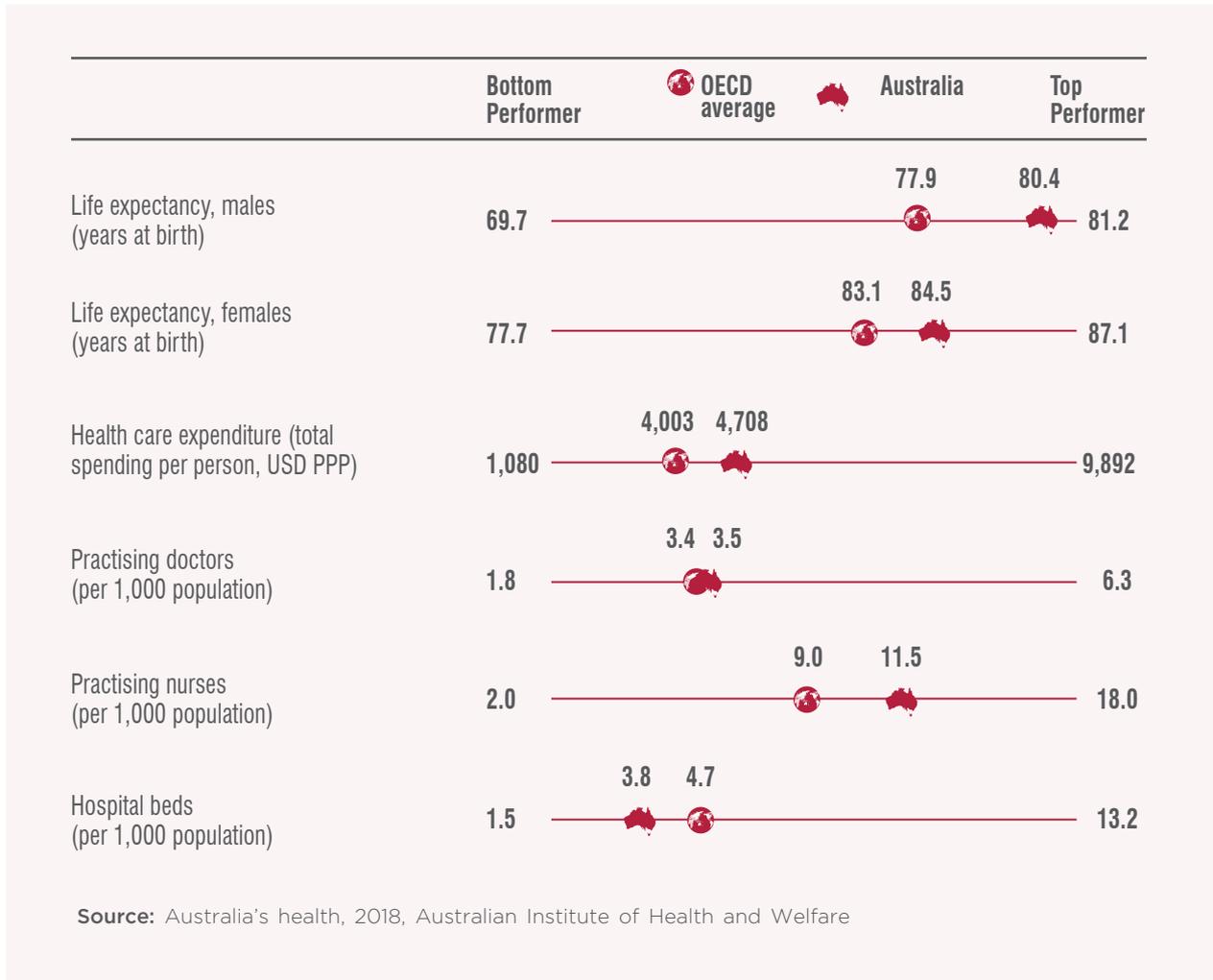
The following opportunities have been identified for this sector:

- Adopting Australian healthcare best practices in India
- Collaborating between Indian and Australian hospitals to gain from Australian expertise
- Leveraging Australia's expertise in creating a developed aged care model.
- Collaborating in cancer detection and research
- Collaborating with Australian med-tech companies
- Collaborating across medical coding and data analytics
- Developing India as a medical tourism hub for Australians
- Collaborating in areas such as healthcare education and training for nurses
- Increasing expert consultations from India

## 5.4 Healthcare

### Australian healthcare ecosystem

The Australian healthcare system is renowned worldwide on account of significant Government focus, which has resulted in greater access to affordable and quality healthcare. Healthcare in Australia is provided by both public and private players. Australia's performance on several health parameters is largely in line with OECD averages.



Australia spends 10.3% of its Gross Domestic Product (GDP) on healthcare, which is comparable to that of other developed countries such as the UK (9.7%) and France (11%).<sup>258</sup> Over the last few years, the expenditure on healthcare has grown at a faster pace than the overall GDP growth, which signifies the Government's intent to further develop and improve the healthcare sector.

<sup>258</sup> The United States Health System Falls Short, The Commonwealth Fund, 2017



## Traditional healthcare services

The Australian health ecosystem faces challenges from an ageing population along with the burden of chronic illnesses. These challenges are typically long term that need continuous management and have a considerable effect on individuals, their families and care-givers and the health system. The incidence of chronic diseases such as cancer, heart related problems as well as health issues specific to the aged population such as arthritis, dementia, etc., highlight the need for a robust healthcare service network. Australia's healthcare sector has been successful in providing widespread access to services for the majority of the population. This success can be attributed to the collaboration across different levels of Government (Central, State, etc.) as well as the innovation driven by the private sector.

## Primary healthcare

Primary health is at the forefront of Australia's health care system, as it is generally the primary point of contact for patients. Australians receive primary health care largely from general practitioners (GPs), along with other stakeholders such as nurses, midwives, community health workers and allied-health professionals, who perform a wide range of services. General practitioners (GPs) are central to primary healthcare in Australia.<sup>3</sup> There are 1.4 GPs for every 1000 people.<sup>259</sup> The number of GP services availed by Australians has steadily risen at approximately 18% in the last ten years to reach 602.7 per 100 people in 2016-17.<sup>259</sup>

India, in stark contrast to the Australian scenario, suffers from a shortage of primary healthcare service providers. Furthermore, the demand gap in primary healthcare in rural India is even more pronounced since primary health infrastructure, as well as workforce are scarce. This demand gap leads to migration from rural to urban and semi-urban areas to access quality healthcare. While rural India holds 70% of the population, only one third of the country's healthcare infrastructure is located in these areas.<sup>260</sup>

In Australia, primary healthcare is well connected to the rest of the healthcare ecosystem, which includes hospitals, secondary care providers and other service providers through Primary Health Networks (PHNs). Australia has 31 Primary Health Networks (PHNs), which are independent Government-funded organizations, managed by a board of medical professionals.<sup>261</sup> PHNs partner with Government organizations at both state and territory levels to enhance patient care by aligning and increasing coordination between different stakeholders to avoid overlaps in providing health related services. Primary healthcare providers in Australia can refer patients to access specialist secondary healthcare or directly to hospitals (tertiary healthcare).

## Hospital Infrastructure

Australian hospital infrastructure has a mix of public (52% of hospitals) and private (48%) players.<sup>262</sup> Public hospitals in Australia are largely funded by the Government and offer a wide variety of high-quality services at no/low cost to patients under the Medicare Scheme. The public hospitals in Australia have a higher capacity than that of private hospitals; thus providing treatment to a larger number of patients in Australia.

Private hospitals in Australia are largely funded by private insurance companies as well as through out-of-pocket payments by patients. The number of private hospitals in Australia are on the rise on account of rising demand as well as increase in private insurance.

Some of the large private healthcare chains in Australia include Ramsay Health, Healthscope Hospitals and Healthe Care, etc. Ramsay Health Care is one of Australia's largest private hospital networks with a chain of 72 private acute and day surgery units. Apart from its private hospital chain, Ramsay Health also operates in 4 public general hospitals under a

<sup>259</sup> Australia Health, 2018; Australian Institute for Health and Welfare, Australian Government, 2018

<sup>260</sup> Tackling doctor's shortage, The Pioneer

<sup>261</sup> Primary Health Networks, Health direct

<sup>262</sup> Australia's hospitals 2016-17 at a glance, Australian Institute of Health and Welfare

public private partnership model in Australia. Healthscope Hospitals is Australia's second largest private hospital operator with a network of 43 hospitals. It is concentrated specifically around important cities in Australia. Health Care is the third largest chain with 36 private healthcare facilities.

## **Opportunities for Australian investments in Primary Health Care / Healthcare Governance**

The Ministry of Health and Family Welfare has projected an investment of Rs. 5.38 lakh crore (USD 76.8 billion) in India's primary healthcare over the next 5 years to cater to India's growing healthcare demands. In addition, the Ministry also projected an investment of Rs. 1.88 lakh crore (USD 26.8 billion) to address shortage of healthcare professionals and Rs. 90,336 crores (USD 12.9 billion) for infrastructure upgrades.

In recent years, India's healthcare sector has witnessed significant international investor interest. Post the year 2000, 100% FDI under the automatic route for greenfield healthcare projects and 100% FDI under the government route for brownfield projects has been permitted. As per industry reports, private equity investors have invested more than USD 3.4 billion in Indian hospitals between 2004 to 2017. Apart from meeting funding requirements, foreign investments also bring in technology upgrades and new skill sets to the healthcare sector in the country. Further, an upgradation of service levels and facilities is also required to provide a boost to medical tourism in the country. Apart from opportunities for investment in hospitals, India also presents several avenues for investments to Australian healthcare providers, namely in diagnostics, medical devices and equipment industry and for setting up training facilities for healthcare personnel. International investment in the healthcare sector has been largely limited to the higher end of the value chain, namely secondary and tertiary care. Australian investments can assist the Indian healthcare sector upgrade the primary healthcare sector and increase penetration of healthcare services via investment in technologies such as e-healthcare.

## **Preventive Healthcare and Mental health**

Sedentary lifestyles, changing dietary patterns and mounting healthcare costs have necessitated the shift in healthcare from traditional curative models to more preventive ones. Preventive healthcare focuses on taking measures to maintain wellness and overall good health. Increasing expenditure on preventive healthcare is a cost-effective strategy that can vastly improve health outcomes in a country.

Prevention has been a vital part of the Australian Government's National Primary Health Care Strategy. Immunization and disease screening are key preventive health care measures in Australia. Australia also has extremely effective anti-smoking and road safety campaigns. Given that mental disorders, namely anxiety and depression, are a heavy disease burden on the Australian population, early detection and treatment of mental health disorders are also priorities of the Australian medical system.

India's healthcare system lays more emphasis on curative rather than preventive healthcare. It is estimated that only 9.6% of India's overall healthcare expenditure is on preventive measures and the remaining 90% is on the treatment of various illnesses. India has a universal immunization program under which the Government of India provides vaccination to prevent several preventable diseases. Even while this program has been extremely successful in almost entirely eradicating the incidence of polio from the country, the focus of preventive healthcare has still largely been on communicable diseases. India still lacks frameworks for screening and early detection of non-communicable diseases (NCDs). Despite NCDs being far easier to detect than communicable diseases, they account for approximately 61% of the deaths in India.<sup>263</sup> Early detection through regular health check-ups and screening will not only significantly reduce the incidence of NCDs, but will also materially bring down long-term healthcare costs.

<sup>263</sup> Non-communicable diseases cause 61% of deaths in India: WHO report, Times of India, 2017



Furthermore, mental health and wellbeing represent some of the most neglected areas in India's overall healthcare system. While perceptions towards mental health are changing in India, factors such as lack of awareness, social stigma and inadequate access to mental health professionals reflect that the progress of mental health service delivery in India has been particularly slow. India can learn from Australian best practices in mental health service delivery to bring awareness and improve overall management of mental health as well as create delivery systems that support self and family driven care throughout the life-cycle.

## Vendors

### Pharmacies

Pharmacies play an important role in Australia's healthcare system. They are the key providers of medicines under the Pharmaceutical Benefits Scheme (PBS). Australia's retail pharmacy sector is a mix of private pharmacy chains and independent community pharmacies. The ownership of pharmacies in the country is restricted to registered pharmacists. Australia also has restrictions on the number of pharmacies owned by a pharmacist, which differ by state. For example, in Western Australia and Tasmania, the maximum number of pharmacies owned by a pharmacist is 4, in Queensland, NSW and Victoria, this number is 5 and in South Australia, the number is restricted to 6. Large pharmacy chains in Australia have therefore established a network under franchisee models. Leading players in the pharmacy industry in Australia include Sigma Healthcare, Terry White, Chemist Warehouse, Priceline Pharmacies, etc. Australian pharmacies are well-connected and it is estimated that 95% of consumers are within a 2.5 km radius of a pharmacy in state capital cities and 72% in regional Australia.<sup>264</sup>

In contrast, India's pharmacies are highly fragmented with a large number of standalone stores. Branded stores and chains account for only 1% of the estimated 0.7 million retail outlets.<sup>265</sup> Apollo Hospitals' pharmacy chain is the largest in India with over 3100 stores.<sup>266</sup> Other large pharmaceutical chains in India include MedPlus, Wellness Forever, etc.

### Diagnostics

The diagnostics services in Australia can be divided into two segments- diagnostic imaging and pathology services. Pathology services include study and diagnosis of disease through examination of organs, tissues, cells and bodily fluids. Diagnostic imaging includes an array of technologies, such as general X-ray, bone densitometry, mammography, ultrasound, magnetic resonance imaging (MRI), etc.

Pathology services in Australia are highly consolidated and organized, mainly in the hands of two major players - Sonic Healthcare and Primary Health Care, with a market share of 43% and 34% respectively.<sup>267</sup> Diagnostic imaging in Australia is a fragmented sector with multiple small and medium players. However, some of the large players are expanding organically as well as by acquiring smaller practices. In addition to pathology majors, some of the large players in the diagnostic imaging sector are I-MED Radiology and Integrated Diagnostics.

India's diagnostics services market is fragmented and largely unregulated, especially in tier 2 and tier 3 cities. India has over 100,000 laboratories and only 20% of these are run by organized players.<sup>268</sup> A large part of the organised sector's revenue is contributed by tier 1 cities in India.

<sup>264</sup> Australian Government, Australian Institute of Health and Welfare

<sup>265</sup> Branded Pharmacy chains pump up the volume, Business Standard

<sup>266</sup> Retail Pharmacy Market Scenario of India, Hospaccx

<sup>267</sup> Australia's other great duopoly is literally pathological - Sonic and Primary, Sydney Morning Herald

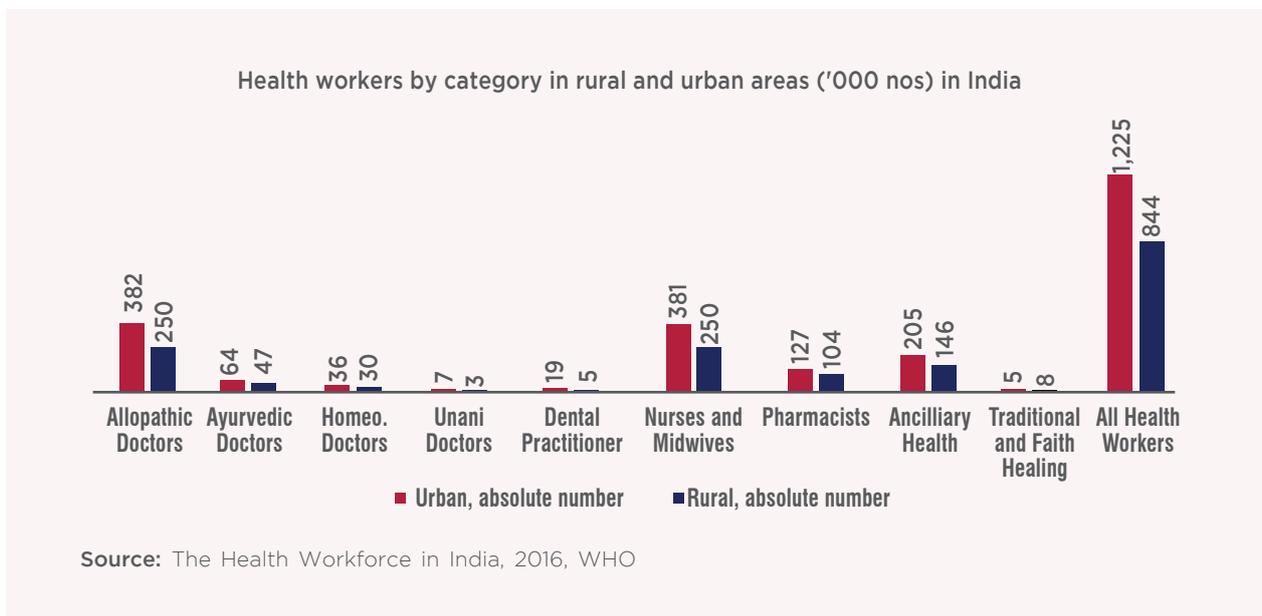
<sup>268</sup> Pathology of regulation, 2018, Business Today

## Healthcare workforce

The Healthcare and social assistance industry in Australia employed the largest share of the workforce in 2018, with ~1.6 million people representing nurses, doctors (general practitioners and specialists), aged and child care professionals and allied health professionals.<sup>269</sup>

As per the Medical Board of Australia, there were over 103,000 practicing doctors in the country as of December 2018, of which ~39,000 were purely general practitioners, ~54,000 were general practitioners with a specialty and around ~10,000 were specialists. While Australia has a high density of doctors (3.5 per 1000 people and 4.4 per 1000 people in key cities), there still exist gaps in the supply of medical practitioners in rural and remote areas. On an average, the ratio of nurses per 1,000 people is well above the WHO standard of 2.5 nurses per 1000 people in Australia, i.e. there were 12 nurses per 1000 people.<sup>270</sup> Thus, regardless of the fact that metropolitan regions in Australia do not face shortages, certain regional areas in states like Victoria and South Australia are facing skill shortages for nursing staff and are unable to fill vacancies.

The health workforce in India comprises of broadly eight categories, namely: doctors (allopathic, alternative medicine); nursing and midwifery professionals; public health professionals (medical, non-medical); pharmacists; dentists; paramedical workers (allied health professionals); grass-root workers (frontline workers); and support staff.<sup>271</sup> While this sector in India employs 5 million people, the density of healthcare professionals is extremely low. India also faces issues such as acute shortages and inequitable distribution of health professionals.<sup>271</sup> Medical facilities are heavily concentrated in urban regions, while in rural regions they are under-developed. For example, Maharashtra has ~154,000 registered doctors, compared to just 792 registered doctors in Arunachal Pradesh.<sup>272</sup> Medical workforce requirement in India is expected to further grow from 3.6 million in 2013 to 7.4 million by 2022.<sup>273</sup>



<sup>269</sup> Australian Institute of Health and Welfare, Australian Government

<sup>270</sup> Nurses and Midwives (per 1,000 people), World Bank Data Bank

<sup>271</sup> India facing critical shortage of healthcare providers: WHO, The Hindu

<sup>272</sup> India's public health system in crisis: Too many patients, not enough doctors, 2017, Hindustan Times

<sup>273</sup> India's healthcare sector to require 74 lakh employees by 2022: NSDC, 2015, The Economic Times



## Public health insurance

### Medicare Australia

Australia provides universal healthcare to its citizens through its universal health insurance scheme – Medicare. It guarantees all Australian citizens and permanent residents, access to a wide range of health and hospital services at low/ no cost. Apart from the general taxation revenue, Medicare is funded by 2% Medicare levy charged over and above federal income tax rates.<sup>274</sup> Medicare cardholders have access to free-of-cost treatment in public hospitals. Medicare cardholders can also purchase prescription medicines at a subsidized cost under the Pharmaceutical Benefits Scheme. However, certain medical services such as ambulance services, dental examinations and allied health services such as physiotherapy and optical aids (such as glasses and contact lenses) are not subsidized under Medicare.

### Ayushman Bharat Scheme

In India, expenditure on healthcare is largely borne by individuals from their own pocket. Of the total health expenditure, only one third is borne by the public sector. This contribution is far lower than countries such as Brazil (46%) and China (56%).<sup>275</sup>

The Ayushman Bharat Scheme or the Pradhan Mantri-Jan Arogya Yojana (PM-JAY) is one of the Indian Government's largest initiatives to structure the healthcare sector in the country. It aims to integrate latest technology and synchronize between various healthcare value chains such as state agencies, insurance firms and trusts, third party administrators and public and private hospitals. As a part of this initiative, the Government has envisioned to open 0.15 million health and wellness centres as comprehensive primary health care centres (PHCs) that will provide maternal and child health services, mental health services, vaccinations against select communicable diseases and screening services for hypertension, diabetes and select cancers.<sup>276</sup> This scheme also sets out to provide essential medicines and diagnostic services free of cost to its patients.

The Government has also introduced the National Health Protection Scheme (NHPS), which will provide a cover of up to Rs. 5 lakhs (USD 714.3 million) per family per year for secondary and tertiary care hospitalization. The NHPS is the largest funded public insurance scheme in the world that is expected to cover 100 million poor and vulnerable families and have 500 million beneficiaries covering around 37% of the population.<sup>277</sup> Hence, NHPS is the first step taken by the Government to introduce universal health care in India.

## Opportunities for collaboration

The following opportunities for collaboration in the healthcare sector exist in the private and public domain. The areas of collaboration pertaining to B2B collaborations within the private sector can be undertaken through various forums and organizational summits such as the Australia-India Business Forum, etc. The areas of cooperation and collaboration within the public sector continue to be discussed in the Joint Working Group (JWG) for Health Cooperation formed by both countries.

### 1. Healthcare Governance

Primary health care represents 'Level One' of the healthcare system of any country. Efficiency of primary healthcare is the first step towards ensuring improved health

<sup>274</sup> Australian Government, Australian Taxation Office, Medicare Levy

<sup>275</sup> Healthcare financing: Who pays for healthcare in India? 2018, Moneycontrol

<sup>276</sup> 1.5 lakh wellness centres to be set up under Ayushman Bharat: MoS for Health Ashwini Kumar Choubey, 2018, The Economic Times

<sup>277</sup> Ayushman Bharat health insurance: Who all it covers, how to apply, 2018, The Economic Times

standards and reduced costs. The healthcare set up of a developed economy is usually characterized by a robust primary healthcare establishment. Accordingly, the primary healthcare scenario in Australia is largely reflective of the sector in other developed countries such as the UK and Canada. Primary health networks (PHN) have acted as the backbone of the health care system in Australia. They have enhanced the quality of healthcare amenities by ensuring seamless integration and exchange of information of patients' backgrounds and medical histories with the concerned health professionals at each successive level.

In theory, India has a well-defined healthcare system, where preliminary health problems are expected to be treated by identified Primary Healthcare Centres (PHCs) that are then required to screen and transfer more serious cases to specialist hospitals in districts and further to state-level hospitals. However, in practice, most PHCs are plagued by poor infrastructure and staff availability challenges. There is also a significant disparity in provision as well as quality of primary healthcare services in urban and rural India. Problems with early detection and prevention of illnesses, a pre-requisite to reduce the disease burden in the country, also emanate from poor access to primary healthcare. Furthermore, primary healthcare providers are largely fragmented in the country and lack alignment with healthcare vendors at secondary and tertiary levels.

The Ayushman Bharat Scheme has the objective to redesign the primary health network in India. The lowest level healthcare facilities, that currently provide selective care, are being converted to Health and Wellness Centres (HWCs) to provide all-inclusive primary treatments. The Indian Government has a target to revamp ~1.5 lakh sub-centres to HWCs by 2022.<sup>271</sup> In addition, State Governments are also expected to develop their own roll out plans and prototypes to suit their respective state environments. For example, the Kerala Government has decided to provide comprehensive services at the primary health level itself rather than converting sub-centres.

Ayushman Bharat is the Indian Government's most ambitious healthcare reform plan till date. At this stage, professional expertise and management of healthcare utilities is the need of the hour. Australian expertise in modelling healthcare systems and organizing rural health amenities will be beneficial in tackling India's healthcare challenges. Discussions between both countries in this space had been initiated in





2014, such as the talks between officials of the Australian Department of Health with the Ministry of Health and All India Institute of Medical Sciences (AIIMS) in India to identify potential areas of cooperation in healthcare. Further discussions between Governments, stakeholders and leaders in the healthcare sectors in both countries should be facilitated and expedited to streamline India's healthcare at the grassroots level.

### **Sector Representative Contribution: Healthdirect**

Healthdirect Australia is a national, government-owned, not-for-profit organisation providing free health information advice and information to Australians via telehealth services, including helplines, video call, websites, service finders, mobile applications and social media networks.

#### **Core services**

Telephony and digital services aim to connect people with the right part of the health system, so they receive the right care at the right time. This is particularly important for people needing medical help in the after-hours period or if they are unsure about which course of action to take.

healthdirect provides 24/7 access to health information and advice via a range of digital channels and a telephone helpline to help people make more informed health decisions. It is a free national service delivered across a variety of channels – phone line, website, app, voice apps. There is also an after- hours GP helpline which is an extension of the healthdirect helpline and is operational at night, on weekends and during public holidays. This health-grade technology provides a platform to healthcare providers to offer their services directly to patients via video consultation and integrate telehealth as an everyday part of a modern Australian health system.

Pregnancy, Birth and Baby is a national service that provides support and information for parents, families and carers on the journey from pregnancy to pre-school either online, over the phone, via video call and social media.

The National Health Services Directory (NHSD) is a comprehensive, up-to-date and accurate online directory of Australian health services and the practitioners . It is a key piece of national digital health infrastructure.

In addition, healthdirect also provides other services such as free and confidential motivational coaching, lifestyle coaching, etc.

This platform could be adopted in India, in line with the Indian Government's digital health initiatives

Further, Australia's National Digital Health Strategy has implemented various successful Digital Health Initiatives such as My Health Record. It has also led the foundation of Global Digital Health Partnership (GDHP), which is the largest inter-governmental platform and includes 30 WHO member countries. Australia served as the inaugural Chair of GDHP. In February 2019, India was elected as the Chair of the GDHP and Australia is supporting the GDHP as Co-chair. This partnership can provide economic opportunities for IT and ITES organizations in India to leverage benefits on the digital health platform focusing on provision of health IT services (as Health Solution partner, implementation partner, consultancy provider and partner for disruptive Technologies (AI, Big Data, IoT) etc.) both on-shore and off-shore to global clients.

## 2. Medical Coding and Data Analytics

The International Classification of Disease (ICD) is a standard diagnostic tool implemented by the World Health Organisation (WHO), which is a code system for classification of diseases. The ICD has varied applications and is used by doctors, paramedic staff, insurance companies, researchers and policy makers.

Clinical coding has been performed for over 60 years in Australian hospitals for health service management, planning, activity monitoring and epidemiological studies. It is usually the first stage in medical billing. Medical coders ensure that codes (in accordance with relevant standards) are applied correctly during the billing cycle and the process includes extracting data from documents, assigning appropriate codes and creating claims for insurance companies. Clinical coding requires an extensive knowledge of medical terminology along with an analytical ability to translate medical records into appropriate codes.

India's strengths in information technology, driven by a large and skilled workforce, has resulted in India emerging as a popular outsourcing destination for medical coding. Approximately 80% of the US companies outsource their medical coding operations to India.<sup>278</sup> Indian medical coders are well-equipped to deliver customer-centric solutions that can be utilized to cater to the requirement of various types of organizations (i.e. hospitals, clinics, academic medical centres, etc.) in Australia.

Apart from medical coding, in recent years, the requirement for big data analytics has grown manifold owing to deep insights that can be obtained to improve healthcare services and patient outcomes. Data analytics has quickly moved from being restricted to IT and finance to other sectors such as healthcare. Data mining and analytics, derived from medical databases, is an emerging trend in the healthcare sector. It is required by healthcare providers and insurance companies alike. Data analytics in healthcare finds applications in multiple areas that include public health analysis, patient profile analytics, fraud analysis and safety monitoring.<sup>279</sup> A sound medical coding mechanism, coupled with domain knowledge and robust IT skill availability in India implies that India can further leverage its expertise in the sector to work towards this new and upcoming trend for Australian healthcare companies.

Data on health in India is plagued by insufficient inputs that severely affect policy planning in the country. There are also issues with consistency, comparability and usability of data at a national level. Medical coding, if carried out accurately, has several benefits. It results in procedural efficiencies and promotes transparency and ease in data collection. It also standardizes the billing process in addition to environmental advantages of making the industry paperless. While India has established itself as a hub for outsourcing of these services, medical coding and medical data collation in India itself is at a nascent stage. Unlike developed countries, medical coding in India is not strictly implemented or required by hospitals and insurance companies. The use of ICD-10 has been very recent with its implementation in only 11-12 Indian hospitals.<sup>280</sup> Medical coding in India may further improve the current discordance at multiple points of data collection in the country.

<sup>278</sup> Opportunities galore in medical coding, 2017, Deccan Herald

<sup>279</sup> Data security and Analytics, Asian Hospital and Healthcare Management

<sup>280</sup> Indian Journal of Public Health, 2015, Implementation of ICD 10: A study on the doctors' knowledge and coding practices in Delhi



### Sector Representative Contribution: Synapse

Synapse Medical Services is a leading international provider of medical administration services with over 30 years' experience in the international healthcare sector. Synapse's services include cutting edge technology, clinical coding and billing, health system classification, consulting and health administration education. Synapse, founded by Margaret Faux in 2009, began as a modest medical billing service solely in Australia, serving individual practitioners, clinics and hospitals. In 2015, Synapse established an office in the southern Indian city of Chennai and now employs 130 people in its wholly owned Indian office. Additionally, the Synapse group now also has an office in the Middle East and the three offices combine technology and resources across different time zones to work in tandem seamlessly. Synapse provides administrative support for clinical services in Australia, with an integrated delivery centre for medical billing, clinical coding and transcriptions in India. The key focus areas include using technology to decrease paperwork for healthcare professionals, so they can focus on frontline service delivery and patient care. In 2018, Synapse also became a Registered Training Organisation under Australia's vocational education framework and the non-clinical courses it now offers target modern, progressive medical administrators and managers to improve health system literacy across the globe.

At Synapse, the India and Australian offices are viewed as one. They use time differences to their advantage, processing work around the clock. They move staff between their Sydney and India offices constantly and their Sydney based managers visit the Chennai office frequently. The Australian staff work at the customer interface while Synapse India works at the data interface. Having a service centre in India has augmented Synapse's capacity and capability that has led to winning new contracts in other countries including India.

India is paramount to the long-term plans of the company as it houses their main delivery centre and has the highest number of staff. Additionally, since India has committed to Universal Health Coverage and the introduction of Ayushman Bharat, Synapse is engaged with key stakeholders in India's health system journey, discussing both education and up skilling the local population and also providing health system services and software solutions.

### 3. Hospital Governance – Trauma Care

Trauma care entails immediate treatment to critically injured patients in the aftermath of a natural/manmade disaster, accident, etc. The first hour of treatment after a serious injury is crucial and the right medical treatment in that duration, when the chances of survival and minimum disability are the highest, is essential. In India, road accidents are the leading causes of disability and mortality. With the number of vehicles on Indian roads on the rise, the exposure to road injuries and deaths has also increased. India accounts for 6% of the world's total road accidents with merely 1% of the world's vehicles.<sup>281</sup> In 2016, at least 17 deaths occurred from road traffic accidents every hour. Road accidents also result in precious loss of demographic dividend and in 2016, the working age group of 18-60 years accounted for ~83% of the total road accident fatalities.<sup>282</sup> Road traffic death statistics in high income countries have witnessed a downward trend or have largely stabilized. However, in countries such as India, road accidents have been on the rise. While these

<sup>281</sup> Rs 554 crore national trauma care policy awaits cabinet approval, 2017, Live Mint

<sup>282</sup> Post-crash care in India, JPN Apex Trauma Center

statistics are alarming, the overall number of casualties can be significantly reduced with adequate trauma care. More than half of the cerebral injuries that occur as a consequence of road accidents can be remedied with appropriate pre-hospital trauma care systems.

Currently, India does not have enough hospitals/clinics with adequate trauma care. Furthermore, the unavailability of adequate infrastructure makes it extremely difficult for ambulances to reach patients and hospitals promptly. The integration of resources at the pre-hospital environment, at the hospital where primary treatment is administered and at the tertiary level is required for the time-critical trauma care system to be effective.

The Indian Government has taken initiatives to address this with schemes such as, “Capacity Building for developing trauma care facilities on National Highways” that includes setting up trauma care facilities along national highways at every 100 km and includes training courses for doctors, nurses and paramedics.<sup>283</sup> However, trauma care in India is still at a formative stage. There is also sufficient disparity in the availability of facilities between rural and urban areas.

### **Case Study: AITSC (Australia-India Trauma System Collaboration)**

In 2013, the National Trauma Research Centre in Australia and All India Institute of Medical Sciences (AIIMS) set up a partnership, called the Australia India Trauma Systems Collaboration (AITSC) and brought together clinicians, researchers and other stakeholders in the sector. The mission of this partnership was to pilot improved trauma systems in India that span over pre-hospital, hospital and post-hospital trauma care. Given the urgent need for change in India’s trauma care systems, AITSC has initiated projects over the last 5 years that have laid the foundation for growing development and quality improvement in India’s trauma care. The most recent achievement was AITSC’s assistance in creating India’s first trauma registry that extracts data patterns in India’s morbidity and mortality rates. Insights from these data patterns will help bridge gaps in India’s current trauma management strategies to offer better outcomes. AITSC is developing an effective channel of communication via its pre-hospital notification to ease the mobility of transporting injured patients to the nearest hospitals in Delhi, Mumbai and Ahmedabad. This will be a locally tailored protocol that will be implemented in India for the first time as an integral component to India’s trauma system. Moreover, the Trauma Reception and Resuscitation program, developed at the Alfred Hospital, has made it easier for trauma management teams to make informed decisions in the first 60 minutes of managing the trauma. This system was modified to enable Indian trauma teams access to computerized decision through a quick exchange of time-sensitive patient data such as his/her vitals, diagnosis and treatments.

Australia has helped India formalize its trauma care through the introduction of such trauma interventions, while the evaluation of these systems has helped Australia further develop and improve its own trauma care.

<sup>283</sup> Trauma Care Centres for Road Accident Victims, Press Information Bureau, Government of India, Ministry of Road Transport & Highways, 2019



#### 4. Training of healthcare workforce

India has a considerable requirement for an adequately trained and skilled medical workforce. With a population that grows at a rate of ~26 million persons ever year, India has merely 462 medical colleges that train ~57,000 doctors and 3,000 institutions that prepare ~126,000 nurses annually.<sup>272</sup> Further, healthcare service delivery is now not only the prerogative of doctors and nurses, but also vastly dependent on the services of allied health staff, also known as ‘paramedics’ or health technicians. The medical industry in India thus requires stringent quality frameworks that can standardize training processes for different vendors in the healthcare value chain. With technology driving future trends in the sector, along with a shift in requirement to 24 hours, 365 days a year facilities and the Indian Government’s efforts towards making universal health coverage a norm, the need for well-qualified, well trained medical staff is indispensable. This could entail providing training for basic services such as sample collection, early diagnostics, basic health check-ups, elaborate patient management, medicine administration, etc. Shortage of doctors and inequitable distribution of medical staff results in a large part of the healthcare demand in rural areas being addressed by informal workers.

The Union Health Ministry in India is also encouraging and taking steps to standardize the medical staff training process in the country. In 2019, NITI Aayog organized talks on nursing education reforms with experts in the industry. The importance of integrating IT in the training curriculum was also discussed.

In Australia, the healthcare and social assistance industry is a training intensive industry where over 76% of the workforce has a post-school bachelors degree or have undergone vocational training.<sup>284</sup> India can thus collaborate with Australia for healthcare education and training. Training could be imparted by joint medical courses and certificate courses by Indian and Australian institutes. Australian institutes can also impart online training to Indian healthcare personnel. There is also an opportunity for medical community exchange programs, where trainers and workforce personnel from rural India visit regional Australia to share best practices, while regional Australian students can work in Indian communities as part of their healthcare training. India and Australia can also collaborate on tribal and rural health training.

#### 5. Aged Care

Ageing is a global issue. The world’s population is getting older due to increasing life expectancies and decreasing birth rates. India has not been spared from this demographic transition and the country’s aged population is rising rapidly. India is expected to have more than 340 million people over the age of 60 years by 2050.<sup>285</sup> The leap in the numbers of the country’s grey-haired population presents significant challenges to India’s healthcare system. While keeping senior family members under care in assisted living centres or old age homes has been historically accompanied by societal judgments and social stigma in India, the concept is slowly gaining acceptance in the country. Urbanization is on the rise and the traditional joint family system in the country is slowly disintegrating. A wave of migration in recent years that has resulted in many young Indians moving abroad and the large number of women in the workforce are glaring reminders of the need to prepare adequately for geriatric care in the country. This issue is particularly more pronounced for senior citizens who require a higher level of care from serious illnesses that their immediate families cannot provide.

<sup>284</sup> Australian Jobs 2018; Department Jobs and Small Business, Australia

<sup>285</sup> Demographic time bomb: Young India ageing much faster than expected, 2018, The Economic Times

The Indian Government has made some interventions to tackle this issue. For example, in 2007 the Indian Government passed the Maintenance and Welfare of Parents and Senior Citizens Act, which requires children to take care of their elderly parents. The Government also introduced the National Programme for Health Care of the Elderly (NPHCE). However, the impact and reach of these measures on geriatric care in the country is debatable. As of mid-2017, only 360 old age homes had been set up with Central Government assistance.<sup>286</sup> India's private sector has made some inroads in this segment, with as many as 30 assisted living projects and another 30 under development. There are also several real estate developers venturing into setting up retirement facilities with state-of-the-art amenities across the country. However, these facilities are expensive and largely cater to the highly affluent segment. The mid-tier, affordable segment in this space is dominated by non-profit organizations and private organizations. However, in the old age homes run by these organizations too, the number of beds is significantly outweighed by their requirement. These homes are also significantly understaffed. There is a dearth of adequately trained geriatric healthcare professionals in the country. The lack of Government-imposed industry standards also poses questions of quality and standardization.

The ageing of the population and the associated increasing number of people with dementia are the two main factors driving increased demand for aged care services in Australia. By 2050, over 1.8 million Australians are expected to be above the age of 85, with an estimated 3.5 million expected to need access to aged healthcare services. The Australian Government has been highly involved in providing geriatric care. In addition to the Government, aged care in Australia is offered by non-profit organizations and private organizations. 'My Aged Care' is the Government subsidized support offered to Australian citizens. The aged care system offers three different types of services - Commonwealth Home Support to support individuals to undertake everyday tasks on need-basis requirement, home care packages depending on the level of medical need and residential care to provide accommodation for people requiring higher levels of care. The home care package offers supplementary support such as cleaning, shopping services, home visits by nurses and equipment to help with mobility, etc.

India needs to upgrade its geriatric healthcare system. One of the key areas for collaboration with Australia can be for training and skill development. Australian aged care bodies can assist Indian organizations with training materials, mentoring and resources required to enhance skills in this sector. The private sector in India has been trying to plug the demand supply gap with senior living and assisted living projects. Indian private organizations can collaborate with Australian companies in this sector by forming joint ventures.

## **6. Opportunities for Australian investments in the Aged Care Segment in India**

Several Indian companies such as India Home Health Care, Portea Medical, Epoch Eldercare etc. are seeking to expand investments in the aged care industry. Rising demand for geriatric care in the country is expected to create significant opportunities in products such as power wheelchairs, home monitoring BP devices, wearable devices to record patient vitals etc., retirement communities and specialized staff that include physiotherapists, medical suppliers, etc. Indian private sector players have displayed a keen interest in investing in this sector. Australian investors should also be encouraged to tap into India's growing geriatric healthcare market.

<sup>286</sup> Here's what the future of the senior living industry looks like for 25% of India's population, 2018, Business Insider



## 7. Medical devices

Australia's medical devices are globally recognized for their innovation. Australia's medical technology sector comprises over 500 companies and has established a global reputation and track record for being innovative, especially in areas such as bionics and implants. Companies such as Cochlear Ltd, Cook Medical Australia and ResMed are some renowned companies in this space. The sector generates a revenue of AUD 11.8 billion (USD 7.9 billion). Most businesses in this sector are SMEs (54%) that have grown from start-ups, though Australia also has a sizeable number of large multinationals in this space (35% of businesses).<sup>287</sup> The industry has several inventions to its credit such as 3D customized titanium implants, non-invasive blood glucose monitoring systems, long-wearing night and day contact lenses, continuous positive airway pressure (CPAP) devices for sleep apnoea, etc.<sup>287</sup>

In an effort to reduce dependence on imports, the Government of India has sanctioned the setting up of 8 manufacturing parks, 4 each for bulk drugs and medical devices.<sup>288</sup> The idea is to have Special Purpose Vehicles (SPV) build the necessary infrastructure and receive clearances in place for these parks.

This presents an opportunity for Indian health care companies to invest in Australian start-ups that have unique medical device technologies. The scale of manufacturing can be supported in India to commercialize device technology developed by Australian SMEs. In the long run, this can help develop a thriving medical technology segment in India. Indian companies can leverage the reputation of Australian device companies to access developed markets. Australian companies can also utilize and leverage India's strengths in low cost manufacturing and to reduce costs and increase margins.

## 8. Medical Technologies

The Indian med-tech market, valued at ~USD 10 billion, is expected to grow at a CAGR of 15-20% by 2025.<sup>289</sup> While the domestic market is still nascent, the Indian Healthcare Information and Communications Technology (ICT) market is forecasted to grow 1.5 times by 2020. The growth in this market is expected to be driven by digital health start-ups.<sup>290</sup>

The digital health start-ups in India are introducing new technologies such as wearable-tech, telemedicine, genomics and artificial intelligence to the Indian healthcare system that are trying to drive demand towards ICT-led delivery and consumption of healthcare services.

The Government of India has initiated the following policies to realize the full potential of the sector:

- Allowing 100% FDI in developing the quality of medical devices and infrastructure facilities.
- The set-up of bio incubators and technology entrepreneurship parks, such as the Andhra Pradesh MedTech zone, InnAccel Bangalore and IKP-EDEN are expected to reduce import dependency and offer resources for product development.

<sup>287</sup> Medical Devices and Diagnostics, Australian Government, 2016

<sup>288</sup> Manufacturing hubs of medical devices, bulk drugs in offing, 2019, Business Standard

<sup>289</sup> Purposeful innovation: How start-ups are solving challenges plaguing Indian healthcare, The Economic Times

<sup>290</sup> Digital health start-ups in India: The challenge of scale, Forbes India

The latest trends in the field include the following:

- Management information systems for consolidating and holding healthcare related data
- Electronic medical records
- Telemedicine in rural areas
- Computer aided diagnosis for assisting radiologists; robotics and non-invasive treatments.<sup>291</sup>

Moreover, the products in this sector are focusing on arriving at clinical solutions, in addition to their offerings in administrative challenges. A few Indian start-ups in this sector include:

- Practo, initially only offering a SaaS based clinical management software to doctors, has developed online consultation, medicine delivery and patient management software.
- Healthifyme is an application, which is designed to collect health data to recommend personalized exercising and diet plans.
- Qure.ai provides AI solutions for efficient diagnosis. It uses the database on radiology images to detect abnormal X-Rays and imaging scans.
- 99Dots focuses on cost-effectively diagnosing tuberculosis in patients.
- Online pharmacies, such as IMG, Myra and Netmeds have also gained popularity in India.

Australian strength in medical innovation can thus be harnessed by the Indian healthcare system to support the country's growing economy. Medical technology is a growing market in India and Indian start-ups in this space can leverage the established framework of Australia's medical technology market to develop similar technologies in the country. India's growing capabilities in IT, data analytics, IoT driven solutions, AI and SaaS solutions can be leveraged by Australian med-tech start-ups in their pursuit of arriving at cost-effective solutions in this space.

Additionally, Australian medical technology start-ups can widen their scope of commercialization by tapping into the Indian market. This opportunity will enable Australian med-tech start-ups to not only access a wider market but also establish the brand value of their innovations at a faster pace.

Further, India and Australia have entered into collaborations across the medical technology space over the last three years. A few examples of these are as below:

- Andhra Pradesh Med Tech Zone (AMTZ), Vishakhapatnam and the University of Wollongong have signed an MoU for 3D printing of medical devices. While the Australian university will provide expertise on the usage of bio-inks, AMTZ will offer one of the largest 3D printing facilities in the world. A series of knowledge programs such as 'AusInnovex' have been conducted jointly under this partnership.
- Flinders Biomedical Enterprises Pty Ltd (FBE) based out of Adelaide specializes in repair of endoscopes which is a highly rated skill and has set up a subsidiary

<sup>291</sup> Emerging Trends in Medical Technology, Elets Technomedia Pvt Ltd



in India. Further efforts are being directed towards setting up the Australian India Centre of Excellence for Endoscopes.

- George Institute of Global Health in Sydney is collaborating with start-ups in the medical technology space for integration of start-ups in early value chain of Indian medical devices sector.

## Opportunities for Australian investments in the med tech sector in India

India's digital healthcare is an attractive domain for several investors. India has around 2,975 med-tech startups that belong to various categories across the healthcare value chain i.e. home healthcare, diagnostics, pharmacies etc. Furthermore, as per Invest India, the medical devices industry is expected to grow at 28% to reach USD 50 billion by 2025. In 2015, the Indian government allowed 100% FDI in medical devices under the automatic route to encourage foreign investments in this sector. This sector thus presents significant opportunities for attractive returns to Australian investors.

## 9. Expert Consultations

Second opinions, especially in diagnosis of crucial illnesses, have become indispensable to reduce healthcare charges and to minimize clinical errors. A study conducted by the Mayo Clinic found that ~88% patients, who sought a second opinion received a new diagnosis after the second round of consultation<sup>292</sup>. Furthermore, 10-15% of illnesses are misdiagnosed, resulting in additional costs of USD 15 billion from irrational use of medicine and medical procedures<sup>293</sup>. Thus, while second opinions are being encouraged, expensive medical bills in developed countries means that most people shy away from getting additional specialist opinions. While most of Australia's citizens are insured under Medicare or private health insurance, they still incur a large out-of-pocket fees for specialist opinions because the cost of a second medical opinion is dependent on the doctors' charges and the rebate Australian citizens receive from Medicare, which can vary significantly.

Digital engagement in healthcare has resulted in a paradigm shift in the way doctors are being consulted and illnesses are being diagnosed. India has several start-ups that offer a medical platform for foreign patients seeking second opinions. These start-ups allow the online exchange of medical files and treatment plans without the need of a physical visit. For instance, TreatGo is a Kochi-based start-up that is seeking to expand its scope of offering second medical opinions by offering treatment options at leading Indian hospitals. Indian doctors can also provide second opinions or expert consultation on medical reports to Australian patients at highly discounted rates as compared to other Western countries. While these expert opinions are discounted, they are as insightful as the ones offered by the doctors in Australia. Therefore, Australian patients can use the cost-effective advantage and quality of expertise offered by Indian doctors to receive a second opinion on their medical diagnosis.

## 10. Cancer Research

Cancer poses a strong challenge to economic and social progress around the world. Countries need to not only take a customized local approach but also collaborate with other countries to collectively address and overcome the risk of cancer.

<sup>292</sup> The value of second opinions demonstrated in study, 2017, Science Daily

<sup>293</sup> Irrational Uses of Medicines - A Summary of Key Concepts, NCBI

Cancer is a significant cause of illness in Australia affecting over 1 million people in the country, who are either currently battling or have survived cancer.<sup>294</sup> Cancer is further expected to affect approximately 150,000 people in Australia by 2020.<sup>294</sup> The five most common types of cancers in Australia include lung, breast, prostate, colorectal and melanoma cancer.<sup>295</sup>

In light of the current and projected impact of cancer, the Cancer Australia Strategic Plan 2014-2019 was developed by Cancer Australia and the Government of Australia. The vision of the plan was to mitigate the effects of cancer and improve the well-being of those affected. This plan is responsible for Australia's first national database for the stage, treatment and recurrence of cancer. Australia has one of the best survival rates for all types of cancer in the world. Australia has three population- based screening programs for breast, bowel and cervical cancer. These screening programs are offered free to all Australians. In addition to these programs, the Government also offers subsidized monitoring and detection tests under Medicare. These programs have contributed to the increase in Australia's current five-year survival rate, which has recently increased to 68%.<sup>296</sup> The Australian Government is the largest investor in cancer research in Australia and in the past four years, the Australian Government has invested over AUD 10 billion (USD 7.14 billion) to fight and control cancer.<sup>297</sup>

Cancer patients in Australia also have access to new treatments on account of AUD 5.1 million (USD 3.4 million) research partnership between CSIRO and GenesisCare, one of Australia's largest cancer care providers.<sup>298</sup> This partnership aims to bring new targeted therapies for patients suffering from the most fatal kind of cancers, such as brain, pancreatic, ovarian and metastatic cancer.<sup>299</sup>

Cancer is a major cause of concern in India as well and the number of cancer cases is progressively increasing every year. In 2016, India had 14 million patients suffering from cancer and this number is on the rise.<sup>300</sup> The most common types of cancers in India include breast, oral, cervical, gastric, colorectal and lung cancer. However, early prevention and detection can significantly improve survival rates in India.

Preventive approaches towards cancer have been initiated in India. For example, the National Institute of Cancer Prevention and Research has been instrumental in creating an operational framework with the Ministry of Health and Family Welfare for the management of population- based cancer screening in 100 districts of India.<sup>301</sup> However, these initiatives have not been implemented at the grassroots level. For instance, less than 30% of women in India undergo screening tests for cervical cancer. While the issue of cervical cancer is pressing, given that the disease contributes to over 60,000 deaths, there is low participation amongst patients due to the lack of awareness and limited access to screening and treatment services in India.<sup>302</sup>

In the last few years, India has made significant progress in cancer research and has several international collaborations to its credit in this field. In the face of the ongoing COVID-19 pandemic, several reforms were announced by India's Finance Minister to revive the Indian economy in mid-May 2020. It was announced that reforms within the field of atomic energy for the production of medical isotopes for affordable treatment of cancer will be undertaken by the Central Government of India. India has become an

<sup>294</sup> Cancer in Australia, 2019, Australia Institute of Health and Welfare

<sup>295</sup> Cancer Council Organization of Australia

<sup>296</sup> Cancer incidence, mortality and survival in Australia, Australian Government, Cancer Research

<sup>297</sup> Cancer Australian Government, Department of Health

<sup>298</sup> New \$5m research project to treat 'untreatable' cancers, 2019, CSIRO

<sup>299</sup> Working to treat 'untreatable' cancers, CSIRO, 2019

<sup>300</sup> Indian Medical Research Center, 2016

<sup>301</sup> ICMR – National Institute of Cancer Prevention and Research, National Institute of Cancer Prevention and Research

<sup>302</sup> Fewer Women undergo test for cervical cancer despite Government push, Live Mint



active member of the International Agency for Cancer Research. India also serves as an important center for training and education in epidemiology for WHO's Southeast Asia region. India hosts the International Agency for Research on Cancer's regional hub for cancer registration, which is one of the most important initiatives in leading cancer epidemiology and secondary research in developing countries worldwide.<sup>303</sup>

While there have been successful partnerships in the field of research with other countries, India can forge new partnerships with Australia to adopt successful models of early detection and control programs. These programs can vastly improve India's survival rates of cancer. While initiatives have been taken by the Government of India, India can collaborate with Australia to learn from its outreach programs in raising health awareness and increasing active participation amongst citizens in screening programs.

## 11. Medical Tourism

While the primary healthcare scenario in India needs vast improvements, the country has an advanced tertiary care sector, especially in urban pockets. Advanced facilities, highly skilled doctors and advantageous price differentials in medical treatments have attracted several medical tourists to India. India has large hospital chains that offer state of the art tertiary treatments. For example, the Apollo Hospital Group has multi-speciality hospitals and satellite chains set up across the country and outside India that are known for specialized treatments in cardiology, hip-replacement and neurology; Max Healthcare has a growing international clientele due to internationally renowned cardiology treatments and use of up-to date modern technology; Tata Memorial Centre is globally ranked as one of the top hospitals for oncology. Medical tourism is one of India's major sources of foreign exchange. The medical tourism industry was valued at USD 3 billion in the year 2015 and is projected to be valued at USD 8 billion, accounting for 20% of the global market share by 2020.<sup>304</sup>

Apart from tertiary care, cosmetic surgeries and dental procedures are highly affordable in India. Medical procedures in Australia such as a hip replacement on an average, costs two-three times (USD 13,850- USD 27,700) more than the amount in India (USD 9,000). ~15,000 Australians travel overseas for medical treatment each year.<sup>305</sup> With rising insurance premiums, even basic hospital insurance becomes unaffordable for many Australians and therefore supplemental extras such as dental care are preferred to be carried out overseas.<sup>306</sup> The most popular treatments amongst Australian medical travelers include facelifts, spinal surgeries, neck surgery, hip replacements, knee replacements, shoulder reconstructions and fertility treatments.

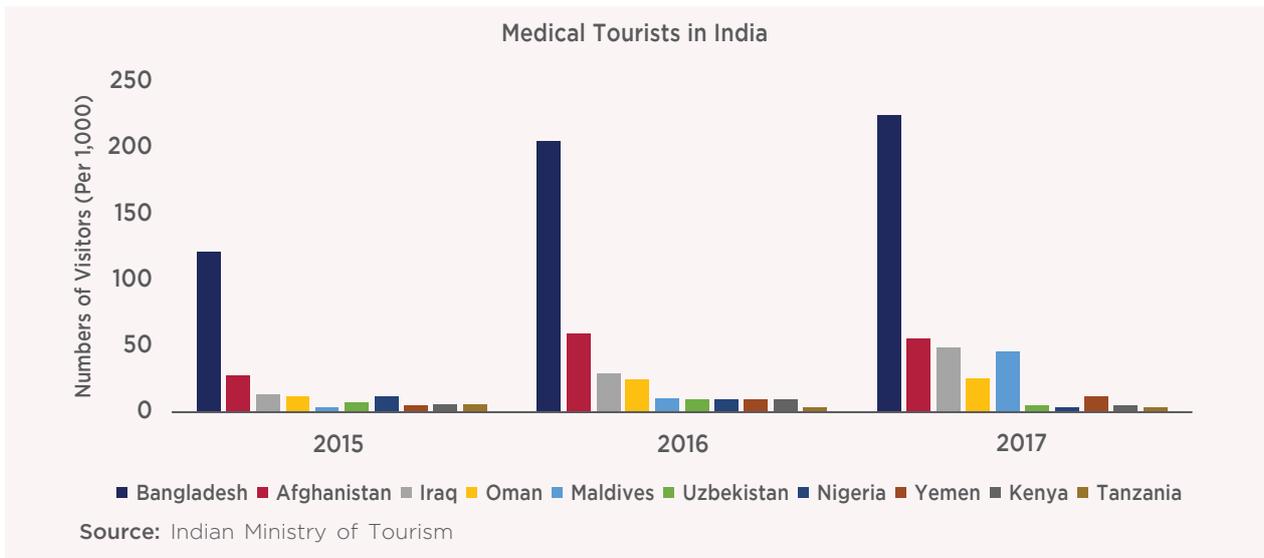
While India witnesses an influx of patients from Bangladesh, Afghanistan, Iraq, Maldives, Oman, Yemen, Uzbekistan, Kenya, Nigeria and Tanzania, the share of patients from Australia is relatively less.

<sup>303</sup> Cancer Burden and Health systems in India, Tata Memorial Center

<sup>304</sup> Indian medical tourism industry to touch \$8 billion by 2020: The Economic Times

<sup>305</sup> Medical Tourism and Insurance, Better Health - Victorian Government

<sup>306</sup> Medical Tourism: 500,000+ Aussies Heading Overseas For Procedures In 2017, Canstar



This could be on account of the lack of direct flights and lack of awareness about medical procedures in India. In order to further incentivize the medical tourism industry and encourage travel from Australian citizens, the Government of India should extend its support by improving infrastructure to ensure a comfortable stay for foreign visitors. India needs to develop a one-stop service that will provide travel, lodging, cashless direct billing, efficient customer service and post-hospital care coordinated via a single portal or call centers to its medical tourists. Nasscom companies could provide the industry with the necessary technology and business transformation know-how to make this whole process smoother. Large companies such as Tata, Fortis, Max, Wockhardt and Apollo Hospitals have already made significant investments in the establishment of modern hospitals and tourist services to host international patients. These companies can also partner with Australian private health insurance companies to provide attractive health travel packages that ensures Australian travelers large cost savings. Such a partnership, in turn, will raise confidence in and awareness about India's healthcare system. The Joint Commission International, a non-profit organization based out of the US, is an independent global accreditation agency that evaluates, classifies and offers innovative solutions to health care organizations across the world. A similar set-up agency in Australia can also provide an additional safety measure to Australian citizens travelling to India, while also incentivizing Indian hospitals to raise their standards.

## Recommendations

- To promote Indian medical tourism in Australia, the Indian Government should establish a medical tourism framework with support infrastructure to ensure a comfortable stay for Australian visitors who come to India for procedures such as dental care, major and minor cosmetic surgeries, etc.
- Large private hospitals, in collaboration with the Indian Ministry of Tourism, need to develop a one-stop service that will provide travel, lodging, cashless direct billing, efficient customer service and post-hospital care for Australian medical tourists. Nasscom companies could provide the necessary technologies to make this process smoother.
- Indian companies could explore partnering with Australian med-tech start-ups and supporting them with funding requirements for large scale commercialization to target the global market. This could be done by way of signing MoUs between Indian and Australian companies as well as setting up Med-tech parks.
- Indian Government should engage with Australian aged care companies to encourage investments into building an aged care ecosystem in India.
- Australian investments should be encouraged by India in the primary healthcare, e - health care areas

## Agribusiness

### Synopsis

Australia has an abundance of natural resources and is recognized internationally for the productivity of its agriculture sector and its high quality exports. Scientific advances have helped Australian farmers put themselves at the forefront of efficient and productive agricultural practices in the world.

India is the leading producer of several commodities such as rice and wheat. The Indian agribusiness sector has significant untapped potential that could be enhanced with access to Australian technologies that improve both yield and quality of agri-farming and output.

The following opportunities have been identified for this sector:

- Increasing knowledge transfer initiatives between India and Australia in agri-technologies
- Adopting best practices in dairy processing
- Collaborating with Australian Government/ companies for innovative storage techniques
- Investing in farm lands and wool farms in Australia
- Collaborating with Australian companies in areas such as aquaculture and deep-sea fishing
- Investing in Australian food processing
- Exporting India's Ready to Eat products to Australia
- Encouraging research partnerships with Australia to develop India's biofuel potential
- Promoting investments by Australian companies in India's mega food parks

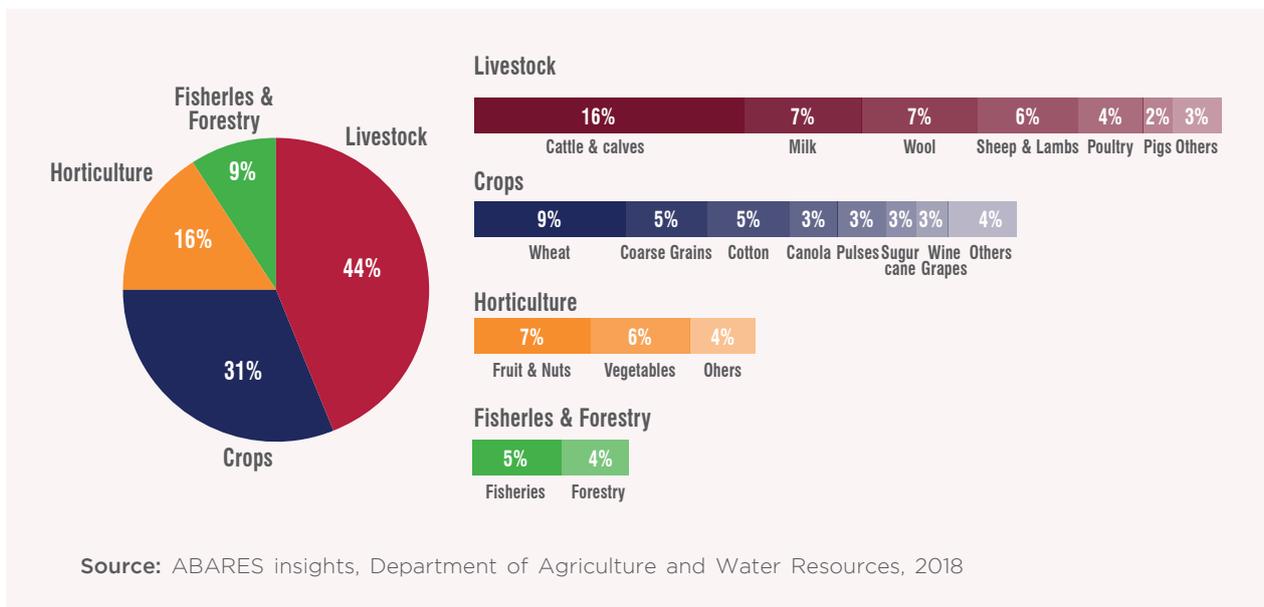
## 5.5 Agribusiness

### Macroeconomic Overview - Agribusiness in Australia

The agricultural sector in Australia is renowned for its high productivity, technological advancement, innovation and high quality of produce.<sup>307</sup> This sector, which employs more than 300,000 people, is one of the strongest pillars on which the Australian economy is built. About half of the land area in Australia is utilized for agricultural activities. It is one of the fastest growing sectors in the economy, contributing 2.6% (~USD 30 billion) towards the Australian GVA.<sup>308</sup> Australia is on par with other developed nations like France, the US and the UK in terms of the share of agriculture (1-2%) in the overall economy.

### Agricultural production in Australia

Agricultural production in Australia can be categorized into four broad categories: livestock (44%), crops (31%), horticulture (16%) and fisheries and forestry (9%).



Livestock includes animal rearing for consumption of meat as well as products such as wool, dairy, etc. It is the fastest growing category in the agriculture sector in Australia and livestock production has grown by more than 50% over the last 20 years. Specifically, the rearing of cattle and calves (for beef) is the largest activity within livestock farming, contributing 16% to the overall livestock output.<sup>309</sup> Australia is amongst the top ten dairy producers in the world with the highest value addition domestically. Crop cultivation is the second largest activity under agriculture and comprises of cultivation of grains like wheat and other coarse grains such as barley, oats, etc. and crops like sugarcane and oilseeds. Australia is amongst the top ten wheat producers of the world producing 35 million tons in FY 2017-18.<sup>310</sup> Horticulture is the third largest category within agriculture comprising of cultivation of fruits and nuts worth ~AUD 4.9 billion (USD 3.3 billion) and vegetables ~AUD 4.1 billion (USD 2.8 billion).<sup>309</sup>

<sup>307</sup> Australian Bureau of Statistics

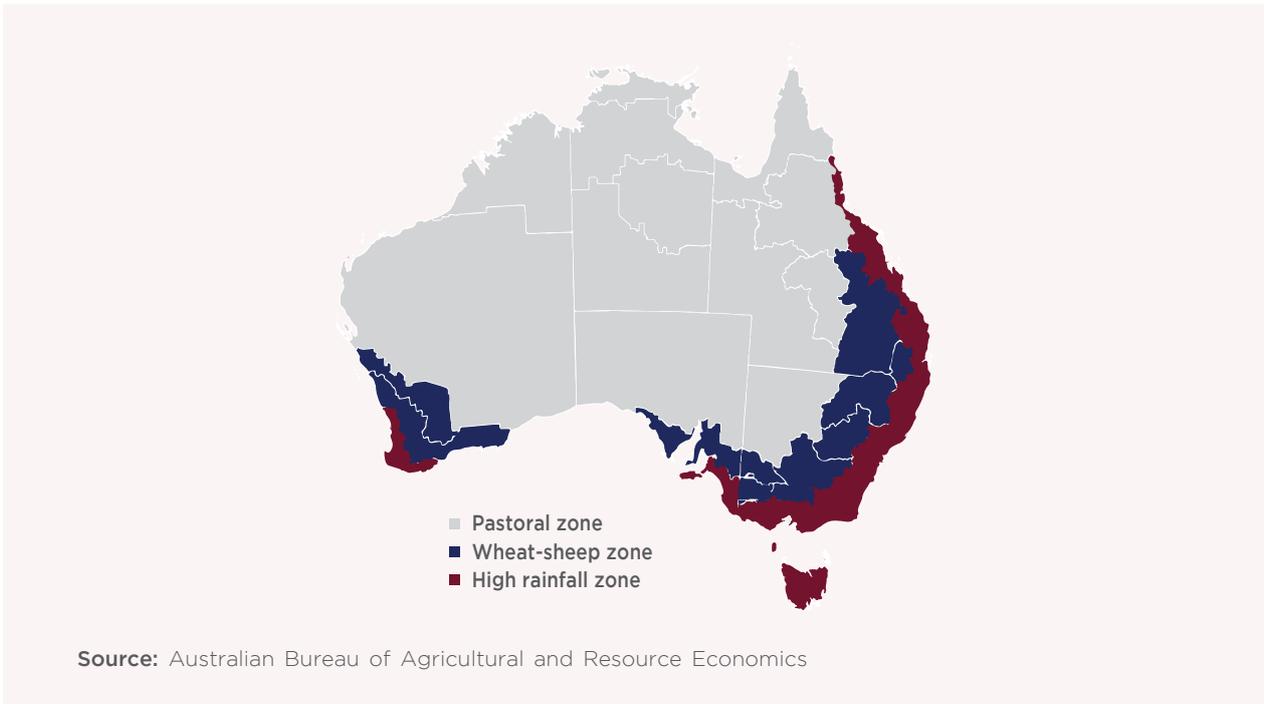
<sup>308</sup> Australia Benchmark Report 2019, Austrade

<sup>309</sup> ABARES insights, 2018, Department of Agriculture and Water Resources

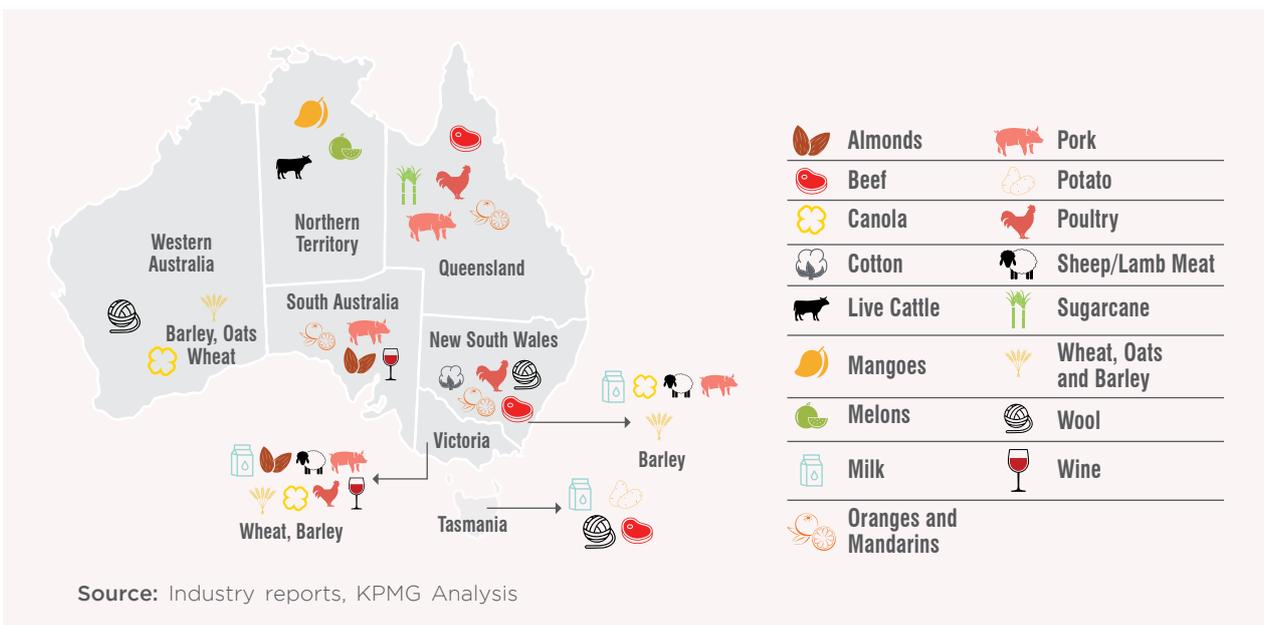
<sup>310</sup> National Farmers' Federation, Food, Fibre & Forestry Facts - A summary of Australia's Agriculture sector, 2017

## Regional map of Australia's agriculture

Australia has diverse climatic conditions that are conducive to the cultivation of a wide array of agricultural products. Australian territory can be classified into three broad zones, viz., pastoral, wheat-sheep and high rainfall zones.



The western parts of Western Australia, eastern parts of Queensland and New South Wales and southern parts of South Australia are all parts of the wheat-sheep zone, which is suitable for cropping as it is made up of arable land. The pastoral and high rainfall zones are typically used for grazing of animals as they are not as fertile and hence have lower capacity for cropping.



Majority of the farms in Australia are located in Victoria, Queensland and New South Wales.

Victoria is the largest producer of almonds and milk in Australia. The state accounts for ~60% of the overall milk production and 73% of almond production, in value terms. It is also the second largest producer of wool (25%)<sup>311</sup> as well as sheep & lamb meat (43%).<sup>312</sup> Victoria is a significant producer of barley (22%), wheat (14%), canola (14%) and poultry (23%). The state is also known for food processing with companies undertaking over 30% of Australia's food processing R&D.<sup>312</sup>

New South Wales is the largest producer of cotton, poultry meat, wool, oranges & mandarins. It is also the second largest producer of beef, milk, canola and sheep/lamb meat. New South Wales constitutes about 63% of overall cotton production in Australia by value.<sup>313</sup> The state has the largest poultry flock estimated at ~30 million animals and accounts for 28% of the overall poultry meat production by value. The state is also well-known for its wool production and has a value share of 32% in total wool produced in Australia. The state is also known for its Valencia and Navel oranges and accounts for 43% value share in total production of oranges in Australia.

Queensland is well renowned as a producer of sugarcane, cotton, beef, poultry meat, pig meat and mandarin oranges. Queensland accounts for 95% of sugarcane production in Australia, valued at USD 1.1 billion. The state is home to half of the cotton farms in Australia and accounts for 37% of the country's production by value. It is the largest producer of beef-constituting 47% of Australia's beef production by value, second largest producer of poultry meat (24%) and third largest producer of pig meat (23%). The state is also a significant producer of mandarins, accounting for 22% value share of total production.

Western Australia is the largest producer of barley (32%), oats, canola (49%) and wheat (33%) in Australia and the second largest producer of wool (24%). The state also provides raw materials for exports of a large number of processed products including wine, ice-cream, barley malt, noodles and fine leather and is also a globally recognized supplier of lobsters, prawns and pearls.

South Australia is the largest producer of wine in Australia-constituting 42% of total grape crush. Riverland and Barossa valley are the prime wine producing regions in the state. It is also the largest producer of pork (26%), second largest producer of oranges (32%) and a significant producer of almonds (14%). The Waite Research Institute (WRI) that supports research and innovation across Australia's agriculture, food and wine sectors, is also located in South Australia.

Northern Territory is close to the fast growing and high demand Asian markets and supplies live cattle for both export and domestic markets. The territory has several mango farms and produces tropical horticultural crops such as melons, bananas and Asian vegetables.

Tasmania is known for milk, beef, potatoes and wool. The volcanic soil of Tasmania allows it to produce high quality potatoes. The region is also acclaimed for its superfine wool.

<sup>311</sup> Why Victoria is the food state of Australia, Global Victoria website, September 2018

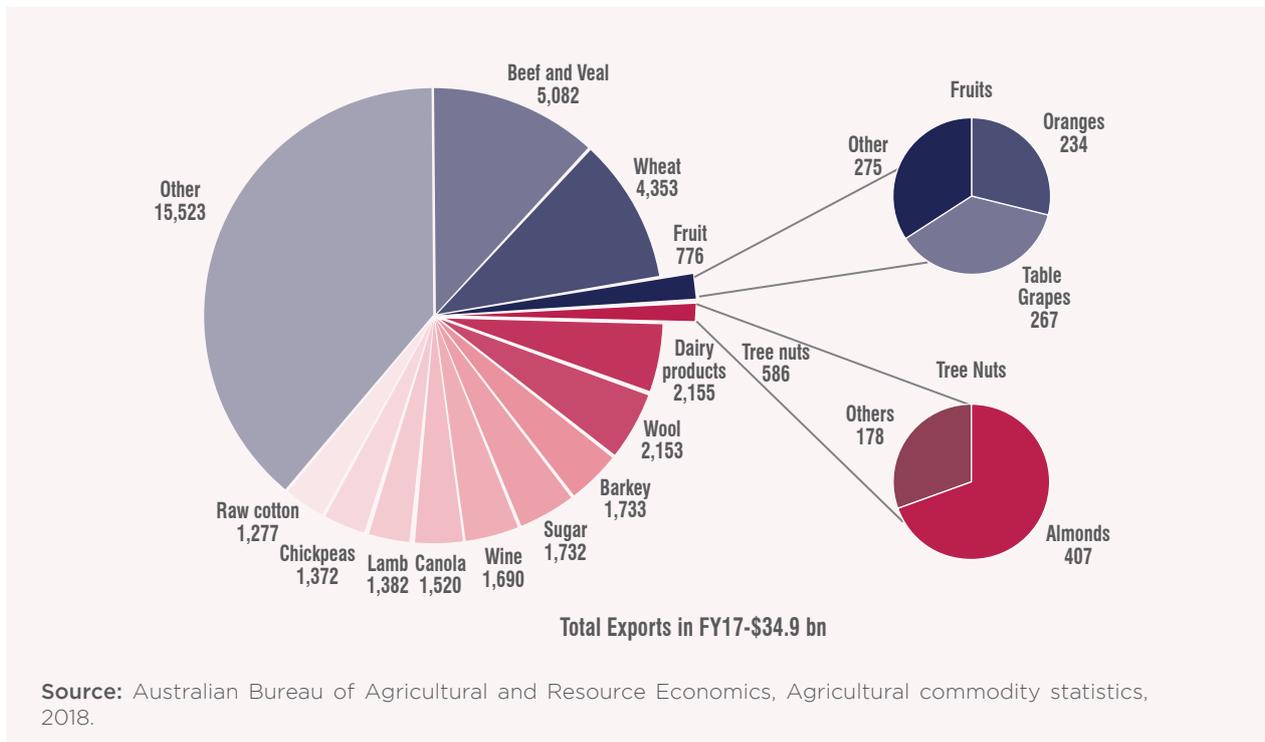
<sup>312</sup> "Horticulture, Invest in Victorian agriculture and food, Agriculture Victoria, August 2018 Australian Dairy Industry, Dairy Australia"

<sup>313</sup> Australia Bureau of Statistics, Value of agricultural commodities produced, no. 75030.



## Agricultural exports from Australia

The key commodities exported by Australia are beef and veal, wheat, dairy products, barley, sugar, wine, canola, lamb meat, chickpeas, raw cotton, almonds and oranges. The total agriculture commodity exports from Australia stood at ~AUD 7.3 billion (USD 4.9 billion) in FY17.<sup>314</sup> The top destinations for Australia's agro commodities are China (21%) followed by Japan (10%), the European Union (8%), the US (7%), South Korea (7%) and Indonesia (7%).



Australia is the third largest exporter of beef in the world. The key export markets for Australian beef are Japan (27%), the US (21%) and South Korea (17%).<sup>315</sup> Australian beef is considered to be of a superior quality and free from diseases. Australia's traceability and meat standards gives it a competitive edge in the global market. A few notable beef producing companies from Australia are Stanbroke Pastoral, AA company, Consolidated Pastoral Co. and Kidman holdings.

Wheat exports from Australia were valued at ~AUD 6.4 billion (USD 4.3 billion) constituting 12% of Australia's total agriculture exports by value in FY17.<sup>316</sup> The key export markets of Australian wheat include Indonesia, China, Vietnam, South Korea and Japan. White grained wheat varieties that generate high flour milling yield are produced in Western Australia. Notable companies producing wheat in Australia include family owned companies like Harris family, Stanbroke Pastoral and Sundown Pastoral.

<sup>314</sup> Australian Bureau of Agricultural and Resource Economics, Agricultural Commodity Statistics, 2018.

<sup>315</sup> Agricultural commodities 2018, Government of Australia

<sup>316</sup> Agriculture commodity statistics, 2018

Australia is the world's largest producer of wool, accounting for one-quarter of the global wool production. It is the leading exporter of fine apparel wool, constituting 90% of the world's fine apparel wool production.<sup>317</sup> China is the largest export market for Australian wool constituting 74% value share followed by the European Union (10%) and India (10%).<sup>317</sup>

Australia ranks among the top four countries in dairy trade, constituting a 6% share in the world behind New Zealand, EU and US. Of the total production, more than one-third is exported. Asia is the largest market for Australian dairy products, constituting 85% of the total exports. Within Asia, China (27%), Japan (13%), Singapore (9%), Malaysia (7%) and Indonesia (7%) are the key markets. High demand from Asian markets and Australia's geographic proximity to Asia have led to high concentration of exports to Asia within Australian dairy exports. The total value of Australian dairy exports in FY18 was ~AUD 3.7 billion (USD 2.5 billion). The key products exported include cheese, whole milk powder-including infant powder, skim milk powder and milk. The dairy exports from Australia to China have increased by 164% from FY14 to FY18, with categories like infant powder, skim milk powder and cheese witnessing significant growth.<sup>318</sup>

Australia is one of the largest barley exporters in the world, constituting 30-40% of the exported malting barley and 20% of the global feed barley.<sup>319</sup> China and Japan are the key markets for malt grade barley while the Middle-Eastern countries, mainly Saudi Arabia and Kuwait, are the key markets for feed grade barley.

Australia produces different kinds of red and white wine varieties such as Shiraz, Cabernet Sauvignon, Chardonnay, Merlot and Sauvignon Blanc. Australia exports ~64% of the wine it produces and is the 5th largest wine exporter in the world. The key export destinations for Australian wines are China (33%), US (18%), UK (14%), Canada (7%) and Hong Kong (5%).<sup>320</sup>

Australia is the second largest exporter of Canola in the world after Canada. Canola oil can be used as margarine, cooking oil and salad dressings and as a fuel source in farming business operations. Australia's key export markets for canola include Germany, Belgium, Japan, France and UAE.

Other agricultural products exported from Australia include sheep meat, lamb and mutton, chickpea, cotton, sugar, citrus fruits and almonds. Australia is the world's largest exporter of sheep meat. Australia is the largest chickpea exporter in the world and its key export destinations are India, Pakistan and Bangladesh. India constitutes a large share (80%) in the Australian chickpea exports. Australia is the fifth largest exporter of cotton with 99% of the raw cotton produced in Australia being exported to countries such as China (55%), India, Thailand, Vietnam and Indonesia.<sup>321</sup> Table grapes and citrus fruits such as oranges and mandarins are one of the largest fruit exports from Australia. The prime export markets of Australian citrus fruits include China, Hong Kong, Japan, Indonesia and Singapore. Australia is the world's second largest almond exporter in the world. India is the most important export market for Australian almonds accounting for 40% share in the overall export quantity. Other significant markets for Australian almonds include Vietnam and China. Australia is the second largest exporter of raw sugar in the world and raw sugar constitutes 80% share in the domestic sugar production. The key export destinations for Australian sugar are South Korea, Japan, Indonesia and Malaysia.<sup>322</sup>

<sup>317</sup> Department of Agriculture and Water Resources, Wool

<sup>318</sup> Australian Dairy Industry In Focus 2018 by Dairy Australia

<sup>319</sup> Australian Exports Grain Innovation Centre (AEGIC), Australian Barley - Quality, safety and reliability

<sup>320</sup> Australian wine sector 2017 at a glance by Wine Australia

<sup>321</sup> Food, fibre & forestry facts by National Farmers' federation

<sup>322</sup> Department of Agriculture and Water Resources, Sugar



## Agriculture in India

Around 70% of India's population resides in rural areas, where the main occupation is agriculture related.<sup>323</sup> India has traditionally been an agrarian economy, with more than 40% of the workforce employed in the agricultural sector.<sup>324</sup> A wide array of diverse climatic conditions and soil types have led to India's agriculture sector being one of the most significant sectors of the economy, contributing 17-18% of India's Gross Domestic Product (GDP).<sup>325</sup> The Gross Value Added (GVA) by agriculture, forestry and fishing was approximately USD 275 billion in FY18.

India is a leader in the production of food grains, horticulture and livestock. India is the second largest producer of food grains globally with an estimated production of 285 million tonnes in 2018.<sup>326</sup> India is the 2nd largest producer of rice and wheat and the largest producer of pulses. It is also a leading producer of cotton (2nd largest), jute (largest) sugarcane (2nd largest), oilseeds and tea.<sup>327</sup> India is also a leading producer of fruits (leading in mangoes, bananas, papayas), vegetables (leading in potatoes, onions, cauliflowers) and of fish, poultry and livestock, having the world's largest cattle herd (buffaloes). It is also the largest producer and consumer of dairy products.

India is one of the top ten exporters of agricultural produce in the world. The two significant contributors to export revenue for Indian agricultural produce are food grains and livestock (and related products). Rice is India's most valuable export, at approximately USD 8 billion in 2018 especially the famous 'Basmati' rice. The Middle East - Saudi Arabia, Iran and UAE - are important markets for India's rice exports. India also ranks as the second largest exporter of cattle meat (beef), largely exporting to Vietnam, Malaysia and Egypt. India exports around 14 million tons of seafood (worth approximately USD 7 billion) to the USA and South East Asia.<sup>328</sup>

India is amongst the top five exporters of onions, with exports worth USD 500 million in 2018. India is also the world's largest processor and exporter (USD 943 million) of cashews in the world. As a pioneer of the cashew industry, India was the first country to introduce kernels to the world market. India is also a notable exporter of coconuts (USD 63 million in 2017) and a key exporter of groundnuts with approximately USD 525 million exported in 2018.

Despite the large agricultural production, India faces significant challenges in this sector. India employs approximately 42% of the population in the agriculture sector. However, this sector contributes only about 17-18% of the GDP in India. This trend reflects the slow adoption of mechanization and the relatively low labour productivity in this sector. While India's dependency on rainfall for agriculture has reduced significantly over the years, there are still a large number of geographical pockets, which are heavily dependent on rainfall.

There is a limited degree of concentration of land holding in India. Large parcels of lands are held by a small section of wealthy farmers or landlords, while a vast majority of farmers own very little or no land at all. The main constraint to adoption of mechanization in India has been land fragmentation, with a majority of marginal and small landholdings hampering

<sup>323</sup> 70% Indians live in rural areas: Census, The Business Standard

<sup>324</sup> Employment in Agriculture Data Set, World Bank

<sup>325</sup> Contribution of various sectors to GDP, PIB, Ministry of Finance

<sup>326</sup> India's foodgrain production touched new high in 2017-18, Times of India

<sup>327</sup> India at a glance, FAO

<sup>328</sup> Indian seafood export touches new high at \$7.08 billion, The Economic Times

the utilization of agricultural machinery and inadequate access to formal sources of finance for long-term credit.

Additionally, storage facilities in rural areas are inadequate. Indian agriculture faces several challenges such as food wastage, lack of adequate food processing, logistics and preservation and refrigeration facilities. As a result, farmers are forced to sell their produce immediately after the harvest at low market prices. Such distressed sales deprive the farmers of their rightful income.

## Key Opportunities

### Investing in agriculture technologies in Australia

While India is one of the largest producers of a number of crops such as rice and wheat, it suffers from a relatively low yield (quantity of crop produced per unit of land). For instance, for two of India's largest produced crops, rice and wheat, India's yield is far lower than other countries. India has a rice yield rate of 2.4 tonnes per hectare while China and Brazil have yield rates of 4.7 and 3.6, respectively.<sup>329</sup> Similarly, India's yield rate for wheat of 3.15 tonnes per hectare is significantly behind countries such as South Africa and China whose yield rates are 3.4 and 4.9 respectively.<sup>330</sup>

There are a number of reasons for India's low levels of productivity, primarily, the fragmentation of farm land holdings leads to a feasibility gap in implementing large scale solutions to the Indian agricultural landscape. The lack of access to modernized technology and processes – for irrigation, automation using machinery, etc. act as a key hindrance for improvement in yields.

In Australia, the use of technology in agriculture has led to an improvement in the efficiency and productivity of animal and plant production systems. Biotechnology, farm management and farm robotics are some of the key areas where Australian agritech has witnessed development and investor interest. Particularly, in biotechnology, the use of genetically modified plants in commercial farming is prevalent for some crops, with extensive use in herbicide-tolerant canola, carnations and cotton. Cotton, one of Australia's key export commodities, is largely (98%) grown using genetically modified seeds.<sup>331</sup> Genetically modified crops however, are heavily regulated and limited in Australia, and apart from the three aforementioned crops, genetic modification is not permitted in most other commercial cropping. Farm management software involves the use of decision support tools to help farmers take decisions that result in improvements in crop production and performance. The use of Internet of Things (IoT) and Artificial Intelligence (AI) in Australian agritech have seen significant innovation and investments from the likes of large corporations like Bosch and Cisco as well as home grown start-ups such as Agrivi, CropLogic, Aerofarms, etc. Incorporating innovative technologies such as driverless tractors, drones to monitor crop health, use of data to drive solutions and Uber-like mobile applications for ferrying fresh produce has revolutionized the agricultural production process.

Large investments in research and development of innovative technologies has brought forth these solutions, leading to high growth in this sector. Specifically, the Government has funded rural R&D corporations to focus on agritech research activities. CSIRO initiatives, such as using Delta Carbon Technology to identify water-efficient plants, have brought about this change. Australian technologies, that drive productivity improvements despite challenging weather conditions, can be leveraged by India.

<sup>329</sup> India's agricultural yield suffers from low productivity, Live Mint

<sup>330</sup> Raghavan, 2014, India's agricultural yield suffers from low productivity

<sup>331</sup> "Farmers continue to debate the merits of genetically modified crops as Monsanto marks 20 years of GM in Australia, ABC News"



Possible areas of collaboration with Australia include exchange of germplasm; quality planting material for almonds, grapes, oranges and vegetables for healthy production; capacity building of personnel through knowledge-exchange training and visits; transfer of technology for application in the Indian context in farm management and Artificial Intelligence (AI); post-harvest management specially for cold storage of perishable horticulture produce. In addition to this, possibilities may also be explored for use of Australian solar energized greenhouse technology for North Eastern parts of India.

Collaborations between Australia and India can occur at multiple levels across stakeholder organizations to facilitate the transfer of knowledge and technology for application in the Indian context. This could be in the form of the two Governments driving programs for nodal institutions that oversee the development of the agriculture sectors, to share knowledge on processes as well as to administer the use of new technology in agriculture. It could also take the form of private institutions from India collaborating with other private bodies across the borders or directly with the Australian Government to customize solutions that could be implemented for India's agriculture.

Indian HNIs, private corporations and the Government can invest in agri-technology and expertise in Australia. Inventions arising from Australian agriculture include the combine header harvester and stump-jump plough and drought and disease-resistant wheat. Australian farmers are also rapidly adopting practices that are highly mechanized to remain price competitive.<sup>332</sup>

In addition, investment by Indian companies in Australia could also result in research partnerships between Indian companies and CSIRO and other research bodies in Australia, which could benefit both countries. For example, Waite Research Institute (WRI) at the University of Adelaide was established to drive research and build capacity for Australia's agriculture including research on soil, food and wine sectors. WRI aims to contribute solutions to the emerging challenges of global food security and agricultural sustainability. Researchers at WRI use genomics to understand genetics as well as to produce drought and disease resistant and high-quality varieties of wheat, barley, etc. India could collaborate with such institutes for research.

Another route for investment by Indian companies could be the acquisition of specific agriculture-tech companies/start-ups in Australia. Access to capital as well as resource augmentation is necessary for agri-start-ups to thrive. A report released by KPMG Australia compared six international AgTech players on specified parameters. While Australia scored higher than India on parameters such as capacity to innovate and university-led collaborations, India ranked higher on monetary parameters. Indian companies can thus invest/ acquire Australian agri-tech companies and utilize the technologies that focus on solutions for problems relevant to the Indian context. For example, in 2017, Jain Irrigation Systems Limited, India's largest micro-irrigation firm, acquired the technology and the core team of Australian agri-tech firm Observant Pty Ltd that is well known for its in-field hardware and cloud-based applications for precision farm water management.<sup>333</sup>

<sup>332</sup> Australian Bureau of Statistics, Farming in Australia, No. 1301.0.

<sup>333</sup> Jain Acquires Observant Technology - Strengthens Global Commitment to Precision, 2017, Jain Irrigation Systems Ltd.

### Case Study: YES Bank and Austrade

Agriculture in Australia is posed with several challenges from climate and logistical complexities. However, the country overcame these challenges and produces high quality produce, which meets some of the most stringent food standards in the world such as that of Japan and Europe. In 2013, Austrade and YES Bank signed a Memorandum of Understanding (MoU) to address concerns faced by Indian agricultural sector, such as food security and farm productivity using Australian expertise.

Under the MOU, Austrade and YES Bank have arranged joint workshops across India to spread awareness about Australian agribusiness capabilities and to provide information to Indian businesses searching for opportunities to expand internationally. Austrade has also provided assistance to Australian companies with their expansion in India by identifying potential investment opportunities and partners for joint ventures.

**Source:** Australian trade commission partners with Yes Bank to offer Australian agribusiness and food expertise for India, 2013, The Times of India

### Case Study: ITC's acquisition Technico's seed potato technology

In 2007, ITC Limited acquired Technico Pty Ltd (“Technico”), an Australia-based agritech company that has expertise in rapid seed potato technology. Technico developed TECHNITUBER®, a proprietary technology that enables the rapid multiplication of seed potatoes through the use of pathogen-tested tissue culture and processes in a controlled environment. It significantly expedites the commercial production of quality seed potatoes and enables introduction of new varieties in a shorter timeframe.

Before being acquired by ITC, Technico was a step-down subsidiary of Chambal Fertilizers and Chemicals Ltd, a K.K.Birla group company. In 2007, Russell Credit Limited, a wholly owned subsidiary of ITC, acquired Technico from its owners, which was subsequently acquired by ITC in March, 2012.

**Source:** ITC buys Technico's India seed potato unit for Rs121 crore, 2016, Live Mint

Australia and India can develop and fund a collaborative agri-food research program focused on tropical conditions farming and agriculture, greenhouse technology and fish farming. The joint R&D programs could increase projects, which are designed to improve food production and logistics practices. Currently, Australia's Western Sydney University has entered into a partnership with the Indian Council of Agricultural Research (ICAR) and thirteen state agricultural universities as a part of a new initiative designed to combat global food security issues presented by climate change.<sup>334</sup>

<sup>334</sup> Australian university to help Indian farmers double income, 2018, The Economic Times



Indian Council of Agricultural Research (ICAR) has the capability to establish agricultural universities. India has additionally established the Afghanistan National Agriculture Science and Technology (ANASTU) in Afghanistan and the Advanced Center for Agricultural Research and Education (ACARE) in Myanmar.

India currently has three<sup>335</sup> Central Agricultural Universities (CAUs) and 64 State Agricultural Universities (SAUs).<sup>336</sup> While the institutes in India have contributed towards agriculture research in the country, they require institutional support, better infrastructure and faculty development to be able to achieve international excellence. There is also a requirement for greater focus on innovation-based research in India as well as deeper collaboration with agri-universities and students from other countries. Agricultural education in Australia is highly developed with several universities such as the Australian National University, University of Melbourne, University of Sydney and University of Western Australia, etc. are offering specialized research based agricultural courses. Some of these programs are ranked amongst the top 50 in the world.<sup>337</sup>

For example, in 2012 a 6-year research agreement was signed between Biotechnology Industry Research Assistance Council (BIRAC) (representing the Indian Government) and Queensland University of Technology for development and tech-transfer of a bio-fortified and disease-resistant banana variety. This project involved Indian institutes such as National Research Centre for Banana, National Agri-Food Biotechnology Institute, Bhabha Atomic Research Centre, Tamil Nadu Agricultural University, Centre for Plant Molecular Biology and Biotechnology and Indian Institute of Horticultural Research.<sup>338</sup>

India can also collaborate with Australia to set up a leading-edge agri-university in India, based on Australian institutes' world class infrastructure, specialized curriculum and extensive research-based programs as well as work towards upgrading the existing universities in India.

### Case Study: CISCO in agribusiness

Australia offers numerous opportunities for new technologies in agribusiness, which have attracted partnership and investments from leading multinationals such as Cisco. Out of its 10 Global IOT innovation centres, two are hosted in Australia (Sydney and Perth) with the Sydney facility being the only one focused on agritech and foodtech. Since 2016, Cisco has invested over AUD 50 million (USD 35.7 million) in Australian venture capital and in the two innovation centers aiming to quicken the digitization of certain sectors within Australia including agriculture. In agriculture, the specific focus is to improve supply chain efficiency, productivity and quality of food production.

At the Sydney innovation centre, Cisco developed the Farm Decision Platform (FDP) to resolve the challenges from on-farm connectivity. It is a smart farming platform designed as an open system where other independent parties can develop and commercialize their own application and other solutions, similar to app development on a smartphone operating system. FDP doesn't necessarily require internet access. Some examples of FDP enhancing farmer productivity include:

**Data sensors:** Sensors are installed in electric fence of the farm that send the farmer a notification when the current is not flowing through a fence. It notifies the farmer of any signal issues immediately preventing animals from escaping.

<sup>335</sup> Central Agricultural Universities, Indian Council of Agricultural Research

<sup>336</sup> State Agricultural Universities, Indian Council of Agricultural Research

<sup>337</sup> QS world university rankings 2018: agriculture and forestry, 2018, The Guardian

<sup>338</sup> India PM Narendra Modi visits 'Super-Banana' lab in Australia, 2014, Livemint

**Measuring micro-climate data in feedlots:** Using FDP, temperature and wind data can be monitored by provisioning sensors as an alternate to expensive monitoring systems. This helps farmers to detect and mitigate severe problems like heat stress on feeding cattle.

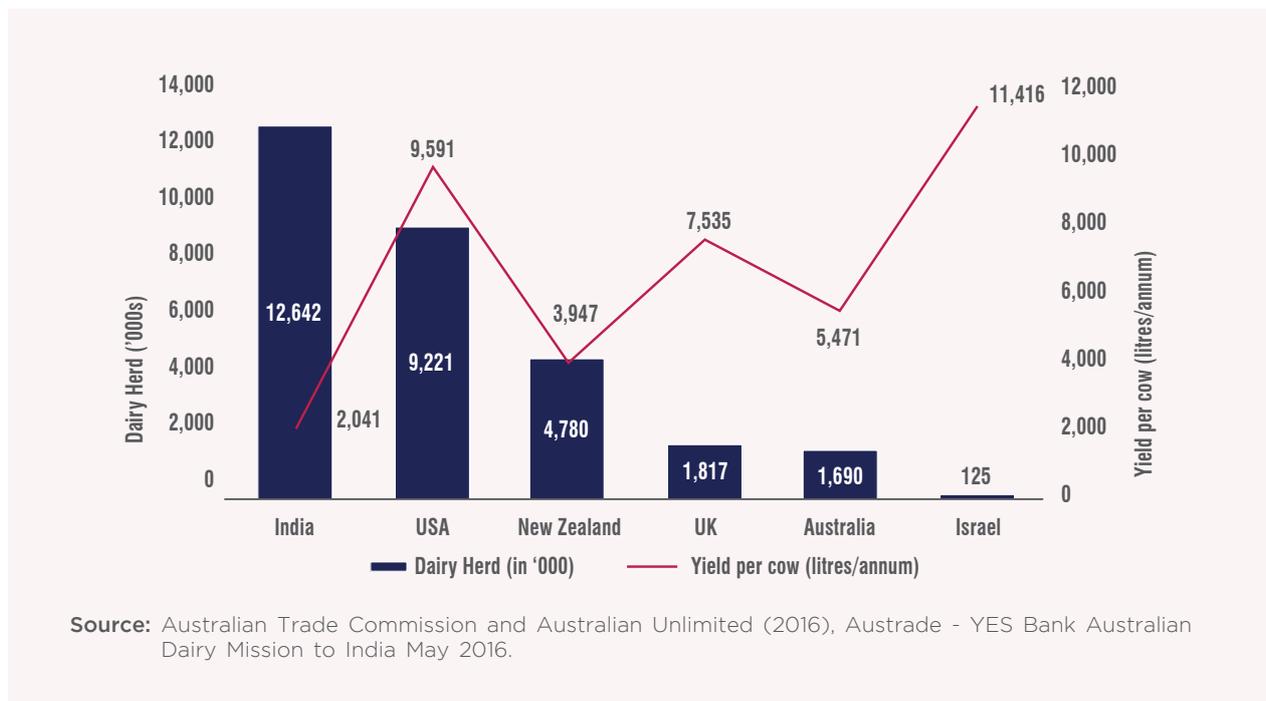
Cisco and its partners plan to commercialize FDP internationally. Based on the local acceptance in Australia and proven use-cases, Cisco expects up to 20 target markets to deploy the FDP.

Source: Agtech in Australia: Driving IOT connectivity for farming,

### Opportunity for adoption of best practices in dairy processing

India is the largest milk producing country in the world. India produced 156 million tons of milk in 2015-16.<sup>339</sup> A large portion of Indian dairy is domestically consumed, leaving very little quantity for export. Demand for dairy products in India is likely to grow significantly over the next few years, driven by growth in population, higher remuneration levels and an increased interest in nutrition. Consumption of processed and packaged dairy products is increasing in urban areas.

In India, although the dairy sector has developed significantly, with a large stock of dairy herd, the yield per cow is still low. This is primarily due to a number of reasons including genetic deficiencies as well as farming techniques. India has historically focused on cross breeding, which has not improved the indigenous breeds significantly. Furthermore, the limited size of individual herds and the absence of technically skilled labour has led to limited focus on progeny testing and other such methods. Apart from this, there is lack of modernization in farming techniques and animal care, which results in poor nutrition and feed management, inferior farm management practices and ineffective care for cows.



<sup>339</sup> On World Milk Day, a look at how India became the largest producer and why it continues to be so, 2017, Financial Express



The dairy industry is one of Australia's most important agricultural industries. The participants in the Australian dairy sector range from farmer owned co-operatives through listed, private and multinational dairy and food specialists. Globally, Australian firms and research centers also use their expertise to provide technology, equipment, services, skills and systems to farmers to improve production in different climates and settings.<sup>340</sup> Australia has made significant advancements in its dairy sector on the basis of technological innovations such as milking shed technologies, calving patterns and feeding systems.

Milk shed technologies have increased efficiency of farm operations, through automation of different processes for the milking of cattle, such as cup removal, drafting, cleaning, etc. The use of these technologies has resulted in farmers reaping the benefits of higher productivity, while reducing their labour costs significantly. Owners of cattle herd employ different calving patterns (seasonal, year-round, etc.) in order to maximize their profitability amidst changing climatic conditions, supply of feed materials, etc. In the Australian context, states such as Tasmania, which have had a rather even mix of calving patterns, have experienced higher levels of productivity. Dairy farming in Australia has witnessed a widespread implementation of supplementary feeding, though it is largely pasture based grazing. Regions, which face relatively inconsistent rainfall, have a higher usage of conserved fodder.

Indian HNIs, private corporations and the Government can invest in dairy-technologies and know-how in Australia. Dairy provides several opportunities for an Indo-Australian partnership that can benefit both countries. There is limited exposure to Australian dairy expertise in India. Stakeholders in the Indian dairy sector have more knowledge about the dairy sector in North America, Western Europe (the Netherlands, Germany) and Israel. Investment in Australian technology can improve not only the quality but also the productivity and consequently, the quantity of milk produced in the country. This would also enable expertise in production of processed milk products that can compete with international demand. Technical collaborations in terms of joint ventures/partnerships between large dairy companies in Australia and Indian businesses can become viable business propositions as they combine Australian expertise with Indian cost structures. The technology and know-how of Australian dairy processing can be imported to India and the products manufactured can be sold under an Australian brand name.

### Case Study: Longley Farm

Richmond Dairies in Australia is a part of the UK based Longley Farm Group. The family-owned group introduced dairy technology to the factory at Casino, Australia in 1995. Longley Farms has invested over AUD 100 million (USD 71.43 million) in their dairy processing facilities in Australia, establishing an export business using their patented fast freeze technology. Under the local subsidiary Richmond Dairies, the company exports high-quality frozen cream in 10 kg blocks that are used in Middle East, South West Asia and Japan to produce premium ice-cream and in patisseries and bakeries. Longley Farms also manufactures yoghurt concentrate and skim milk powder.

**Source:** Austrade

<sup>340</sup> Australia Trade Commission and Australia Limited, Dairy Technology and services

Educational collaborations and dialogue between both the countries could be increased to facilitate knowledge transfer and spread awareness regarding the latest developments in the dairy industry in both the countries. In the past, such dialogues have helped in strengthening the dairy industries' relationship between the countries. In 2015, an Australian delegation visited the National Dairy Development Board (NDDB) in Anand district and Dudhsagar dairy in Mehsana district to pave the way for future collaborations in the Indian dairy industry. Greater visits can be organized to enable Australian companies to understand the requirements of Indian dairy companies.

## **Opportunities for Australian investments in the Dairy Sector in India**

India is one of the world's largest milk producers, and since milk is a perishable product, it needs to be processed quickly to produce value added products to prevent wastage. Liquid milk has long been the focus of Indian dairy producers. At present, value added products in the Indian dairy industry are largely available in the form of yogurt, cheese and ice cream. Other enhanced products are available but restricted to highly urbanized pockets in the country. Foreign investors in the Indian dairy have either set up independent units or have partnered with local players. Significant investors in the Indian dairy industry include Lactalis (France), Schreiber (USA), Danone (France), Arla (Denmark) and recently New Zealand's Fonterra via a 50-50 Joint Venture with Future Consumer Products. The Indian government has also permitted 100% FDI under the automatic route in the animal husbandry sector.

Australia's advanced dairy industry and brands can invest in India to provide new processing, cold chain and storage technologies to produce value added products in India.

## **Investments in Australian agriculture**

One of the largest factors driving Australia's leading position in the global market for agricultural produce is its strategic location. Its proximity to growth markets in Asia, Middle East and Africa, along with its rich and diverse produce has contributed to the growth in agricultural exports. Australia has finalized free trade agreements with 10 countries, which has made it easier to grow agricultural exports to countries such as China, the US, Korea, etc.

Australia has a robust freight network (spanning both sea and land) that ensures efficient internal transportation of goods, coupled with a strong shipping services network for international outbound logistics, thus enabling timely delivery of exported goods. The robust network of rail and port infrastructure in Australia is a key factor which makes the Australian agri sector attractive to investors.

The aforementioned standards of clean, green produce in Australia are a result of stringent Government regulations on biosecurity. Australia is also at the heart of agritech innovations, which ensure a high level of productivity, thus contributing to surplus production that is available for export.

Factors such as proximity and exposure to growing markets such as Asia, infrastructure network and superior agriculture practices resulting in surplus production, etc. makes Australian agriculture sector lucrative for investments. Indian companies can explore the opportunity to invest in the production of prime export commodities and also identify any other niche Australian commodities to cater to the global as well as Indian markets. Australia has built a very strong brand value on the global platform, which can be leveraged. Indian private companies and MSMEs can invest in both large sized and medium/small sized agro-businesses in Australia. Investments in Australian MSMEs can be used to scale existing processes and mechanisms to a global level and utilize their own existing capabilities in packaging, marketing and distribution to service export demand.



There are very few categories in which India has an export surplus for which Australia has a corresponding supply deficit. However, there are opportunities for specific niche agricultural products such as Alphonso and other mangoes, pomegranates, table grapes, tea, varieties of spices, etc. that are unique to India, which can be exported from India to Australia to develop a market there. Some of these commodity exports have already been initiated, albeit on a small scale. There is a need, however, for continued discussions between the two Governments and making Indian agriculture corporates and exporters aware of phytosanitary and other non-trade conditions and requirements so that they can gain market access in these products in Australia.

With a highly mechanized approach to agriculture, suitable climatic conditions, high quality produce and availability of large tracts of land for farming, Indian companies (as well as individuals) have an opportunity to purchase land in Australia, especially in the Northern Territory and New South Wales where products such as mangoes, chickpeas, cotton, etc. can be grown. This can also provide an opportunity for contract farming to Indian companies to cater to the growing demand for agricultural products in India as well as around the world. The appetite for specific products, such as sweet potatoes, is also on the rise in India and these can be cultivated in Australia to meet domestic demand, especially in areas such as Queensland. Furthermore, availability of water and logistics would be a major factor. Australia is the world's largest wool producer and Indian companies can consider setting up wool farms in Australia for exports to India and the world.

In addition, several Australian well-known wine brands are imported to India and sold in retail markets via distributors. An alternative to this is to adopt Australian wine processing technology and capabilities locally and manufacture such brands within India. Australian investors may be encouraged to set up joint ventures in India for this purpose. This would bring down prices of Australian wines in India to a great extent due to elimination of import tariffs and thus make them more accessible to the Indian consumer and would also result in significant quality upgrades for the Indian wine industry.

### **Supply chain/Logistics enhancement- Getting access to Australian expertise in warehousing**

Warehousing is an important part of the overall agricultural system. It is important for stocking both dry as well as perishable produce brought in the market. The majority (66%) of the storage capacity in India is controlled by Government entities - Food Corporation of India, Central Warehousing Corporation and state agencies - while the remaining share (34%) is controlled by other players such as private entrepreneurs, cooperative societies and farmers. Currently, a large part of the rural markets in India do not have integrated warehousing and cold storage facilities, due to which significant amount of produce gets wasted, especially in case of the perishable produce, leading to significant losses.

The farm produce is stored in archaic warehouses and godowns, which are not equipped with any storage technology to control the temperature and moisture conditions, leading to damage by pests, insects and water seepage. Inadequate storage capacity and imbalances in inter-state warehousing availability is another key challenge faced by India. India's food grain losses are estimated to be 25 million tonnes per annum, which translates to a massive Rs. 45,000 crore (USD 6.42 billion) per year. Farmers are hence forced to sell their produce at low prices immediately after harvest, thus leading to sustained levels of low income. Along with these problems, the majority of farmers lack proper marketing channels and mediums to sell his/her produce.

Australia employs innovative storage techniques such as usage of silo bags and silos to meet its storage requirements. Silo bags are tubes, made of triple layered thick laminated plastic, which protects the grains from damage due to atmospheric conditions and spoilage

by pests. The silo structures enable bulk preservation of farm produce for a longer duration. They are the most common medium of storage in Australia, constituting 79% of the grain storage facilities.<sup>341</sup> Storage using silos/silo bags is gaining popularity in India as a durable and cost-effective solution to storing food grains to avoid the huge losses incurred from the current archaic storage facilities in place. Moreover, the use of silos/ silo bags involves lower land requirement, labour and transportation costs making it a suitable solution to tackle the loss of food grains in the country. Thus, the Indian Government could tie-up with Australian private companies practicing these techniques to expand the coverage of silo use across India. The Indian Government has a plan to expand the capacity of silos in the country to reach an aggressive target of 10 million tonnes through the public-private partnership mode. Private companies like Adani Agri Logistics Ltd have also invested in building silo capacity in the country. Australia has rich expertise in building and maintenance of silos, which can be leveraged by both the Indian Government as well as private players to upgrade storage facilities in India, through joint ventures and collaborations.

### **Case Study: Silo Bags- Collaboration between India and Australia**

Silo Bags are a safe and economical way to store grains especially when farmers are unable to obtain storage space in warehouses due to capacity constraints or lack of access. Farmers across India are resorting to silo bags for grain handling and storage.

Silo Bags are made of polyethylene and can be used for storage of grains like paddy, barley, soya, maize, wheat, mustard and other commodities.

Originally from Argentina, silo bags were first manufactured to provide temporary storage capacity in times of excess harvest. Effective results in storage led to the concept being used around the world to store normal as well as excess capacity. Silo Bags Australia Pty Limited operates in India through a subsidiary, Silo Bags India.

**Source:** Austrade

While silo bags and silos could prove to be useful solutions to India's storage problems, they may need to be customized to suit Indian farmlands. Indian farms are highly fragmented and hence a community system is essential for silos to become effective storage solutions in India. This will not be possible without adequate Government intervention.

In addition, Australia has several associations such as the Grain Industry Association of Western Australia (GIWA) and the Grain Research and Development Corporation (GRDC). The Grain Industry Association of Western Australia (GIWA) was established in 2008 to represent the interests of the grains industry across the supply chain. GIWA has members from all grain supply chain sectors including grain growers, consultants, processors, storage and handlers as well as the Government. Grain Research and Development Corporation (GRDC) invests in the Grain Storage Extension Project to provide information and training for growers to use best practices for on-farm grain storage. Collaborations between Indian agricultural bodies with associations such as GIWA and GRDC to carry out joint research on specific storage solutions for Indian agriculture will enable India to reduce wastages.

<sup>341</sup> Austrade



### **Sector Representative Contribution: Linfox Logistics**

Linfox is a logistics and supply chain company established in Australia in 1956. It is the largest privately held supply chain solutions company in the Asia Pacific region, providing end to end supply chain solutions. It operates in 10 countries namely Australia, China, Hong Kong, Indonesia, Thailand, Laos, New Zealand, India, Malaysia and Vietnam. Linfox offers a wide range of logistics solutions across supply chain, fleet management, warehousing and distribution, logistics IT, transportation, road and rail freight, intermodal logistics, cold chain, bulk haulage, remote logistics etc. Its end use industries include beverages, dairy and fresh foods, FMCG, government & defence, healthcare & pharmaceuticals, industrial, resources and retail.

Linfox began operations in India in 2006. It operates across 16 sites in North, West and South India, serving the FMCG, beverages and industrial companies in India. They hold ~1.9 million square feet of warehousing space in India. They specialize in plant supply chain, warehousing, transport & freight management, technology and last mile delivery solutions for complex logistics requirements of companies.

### **Leveraging Australia's brand equity in food products and advanced food processing technology to tap into the global opportunity**

In the consumer space, Australia has innovative food recipes and provides cutting edge food processing technology. Australian snacks are available in various markets around the world, with brands such as Kettle Chips. Australia produces a wide variety of popular spreads including honey, jams and the iconic 'Vegemite'. Australian consumers are increasingly looking out for new and healthier products with fresh combinations and fewer preservatives. Australian companies such as Beerenberg, Buderim Ginger, Yackandandah Jam and Preserving, Chris' Dips and Spring Gully Foods have been quick to respond to changing consumer tastes by making gourmet jams and spreads with natural ingredients and innovative packaging.

The Indian market has witnessed a growing preference for new consumer products, favored by prevalent megatrends such as rising incomes and changing tastes of consumers. Food habits of the modern Indian consumer have changed, with a higher propensity to explore different cuisines.

Indian food processing companies can form joint ventures with Australian companies to import Australian technology to India and manufacture food products at a low cost by using Australian recipes to cater to both India and the rest of the world. Similarly, Australian companies should be encouraged to invest in India to leverage the Indian and global markets and to produce at cheaper costs.

## Case Study: Unibic Cookies in India

Unibic is a brand of Australian origin. In 2004, Michael Quinn visited India and identified an opportunity for premium biscuits and cookies. Unibic Foods Private Limited was thus started in 2004 with headquarters in Bengaluru. Unibic India is a subsidiary of Unibic Australia Private Limited. The initial operations of Unibic in India involved importing cookies from Australia. However, by the end of 2005, a state-of-the-art manufacturing unit was set up in Bangalore, India. The manufacturing plant used wire-cut technology to cater to Indian as well as global markets. At the factory, fully made biscuits come out of a moulder. In comparison, with wire-cut, dough is pushed through nozzles and gets precisely cut by a wire, with measured pieces. This technique was not commonly used in India.

Unibic entered into a five-year deal with Amalgamated Bean Coffee Trading Co. to supply to the Cafe Coffee Day outlets. This helped them significantly to build their brand in India. Over the years, Unibic has grown its range to over 24 variants and has now been acquired by an Indian owner.

**Source:** Filling up the Indian cookie jar, 2017, Deccan Herald

India can also leverage Australia's specialized food segregation technologies that separate food qualitatively, i.e. the best quality produce is sent to the market to be sold as raw fruits and vegetables, while the lower quality produce is sent for food processing to make processed food such as jams, jellies, purees, etc. These technologies, if adopted and implemented in India, could significantly increase productivity and reduce food wastage in the country. Australian companies should be encouraged to tie up with Indian partners for providing food processing machinery at lower costs.

## Sector Representative Contribution: Heat and Control

Heat and Control is a food processing company headquartered in California and is a noteworthy example of global collaboration in food processing. It is the world's leading designer and manufacturer of food processing and packaging technology and has operations in the US, Australia, Mexico, China and India. The Australian operations are located in Brisbane and the Indian entity reports to the Australian entity. Heat and Control began its Indian operations in 1997. Heat and Control (South Asia) Pvt. Ltd., is a 100% subsidiary of Heat and Control Pty Ltd., Brisbane, Australia and has its office and manufacturing facility based in Chennai, India and is responsible for India and the South Asian countries like Bangladesh, Nepal, Sri Lanka etc. The company has established a large manufacturing facility in Chennai. The facility is equipped with the latest technology, at par with its global counterparts. The manufacturing facility also includes special customized equipment to manufacture Indian 'namkeen' snacks and sweets. This equipment is designed in Australia and the US and is then manufactured and assembled in India. The Chennai office also often receives technical experts from Australia that oversee the application of latest technologies in the factory.



Today, Heat and Control (South Asia) has over 300 employees in various functions such as sales and marketing, production, engineering, planning and service, etc. Initially, Heat and Control only supplied equipment for manufacture of ‘western’ snacks such as potato chips, tortilla chips and nuts, etc. However, the company later realized that the market for Indian ethnic snacks like bhujia, moong dal, etc. was much larger than that of western snacks in India. Heat and Control (South Asia) developed the “Namkeen Line” that produces over 15 varieties of Indian namkeen snacks and most top manufacturers of Indian namkeen snacks use Heat and Control equipment.

### Sector Representative Contribution: Riverina Oils and Bio Energy (ROBE)

ROBE is an Australian refined oil producing company. The company crushes 200,000 tonnes of canola seeds per year and refines 85,000 tonnes of canola oil. Their manufacturing facility is located in Wagga Wagga, with an investment more than AUD 100 million which is touted to be one of the largest greenfield food and agri investment in Australia in the last 10 years. The manufacturing unit sourced technology from the Indian company Desmet Ballestra wherein 100% engineering of the plant was carried out by the Indian company. Additionally, the project has been funded by Indian banks such as the State Bank of India and Bank of Baroda as well as some Indian shareholders. Subsequently, the company launched its product (canola oil) in India under the brand name “Wagga Wagga”.

### Deep sea fishing and aquaculture

Aquaculture and fisheries are India’s fastest growing sectors. India has a vast coastline, ~7,500 km and an Exclusive Economic Zone of approximately 2.02 million square kilometres. The fisheries sector provides employment to ~14 million people in the country.<sup>342</sup> In 2018, India’s shipment of seafood earned USD 7.08 billion<sup>344</sup> and during 2017-18, fish production in the country was approximately 12.60 million metric tonnes. India’s fish production constituted around 6.3% of the global fish production<sup>342</sup>. India exports more than 50 types of fish to around 75 countries. Fish and fish exports contribute 0.91% to the country’s GDP. In 2017, India was the 10th largest exporter in value terms for frozen fish.<sup>343</sup> Frozen shrimp and frozen fish are India’s most valuable seafood export items and majority of the products are exported to the US and South East Asia, followed by Europe, Japan, Middle East and China.<sup>344</sup>

In line with the vast potential of the fisheries sector in India, the Government of India called for a Blue Revolution, in which the Government merged all schemes of the fisheries sector into an umbrella scheme. The new integrated strategy was set out to improve fish production and productivity from aquaculture and deep-sea fishing. While the sector is growing rapidly in the country and has received considerable Government support, it also faces several issues such as wastage and loss of revenue. There is also too much pressure on existing wild fisheries in the country and there is a limited understanding of technology in aquaculture. Further, despite the large numbers in exports of fish and fish products, the deep sea fishing sector in the country is largely underdeveloped. Although there is significant potential in this area in India, especially in Tamil Nadu and the Andaman and Nicobar belt, the knowledge about the commercial potential of deep- sea fishing beyond the Bay of Bengal area is limited.<sup>345</sup>

<sup>342</sup> About Indian Fisheries, National Fisheries Development Board

<sup>343</sup> “Frozen fish export from India continue to see astounding growth by Center for Advanced Trade Research, 2018, Trade Promotion Council of India”

<sup>344</sup> India’s seafood exports cross 7 billion, 2018, The Times of India

<sup>345</sup> India not Tapping Deep Sea Fisheries Resources, 2015, The Fish Site

As per the decision taken by the Island Development Agency, Government of India, in 2018, the Union Territory Administration decided to promote tuna fishing for the development of fisheries sector in Andaman and Nicobar Islands. The Andaman and Nicobar Islands have a coastline of 1,912 kilometers with a 30% share of the Indian Exclusive Economic Zone (EEZ). The fishery potential of the islands is estimated at 148,000 MT per annum which includes 64,500 MT of tuna fishery resources. However, in 2017 only 2500 MT and currently only 3500 MT of tuna have been exploited from this belt. There is thus significant potential in this area. The Andaman and Nicobar administration has proposed an integrated INR 101.8 crore (USD 14.5 million) fisheries development project for harvesting of Tuna and other fish, along with setting up adequate infrastructure facilities such as EIC Labs, online catch and collection analysis projects, transshipment port facilities etc.

Australia has a reputation as a reliable and high-quality supplier of high unit value and fishery products such as rock lobsters, tuna, etc. In recent years, with increase in consumption of sea food around the world, wild catch fisheries have reached their full capacity. Aquaculture is thus a sector that has gained attention to meet the local and global demand for seafood. Australian enterprises in the sector have continuously adopted innovative techniques and sophisticated technology to increase productivity in the sector. The sector generates ~AUD 2.4 billion (~USD 1.6 billion) annually in Australia and employs approximately 10,600 people. The specific items produced in Australia are salmonids, rock lobsters, prawns, tuna and abalone. Australia's chief export markets are Hong Kong, Vietnam, Japan, China and the US.<sup>346</sup>

Accordingly, in line with the Indian Government's Blue Revolution initiatives, India can seek Australia's assistance in aquaculture and deep- sea fishing in areas such as barramundi fingerlings and hatchery setup processes, pearl oyster harvesting, bio-algae-based aquaculture waste water treatment, high-performing shrimp feed and deep- sea fishing vessel design.<sup>347</sup>

With a shift in the fishing industry from traditional practices to scientific and technical developments, there is also a dire need for up-skilling personnel in this sector in India. In Australia, the Seafood Industry Training Package (SITP) forms the basis for vocational education and training for the seafood industry. SITP covers all commercial aspects of fishing including harvesting, farming, culturing, storing, processing and selling. Indian Institutes such as the ICAR and State agricultural and fisheries universities can enter into MoUs with such Australian institutes to build a fisheries training program specific to India's fisheries sector.

## Ready to eat products

In recent years, there has been a paradigm shift in the consumption and buying pattern of the Indian consumer. Rapid urbanization, characterized by busy lifestyles, increasing purchasing power and paucity of time have made the Ready to Eat (RTE) and Ready to Cook (RTC) food segment extremely popular amongst urban Indians. During the period 2011-2016, the RTE market in India grew at a CAGR of 14.8%.<sup>348</sup> The RTE and RTC segment has also gained popularity due to a large number of Indian tourists and students abroad. As many as 4.7 million Indians travelled abroad in 2017<sup>348</sup> and the number of Indian students abroad is also growing. Further, with a growing Indian diaspora abroad, the demand for Indian RTE products has been growing overseas. Consumers around the world are also increasingly becoming conscious about health implications of food and the demand for organic products from India is on the rise due to consumers' increased preference for products without the use of chemical fertilizers and pesticides. The past decade has seen the emergence of several players in the organic products sector that could also export products to Australia and other global markets. India has a large market in this segment and the country exported organic products worth USD 515 million in financial year 2017-18. The US, European Union member countries and Canada were the biggest buyers of organic

<sup>346</sup> Aquaculture and Fisheries, Austrade 2018

<sup>347</sup> Catching deep sea fishing and aquaculture opportunities in India, 2017, Australian Trade and Investment Commission

<sup>348</sup> High growth segments of the delicious Indian food and beverage industry, 2017, Forbes India



products from India. Countries such as Israel, Vietnam and Mexico have also shown interest in Indian organic products.<sup>349</sup> In addition to RTE and organic products, other products such as Indian pickles, savouries and snacks have also gained popularity. Indian companies such as Haldiram's are already offering a wide range of products to customers in that segment. This provides Indian players in this segment with significant opportunities to offer a wide range of products, ranging from healthy organic products to processed and convenient food that caters not just to the Indian diaspora, but also the broader consumer segment in Australia. However, physical quality parameters and packaging norms must be revamped for the Australian market. There is also a need to set up efficient distribution channels.

### Sector Representative Contribution: MTR Foods

Indian companies in the Ready to Eat (RTE) foods market have established a large presence in global markets. MTR represents one such global success story. MTR has been exporting its products since the 1980s to over 40 countries and across five subcontinents, with the US and Australia as its largest markets. Australia is an important segment for MTR and the company generates ~10% of its total revenue from Australia. MTR operates in Australia through retail stores such as Coles, Woolworths, etc. It offers a wide variety of food selection ranging from mainstream food products to ethnic Indian food snacks. MTR not only caters to the Indian population in Australia but also towards the large consumer base pivoting towards vegetarianism.

## Biofuels

Biofuels are fuels extracted from biomass such as organic wastes and plants. Conventional biofuels include sugar and starch-based ethanol, oil crop-based biodiesel and straight vegetable oil which are the most common commercially produced biofuels around the world. Second generation biofuels can be produced from non-food biomass such as municipal solid waste and third generation biofuels are highly advanced and are produced from micro-organisms like algae. In recent years, there has been a gradual shift towards bio-based fuels and chemicals globally. This is directed by a conscious responsibility and a necessity to reduce dependence on depleting non-renewable energy sources.

India's biofuel market is at a nascent stage. However, alternative energy sources are the way forward to increase energy efficiency and to reduce greenhouse gas effects in the country. Further, given the country's vast agricultural sector and easy availability of raw material, generation of energy from bioethanol and biogas has a large potential in the country. The biofuel industry in India also provides tremendous opportunities to uplift many less advantaged rural villages. Biofuels also have a potential to generate large savings for the country. For example, Delhi and Gurugram together consume 1,699,000 tons of diesel in a year. Just for an estimated use, if 5% of biodiesel is blended with petroleum diesel, 84,950 tons of diesel can be saved per year.<sup>350</sup>

Accordingly, the demand for bio-fuels has been rising in the country. The biofuel industry in India is expected to touch Rs 50,000 crore (USD 7.14 billion) by 2022.<sup>351</sup> The Government implemented the National Policy on Biofuels, first in 2009 and then in 2018. Additionally, on World Biofuel Day, the Food Safety and Standards Authority of India (FSSAI) launched RUCO – Repurpose Used Cooking Oil, an ecosystem that will enable the collection and conversion of used cooking oil to biodiesel. Under the National Policy on Biofuels 2018, the Government set a target to blend 20% of ethanol with gasoline and 5% blending of biodiesel with diesel by 2030.

<sup>350</sup> Biodiesel: The Future Fuel of Automobiles in India – Analysis, 2019, News 18

<sup>351</sup> By 2022, biofuel 'will become a `50,000-crore business', 2016, The Hindu Business Line

<sup>349</sup> Global demand for Indian Organic food products on constant increase, 2018, The Economic Times



The biofuel industry in Australia has a large potential. Australia's specialization in agriculture makes the country predisposed to raw materials for biofuels. According to a study by the Queensland University of Technology (QUT), Australia's biofuel industry can add more than AUD 1 billion (USD 0.67 billion) in revenue to the Australian economy. While the industry has some marquee players, the country lags behind other economies such as USA and Brazil. Ethanol and biodiesel are the two main biofuels produced in Australia and ethanol-based petroleum accounted for merely 1.1% of Australia's total petrol sales in 2015-16.<sup>352</sup>

The Australian Renewable Energy Agency (ARENA) has forecasted that the global demand for biofuels will triple by 2050 to reach USD 1.13 trillion by 2022 and most of this demand is expected to be fulfilled through ethanol.<sup>352</sup> Accordingly, India and Australia can jointly collaborate, first at a policy and Government level and then at a private organization level, to increase research, not just on first and second generation biofuels but also on advanced third generation biofuel technologies.

### Encouraging Australian companies to invest in India's Mega Food Parks (MFPs)

Since 2008, the Ministry of Food Processing Industries in India has sanctioned around 40 Mega Food Parks to harness potential opportunities and ensure efficiencies in India's food processing industry. The MFPs are set up over a space of 50 acres, with an aim to provide linkages among farmers, food processors and retailers to ensure waste reduction and enhancement of farmers' income. These MFPs have been sanctioned across several states including Maharashtra, Himachal Pradesh, Punjab, Bihar, Tripura, Telegana, Mizoram, Chattisgarh, Madhya Pradesh, Andhra Pradesh, Haryana, Odisha, Arunachal Pradesh, Assam, Gujarat, Jammu and Kashmir, Karnataka, Manipur, Nagaland, Rajasthan, Uttarakhand, Uttar Pradesh, West Bengal and Kerala.<sup>353</sup> As of 2018, 18 of the 40 MFPs were operational.<sup>353</sup>

Financial assistance up to Rs. 50 crore (USD 7.14 million) is provided by the Government for setting up infrastructure facilities such as cold storage, warehousing, sorting, grading, pulping and packaging units, etc.<sup>354</sup> These MFPs are expected to contribute generously to the Indian economy. Each MFP project would have around 25-30 food processing units with a collective investment of around Rs 250 crore (USD 35.7 million). This is expected to lead to an annual

<sup>352</sup> Biofuel the forgotten renewable energy, report says, 2018, The Sydney Morning Herald

<sup>353</sup> Fourteen mega food parks to become operational this year, 2018, Economic Times

<sup>354</sup> 17 New Mega Food Parks Sanctioned, 2015, PIB



turnover of about Rs 450-500 crore (USD 64-70 million) and directly/indirectly employ ~5,000 persons. The Ministry also expects that each food park, on being fully operational, will benefit about 25,000 farmers.<sup>353</sup>

India has been encouraging FDI in food processing by liberalizing FDI norms and allowing 100 % FDI in manufacturing of food products. In addition, 100 % FDI is also permitted in trading (including e-commerce) of food products manufactured and produced in India.<sup>355</sup>

Australia can invest in various stages of India's food processing value chain via these MFPs. This will also provide the means to Australian food processing companies to enter India's domestic food industry market. Investments by Australian companies in Indian MFPs will not only benefit Australian investors but will also provide significant technological upgrades and know-how for India's cold storage and food processing industries. In addition, this would also provide Indian companies access to Australian companies with technologies related to food waste management and waste segregation.

### **Opportunities for Australian investment in India in the Agriculture sector**

At present, 100% foreign direct investment (FDI) is allowed via the automatic route into India for the following agricultural activities:

- Floriculture, horticulture, apiculture and cultivation of vegetables and mushrooms under controlled conditions
- Development and production of seeds and planting material
- Animal husbandry (including breeding of dogs), fish farming, aquaculture, under controlled conditions
- Services related to agriculture and its allied sectors

Other than these activities, foreign investment of up to 100% under the government route is permitted in the tea sector, including tea plantations. Further, 100% Foreign Direct Investment (FDI) is allowed under automatic route in storage and warehousing including warehousing of agriculture products with refrigeration (cold storage).

Australian companies can therefore explore investment opportunities in India's agriculture.

### **Collaboration with Australia to address specific challenges faced by Indian exporters to Australia**

Sanitary and phytosanitary measures are quarantine and biosecurity regulations that are governed by the World Trade Organization's Agreement on the Application of Sanitary and Phytosanitary Measures (SPS).<sup>356</sup> The SPS agreement provides its member countries with a set of safety measures, which are to be applied to protect human, animal and plant life from health risks arising from contaminants and toxins in food and the spread of diseases and pests. The Australian Government's Department of Agriculture, Water and the Environment (DAWE) is responsible for administering Australia's SPS measures.

<sup>355</sup> India pitches for FDI in food processing industry, 2017, The Hindu

<sup>356</sup> Sanitary and Phytosanitary measures, WHO

India is one of the largest producers of a vast number of agricultural commodities. Efficient quality control and food safety are vital for improving India's export potential. However, SPS measures also have the potential to create barriers for exports, especially for developing countries. There have been instances in the past when Indian exports of spices and marine products were detained in the importing country.<sup>357</sup> While there has been some breakthrough in India's exports of grapes and mangoes to Australia, the volumes for these commodities have the potential to increase in the future. India requested market access in the year 2007 for many vegetables (cucumber, okra, green peas, onion, tomato, potato and gherkin) and fruits (pomegranates, papaya, pineapple, custard apple, banana, guava and orange) which is yet to be allowed. India's export of prawns, egg products and brown basmati rice to Australia have also faced technical issues. In 2013, the European Commission had funded the EU-India Capacity Building Initiative for Trade and Development project to address trade related issues faced by India.<sup>358</sup> Australia and India can collaborate in a similar manner. Australian Sanitary and Phytosanitary (SPS) regulations for import of all agricultural commodities are available at <https://bicon.agriculture.gov.au/Bicon>. The aforementioned standards are a result of stringent government regulations on bio- security. The aforementioned standards of clean, green produce in Australia are a result of stringent Government regulations on biosecurity. Such matters can be further discussed in Annual bilateral meetings that are regularly held between officers of National Plant Protection Organization (NPPO) Australia and NPPO India. In addition, regular meetings are also held with the Counsellors of Australian High Commission and officers of Department of Agriculture, Cooperation & Family Welfare (DAC&FW) and the Indian Embassy in Australia and officers of NPPO Australia, where such issues can be discussed. Australia can also share the SPS issues for import of livestock and livestock products from India into Australia. Such a collaboration will help India address specific SPS related issues faced in Australia, while also raising the quality of India's exports. This collaboration can help India with market access for fruits, vegetables and marine products in Australia.

## Recommendations

- In line with the Indian Government's ambition to increase productivity of agriculture, India should seek Australia's expertise and experience to set up a specialized agri-university in India.
- Australia and India should develop a collaborative agri-food research program focused on farming in tropical conditions, greenhouse technology and fish farming. This program should also focus on improving agricultural productivity and logistics practices.
- Indian government should encourage Australian logistics companies to invest into the Indian agri-logistics space.
- Australian confectionery and food processing companies should be encouraged to invest into the Indian market to set-up a low-cost manufacturing base to supply these products to the local and international markets.
- Indian government should encourage Australian companies to invest in India's Mega Food parks, as well as processing, cold chain and storage technologies in the dairy sector.
- India and Australia should collaborate to help overcome phytosanitary and technical parameters for augmenting exports of Indian fruits and vegetables to Australia.

<sup>357</sup> WTO Agreement on the Application of Sanitary and Phytosanitary Measures and the Indian Experience; Kaul, Rohit;

<sup>358</sup> SPS Barriers to India's Agriculture Export - Learning from the EU Experiences in SPS and Food Safety Standards



## Education

### Synopsis

Australia has a well-developed education and vocational training sector, with a strong focus on quality driven research. Australia's focus lies in creating a job-ready workforce and can contribute to further strengthening India's education sector through collaborative efforts.

India's current education infrastructure needs to be strengthened to support the fast-growing population. With an aim to upskill 400 million workers by 2022, India's skill development program could leverage Australia's strengths in vocational education and training.

The following opportunities have been identified:

- Increasing collaborations between Indian and Australian universities.
- Initiating dual degree programs between India and Australia subject to presence of enabling mechanism.
- Working with Australian education bodies on curriculum development.
- Partnering with Australian vocational institutions.
- Enhancing research funds between India and Australia to focus on other areas.
- Augmenting the Australia India Strategic Research Fund.

Following are the recommendations in the education sector:

- Collaboration with Australian regulators on curriculum development and vocational education and training;
- Discussion on ramifications of Mutual Recognition of Academic Qualifications in Higher Education.
- Enhanced cooperation and research collaboration under the Scheme of Promotion of Academic and Research Collaboration.
- Promoting a research fund with a focus on humanities and social sciences with a funding of USD 10 million each from both sides over five years.
- Augmenting contribution to the Australia India Strategic Research Fund by both the countries by contributing USD 20 million each over the next five years.
- Encouraging participation of Australia under Study in India.

## 5.6 Education

### Australia's education sector

Education is vital to Australia's overall development and is a fundamental pillar of the country's economy. The education sector is Australia's largest service export sector and is its fourth largest export overall. Education contributes ~5.2% towards the GVA of the country and is the fourth largest employer<sup>359</sup>, accounting for ~8.1% of the workforce in the nation.

The education system in Australia is largely homogenous across the entire country with some differences amongst states and territories. The first level includes primary (up to Year 6/7) and secondary education (from Year 7/8 to 10) followed by senior secondary education (Years 11 and Years 12). The tertiary level includes universities, as well as vocational education and training (VET) institutes. The different levels of education, i.e. school, university and vocational education, are bound by the Australian Qualifications Framework (AQF). The AQF was designed by the Government to ensure quality and consistency of titles across Australia and the AQF provides details about what each qualification title represents. This results in a highly standardized system that increases ease of transfers between different educational providers in Australia.

Australia's tertiary education has created a world-wide reputation for itself. After the US and the UK, Australia is the third most preferred destination for education for international students. Australia has 43 universities offering a wide range of courses in STEM, Management and commerce, arts and culture. Six Australian universities routinely find themselves in the Top 100 universities of the world.

**Table: Australia's top ranked universities**

Rank in Australia	University	ARWU Rank 2018
1	The University of Melbourne	38
2	The University of Queensland	55
3	The University of Sydney	68
4	The Australian National University	69
5	Monash University	91
6	The University of Western Australia	93

**Source:** Academic Ranking of World Universities by Shanghai Ranking Consultancy

Australia is also well known for its excellence in vocational education and training (VET). VET focuses on providing work-related skills in real and simulated environments in several areas such as business, tourism, marketing, computing and hospitality. Most vocational courses in Australia have been developed based on the requirement of employers and students in relevant industries. Registered Training Organizations (RTOs) offer VET courses in Australia. RTOs include Technical and Further Education (TAFE) institutes and private colleges.

<sup>359</sup> Australia Benchmark Report, 2019, Austrade



## India's education system

India's strength lies in its demographic dividend. The Indian education system is one of the largest in the world with a wide network of schools (over 1.54 million schools and 253.4 million students in 2016-17) (As per Unified District Information on School Education (UDISE), 2016-17) higher education institutions (993 universities, 39,931 Colleges and 10,725 Stand Alone Institutions and 37.4 million students in 2018-19) (As per All India Survey on Higher Education (AISHE), 2018-19). India is also home to the world's largest population between the ages of 3 and 23 years. As a result, there is a huge demand for education at all levels.

With respect to elementary education, the Government of India has made education free and compulsory for children between 6 to 14 years of age (or up to Class 8), under the Right of Children to Free and Compulsory Education Act 2009.

The Integrated Scheme for School Education called "SamagraShiksha" launched in 2018 seeks to ensure inclusive and equitable quality education from pre-school to senior secondary stage. The "Samagra Shiksha" subsumes within it the earlier centrally sponsored schemes of Sarva Shiksha Abhiyan (SSA), designed to facilitate universal elementary education, the Rashtriya Madhyamik Shiksha Abhiyan (RMSA), introduced in March 2009 to improve access to quality of secondary education in India and the scheme of Restructuring and Reorganization of Teacher Education that constituted three of the major school education development programmes of the Ministry of Human Resource development (MHRD), Government of India and implemented in partnership with State/UTs. The major objectives of the Samagra Shiksha include the provision of quality education and enhancing learning outcomes of students; bridging social and gender gaps in school education; ensuring equity and inclusion at all levels of school education; ensuring minimum standards in schooling provisions; promoting vocationalisation of education; support to states in the implementation of the Right of Children to Free and Compulsory Education (RTE) Act, 2009; and strengthening and up-gradation of the State Councils of Educational Research and Training/State Institutes of Education and District Institutions of Education and Training (DIETs) as nodal agencies for teacher training.

At the higher education level, several schemes such as the Rashtriya Uchchatar Shiksha Abhiyan (RUSA), Impacting Research, Innovation & Technology (IMPRINT), Technical Education Quality Improvement Programme (TEQIP), Global Initiative for Academics Network (GIAN), Scheme for Promotion of Research Collaboration (SPARC), Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMNMTT), Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM), National Digital Library, campus connect programs, etc. are being implemented to develop and improve the quality of higher education.

There is already a commendable interaction between the Indian and Australian higher education institutions. Further, Australian institutions and faculty prominently feature in the flagship Indian government initiatives such as the Scheme for Promotion of Academic and Research Collaboration (SPARC) and Global Initiative for Academics Network (GIAN). Australia is one of the focused 28 countries under SPARC. There are 26 universities from Australia involved in SPARC. Out of the total of 157 applications received in the first call for applications, 54 joint research projects from Australian and Indian institutions have been approved under SPARC totalling US \$ 4.9 million (Rs 3558.74 lakhs). Out of the 1,839 courses that have been approved under GIAN, 104 courses were taken by Australian faculty.

India's emphasis on enhancing research collaboration and Australia's robust education sector and research initiatives provide opportunities for collaboration between both the countries. Academic links between the two countries date back to the 1950s. From the 1950s to 1970s, Australian universities provided India with assistance to develop the country's education sector, with a keen focus on science and development. Several Indians were also awarded

scholarships by the Australian Government under the Colombo Plan to pursue studies and practical training in Australian universities. Since then, the number of Indian students in Australia has been on the rise. In recent times, there has also been significant interest in increasing educational alliances between the two countries at an organizational level, with associations like Australia India Education Council (AIEC) playing an important role. The AIEC was established in 2010, and is a government to government bilateral platform to enhance the bilateral educational relationship. AIEC has had specific working groups in areas such as higher education and research, vocational skills, student mobility and schools. Currently, special interest working groups are set up as and when required.

## **Impact of Covid-19 on India's Education Sector / Ed-Tech Sector**

In the face of the current Covid-19 pandemic, India's nationwide lockdown created a paradigm shift in the delivery of education services. Board and competitive examinations, entrance tests for entry into various educational institutes, school admissions, etc. were halted to contain the spread of the disease. In line with the guidelines specified for this pandemic, ~1000 universities, ~40,000 colleges and several schools in India have been temporarily closed. With physical classrooms suspended, this health crisis will affect over ~260 million students in the country. Structural changes in the system of imparting education and assessment methodologies can be expected. The lockdown has accelerated the adoption of digital technology to resume continuity of learning for students. For instance, the Indian based learning app - Byju's witnessed a ~60% increase in students using its online educational products.

This disruption in delivery of education in India is expected to drive policy makers to integrate e-learning solutions into existing curriculums and work towards increasing affordability of online systems and ensuring stability of internet connectivity. In 2017, the Ministry of Human Resource Development (MHRD), in association with National Council for Teacher Education (NCTE), had launched an initiative in the domain of digital learning, named, Digital Infrastructure Knowledge Sharing (DIKSHA) to enable teachers and students across various age groups to access learning material. This platform can be expected to be further strengthened to meet teacher-learning objectives and promote the adoption of a digitized curriculum. India can collaborate with Australia to leverage the country's expertise in online learning management platforms to enable teachers in developing and managing visually engaging content. Furthermore, Australia can assist teachers in India through adequate online tutorials on delivering e-curriculum for students.

While simulation-based, platform-only and ed-tech players will witness an increased adoption and acceptance as the preferred mode of learning by students, India will still face challenges with resource availability and capacity for online infrastructure. Public schools and low-fee private schools are bound to face a larger impact on teaching and learning owing to their dependency on brick and mortar means of delivering lessons. Additionally, most higher education institutes are not fully equipped to implement online learning due to constraints in developing digital content, technology and delivering capabilities.

Collaborations with Australia can help India in arriving at flexible and cost-effective educational solutions in areas with low or no internet connectivity. For instance, radio, TV, ubiquitous online platforms such as Youtube or Whatsapp that require lower bandwidth can be accessed to design creative and innovative solutions to meet current challenges.

Moreover, this pandemic will undoubtedly be detrimental to the skilled labour force and employability rate of India. Closure of skilling institutes on account of the mandated lockdown in India is expected to decrease available manpower by 10-15% in the country. This, coupled with sluggish human resources demand, is likely to result in a surge in the unemployment rate in the country. The additional financial stress caused by the health crisis



could lead to insolvency among private training and educational partners. India could leverage Australia's expertise to develop online entrepreneurial courses at minimal cost and assist existing training institutes to devise effective online skilling modules across various sectors. For instance, Australia and India can collaborate to develop and promote basic healthcare e-learning course for training healthcare professionals and staff members to meet the existing shortfall of healthcare professionals in both countries. Therefore, a reconfiguration of the existing educational practice is required to adapt to the current pandemic in order to build capacity and skills needed to drive employment, productivity and health in both countries.

## Opportunities for collaboration with Australia

Some of the opportunities suggested in this section can be fully implemented once a state of normalcy returns post the Covid-19 pandemic.

The impact of Covid -19 on Indian students already studying in Australian universities has been stressful. Many Indian students were put under considerable difficulties due to the sudden closure of universities and the shift to online methodology which may have affected the confidence of Indian students in the educational environment in Australia to a considerable degree. Indian students , in future, will therefore explore the options of studying in Australia taking into account the conditions and the handling of the situation in other competing locations.

## Research Collaboration

There are several MOUs and collaborative arrangements between various universities and research institutions in both the countries. Most recently, an MoU was signed on 22 November 2019 during the visit to India of the Minister of Education of Australia. The MoU is between the Central Ground Water Board and Managing Aquifer Recharge and Sustaining Groundwater Use through Village-level Intervention (MARVI) Partners and Western Sydney University, Australia (This was signed in the presence of the Minister of Jal Shakti).

Two agreements/MoUs have been signed between Indian and Australian universities/institutions during the visit of the President of India to Australia from 21-24 November 2018. These include MOU/Agreement between Acharya N.G. Ranga Agricultural University, Guntur, Andhra Pradesh in India and the University of Western Australia; and between the Indraprastha Institute of Information Technology Delhi (IIITD) and Queensland University of Technology (QUT), Australia.

Seven agreements/MOUs were signed between the Indian and Australian universities/institutions on the sidelines of the Australia India Education Meetings held in Australia in mid-2018. These include MOUs/Agreements between: i) Deakin University, Australia and Central University of Jammu; ii) Deakin University, Australia and All India Institute of Medical Sciences ; iii) Deakin University, Australia and Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry; iv) Curtin University, Australia and Indian Institute of Technology, Guwahati; v) Curtin University, Australia and National Council of Educational Research and Training (NCERT), New Delhi; vi) Western Sydney University, Australia and Centurion University, Odisha; and vii) University of Adelaide, Australia and O. P. Jindal University, Haryana.

Australian universities are globally recognized for their internationally competitive research environment. The quality of scientific research is one of the most appealing facets of Australian education for international students. International students in Australia can take advantage of the impressive cutting-edge technology, research resources and innovations. At a national level, Australia invests heavily in science - (~2%<sup>360</sup> of its GDP) and has

<sup>360</sup> Business doesn't spend enough on R&D, 2018, Financial Review

<sup>361</sup> Greg Hunt aims for CSIRO to become world's best public research organization, 2016, The Sydney Morning Herald

developed an advanced network of national as well as regional agencies for scientific research and development. Its primary agency, CSIRO ranks as the 20th most innovative research institution in the world.<sup>361</sup>

Besides scientific research, Australian universities are also known for their exceptional business research programs. Deakin University is renowned for global marketing, the University of South Australia for brand management and Macquarie University for accounting education. The University of NSW (UNSW) is also known to be the top Australian university for four business-related topics: customer service, audit, corporate governance and corporate finance, while Monash University leads Australia in areas such as services marketing, econometrics and experimental economics.<sup>362</sup>

In India, the nuclear and satellite programs and space research spearheaded by organizations, such as ISRO, have produced several noteworthy outcomes. While the gross expenditure on research and development in India, carried out by both public as well as private institutions, tripled between 2004-05 and 2014-15, India's pattern of expenditure on R&D greatly differs from other countries. The proportion of Government spending on India's R&D (55%) is much higher than that of other countries such as the UK (7%) and Mexico (38%). However, India's higher education institutions contributed only 4% to the overall R&D expenditure as compared to 7% in China and 40% in Canada, as recorded in the year 2015.<sup>363</sup>

Accordingly, research collaborations can be explored between academic institutions in India and Australia. This will entail sharing resources, collaborating with researchers and developing industry-level partnerships through student exchange programs, short term research visits, seminars and conferences, in addition to providing candidates/students from both countries a platform for collaboration to take up research projects across various sectors. Indian universities can also collaborate with their Australian counterparts to enter into joint PhD programmes for students from both nations. For instance, Australia's top 8 universities can partner with India's top 20 universities (such as the IITs, NITs, etc.) for joint research programs. Currently, Indian and Australian universities have several noteworthy programs involving research collaborations. For example, Deakin and RMIT universities have collaborated with various categories of institutions like:

- Universities such as University of Hyderabad;
- Public institutions, such as the Indian Institute of Chemical Technology (IICT), Hyderabad; the Centre for Cellular and Molecular Biology (CCMB), Hyderabad; and the Jawaharlal Nehru Centre for Scientific Research (JNCASR); Bangalore;
- Public-private institutions such as the Public Health Foundation of India (PHFI);
- NGOs such as HelpAge India and Business Community Foundation (BCF);
- Research institutes such as The Energy Research Institute (TERI); and
- Corporations such as VIMTA, Biocon, Tata Steel and ABB Corporate Research Centre, Bangalore<sup>364</sup>

Apart from educational institutions, there also exist opportunities for more collaborations between standalone industry-led research institutions and universities, especially in the field of agriculture, water resources, mining, space technology and ecology. For example, in 2018, Western Sydney University (WSU) invested AUD 5 million (USD 3.4 million) to create a joint venture with the Indian Council of Agricultural Research (ICAR) and thirteen state agricultural universities as part of an initiative

<sup>362</sup> Australian universities are leading the world in business research, data reveals, 2018, Financial Review

<sup>363</sup> India's R&D spending is up but least among all BRICS nations, Business Standard, 2018

<sup>364</sup> India-Australia Institutional Collaborations In Higher Education: Potential, Problems, Promises, Australia India Education Council

<sup>365</sup> US continues to be preferred destination for Indian students; UAE sees a surge, The Hindu



designed to combat global food security issues presented by climate change. As a part of the collaboration, WSU will provide training programs through joint research in horticulture and agriculture.<sup>365</sup> Similarly, New South Wales based University of Wollongong, in its MoU with IIT Kharagpur and IIT Bombay, had initiated a project with the Council of Scientific and Industrial Research and the Government of Gujarat for the development of an International Centre for Excellence in Mining Automation and Safety (iCEM), in addition to its existing collaboration to enhance electrical systems in India.<sup>366</sup> iCEM offers professional development and training within the mining sector including a Master's program and PhD research opportunity. They also provide industry-related R&D, workshops and conferences.<sup>367</sup>

Some of these research collaborations have yielded path breaking results. For instance, a recent successful collaboration between researchers from Chennai based Schizophrenia Research Foundation and University of Queensland led to the identification of a common gene that is found in patients with schizophrenia that provides new insights in the diagnosis and treatment of the illness.<sup>368</sup>

Established in 2006, Australia-India Strategic Research Fund (AISRF) is a platform for bilateral collaboration in science, jointly managed and funded by the Governments of India and Government of Australia, contributing to cutting-edge research between scientists in India and Australia across a range of areas. Australia also has strong capabilities in social sciences, humanities, art and music. Partnerships in these sectors between the two countries remain largely untapped. Indian education in these fields is relatively under-developed. To promote advancement of these courses in the Indian education system, a research fund, with a budget contribution of USD 10 million from each country, focusing on humanities and social sciences, can be initiated in collaboration with Australian universities. A successful example of such a collaboration between the two countries is a fully funded scholarship called, "Indian Partner Arts Scholarship" that offers Indian students from Lady Sri Ram College, The Tata Institute of Social Sciences and St. Xavier's College opportunities to study at any postgraduate program in the Faculty of Arts at Macquarie University in Australia. In addition, funding for the Australia India Strategic Research Fund should be scaled up to USD 20 million by each country over the next five years.

### Case Study: AISRF

India and Australia are actively collaborating in the field of S&T and Innovation. The Australia-India Strategic Research Fund (AISRF) was set up in 2006 to support scientists in India and Australia. There are two parts to the Fund: The Indo-Australian S&T Fund is jointly managed and funded by the Department of Science and Technology (DST), Ministry of Science & Technology, Government of India, New Delhi and the Department of Industry, Science, Energy and Resources (DISER), Australian Government. The Indo-Australian Biotechnology Fund is jointly managed and funded by the Department of Biotechnology, Ministry of Science & Technology, Government of India and Department of Industry, Science, Energy and Resources (DISER), Australian Government.

The Australia-India Strategic Research Fund (AISRF) has been successful in financing research across many priority areas such as agriculture, biomedical devices and implants, food and water security, clean energy technologies, marine sciences, information and communication technology etc. The fund was established in 2006 and the success of the research fund prompted both the Governments to extend the fund in 2009 and again in 2014. AISRF has received funding of more than

<sup>366</sup> University of Wollongong Australia, Media Center

<sup>367</sup> Helping India embrace future opportunities, University of Wollongong

<sup>368</sup> Australian-Indian collaboration identifies new gene linked to schizophrenia, 2019, Xinhuanet

AUD 100 million (USD 71.43 million) and the program has supported ~300 collaborative opportunities including joint workshops, collaborative activities and fellowships. In addition, the AISRF also gives Australian researchers funding to travel and work with science and technology organizations in India. Indian researchers are also encouraged to travel to Australia by the Indian Government.

India and Australia, have agreed to cooperate on the following areas:

- Antiviral coatings, other preventive technologies
- Data analytics, modelling, AI applications
- Screening and diagnostic testing of COVID-19.

India and Australia agree on the importance of global cooperation for saving lives and managing the economic impact of COVID-19, and future global challenges. Both countries have resolved to share the benefits of medical research and development to strengthen healthcare systems.

India and Australia have resolved to boost collaboration in science, technology and research to support their national COVID-19 responses. A new phase of the AISRF has been agreed upon to promote innovative solutions for responding to and treating COVID-19, as well as other agreed priorities, to be preceded by a one-off Special COVID-19 Collaboration Round for completion in 2020.

India and Australia have agreed to work cooperatively through multilateral, regional and plurilateral mechanisms to strengthen and diversify supply chains for critical health, technology and other goods and services.

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**Source:** Australia-India Strategic Research Fund- A decade of successful collaboration, AISRF website

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### **Case Study: IIT Madras – Swinburne University**

A Joint Research Centre between IIT Madras and Swinburne University of Technology was established in 2018 to support the creation of joint start-ups between the incubation eco-systems in the two institutions. The Centre was created with a joint funding of USD 300,000 to be shared equally between the two institutions. Through this alliance, the two institutions have the platform to share research facilities and enable partnerships across industries located in India, Australia and the rest of the world. The collaboration will support and link expertise of each institution with the other in the areas of decision sciences such as IoT, artificial intelligence, medical devices, mathematics, biotechnology, advanced manufacturing and materials, smart cities, etc.

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**Source:** Swinburne partners with Indian Institute of Technology Madras, Swinburne University of Technology website



Increase in collaboration/alliances between institutions in the two countries will also lead to a surge in the number of joint academic papers and research journals published between the two countries.

### Case Study: IITB-Monash University

The IITB-Monash Research academy, established in 2008, has emerged from a partnership between the Indian Institute of Technology, Bombay and Monash University. The collaboration offers joint PhD courses and currently has 200 PhD students, 400 researchers and 400 research projects. Indian PhD students spend one year in Australia and graduate with a joint PhD degree from both universities. The research projects are driven by industry needs, as well as issues faced by people in India, Australia and addressing global challenges. The projects range from discovering novel approaches to drug delivery as well as researching sustainable forms of energy production. The graduates of the program have been able to secure jobs in leading global companies such as Amazon Lab 126, CSIRO and the Tata Group.

**Source:** IITB-Monash Research Academy website

However, while there has always been a keen interest in increasing research collaborations from both sides through platforms such as AISRF, bilateral ministerial visits and existing educational partnerships, such as IITB-Monash and IITM-Swinburne, etc., USA and parts of Europe remain the first choice for research collaborations for Indian scientists. There are only a few well-established partnerships between Australia and India and most associations between the two countries need significant funding and scaling up of operations. The respective institutions and Governments need to clearly lay down strategies for partnerships and identify complementary areas of research.<sup>369</sup>

### Curriculum Building and Teacher training

India's education system is in the process of being reformed in order to improve the skills and talents of the large population. During the visit to Australia of Hon'ble Union Minister of Human Resource Development, Shri Prakash Javadekar, India and Australia decided on a partnership to review school curriculum, teaching and learning.

The Australian agencies such as Australian Curriculum, Assessment and Reporting Authority (ACARA) can collaborate with Indian agencies such as the National Council of Educational Research and Training (NCERT) to improve the quality of school education. Further, Indian agencies such as the National Council for Teacher Education (NCTE) can collaborate with their Australian counterparts like Australian Institute for Teaching and School leadership (AITSL) to create India-specific teacher education/training programs. Exchange of teaching tools, methodologies and sharing of teacher training resources would be extremely rewarding and would enhance the overall standard of the Indian education system. Australia has several regional study hubs such as Study Adelaide, Study Perth, Study Victoria, etc. which are States/Territories education marketing entities to serve as hubs for current/future students to find out information which Indian students can use to know of study related opportunities.

India and Australia can also initiate twinning programs, which could offer students with opportunities to diversify their academic experience by spending half the duration of

<sup>369</sup> Australia India Education, Australian Government

the course in India and the remaining duration in Australia. In addition, as a part of this program, cross border internships and fellowship opportunities can also be encouraged. There could also be a joint MoU between the two countries for mutual recognition of academic qualifications in education, excluding the practicing profession.

Apart from teacher training and curriculum development, Indian institutions can partner with Australian organizations to design, develop and execute a scheme of standardized tests in India that can highlight gaps in the education system, current practical job market requirements as well as provide a detailed action plan to address the gaps identified.

## **Vocational education and Training and Soft Skill development programs**

India has a large young population and consequently, a significant demographic dividend. India has set a target to train 400 million people by 2022 to enable them to actively participate in the workforce. The main agencies and targets set by these agencies include: - National Skills Development Corporation (150 million), Ministry of Labour and Employment (100 million) and Ministry of Human Resource Development (50 million). Vocational education and training in India can be especially useful to resolve problems of employability for Indian graduates, especially in areas such as engineering.

Australia has a globally recognized VET ecosystem that provides a wide range of skills and trainings. The Charles Darwin University in Australia is dual-sector university in Australia that offers VETs as well as a bachelor degree, postgraduate degree and PhDs over a wide spectrum of courses and disciplines. In 2017, Australia's Technical and Further Education (TAFE) Institutes conducted a program - Australia-India Vocational Education Leadership Training 2016, to assist India with its target of training 400 million people by 2022. The program witnessed participation by 120 Indian leaders from community colleges, industrial training institutes, etc. The program was a collaborative arrangement between the Department of Education and Training, Government of Australia and University Grants Commission and All India Council for Technical Education in India. Australia can assist India in filling the gaps in vocational training and skill development and these could be done through collaboration either between Government bodies or between private organizations, or a combination of both.

Conversely, despite the shortage of trained IT manpower in Australia to the tune of 160,000 currently, Indian IT training companies have faced difficulties in investing and starting training courses in Australia. The Australian TAFE Regulatory system is difficult and resistant to changes in course curriculum since changes have to be approved by a board and certified, which can take several years. There is a desire to allow only the top tier students from India to undertake these courses in Australia, while opening the field wide to a few other countries like China. Paradoxically, the top tier Indian students prefer to study in other destinations, creating a situation of a stalemate and frustrating the efforts of Indian IT training companies.

## **Opportunities for Australian investment in Vocational education and Training and Soft Skill development programmes**

India's demographic dividend gives the country a significant advantage to provide skilled labour to the world. In order to achieve the government's ambitious vocational training targets, and to further integrate vocational training in mainstream education, this sector would require significant capacity addition and investment to upgrade existing facilities. The Indian government has therefore prioritized vocational education and proposed to provide Rs. 3,000 crores (USD 428.5 million) for skill development in the 2020 Union Budget. This sector thus provides significant opportunities for investment by Australian players.



### **Collaboration among Government bodies:**

One of the initiatives in India relates to improving the quality of curriculum followed by industrial training Institutes. In 2014, the National Skill Development Corporation (NSDC) signed a Memorandum of Understanding (MoU) with Australia's Department of Industry to promote technical and vocational education and training (TVET) between the two countries. This has helped in improving the availability and mobility of skilled labor across the two nations. A new VET MOU was signed in June 2020 between India and Australia which will now take precedence.

The collaboration with Australian agencies can be extended across enhancement of training curriculum, aligning Indian accreditation and assessment to global standards, improving trainer quality and conducting joint training workshops. The Indian Government, through agencies such as the NSDC, can also focus on mapping vocational courses with global and Australian frameworks to increase the mobility of skilled Indian workers across the global market. This can also mean developing niche capabilities for skilled Indian workers such as handicrafts and textiles. Moreover, such a collaboration between the two Government bodies can be designed to primarily focus on skill development in areas that are of national priority to both the countries.

### **Training of the Trainers:**

Partnerships/joint ventures between the Australian and Indian vocational education and training institutions in the private and public sector can be initiated to provide vocational education training in India. This would require the Australian VET institutes to adapt to the Indian model of high volume and low-cost needs of the workforce in the country. Such alliances can be used to address the key skill gaps faced by different industries as well as to design programs to suit the skill requirements of Indians migrating to other regions (such as the Middle East). In addition, Australian vocational institutes can also extend technical collaborations to Indian corporates as well as Australian companies operating in India.

However, the industry structure and skills required for jobs in India are quite different from those in Australia. Australian vocational education and training institutes can help Indian vocational education institutions customize specific course modules, which are suited to the requirements of jobs in India. Australian vocational institutes can train trainers in the vocational education institutions in India through 'train the trainer' programs so that they can then train a larger set of people for employment not just in India, but also to meet the requirement in other geographies such as Australia and the Middle East. Enhancing the capacity of trainers and assessors is an area of focus with the MOU of Australian Department of Education, Skills and Employment (DESE) and the Ministry of Skills Development and Entrepreneurship (MSDE) of India. The list of Information Science and technology (IST) courses can be accessed at [www.employment.internationalsskillstraining](http://www.employment.internationalsskillstraining). Distance learning and online programs could be other modes to train the trainers. The key in this model is the availability of certification from the parent skilling organization in Australia to improve employability.

### **Setting up Australian Universities in India**

In the 5th Australia-India Education Council meeting, both sides decided to explore the possibility of setting up one offshore campus of an Indian university in Australia and one Australian university in India. This will be implemented after finalization of the new National Education Policy.

## Encouraging participation of Australia under “Study in India”

The “Study in India” program was announced in the 2020 Union Budget of India in order to attract foreign students to Indian universities. The program aims to offer seats in select reputed Indian universities and Institutes via fee waivers and scholarships to meritorious students. A centralized web portal has also been launched to facilitate single window admissions of foreign students to more than 160 private and public Indian universities. This program can also be extended to include Australia in order to increase the inflow of Australian students to India.

### Recommendations

- Australia can assist teachers in India, through adequate on-line tutorials, on delivering e- curriculum for students . Collaborations with Australia can help India in arriving at flexible and cost effective educational solutions in areas with low internet connectivity.
- Collaboration with Australian regulators on curriculum development, vocational education and training. Australian Technical and Further Education (TAFE) and other Australian bodies such as Australian Curriculum, Assessment and Reporting Authority (ACARA) and Australia Institute for Teaching and School leadership (AITSL).
- Indian institutes such as National Council of Educational Research and Training (NCERT) and National Assessment and Accreditation Council (NAAC) should collaborate with Australian institutes such as Australian Assessment Curriculum and Reporting Authority (ACARA) and Australian Institute for Teaching and School Leadership Limited (AITSL) for curriculum development programs.
- Indian agencies such as National Council for Teacher Education (NCTE) should collaborate with their Australian counterparts to exchange teaching tools, methodologies and to share teacher training resources.
- Both countries should discuss ramifications of mutual recognition of academic qualifications in higher education.
- Australia and India should enhance cooperation and research collaboration under the Scheme of Promotion of Academic and Research Collaboration.
- Australia India Strategic Research Fund (AISRF) is an example of a successful research fund set up between India and Australia. Both countries should further commit to contributing USD 20 million (AUD 29.8 million), each over a period of five years.
- On the lines of AISRF, joint funds should be set up between the two countries for the following:
  - a. A joint Start-up and Innovation Fund with a contribution of USD 10 million by each country over five years.
  - b. A joint research fund to promote the humanities and social sciences sector with a contribution of USD 10 million by each country over five years
- Both countries should encourage the participation of Australia under ‘Study in India’



## Power and Renewable energy

### Synopsis

Demand for electricity in Australia is on the rise and is expected to grow at an average of 1.6% per year from 2018-22. While ~80% of the annual electricity generated in most states in Australia is from coal or gas power plants, ~20% of energy is generated from renewable sources. The Australian Government has further introduced targets at the state and federal level to encourage adoption of clean energy. The strong growth and technological innovation expected in this sector in Australia provides vast potential for Indian players to cater to the solar and wind energy market in Australia.

The following opportunities can be explored in this sector:

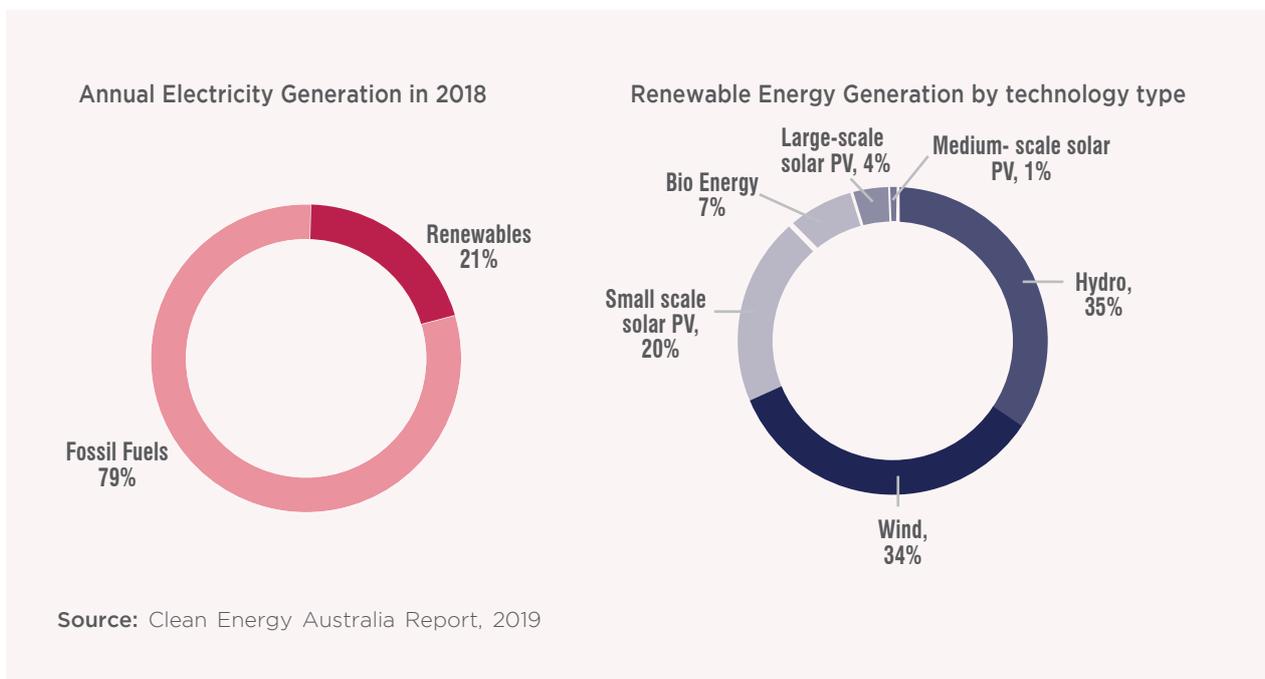
- Investing in EPC projects in renewables in Australia and investing in solar farms.
- Importing and adopting smart grid technologies from Australia
- Exporting renewable energy equipment from India to Australia
- Collaborating with Australia on research programs for renewables.

## 5.7 Power and Renewable energy

### Background

Australia's electricity sector is currently in a period of rapid structural change. The residential demand for electricity in Australia has been on the rise as a consequence of population growth and increasing number of households. The electricity consumption in Australia is expected to grow by 1.6% per year on an average in the period 2018-22.<sup>370</sup> The pattern of electricity usage and consumption is gradually changing in Australia with the spread of awareness of economic and environmental costs of energy usage. Renewable energy has been a contributor towards fulfilling Australia's electricity demand for more than 3 decades and the electricity generation from renewables has more than doubled in the past decade.<sup>371</sup>

In 2018, approximately 21% of Australia's electricity generation was from renewable sources. Renewable electricity generation in Australia is dominated by hydro-electricity followed by wind and solar power.<sup>372</sup>



Electricity generation varies largely across Australia. While electricity in most states in Australia is coal or gas fired, renewable energy is a major source of electricity generation in Tasmania and South Australia. In Tasmania, most of the electricity generated is hydro-powered, whereas in South Australia most electricity is wind generated.

<sup>370</sup> Economist Intelligence Unit

<sup>371</sup> Latest official Australian energy statistics, Australian Government, Department of the Environment and Energy

<sup>372</sup> Clean Energy Australia Report 2019, Clean Energy Council



Table: Renewable energy penetration by state

State	Total Generation (GWh)	Fossil fuel generation (GWh)	Total renewable generation (GWh)	Penetration of renewables
TAS	12,083	499	11,584	95.9%
SA	13,506	6,354	7,152	53.0%
VIC	48,014	38,106	9,908	20.6%
WA	18,950	15,876	3,073	16.2%
NSW	69,085	58,730	10,355	15.0%
QLD	65,066	58,860	6,206	9.5%
<b>NATIONAL</b>	<b>226,703</b>	<b>178,424</b>	<b>48,279</b>	<b>21.3%</b>

Source: : Clean Energy Australia Report, 2019

## Opportunities for partnership in Australia

### Participating in Australia's booming renewable energy market

Australia has an abundance of natural resources for renewable energy. The country is characterized by long coastlines, abundant sunshine and wind resources. In addition, the legal and regulatory frameworks, along with supportive financial measures, have resulted in the deployment of additional renewable energy installations. The Government policies have also accelerated the development and growth of renewable energy in the country.

The Australian Government introduced Renewable Energy Targets (RET), which is a scheme designed to reduce emissions of greenhouse gases and increase generation of electricity from renewable sources. This scheme was first introduced in 2001 by PM John Howard. The RET scheme was expanded in January 2010 to ensure that at least 20% of Australia's electricity is derived from renewable sources with a target of 41,000 GWh set by 2020. However, the Abbott Government in June 2015 reduced the target from 41,000 to 33,000 GWh.

Though the federal Government has currently not set up a long-term renewable energy policy, various state Governments have set up renewable energy targets of their own to encourage increasing adoption of clean energy.

Table: Renewable energy targets by State

State	NT	WA	NSW	Vic	QLD	Tas	ACT	SA
Renewable Electricity Targets	50% by 2030	-	-	25% by 2020 40% by 2025	50% by 2025	100% by 2022	100% by 2022	50% by 2025
Net zero emissions targets	-	-	Net zero emissions by 2050					

Source: Renewables Ready: States Leading the Charge Report, Climate Council of Australia

Investments in the renewable energy sector in Australia have witnessed strong growth in recent years. 2017 and 2018 have been landmark years for Australia's renewable energy sector. At the end of 2018, more than 87 large scale wind and solar projects were either in the construction phase or expected to commence operations in the near future, representing more than 5.3GW of new energy capacity and USD 7.1 billion (AUD 10 billion) in investments.<sup>372</sup>

As of December 2018, 14.6 GW of new wind and solar energy projects were under construction across Australia and investment in the renewable projects sector reached USD 14.3 billion (AUD 20 billion).

Leading states attracting investments in 2018 were:<sup>373</sup>

- Queensland - USD 4.9 billion (AUD 6.9 billion) of investment and 5,640 MW of new capacity
- Victoria - USD 3.7 billion (AUD 5.2 billion) of investment and 3,400 MW of new capacity
- New South Wales - USD 3.1 billion (AUD 4.3 billion) of investment and 350 MW of new capacity

Renewable energy can be generated at a very low cost compared to other forms of energy in Australia. In addition, Australia has been responsible for developing a large number of the world's renewable energy technologies, especially in solar, wind and hydropower. Australia has strong support for R&D from private and public organizations and has generous R&D tax incentives for companies in the renewable energy sector. Indian companies can thus explore this space for investments in Australia.

Indian power companies i.e. Power Generating Companies (Gencos) and Power Transmission Companies (Transcos) are looking at expanding their footprints outside India. NTPC Limited could consider investing in renewable energy as well as gas-based power plants in Australia including collaborations on techniques such as Carbon Capture and Storage (CCS) to reduce its carbon footprint. Power Grid Corporation of India (PGCIL) could leverage on its expertise to invest in grid stability and transmission projects in Australia.

## **Increasing exports of equipment used for harnessing renewable energy from India**

Presently, majority of equipment used for harnessing wind, solar and hydro energy is imported from China. China is highly price competitive in manufacturing wind turbines, blades, solar panels, etc. and benefits accrue from the China-Australia Free Trade Agreement (ChAFTA), which covers these equipments under the zero per cent import duty. This has resulted in companies such as Goldwind, a Chinese wind turbine company, becoming leading players in the wind energy sector in Australia.

India has significant potential to export solar panels and other renewable energy equipment. While this market is predominantly import oriented in India, the sector has been growing with exports to Africa, UAE and parts of the US, albeit at a very small scale. In 2017, the U.S became the largest importer of Indian solar cells and modules, largely due to the exemption of a 30% anti-dumping duty on its solar imports. Even while India's share to the overall size of solar market in the US is small, researchers have speculated a positive growth in India's exports to the U.S in the coming quarters. Apart from the U.S, India also exports solar cells and modules to Turkey, which accounts for 22% of India's total exports and Denmark, which accounts for 10.4% of India's total exports.<sup>374</sup> Additionally, Indian companies can also offer support and maintenance services to Australian companies with investments in renewable energy projects in Australia.

<sup>373</sup> Renewable energy investment hits record \$20 billion in 2018, 2018, Energy Matters

<sup>374</sup> Indian Solar Imports Witnessed 43% Increase While Exports Grew by 16% in 2017, Mercom India



In 2020, Sterling and Wilson Solar, India's solar power generation firm, signed its largest EPC contract with Australia. This contract is worth over INR 2,600 crore (USD 371 million). In addition, the contract also includes an operation and maintenance contract worth INR 415 crore (USD 59.3 million) for 20 years.

Though state policies play an important role in driving the renewable energy sector in Australia, investment decisions are primarily based on costs and return on investments. The strong growth and technological innovation expected in the renewable energy sector in Australia provide vast potential for Indian players to tap into the solar and wind energy market in Australia.

Further, apart from export of goods, Indian Central Public Enterprises under Ministry of Power may provide consultancy services with respect to expertise in areas such as Super Critical Technology in thermal power plants, equity and access issues in the distribution sector and one-nation -one grid operationalization in the transmission sector to Australian companies in this sector.

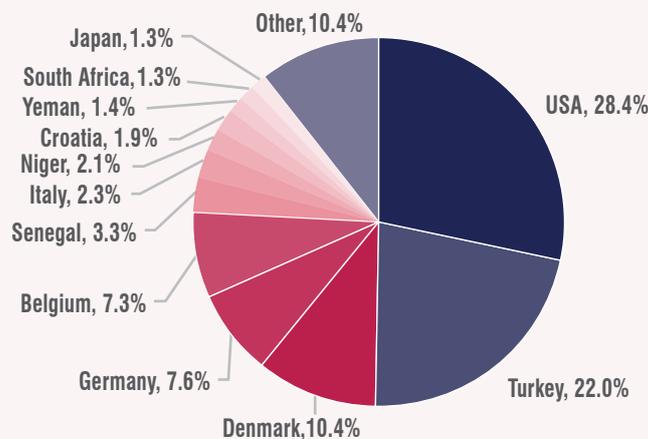
### Challenges faced by Indian Investors in Australia in Power& Renewable Energy

Indian investors face the following challenges in fully harnessing the growth opportunities provided in this sector in Australia:

1. One of the most common challenges faced by Asia-specific investors in Australia is difficulties with seeking planning permits, licensing as well as access to the renewable energy grids in Australia. This lowers investor incentive despite the lucrative nature of the opportunity.
2. Australia's large landmass creates challenges to lay renewable energy-based grids. Construction of new renewable grid infrastructure requires significant planning and long-term financing, which in turn poses high risks and uncertainties for an investor.

In addition to the above, a shortage of EPC contractors in the country for grid construction is also a concern. However, considering India's strong manpower capabilities, this challenge can be potentially mitigated by enabling a short-term visa program for skilled labor from India. This will be possible if resolved at the intergovernmental level.

Country-wise Breakdown of Indian Solar Exports (% , Jan-Dec 2017)



Source: Indian Solar Imports Witnessed 43% Increase While Exports Grew by 16% in 2017, 2018, Mercom Capital Group

## Import of grid engineering technology from Australia to reduce transmission and distribution losses

Rural electrification is currently one of the highest priorities of the Ministry of Power (MoP) in India. The Government of India launched two schemes, viz., “Pradhan Mantri Sahaj Bijli Har Ghar Yojana” and “Deen Dayal Upadhyaya Gram Jyoti Yojana<sup>375</sup>” to achieve 100% rural and urban electrification.<sup>376</sup> The Government identified 40 million rural households that did not have access to electricity and targeted them for electrification by 2018. As per the Rural Electrification Corporation (REC), India has achieved 100% electrification of villages.<sup>377</sup>

With electrification as the main priority of the country, the MoP’s next focus is expected to be on improving the performance and efficiency of the country’s power grid. Electricity losses are mainly on account of technical inefficiencies and theft. When electricity is transmitted through the grid, the wires generate resistance causing technical losses, which can be minimized to 6-8% through usage of wires with high technical efficiency. India has attempted to reduce the technical losses by improving the efficiency in the transmission grid and adding new capacity. “Integrated Power Development Scheme” was launched by the Government in 2014 to enhance the power transmission networks in urban regions by introducing IT based systems for tracking consumption, feeders and transformers. The Government also launched the “National Smart Grid Mission”, which will assist the state-run power distribution companies and agencies providing finance, in planning advanced communications grids.<sup>378</sup>

Despite these reforms and upgrades, the transmission and distribution (T&D) loss, as a percentage of net electricity generated, at 21.30% in FY17 in India, is one of the highest in the world.<sup>379</sup> In 2014, T&D losses in India were almost twice the world average and four and half times that of Australia (4.78%).<sup>380</sup>

Australia has four electricity grids (North West Interconnected System, National Electricity Market, South West Interconnected System and Darwin-Katherine Electricity Network) operating across the country. Australia has a distribution grid spanning 850,000 km and transmission grid spanning 45,000 km. The National Electricity Market grid covers the eastern and south-eastern states of Australia and the interconnected grid between these states is the longest in the world.<sup>381</sup>

Australia’s grid came under intense scrutiny after the “system black” incident occurred in South Australia, on 28th September 2016. This was followed by a number of inquiries and reports suggesting an upgrade of Australia’s ageing grid network. Australia is planning to invest in building smart grids, which will enhance the grid’s storage capabilities, smart meters and communication within the grid. This will, in turn, help utility companies to increase their energy efficiency, increase the share of renewable energy in their portfolio and improve grid network management. Energy storage offered by smart grid, which allows renewable energy to be stored and utilized at a later time, will allow a smooth integration of renewable energy into the grid.<sup>382</sup>

Since the Indian Government has almost achieved its target of 100% rural electrification, the focus of the Government is now on improving grid efficiency through energy storage technologies and smart networks. Grid efficiency is a common cause of concern for both countries. Collaborations between the Ministry of Power in India with the Department of the Environment and Energy in Australia can greatly benefit both countries.

<sup>375</sup> Deen Dayal Upadhyaya Gram Jyoti Yojana, Government Schemes

<sup>376</sup> Pradhan Mantri Sahaj Bijli Har Ghar Yojana-“Saubhagya”, Government Schemes

<sup>377</sup> Rural Electrification Corporation, 2019

<sup>378</sup> Energy Statistics 2018, CSO, MOSPI, table 6.10

<sup>379</sup> Electric power transmission and distribution losses (% of output), The World Bank Group, 2018

<sup>380</sup> U.S Energy Information Administration, 2019

<sup>381</sup> Clean Energy Council

<sup>382</sup> International Energy Association



In 2019, The Ministry of Power, Government of India had advised State Governments and the respective Electricity Departments to convert all their existing consumer meters into smart meters in a period of 3 years. Smart meters are the third pillar of the planned technology-driven shift in global electricity systems, in addition to renewable energy and energy storage technologies. The overall investment in smart metering is likely to be INR 150,000 Crores (USD 21.4 billion) in India, spread over a few years. There exist opportunities for Australian technology providers and investors for investing and providing smart metering technology to aid loss reduction in the Indian distribution grid, subject to Indian government provisions on foreign investments in this sector.

## Hydrogen as the future of fuel

Rising concerns of climate change and depleting resources of fossil fuels are pushing Governments worldwide to develop alternative uses of energy. Hydrogen has been emerging as an alternative fuel for transportation. In comparison to solar and wind, hydrogen has a higher energy content. Moreover, it burns with no traces of pollution and classifies as a zero-emission fuel for fuel cell vehicles. There is a notable global trend towards the adoption of hydrogen powered cars with an 80% increase in sales of fuel cell electric vehicles since 2017.<sup>383</sup>

Japan, France, Korea and the California State Governments in the US have shown an interest in new hydrogen focused strategies. In addition to these Governments, the Australian Government in 2018 issued a national hydrogen roadmap and announced its future plans to strategize its use of hydrogen. On 4th May 2020 the Australian government launched its USD 193 million “Advancing Hydrogen Fund” with a view to expediting the development of Australia’s Hydrogen industry. The potential economic, environmental and geostrategic benefits of developing “green hydrogen” from renewables are well established and are outlined in the Australian government’s 2019 National Hydrogen Strategy. CSIRO in Australia is conducting research on hydrogen as a clean alternative to fossil fuels and Japan has invested in this research program. Australia has a potential export opportunity for hydrogen given that the global demand for it is expected to rise by 8 million tons by 2030.<sup>384</sup> Australia is yet to expand the industrial capacity of hydrogen and requires further investment in infrastructure to remove barriers to market activation. However, as there are currently few applications where clean hydrogen can be used cost effectively as a fuel, investment incentives are low and the path to cost reduction and competitiveness is unclear.

India is one of the few developing countries with active research on the development of hydrogen-based transportation. In 2019, Tata Motors, in partnership with Indian Oil Corporation, innovated a hydrogen fuel-cell bus.<sup>385</sup> This project flagged India’s growing interest in developing clean vehicles for mass transportation. Vehicle manufacturers, safety regulators, state and central Governments and research institutes from both countries can collaborate to find cost-effective ways to shift towards hydrogen as a fuel for transportation. Given that Australia is well positioned to capitalize on its demand for hydrogen from Japan and Asia, India can invest in establishing a strong bilateral trading relationship with Australia on hydrogen technologies.

Australia initiated the Hydrogen Energy Supply Chain (HESC) project for the production of sustainable hydrogen from Victorian brown coal. Collaboration with Australia may thus be initiated for converting abundant Indian brown coal to Hydrogen fuel.

International and cross-sectorial collaboration is crucial for smooth and rapid deployment of hydrogen fuel in areas such as the development of hydrogen refueling standards, construction of refueling stations and safety measures in the use, storage and transportation of hydrogen.

<sup>383</sup> ‘The perfect storm’: hydrogen gains ground on LNG as alternative fuel, The Guardian

<sup>384</sup> Hydrogen: towards cleaner and sustainable transport, 2019, Deccan Herald

<sup>385</sup> India’s first-ever hydrogen fuel cell powered bus by Tata Motors is here, 2018, Financial Express

## Opportunities for Australian investments in renewable energy sector in India

In 2019, India was ranked as the first most attractive renewable energy market in the world. The country has set an ambitious target of 175 GW of renewable power by 2022, which includes 100 GW of solar power and 60 GW from wind power. Up to 100% FDI is allowed under the automatic route for renewable energy generation and distribution projects, which is also an opportunity for Australia.

Australia has had significant experience and possesses relevant technologies to set up Pumped Storage projects. Pumped Storage is a type of hydro-electric energy storage which works by storing water in an upper pool pumped from a second pool at a lower elevation when there is surplus power in the system. When there is demand for energy, the water in the upper reservoir is released and as it falls, it turns turbines that create the power. There is a requirement to set up Pumped Storage projects in India to manage large scale integration of renewable sources of energy and grid balancing. This is also a possible area of collaboration and knowledge sharing with Australia.

### Recommendations

- Inter-governmental discussions with relevant representation from renewable energy and power departments of both countries should be encouraged to enable easier access to planning permits, licensing and renewable energy grids for Indian investors in Australia
- India - Australia Energy Security Dialogue should be revived in order to enhance bi-lateral co-operation for mutual benefit in the electricity sector. The key areas of co-operation under the Dialogue could include adoption of clean coal, fly ash management technologies, solar forecasting and scheduling, cost effective battery technologies etc.
- Australia and India should enhance cooperation and research collaboration to further develop hydrogen fuel technologies
- Australian investors should be encouraged to look at India for renewable energy generation and distribution projects
- Collaborate with Australia to set up pump storage projects for managing large scale integration of renewable sources of energy and grid balancing



## Railways

### Synopsis

Indian Railways is the world's largest commercial enterprise in terms of number of employees. It carries close to 1.2 billion tonnes of freight per annum, as well as over 23 million passengers.

The large passenger traffic and the Government's Make in India initiative has led the country to develop world-class expertise in manufacturing rails, sleepers, signaling equipment, metro coaches, locomotives, etc.

The following opportunities can be explored in this sector:

- Increasing investments from Australia into India's rail infrastructure projects
- Utilizing Indian manufacturing capability in railway components for railway projects in Australia
- Adopting best practices from Australian rail transportation for heavy haul

## 5.8 Railways

India has one of the world's largest railway networks spread across 115,000 km<sup>386</sup>. Indian railways carry ~8.2 billion passengers and ~1.2 billion tonnes of freight per annum<sup>387</sup>. However, India faces the need to upgrade and expand its railway infrastructure and network to achieve sustained economic growth and meet the needs of its growing population.

### Increasing Australian investments into railway infrastructure in India

With a view to support the growth in demand, the Indian government is focused on increasing investments in the rail sector through investor-friendly policies and introducing new railway projects. The government has permitted 100% FDI in railway infrastructure and has announced the development of four new dedicated freight corridors and six new high-speed corridors with a total projected investment of USD 158 billion. The Indian Railways is looking to electrify the entire network by 2025. 700 stations will be fed with solar power in the medium term. Australian private corporations and infrastructure focused funds can therefore explore investment opportunities in India's railway infrastructure. The government has also taken the decision to allow 150 trains to be operated by private operators. It is envisaged that the private train operators will be permitted to have their own rolling stocks which will not only encourage wide participation but also adoption of global best practices. India should encourage private operators from Australia to explore this opportunity. Further, the government also plans to develop 110 new railway stations under the public-private partnership model, thus presenting investment opportunities for Australia.

### Exporting Railway components to Australia from India

Indian railways have huge passenger traffic that has led to the country developing expertise in manufacturing rails, sleepers, signaling equipment, metro coaches, locomotives, etc. (known as rolling stock). Large cities across the country have also invested in state-of-the-art technologies to increase reliability and efficiency of urban rail systems. This has led to the emergence of metro projects across various Indian cities. In addition, the Government's focus on improving public transportation in the country has also resulted in the development of ancillary industries such as railway equipment and spare parts industry. Metro coaches and other parts, including battery boxes, window glasses, bogie frames, brake blocks, propulsion systems and vacuum circuit breakers are now being indigenously manufactured in India.<sup>388</sup>

Global companies, such as Alstom, Bombardier and Hyundai Rotem have already set up manufacturing plants in India. The China Railway Rolling Stock Corporation (CRRC) has also entered into an MoU with the Government of Maharashtra for setting up a manufacturing facility in the Multimodal International Cargo Hub and Airport at Nagpur (MIHAN).<sup>389</sup>

India thus has local manufacturing capabilities that can be leveraged to supply railway components to meet domestic as well as international requirements.

In recent years, railway exports to Australia have been on the rise. In 2016-17, India's railway exports to Australia were USD 167.4 million and in 2017-18, the exports increased to USD 351.3 million on account of export of metro coaches by Alstom to Australia.<sup>390</sup>

<sup>386</sup> Invest India

<sup>387</sup> Indian railways yearbook, 2017-2018

<sup>388</sup> Global Rail Components Market 2018-2024, 2018, Mordor Intelligence

<sup>389</sup> India to make coaches for some of the world's biggest metro projects, 2017, Economic Times

<sup>390</sup> Trademap, HS Code 86



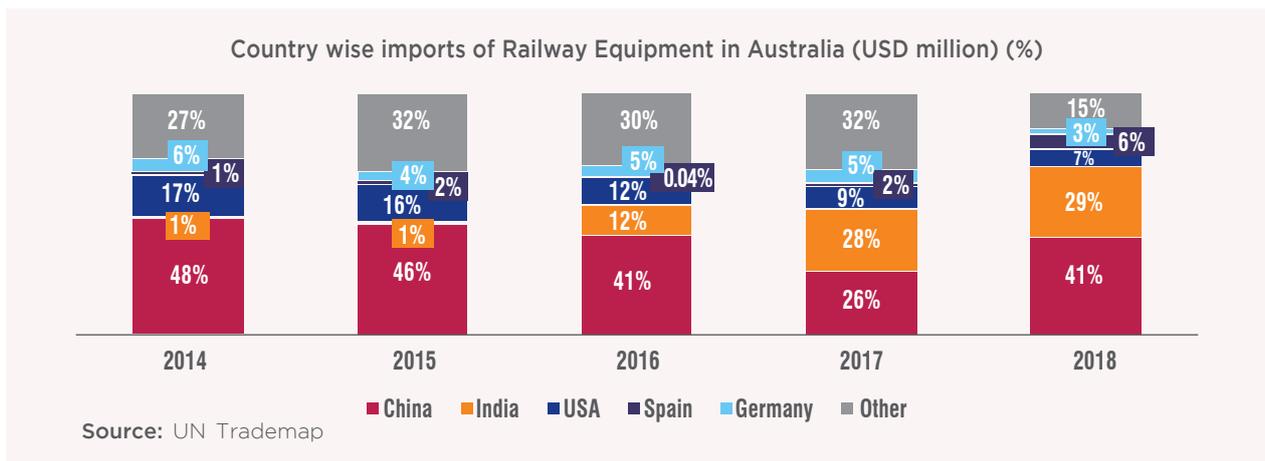
In addition, Bombardier has also invested 33 million Euros (USD 35.77 million) in its Indian manufacturing facility and has orders to export 450 metro rail coaches to Australia and components to Brazil, Australia and Saudi Arabia. The Quebec-based company has a manufacturing plant in the Gujarat in Western India and a transportation engineering services center in Gurgaon, near New Delhi.<sup>391</sup>

Australia has several on-going as well as planned railway projects that offer export opportunities for Indian railway equipment manufacturers.

Some of Australia's current rail projects include:<sup>392</sup>

- Inland Rail connecting Melbourne to Brisbane (AUD 9.3 billion (USD 6.2 billion))
- Sydney Metro (NSW), (AUD 12 billion (USD 8 billion))
- Melbourne Metro Tunnel (VIC), (AUD 11 billion (USD 7.4 billion))
- Melbourne Airport Rail Link (VIC), (AUD 5 billion (USD 3.4 billion))

Australia is a net importer of railway equipment. While the share of Indian exports to Australia is on the rise, China remains the largest source of imports for railway equipment to Australia (Approximately 41% of total imports in 2018).<sup>393</sup>



Railway Equipment thus presents a promising opportunity for Indian exporters to Australia. This can be carried out through technical collaborations with railway equipment manufacturers in Australia as well as by consolidating in-house manufacturing capabilities of Indian companies. At a policy level, the Ministry of Railways in India, in partnership with Indian Government undertakings such as RITES and IRCON, can encourage technical partnerships with their Australian counterparts.

Australian based company Aurizon is a well-established rail freight operator, known for its modernized technology and logistical solutions in the transportation of bulky commodities. This company has specialized expertise in rail design, engineering, construction, etc. Thus, India can seek Australia's expertise on railway haulage via collaborations with companies like Aurizon to increase the reliability and efficiency of its current rail haulage systems. Furthermore, the Institute of Railway Technology (IRT) in Monash University has been developing Unmanned Autonomous Systems (UAS), commonly known as 'drones', for autonomous inspections of railway tracks. The Indian government can use Australia's expertise in conducting such automated inspections to reduce frequency of rail accidents.<sup>394</sup>

<sup>391</sup> Complete list of Australian infrastructure projects, 2019

<sup>392</sup> Trademap

<sup>393</sup> 10-member Australian Rail Delegation visits India, 2019, Austrade

<sup>394</sup> Remote track inspections using drones, Infrastructure Magazine

### **Case Study: Bharat Earth Movers Limited (BEML)**

BEML is a Public Sector Undertaking that manufactures rail coaches & spare parts and mining equipment and serves India's core sectors such as defence, rail, power, mining and infrastructure. BEML has supplied over 1,100 Metro Cars for various projects in India. In addition, BEML has manufactured and supplied over 800 units of Electrical Multiple Units (EMUs) to Indian Railways for use in its sub-urban and mainline routes. BEML has also manufactured and supplied self-propelled equipment viz., 20 nos. rail bus (for public transport), over 40 nos. other maintenance vehicles to Indian Railways and over 120 nos. 8W-DHTCs (for OHE inspection & maintenance), to Indian Railways and various Metro Corporations of India. As Australia has a number of upcoming railway projects namely Inland Rail, Sydney Metro, Melbourne Metro Tunnel and Melbourne Airport Rail Link, BEML can contribute immensely to Australia's railway sector.

### **Recommendations**

- Technical collaborations between railway equipment manufacturers in Australia and India should be encouraged. The Ministry of Railways, Government of India, in partnership with Indian Government undertakings such as RITES and IRCON, can facilitate such technical partnerships with their Australian counterparts
- On the lines of Alstom and Bombardier, the Government of India should encourage other Australian companies to evaluate India as a low-cost manufacturing location for rail infrastructure
- Encourage Australian companies to invest in upcoming railway infrastructure projects in India



## Gems and Jewellery

### Synopsis

The Indian gems and jewellery industry is largely export-oriented, contributing ~12.41% to the country's total exports and 6-7% to India's GDP. India has established itself as one of the largest exporters and manufacturers of precious stones in Asia, with its exports amounting to ~USD 40 billion in 2018.

Australia has a long geological history. While being a large supplier of gemstones and diamonds, Australia also imports significant volumes of gold, diamonds and jewellery from Papua New Guinea and Japan.

India's current contribution is only 5% of Australia's total imports (USD 6.6 billion) of gemstones, thus there is significant opportunity for India to improve its share in overall Australian imports.

The following opportunities can be explored in this sector:

- Leveraging on India's craftsmanship in jewellery and increasing exports of Indian gems and jewellery to Australia
- Encouraging collaborations between the Gemological Association of Australia and the Indian Diamond Institute (IDI) to discuss technical and trade related aspects



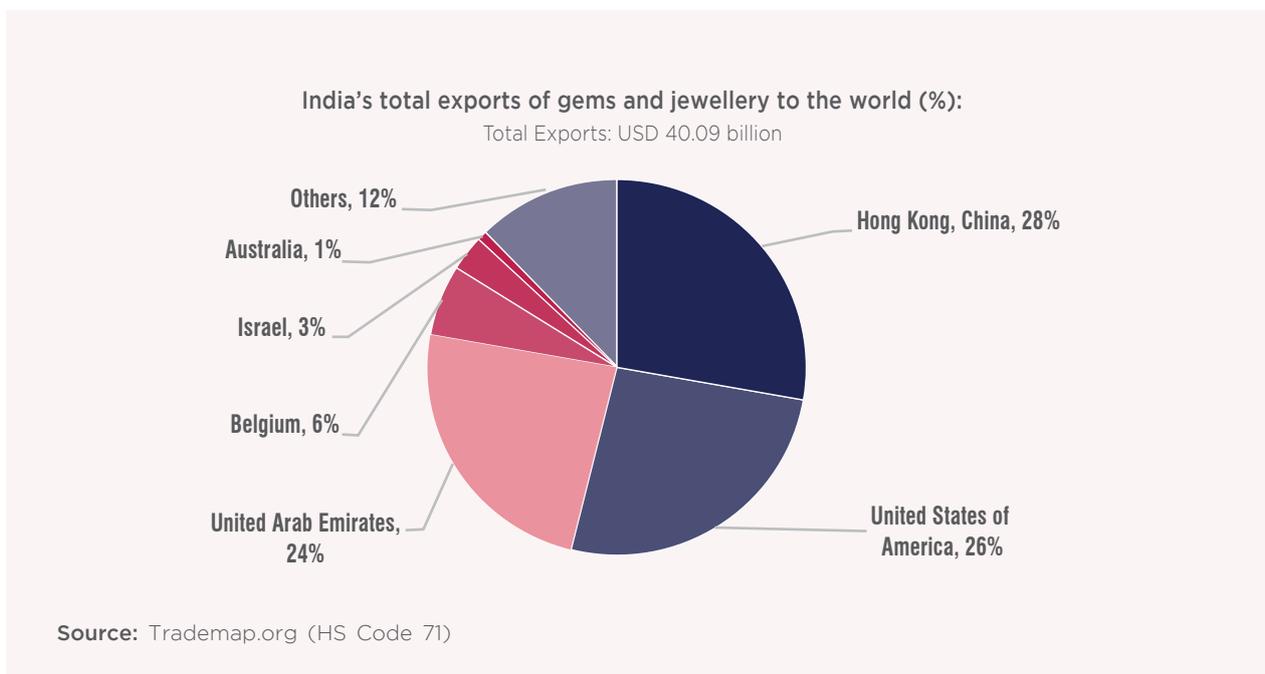
## 5.9 Gems and Jewellery

### India's Gem and Jewellery Industry

The gems and jewellery industry plays a pivotal role in the Indian economy and contributes significantly to India's foreign exchange reserves. The industry is largely export-oriented, contributing ~12.41%<sup>395</sup> to the country's total exports and 6-7% to India's GDP.<sup>396</sup> Along with China, India has established itself as one of the largest exporters of precious stones in Asia. Indian exports of gems and jewellery amounted to ~USD 40 billion in 2018<sup>395</sup> and the sector employs ~5 million people.<sup>397</sup>

India is a pioneer in diamond and jewellery manufacturing. The Indian city of Surat in Gujarat single handedly exports ~80% of the country's diamonds and has the largest concentration of computerized diamond planners and modern machinery for jewellery-making in the country. ~90% of the world's diamonds are cut in Surat. Jaipur is considered to be the largest hub for polishing gemstones such as tanzanite, emeralds, etc. in the country.<sup>398</sup> The jewellery sector in India is known for its craftsmanship. From the art of enameling in Jaipur to silver filigree work in Orissa and Andhra Pradesh, different regions in India have developed their own style and design of jewellery making.

The Indian export basket consists of diamonds, jewellery, gold articles and other precious metals and stones. Exports of diamonds from India stood at USD 25.6 billion, gold coins and medallions at USD 0.8 billion, while other exports, primarily articles of jewellery with precious stones and silver, stood at USD 12.3 billion in 2018.<sup>399</sup> India's prominent export destinations include Hong Kong, USA and the UAE.



<sup>395</sup> Trademap (HS Code: 71)

<sup>396</sup> Glittering India, Invest India

<sup>397</sup> Press Information Bureau, Government of India, Ministry of Commerce & Industry

<sup>398</sup> India Center

<sup>399</sup> UN Trademap



Imports of gems and jewellery by Australia by country of origin, in USD million

Exporters	Imported value in 2018	Share in total	Major type of Product
Papua New Guinea	2,187	33%	Gold
Japan	1,484	22%	Gold
New Zealand	452	7%	Gold
India	349	5%	Diamonds
Switzerland	332	5%	Gold
Hong Kong, China	312	5%	Gold
Others	1,501	23%	
<b>World</b>	<b>6,616</b>	<b>100%</b>	

Source: : Trade Map (HS Code 71)

There are three core bodies responsible for advancing trade in this sector in India, namely the Gem and Jewellery Export Promotion Council (GJEPC), the Gem and Jewellery Trade Council of India (GJTCI) and the All India Gems and Jewelry Trade Federation (GJF). These councils also support traders in this sector by offering financial assistance and infrastructure support.

In recent years, exports have witnessed a slight dip on account of a global surge in import duties and a decline in global demand. In order to strengthen this industry, the GJEPC has established common facility centers such as Special Notified Zones for the creation of separate ITC HS code for lab grown diamonds, reduction of GST rates on certain gems and cut diamonds and the exemption of IGST on the import of silver, gold and platinum to allow the supply at nil GST to jewellery exporters.<sup>400</sup> These initiatives are expected to provide fiscal support to exporters in the industry and incentivize them to participate in international export fairs.

## Australia's Gem and Jewellery Industry

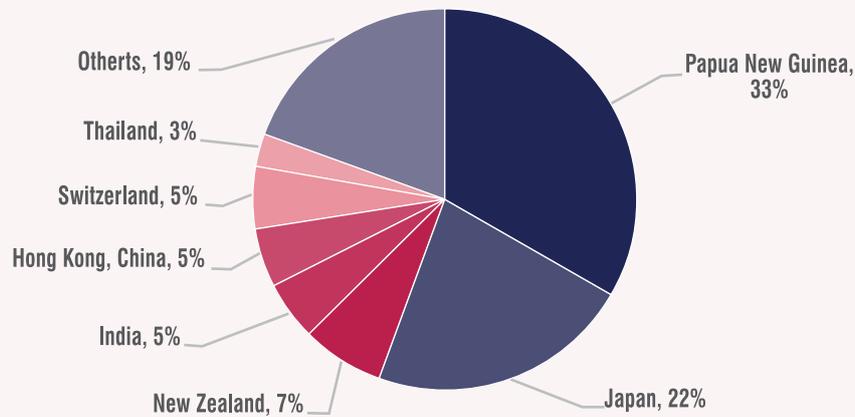
Australia has a long geological history. Even though Australia is a large supplier of gemstones and diamonds, it imported significant volumes of gold (USD 4.6 billion), diamonds (USD 0.9 billion) and jewellery (USD 0.4 billion) in 2018.<sup>395</sup>

Australia imports largely from Papua New Guinea (USD 2.1 billion) for gold, silver, imitation jewellery, etc and Japan (USD 1.2 billion) for gold, pearls, platinum, etc. India features as the 4th largest import source for Australia for diamonds, rubies, sapphires, emeralds, semi-precious stones, imitation jewellery and pearls. Other key import destinations include New Zealand, Switzerland, Hong Kong (China), the US, Italy, France, Philippines, etc.<sup>395</sup>

<sup>400</sup> India: Gems and Jewellery Industry; Thai Economic News Service

### Australia's total imports of gems and jewellery from the world (%):

Total Imports: USD 6.6billion

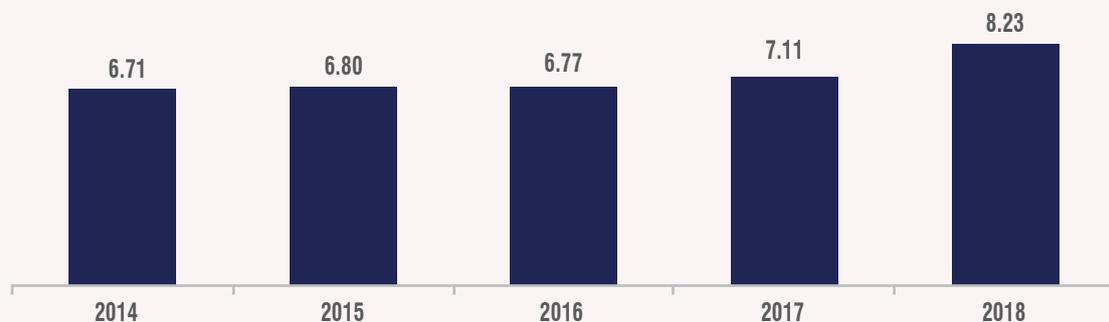


Source: Trademap HS Code 71

## Increasing Indian exports of jewellery and diamonds to Australia

According to the trends noted in Australia's leading publication, Jeweller Magazine, Australia has a growing demand for rubies, emeralds, sapphires, coloured gemstones and jewellery. There is an opportunity for India to import these gemstones to Australia. In case of gold jewellery, in comparison to other Asian markets like China, Thailand and Hong Kong, India is less competitive owing to the duty levied on imports from India. In some cases, Indian companies are forced to value add in one of these Asian countries in order to minimize impact of the duties levied, making their exports more expensive and also bringing down their margins. The two governments should engage in discussions to reduce the duties levied on Indian imports of jewellery.

### Australia's total imports of rubies, emeralds and sapphires (USD million)<sup>395</sup>:



Source: Trademap HS Code 7103910037;

Note: These only refer to the rubies, sapphires and emeralds, worked, whether or not graded, but not strung, mounted or set, rubies, sapphires and emeralds, worked, ungraded, temporarily strung for convenience of transport



Australia's Argyle mine, responsible for majority of the country's diamond volume, is expected to close production in 2020. The gradual decommissioning of the Argyle mine in 2019-20 is expected to significantly change the industry forecasts in the upcoming years. India can fill in the void with its large available export volume of diamonds.

Furthermore, Australia's imports of precious and semi-precious stones such as rubies, emeralds and sapphires have been increasing. Australia imports this largely from Thailand. India is a large exporter of these gemstones and exported ~USD 254.42 million worth of gemstones in 2018. There is thus a significant opportunity to increase Indian gemstone exports to Australia.

As the apex body of gems and jewellery industry, Gem and Jewellery Export Promotion Council (GJEPC) represents over 6,000 exporters in India. The GJEPC has undertaken several promotional activities such as annually hosting the Indian International Jewellery Show (IIJS), which is the largest trade expo for international traders. It is also responsible for organizing the first India-Australia jewellery buyer and seller meet in Mumbai in 2018. India and Australia can work on sending trade delegations across the two countries to facilitate direct trade between Indian suppliers and Australian buyers.

India is a founding member of the Kimberley Process Certification Scheme for tracking the flow of all diamonds certified as "conflict-free" going in and out of the country. India thus has a keen interest in maintaining high standards in jewellery grading.

Established by the Ministry of Commerce and Industry and a project of the GJEPC, the Indian Diamond Institute (IDI) provides vocational education in the field of diamonds, gems and jewellery. From grading, manufacturing and designing to education on the entire spectrum of gems and jewellery, the IDI stands as a knowledge sharing partner of the GJEPC. The Gemological Association of Australia, can also collaborate with IDI on development and promotion of various technical and trade related programs. Such a collaboration will enable both organizations to benefit from mutual exchange in gem expertise, jewellery grading standards and equipment. Training programs in Australia have a large demand. For instance, Australia's largest jewellery group, Nationwide Jewellers, received an overwhelming response of applicants for its free diamond training program launched in 2018.<sup>401</sup>

## Recommendations

- Technical and training collaborations between Indian jewellery associations such as Gem and Jewellery Export Promotion Council (GJEPC) and Indian Diamond Institute (IDI) should be encouraged with Australian bodies such as the Gemological Association of Australia
- The governments of India and Australia should hold discussions on reducing duties levied on jewellery imported from India in order to make Indian exports competitive vis a vis countries that have signed bilateral agreements with Australia

<sup>401</sup> Applicants pour in for Nationwide Free Diamond Training, Jeweller Magazine

## Automotive Spare Parts

### Synopsis

The Indian automotive industry has established itself as a supplier of high-quality and cost-effective auto components to global OEMs. In 2017-18, the Indian automotive component sales were estimated at \$51.2 billion, of which exports accounted for ~\$13.5 billion. In contrast to India's growing automotive industry, Australia's automotive industry has been facing challenges due to relatively high production costs, rising international competition and a relatively high exchange rate. As a result, the automotive OEMs operating in Australia have been importing automotive spares and parts from abroad, which presents an opportunity for Indian automotive component manufacturers to supply spare part to the OEMs operating in Australia. Only 0.32% of India's total auto-component exports were to Australia in 2018 and hence India's exports of these components and spare parts to Australia have significant scope for improvement.

The following opportunities can be explored in this sector:

- Increasing collaborations between Indian vehicle brands such as Tata, Mahindra and Mahindra, Maruti, etc. and niche R&D companies in Australia.
- Increasing exports of Indian auto-components and spares to Australia.
- Increasing exports by Indian tyre manufacturers to the Australian market.

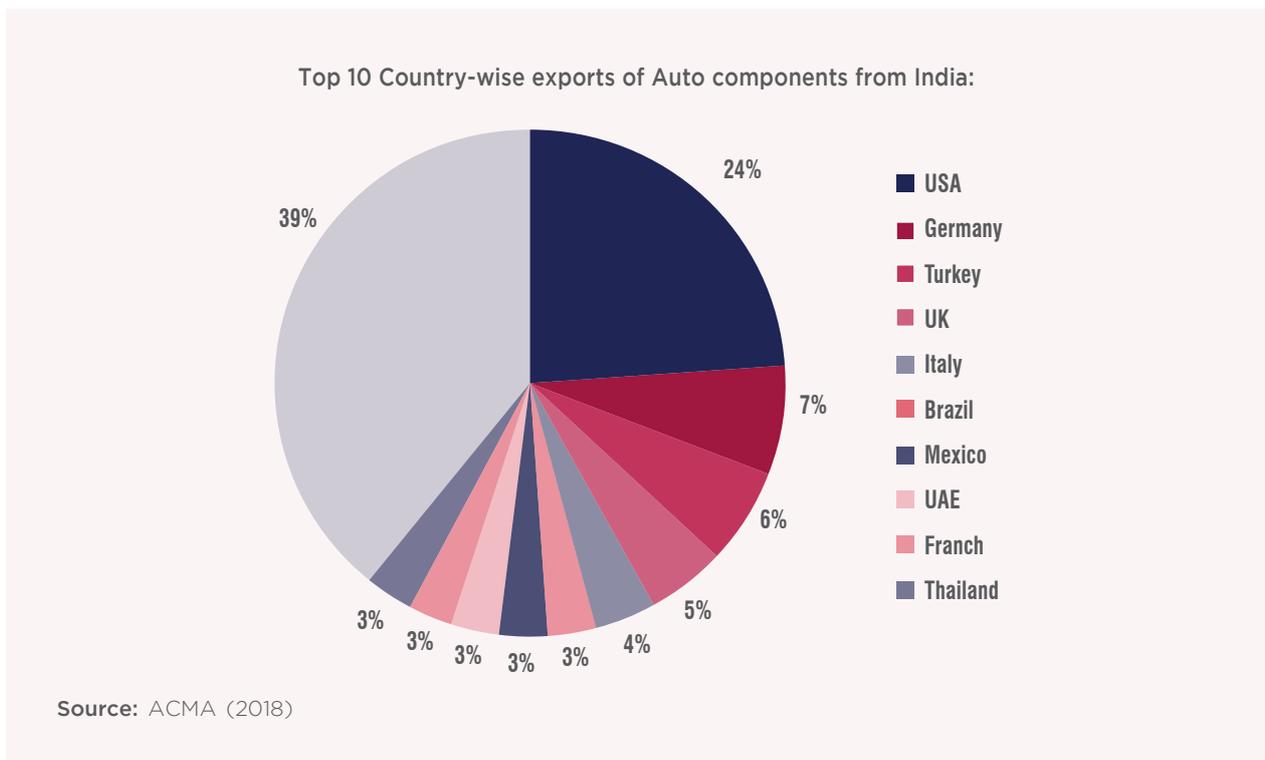


## 5.10 Automotive Spare Parts

The Indian automotive industry is globally recognized and contributes 2.3% to the Indian GDP.<sup>402</sup> Having emerged as a significant contributor to the global automotive supply chain, the Indian automotive industry is a known supplier to OEMs such as BMW, General Motors, Ford, Mercedes-Benz, etc. Indian auto component and spare part manufacturers are known for their high-quality products and low-cost components. Rapid growth in the domestic automotive market has been a prominent driver for the industry.

### Increasing auto-component and spare part exports to Australia

In 2017-18, the Indian automotive component industry had sales of USD 51.2 billion, of which exports accounted for USD 13.5 billion.<sup>402</sup> India now exports to over 160 countries.<sup>403</sup> Among the top destinations, the US accounts for 24% of India's total exports and is a key importer of brakes, servo brakes, drive-axles, road wheels, parts and gear boxes from India.



Approximately 40% of India's total export portfolio comprises of engine, transmission and steering parts, while 60% comprises of chassis, bumpers and rubber products. According to the Automotive Components Manufacturers Association of India (ACMA), the Indian auto component industry, backed by a strong export market, is expected to generate a revenue of USD 100 billion by 2020.<sup>404</sup>

<sup>402</sup> Automotive components industry in India; Madras Consultancy Group, Available at: EMIS

<sup>403</sup> Making Indian auto component industry future-ready, Grant Thornton

<sup>404</sup> Indian Auto Components Industry - Update, FRPT Research; Available at: EMIS



Australia's automotive manufacturers have been facing challenges such as relatively high production costs and rising international competition.<sup>405</sup> As a consequence, the automotive OEMs operating in Australia have been relying less on local suppliers and importing automotive components and spare parts from other countries.

Over the years, automobile manufacturers in Australia have not been able to compete against auto imports from countries like Japan, Korea and Thailand post opening of the auto-market by the Australian Government and thereby reducing import duties. Indian vehicle manufacturers have also made inroads in the Australian market and exported significantly to the country till 2014-15. However, in the last few years, Indian automobile exports to Australia have declined significantly on account of competition from countries like Thailand, Korea, Indonesia etc. Australia has eliminated import duties on automobiles for these countries whereas Indian exports to Australia attract a duty of 4.5%.

The Australian market is primarily dominated by cars imported from Asia and Europe. It is estimated that 17 million vehicles are currently running on the Australian roads. This holds significant opportunities in the service/aftermarket sector for Indian auto component suppliers.

India's exports of automotive components to Australia have significant scope to increase. Indian auto-components and spare parts are globally competitive owing to their high quality and cost effectiveness. The presence of manufacturing facilities of large global OEMs in India is a testament to India's highly specialized auto-manufacturing sector.

In view of the competitive environment in the Australian auto market, Indian Automobile Industry can benefit if tariffs are eliminated for Indian Automobile exports to Australia on a nonreciprocal basis by entering into an India-Australia Free Trade Agreement.

A high demand for automotive spares such as tyres in Australia also presents an opportunity for Indian tyre manufacturers to make inroads in the Australian market. Indian companies such as BKT and TAFE have already established their presence in Australia. Tractors and Farm Equipment Limited (TAFE), a leading Indian tractor manufacturer, has partnered

<sup>405</sup> Future of Australia's automotive industry: Interim Report (2015)



with AGCO Corporation and Massey Ferguson to sell its tractors in Australia. This partnership can be supported through specialized industry association visits to Australia to understand the scope of demand for tractors in the country. Given that TAFE is the third largest tractor manufacturer in the world and the second largest in India by volume, Australia can avail of its large supply of tractors to meet its demand.

India allows 100% Foreign Direct Investment in this sector. 8% of India's R&D expenditure is in the automotive sector. Australian companies should be encouraged to invest in India for sourcing automotive components for the Australian market and also to sell in Indian and other markets.

## Collaboration with Australia on Research and Development

Australian firms are well known for their focus on research and development. Indian vehicle brands such as Tata, Mahindra and Mahindra, Maruti, etc. can collaborate with niche automotive R&D companies in Australia. Such a collaboration will enable these companies to adopt Australian design and manufacture the components at low cost in India to meet demands from Australia as well as the world. Mahindra Reva, a subsidiary of the USD 15 billion Mahindra Group, has already partnered with Swinburne University, La Trobe University, Australia Auto Collaborative Research Center and CSIRO to conduct research in zero emissions mobility solutions.<sup>406</sup>

As an example of India- Australia collaboration, Supashock, an Australian company known for its advanced motion technology, has worked with TATA for product development of commercial vehicles in India. Supashock developed and designed automotive products, such as print circuit board, sensors, etc. that were then manufactured by TATA in India.

### Case Study: Supashock

Supashock is an advanced motion technology company based in Adelaide, South Australia. It is a reputed manufacturer of high-end and world class dampers for the motorsport industry, and an innovative IP developer. It has diversified into other industries including defence, automotive aftermarket, OEM integration, mining, heavy vehicles and autonomous transportation.

Supashock Defence designs and manufactures active and passive suspension systems to meet complex requirements of defence vehicles and defence applications. It offers several defence offerings such as advanced motion and combat technologies, heavy vehicles and high mobility vehicles.

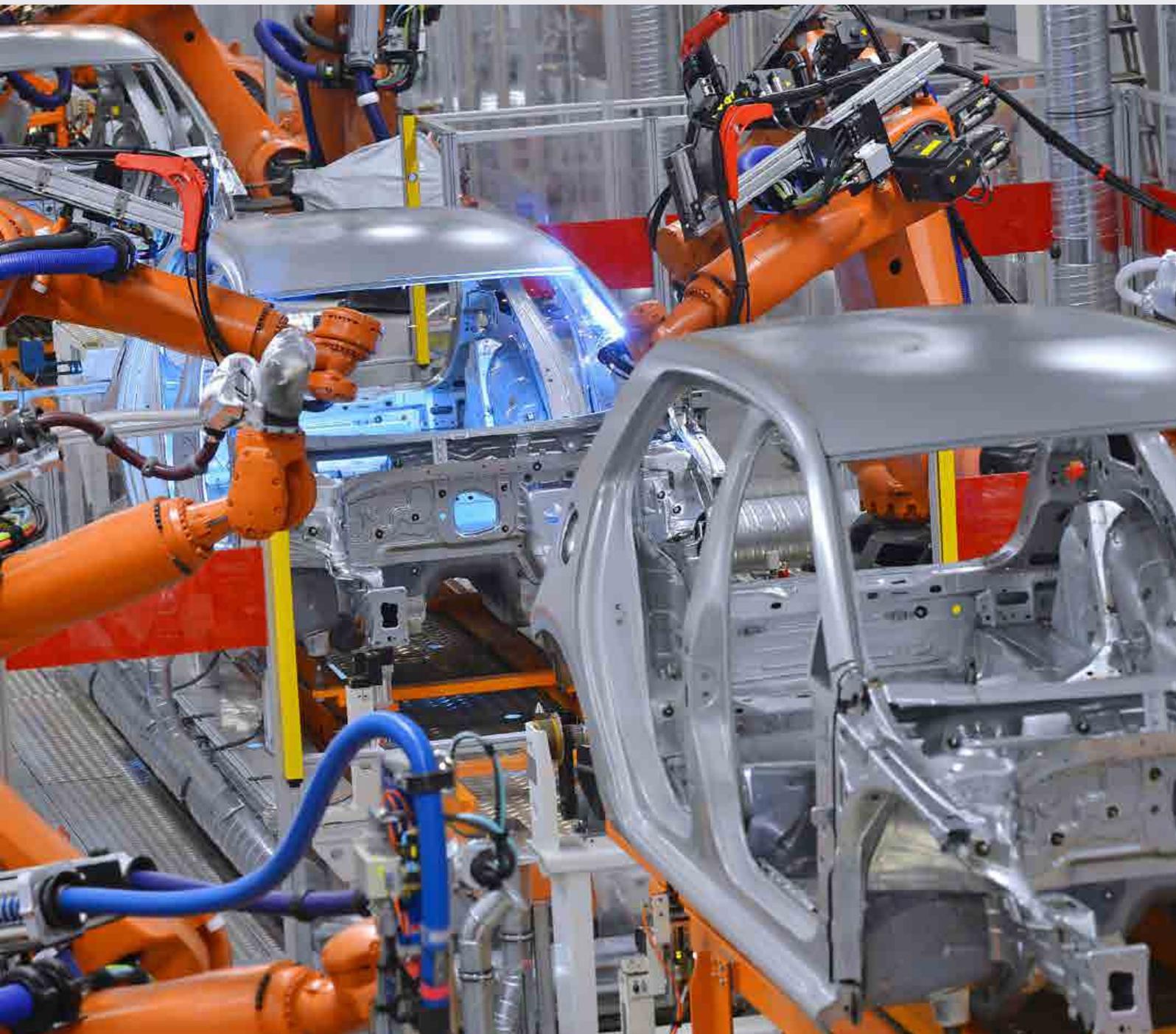
Supashock recently collaborated with an Indian automotive giant - Tata Motors by developing prototype dampers and cabin stabilization for Tata's commercial trucks, using Resistoflex. These products were developed by Supashock but would be manufactured in India. The collaboration is worth ~\$7 million.

Indian component manufacturers and industry associations, such as Automotive Component Manufacturers Association (ACMA), can tie up with their relevant Australian counterparts to avail their expertise through knowledge exchange programs, training programs and joint ventures.

<sup>406</sup> Austrade

## Recommendations

- Organise focused and specialised industry association visits and tie ups to understand the scope of demand and to increase exports of automobile components and tyres to Australia
- Australian companies should be encouraged to invest in India for sourcing automotive components for the Australian market and also to sell in Indian and other markets.
- Indian component manufacturers and industry associations, such as Automotive Component Manufacturers Association (ACMA), should enter into tie-ups with their Australian counterparts in the form of knowledge exchange programs, training programs and joint ventures



## Infrastructure

### Synopsis

In line with India's current economic scenario, the infrastructure sector in India is in a state of transition, with the Government undertaking various large-scale infrastructure projects such as the Smart Cities Mission, 'Sagarmala' Project, Bharatmala Pariyojana, etc. The budget allocations by the Indian Government towards this sector have also been increasing.

Australia's well-developed and modern infrastructure facilities have played a key role in the country's economic progress. Australia can act as a strategic partner for India in its various infrastructure initiatives. India can also participate in Australian infrastructure projects.

The following opportunities have been identified:

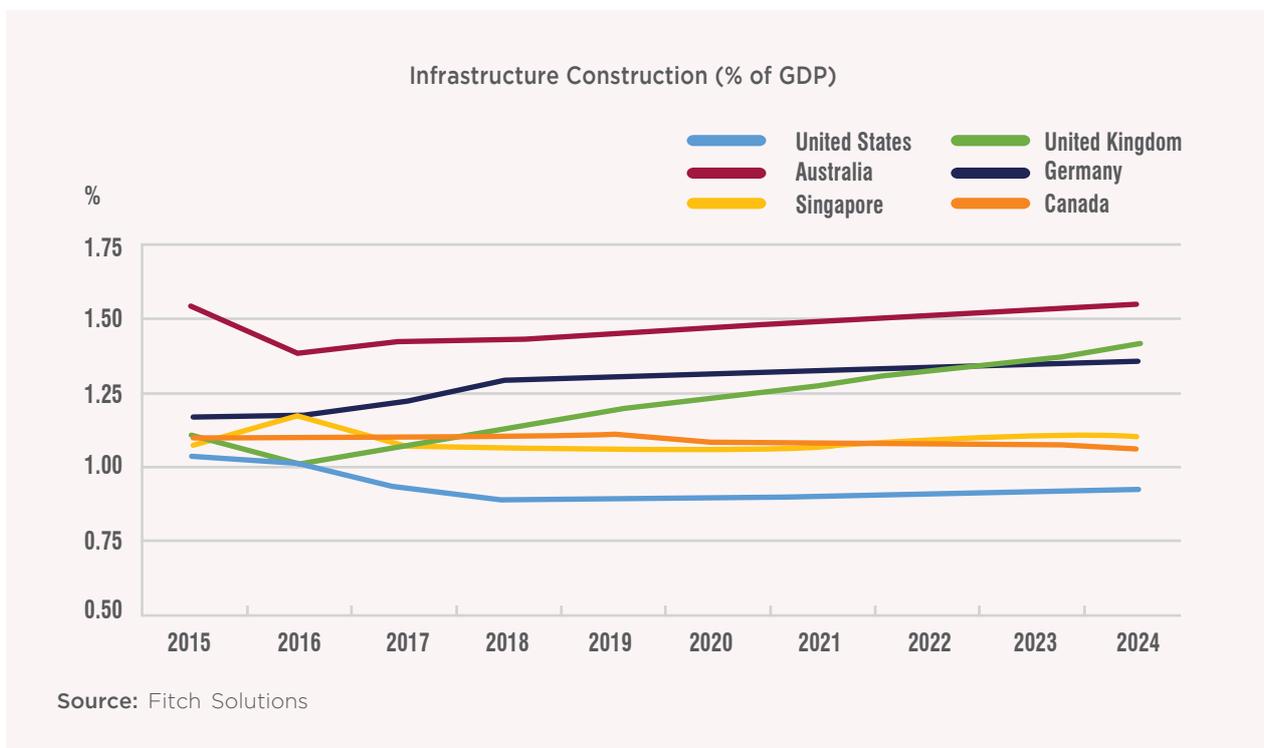
- Collaborating with Australian municipal bodies and companies to support India's smart cities mission.
- Encouraging investment by Australian investors/superfunds/banks in India's infrastructure projects.
- Increasing joint ventures between Indian infrastructure companies and their Australian counterparts.

## 5.11 Infrastructure

### Overview of infrastructure in Australia

Well-developed infrastructure, that includes networks of roads, highways, railways, ports, etc., plays a significant role in encouraging productivity and competitiveness. A large part of Australia’s rapid economic prosperity can be attributed to the presence of high-quality infrastructure in the country. Australia’s industries and its large urban population benefit significantly from access to some of the world’s finest infrastructure facilities.<sup>407</sup>

Infrastructure expenditure in Australia has been growing at a faster pace than that of other developed countries. Australia’s expenditure on infrastructure exceeds that of its peers and this outperformance is expected to continue.



The increasing spend on infrastructure can be attributed to Australia’s growing population that is expected to reach 30 million by 2031.<sup>408</sup> Much of the population growth is expected across four of the largest cities, viz., Sydney, Brisbane, Melbourne and Perth. The Australian Government has outlined an investment of AUD 100 billion (USD 67 billion), over ten years from FY20, in infrastructure to meet the needs of the growing population, to reduce congestion and to improve connectivity.<sup>409</sup>

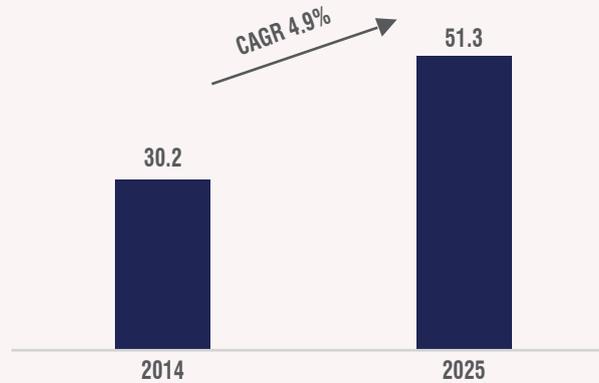
<sup>407</sup> Interesting Facts about Australia’s 25,000,000 population, Australian Bureau of Statistics

<sup>408</sup> Australian Infrastructure Plan (2016), Infrastructure Australia

<sup>409</sup> Infrastructure Investment Program, Australian Government



Projected annual spend on roads, railways, ports, airports in Australia (USD billion)



Source: Assessing the global transport infrastructure market, Australian Outlook to 2025

Further, the Australian Government has also been encouraging public-private partnerships in this space. Several marquee projects in the country, such as the Sydney Harbour Tunnel, Sydney light rail project etc. are a result of combined synergies of the Government as well as private players. A number of Government and private organizations such as Infrastructure Australia, Infrastructure NSW, Partnerships Victoria and Infrastructure Partnerships Australia have also been formed to oversee and promote infrastructure investments in the country.

### Case Study: Aerotropolis

An 'aerotropolis' is developed around the idea of a metropolitan sub-region with its economy, infrastructure and land use centered around an airport. In 2014, the Australian Government announced plans to set up the Western Sydney Airport and in 2018, construction of Stage 1 began with plans to open up the airport by 2026. The estimated passenger capacity of the airport is expected to be 5 million by 2026 and 10 million by 2031. The Government, through its company 'Western Sydney Airport', is investing USD 5.3 billion to develop the airport. The aerotropolis, strategically located within one of the fastest growing regions of Sydney, is an effort made by the three levels of the Government i.e the Australian Prime Minister, the New South Wales Premier and eight Western Sydney mayors. Together, the aim is to develop the Western Parkland City within Greater Sydney, to host the aerotropolis in the center.

#### Workforce and Digital Connectivity

The Government is making consistent effort towards enhancing the workforce profile of the region. New schools are being set up with an emphasis on vocational education and training facilities in partnership with industry players. An investment worth AUD 700 million (USD 469 million) has been planned for 11 new and relocated schools and the

Government is planning to collaborate with global universities to establish an Aerospace Institute in the Aerotropolis, among many other plans that are being formalized to meet the future need of skilled workforce in the region.

World class digital initiatives such as the 5G strategy, Smart Western City Program (smart and secure technology for state Government agencies), Western City Digital Action Plan (modern infrastructure for IT and communications technology) and Western Parkland City Data Catalogue (public availability of data) have been planned.

Investment Opportunities have been identified in the following sectors:

- Aerospace and Defence Industries (ADI)
- Food and Agri business
- Health, Research and Advanced Manufacturing
- Freight and Logistics
- Tourism and Visitation
- Building and Construction

**Source:** Aerotropolis, Investor Guide, Australian Government

## Overview of infrastructure in India

Infrastructure development is essential for India's stable economic growth and improvement in quality of life over the next few decades. The sector includes urban development and transportation infrastructure. In the last few years, the country has witnessed rapid growth in infrastructure, with several large-scale projects being undertaken for highways, railways and airports, along with an increase in foreign investment and government initiatives such as Smart Cities Mission.

The Government of India has estimated that India would require investments worth at least USD 4.5 trillion till 2040 in the sector to continue sustained economic prosperity.<sup>408</sup> Historically, infrastructure was primarily a public sector monopoly. However, in recent years, fiscal constraints and availability of technological innovations have encouraged private players to participate in infrastructure development projects across the country.

While the sector faces issues related to project management, the Government has taken several initiatives such as single window clearances, increase in threshold limit for project appraisals from INR 5 billion (USD 0.07 billion) to INR 10 billion (USD 0.14 billion), stricter timelines, etc. to ensure smooth development of projects. In order for India to achieve its target economy size of USD 10 trillion by 2032, the expected annual investment into infrastructure sector in the country is USD 200 billion. Within the total budget allocated by the Government, railways, roads and highways continue to stand as the Government's primary focus areas.<sup>411</sup> Ports and aviation sector are other areas, in which the Government has been increasing its focus.

<sup>408</sup> Australian Infrastructure Plan (2016), Infrastructure Australia

<sup>409</sup> Infrastructure Investment Program, Australian Government

<sup>410</sup> India will need USD 4.5 trillion till 2040 for infra development: Amitabh Kant, 2018



Key highlights of the infrastructure sector in India are as follows:

- With roadways spanning 5.5 million kilometers, India has the second largest road network in the world, which comprises of National Highways, State Highways and Project and Rural roads.<sup>412</sup>
- Indian railways is the largest passenger carrier and the fourth largest freight carrier in the world. The rail networks spans ~66,000 kilometers, making it the world's third largest rail network. It is also one of the world's busiest networks, with ~22,300 trains running everyday.<sup>411</sup>
- India has a vast coastline of ~7,500 kilometers, comprising of 13 large ports and 64 minor ports.<sup>413</sup> Approximately 95% of foreign trade by volume and 70% of India's trade by value is carried out through maritime logistics.<sup>414</sup> India has vast untapped potential in maritime logistics and the Government has planned investment into port projects worth USD 2.9 billion (INR 205.4 billion) till 2025.<sup>415</sup>
- India is the world's seventh largest aviation market and is witnessing a growth of ~15% ever year. It is poised to become the third largest aviation market in the world by 2022. Air cargo is also expected to quadruple to reach 17 million tons by 2040.<sup>416</sup>

In the face of the ongoing COVID-19 pandemic, several reforms were announced by India's Finance Minister to revive the Indian economy in mid-May 2020. India will ease its current restrictions on the utilization of Indian air space, which will allow efficiency of time and fuel. In addition to an investment of INR 130 billion (USD 1.86 billion) by private players in 12 airports, 6 more airports will be auctioned for private participation.

## Opportunities for partnership in infrastructure

The key themes that have been identified for India-Australia partnership in infrastructure are Australian investments/participation in India, collaboration for India's Smart Cities Mission and India's investments/participation in Australia. In fact, some of the state strategies, such as the NSW-India strategy, have highlighted NSW's interest in assisting the Indian Government with its plan to build 100 smart cities in India. The collaborations highlighted below can be carried out not only at a country level, but also at a state level in both countries.

## Encouraging superannuation funds from Australia to invest in India's infrastructure projects

Australia has a large asset management industry, predominantly consisting of the savings of domestic investors. The total assets managed amounted to ~AUD 2.78 trillion (USD 1.9 trillion) at the end of 2018.<sup>417</sup> Superannuation/pension funds constitute the largest share of these assets.

<sup>411</sup> Sectoral Risk outlook- Infrastructure, Dun & Bradstreet, September 2018

<sup>412</sup> Connecting the country road infrastructure, Make in India, 2017

<sup>413</sup> Make in India, Ports and Shipping,

<sup>414</sup> Ministry of shipping

<sup>415</sup> Projects worth Rs 20,000 crore under implementation to boost ports capacity, The Economics Times, 2018

<sup>416</sup> Global Aviation Summit 2019

<sup>417</sup> Australia Bureau of Statistics, Cat. No. 5655, Managed Funds, Australia, Table 1

Table: Top ten superannuation funds in Australia (June 2018)

Fund Name	Total Assets (USD billion)	Total number of accounts
AustralianSuper	103.64	2,228,296
QSuper	74.11	581,117
MLC Super Fund	58.10	1,168,651
Public Sector Superannuation Scheme	56.26	225,749
Colonial First State FirstChoice Superannuation Trust	55.16	777,042
First State Superannuation Scheme	53.72	788,507
Unisuper	51.30	441,920
Retirement Wrap	46.73	788,364
CSS Fund	46.43	114,940
Sunsuper Superannuation Fund	43.08	1,460,805

Source: APRA

Australian super funds have an appetite to invest in large, long-term projects and they can play a vital role in India's development by investing in several infrastructure projects across the country such as infrastructure, real estate, logistics and retail.

While the funds have considerable exposure to international markets, their exposure to India is limited despite the above-average opportunities for investment and returns offered by India.<sup>418</sup>

However, this scenario is gradually changing. In 2019, Australian Super signed an agreement with the National Investment and Infrastructure Fund (NIIF) in India, to invest USD 1 billion in NIIF's Master Fund. NIIF is an investor-owned fund manager, anchored by the Government of India (GoI) in collaboration with leading global and domestic institutional investors. The agreement with NIIF includes USD 250 million commitments and co-investment rights of up to USD 750 million for future projects. The large-scale investments in NIIF Master Fund from international players have rendered it as one of India's largest infrastructure funds.<sup>419</sup>

A few solutions to encourage greater pooling of funds from Australian investors include simplification of regulatory processes and setting up of a portal/helpdesk as a one stop shop for the superfunds to understand the Indian market, regulatory processes, resolve queries and raise issues about procedural difficulties. In addition, to woo Australian investors, it is important to conduct more road shows, increase regular engagements to boost confidence in the Indian regulatory processes and increase awareness vis-à-vis returns on investments in the infrastructure space.

<sup>418</sup> Prabhu woos Australian pension funds, 2018, The Times of India

<sup>419</sup> NIIF to get up to \$2 bn from AustralianSuper, Ontario Teachers, 2019, The Hindu



## Encouraging Australian investments and participation in India's infrastructure projects

The Indian Government has outlined investments across multiple infrastructure avenues. To expand and enhance the road infrastructure, the Government has planned an investment of USD 108 billion to build 83,677 km of roads across India in the next five years. The investment plan includes Bharatmala Pariyojana, which involves building the highway network of 34,800 km to connect the country's Western and Eastern borders.<sup>420</sup> Further, the Delhi-Mumbai Industrial Corridor and 3,360 km of dedicated freight corridors are under construction.<sup>421</sup> The Government has identified more than 400 projects as a part of the Sagarmala initiative to modernize ports and enhance the performance of the logistics sector.<sup>421</sup> In the field of railways, India has launched its first bullet train project by collaborating with the Japanese Government and is also working with the Russian Government to improve the speed of trains. To improve urban connectivity, the Government has invested in the extension of existing metro rail projects and also announced several new projects across India. To enhance the quality of living of Indian citizens and achieve urban development, the Government launched the 'Smart Cities Mission (SCM)' in 2015. Additionally, there are several opportunities in the renewables sector, specifically wind energy, wherein Australian investors including Australian superfunds can invest into India.

The Indian Government has been encouraging foreign investors to participate and invest in infrastructure projects across India. The Government has allowed 100% FDI in road and railway infrastructure.<sup>422</sup> It has also laid out several incentives such as provision of subsidies, tax exemptions and duty-free imports of modern construction equipment in the road sector. India is expected to witness high growth in cargo traffic, road freight and passenger traffic over the next decade.

Australia should be encouraged to explore the opportunity of green field and brownfield investments in India. Australian super funds/banks focused on infrastructure should also be encouraged to explore the opportunities to invest in low risk greenfield/brownfield infrastructure projects in India.

Australia could also explore the opportunities arising out of asset recycling in India. Undertaken by the Government, India has approved the 'Toll-Operate-Transfer (TOT)' model wherein private players are granted 30 year long leases for operation of toll roads as a part of asset recycling. A key example is the investment by the Australian Macquarie group in the Indian road sector. It is the largest foreign investor in Indian national highways. In 2018, the group in consortium with Ashoka Buildcon of India won the bid to operate and manage 680 km of highways for 30 years under the TOT model.<sup>423</sup>

<sup>420</sup> Invest India, Roads and Highways

<sup>421</sup> Investing in Infrastructure, Make in India

<sup>422</sup> Make in India website

<sup>423</sup> Ashoka Buildcon O&M partner for Macquarie's TOT projects, Financial Express

## Case Study: Macquarie Group

Macquarie Group is an Australian multi-national investment bank and financial services firm. It is the world's largest infrastructure asset manager<sup>424</sup> and the top-rated M&A advisor in Australia. Macquarie Infrastructure and Real Assets (MIRA) is Macquarie group's infrastructure asset management arm which partners with more than 650 pension funds, sovereign wealth funds and insurance companies to manage and invest ~USD 129 billion of assets under management. Of the total Assets Under Management (AUM), 90% is held by infrastructure and real estate assets. Renewables and agricultural assets contribute to the remaining 10% of the AUM of MIRA. The group holds assets in Australia and New Zealand (~11%), Americas (~26%), Europe, Middle East & Africa (~49%) and Asia (~14%). Macquarie actively manages three listed infrastructure funds in the US, South Korea and Mexico.<sup>425</sup>

The Macquarie group made an investment of ~USD 1.38 billion in the Indian roads segment in August 2018. Nine highway projects, totaling to 680 kms were acquired from National Highways Authority of India (NHAI). These toll roads will be operated on a 'Toll Operate and Transfer (TOT) model'. Macquarie is fairly optimistic about its investment outlay in the roads sector in India and expects reasonable returns from this capital outlay.

NHAI has already issued a Request for Proposal to transfer on lease a second bunch of highway projects, under the TOT model with a concession period of 30 years. This would include eight highway projects admeasuring ~587 kms. Large Australian infrastructure investment companies such as Macquarie are looking to bid for this second bundle of assets<sup>426</sup> through their Indian subsidiary.

Source: Macquarie Group Website, Times of India

## Leveraging Australia's urban planning and infrastructure development expertise for India's Smart Cities Mission (SCM)

India is witnessing growing levels of urbanization due to rising population, economic growth and rural to urban migration. Urbanization in India is expected to increase from 35% to 40% by 2030.<sup>427</sup> Development of cities will play a pivotal role in India's future growth. SCM has identified 100 cities and is focused on urban renewal by retrofitting projects in areas such as transport, energy, sanitation and governance.

Australia is a highly urbanized country with two thirds of its population living in cities.<sup>428</sup> Australia is home to several large cities that are renowned for their urban planning and high standards of living. Melbourne has been ranked as the most livable city in the world for seven years, according to Economist Intelligence Unit (EIU) global livability index.

<sup>424</sup> Top 50 infrastructure investment managers, 2018

<sup>425</sup> MIRA Funds

<sup>426</sup> Macquarie to bid for second round of TOT projects, 2018

<sup>427</sup> The horror of urban development in India-identifying real issues, IIM A

<sup>428</sup> Census reveals two thirds of our population live in Australia's capital cities, Australian Bureau of Statistics



Australian companies have developed best practices in various areas of smart urban infrastructure, which include sustainable urban planning, intelligent transport systems, road design, building technology, water and waste management and robust systems for natural disaster preparedness.

Waste Management: Australia has traditionally been dependent on China for waste recycling. However, with China reducing the intake of such waste from Australia since ~2017, there is a significant opportunity for India to assist Australia in waste recycling.

India can collaborate with Australian organizations to develop its smart cities. The areas of collaboration can include transport planning, urban planning, waste disposal, water management, citizen engagement through technology, digitization through smart platforms and training Indian urban planners/municipalities/organizations on urban planning practices.

Australia has already announced an investment of AUD 30 million (USD 20.1 million) to help ASEAN member countries with the development of smart cities. The initiative termed as 'ASEAN-Australia Smart Cities Initiative' will leverage Australia's expertise in water governance, technology innovation, data analytics, green infrastructure and renewable energy to support ASEAN'S smart cities network and support its vision of sustainable development. Australia will help member countries implement smart planning, good governance, through provision of technical assistance, education, training and support for innovation.<sup>429</sup> India could initiate a similar partnership with Australia.

### Case Study: Smart initiatives in Adelaide

Adelaide has implemented multiple smart initiatives to build a better connected and more sustainable future. The city has implemented multiple smart pilot projects to establish new smart technology and infrastructure to provide real time services. The pilot projects include environmental monitoring, smart lighting, smart parking and telepresence. The state Government also implemented the 'Gigcity Adelaide' project to connect the key innovation hubs and co-working spaces into a high-speed gigabit speed network. The network was specifically designed to tackle the internet challenges faced by businesses, which require high bandwidth. Adelaide has also planned the construction of a 21st century Ten Gigabit optical fibre network, which will complement other projects delivering high speed internet services.

### Case Study: Geelong city - developing a smart and connected region

Geelong city, south west of Melbourne, is developing a network of multi-modal connections and environmental sensors to monitor and control lighting, city navigation and Wi-Fi. The city has been involving its citizens to understand their requirements, engaging with universities to arrive at answers on how to tackle socio-economic and environmental challenges faced by the city and working with businesses to develop new business models.<sup>430</sup> The IoT driven data solutions are enabling the city to enhance the services provided by them to the citizens.

<sup>429</sup> ASEAN-Australia Smart Cities Initiative, Department of Foreign Affairs and Trade, 2018

<sup>430</sup> Smart Cities, KPMG and Public Sector Network Smart Cities Series 2017



## Potential Indian participation/investment in Australia’s infrastructure projects

The Australian Government has increased its spending on infrastructure, rolling out multi-billion infrastructure plans for the next decade. The current period is being referred to as the infrastructure boom in the country. The infrastructure projects cannot be solely sustained by public funding and therefore, the Government has encouraged private sector investment in this space. Many projects have also been announced by the Australian Government in the public-private partnership mode, which allows for the participation of private companies in Australia’s infrastructure projects. Infrastructure Australia, a statutory body, which advises the Government on nationally significant infrastructure projects, has identified a diverse and comprehensive list of investments in the infrastructure priority list.<sup>431</sup> Australia offers significant opportunities for investors to fund, own, construct and operate Australia’s urban and transport infrastructure.

Indian infrastructure companies could explore direct investment opportunities in brownfield and greenfield projects in Australia. For example, the GVK Power and Infrastructure Ltd. has shown interest in bidding for airport projects and airport management contracts in emerging economies, such as Asia and Africa.<sup>432</sup> Such Indian companies can similarly participate in upcoming infrastructure projects in Australia as well. Alstom and Bombardier, two multinational companies operating in the world transport markets, have set up manufacturing facilities for Australian metro passenger coaches in India. Indian infrastructure companies could also explore similar projects to cater to demand in the Australian infrastructure space.

Australia has implemented the asset-recycling model across Victoria, NSW, the Northern Territory, South Australia and Australian Capital Territory. Asset recycling in Australia involves the State Government sending out proposals to the Federal Government for the asset to be sold and the intended new infrastructure to be funded with the proceeds from the sold assets. Private companies and the state governments then negotiate the price for the sale of the asset, after approval of the proposal. The new infrastructure is then funded by the proceeds from the sale of the assets as well as certain incentives provided by the Federal Government.<sup>433</sup>

<sup>431</sup> Infrastructure Priority List 2019: Project and Initiative summaries, Infrastructure Australia, 2019

<sup>432</sup> GVK to bid for airport projects in Asia, Africa, 2015, Livemint

<sup>433</sup> Does asset recycling actually work?, 2018, Brink



Some of the high priority infrastructure projects in Australia are as follows<sup>434</sup> :

Proposed Project	Location	Opportunity	Timeline
M4 Motorway upgrade	NSW	Connectivity in outer west Sydney	0-5 years
Sydney Metro	NSW	Sydney rail network capacity	5-10 years
Western Sydney Airport	NSW	Sydney aviation capacity	5-10 years
M80 Ring Road upgrade	Victoria	Melbourne Ring Road Congestion	0-5 years
Monash Freeway upgrade	Victoria	Melbourne regional congestion	0-5 years
North East Link	Victoria	Road connectivity in Melbourne	5-10 years
Brisbane Metro	Queensland	Brisbane public transport capacity	0-5 years
Metronet: rail extension	WA	Perth corridor rail network	0-5 years

Source: : Australia New Zealand Infrastructure Pipeline; Infrastructure Partnerships Australia, Australian Government

Specific India-focused infrastructure companies can explore the investment opportunities in asset recycling models and other brownfield projects in Australia.

## Smart Cities in Australia

Australia has been driving initiatives such as the AUD 50 million (USD 33.5 million) smart cities program. The program is focused around 50 cities in the country and aims to enable innovative technology-based solutions to support Australia's growing urban challenges. In addition, global technology giants such as Huawei, Cisco and Nokia have also been assisting Australia in its smart cities operations.

India has several large IT conglomerates such as TCS, Wipro, HCL, etc. with a presence in Australia that have customized solutions for developing smart cities. While Australia has already been engaging with global giants such as G.E, Cisco, etc., Indian companies can also be actively involved with assisting Australia in their smart cities mission, especially given their expertise in data analytics, IoT and cloud-based solutions. This can be carried out by encouraging partnerships with Australian companies and city councils.

## Mega Cities in Australia

Melbourne and Sydney are the largest cities in Australia. With increasing urbanization and consequently higher population levels, Australian cities are going to face additional pressures of inhabiting a larger population in a limited space.

Indian companies such as Shapoorji Pallonji, L&T, HCC, etc. have participated in tenders across Asia, Middle East and Africa. Leading Indian construction companies can bid for subcontracting affordable housing projects in Australia, leading to profitability of such projects on account of competitive cost structures offered by these companies.

## Recommendations

- Indian Government should engage with Australian super funds to encourage investments in Indian infrastructure projects and Smart Cities Mission (SCM). This will require conducting awareness initiatives in Australia to provide information on regulatory policies in the country, execution potential of the projects, returns on investments, tax structures etc.

<sup>434</sup> Infrastructure Australia, Australian Government



## Tourism

### Synopsis

Tourism is a strategically important sector, both for India as well as Australia. India and Australia are both bio-diverse nations, which have several opportunities to increase their revenues from tourism.

The following opportunities have been identified in this sector:

- Encouraging Australian inbound tourist visits to India.
- Encouraging collaborations between the Ministry of Tourism in India and Tourism Australia.
- Setting up outlets by Indian restaurant chains in Australia.
- Availing of favorable taxation policies by the Federal and State Governments of Australia to film in Australia.



## 5.12 Tourism

Due to the ongoing Covid-19 pandemic the tourism and hospitality industry the world over will take time to recover. However, the narration in this chapter will eventually be benefitted by the implementation of measures in the opportunities identified.

### India's Macroeconomic story

Tourism is an important contributor to the Indian economy. According to World Travel and Tourism Council, tourism contributed 9.2% to the Indian GDP in 2018.<sup>435</sup> It is one of the largest service industries in India and covers heritage, cultural, medical, business and sports tourism.

India is a bio-diverse country that offers picturesque landscapes, beaches, backwaters, hill stations as well as historical monuments and places of religious interest to foreign and domestic visitors. India has 30 world heritage sites, 25 bio-geographical zones and is home to one of the seven wonders of the world.

At a policy level, the Ministry of Tourism is dedicated to promoting and facilitating growth of tourism in India, focusing on easing procedures such as visa regulations, ensuring quality service from all tourism service providers, etc. The Ministry is working towards enhancement of tourism destinations in the country by upgrading infrastructure amenities, enhancing skill development among service providers and collaborating with other related central ministries. On these lines, the creation of “Special Tourism Zones” (STZs), in partnership with different states, has also been recently announced.<sup>436</sup> These STZs will be operated by the Ministry in partnership with state governments and private organizations to develop the sector and improve the tourist experience in the country.

The Covid-19 outbreak will likely shift the order of implementation in this sector, in line with the nation's priorities. The worldwide lockdown has led to the immediate suspension of hotels, flights and other allied tourism operations around the world. However, with the gradual return of normalcy once the drastic effects of the novel coronavirus subsides, the opportunities highlighted in this sector can be implemented in the long-term within the realms of the post-pandemic realities.



### Growth of Tourism in India

The tourism sector in India contributed USD 240 billion in 2018 (~9%) to GDP in comparison to USD 113 billion in 2013 (6% of GDP). The number of tourists in the country has also been increasing. In 2017, there were ~15.5 million international tourist arrivals and 5.5 million NRI arrivals in the country.<sup>437</sup>

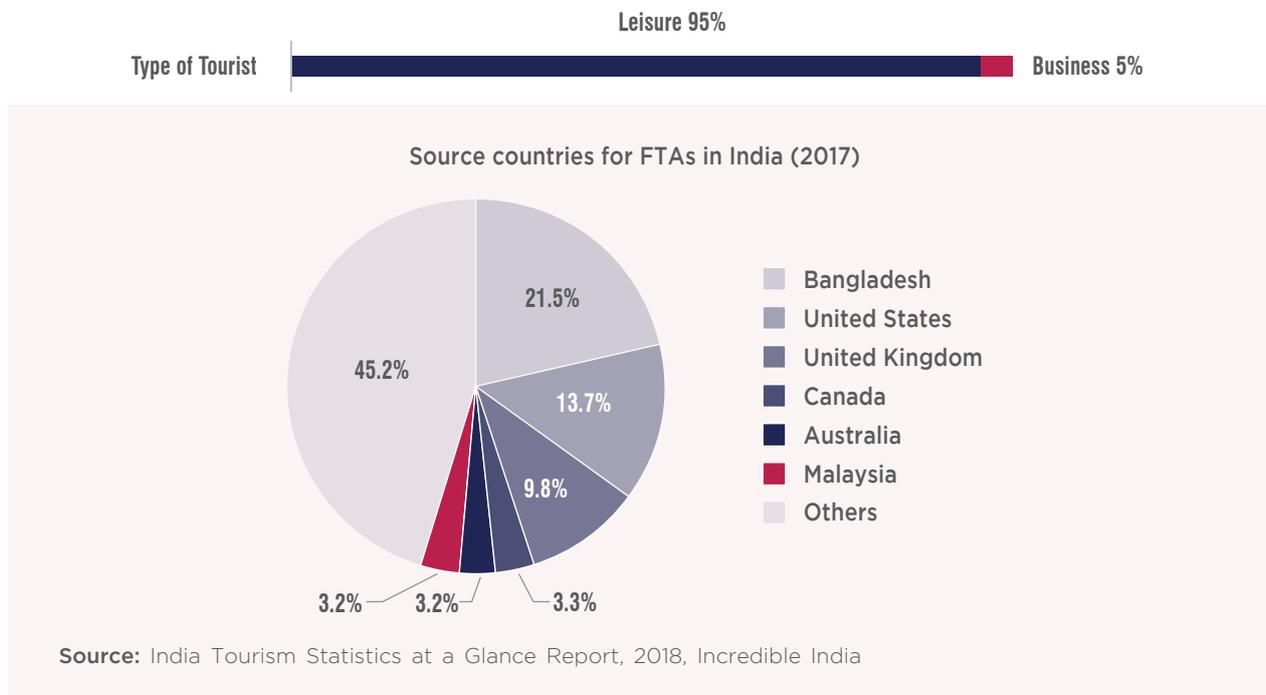
<sup>435</sup> World Travel & Tourism Council

<sup>436</sup> Indian Tourism Infrastructure, Investment Opportunities and Challenges

<sup>437</sup> Ministry of Tourism

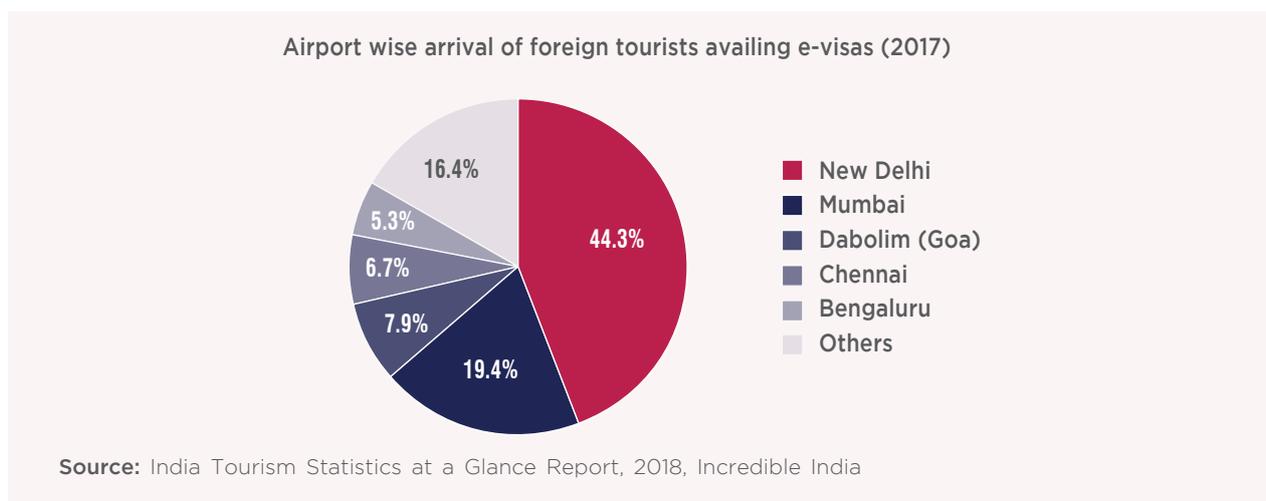
<sup>438</sup> Ministry of Tourism

The steady increase in the number of foreign tourists can be attributed to factors such as easy availability of e-visas to foreign tourists and improvement in road and rail infrastructure. Most of the inbound tourists in India are from Bangladesh, USA and the UK and the three countries account for more than 40% of the total number of foreign tourist arrivals (FTAs).<sup>438</sup>



Over 367,000 Australian nationals visited India in 2019 and the trend has been steadily growing. From being the 6th largest provider of tourists to India in 2018, Australia has jumped to 4th rank in 2019.

### Popular tourist destinations in India



### Government Initiatives to promote tourism in India

The Ministry of Tourism is a dedicated body to improve and promote tourism in the country. Given the potential of the tourism sector in India, the Government has started various promotional programs and initiatives to ease the policies and procedures to boost tourism



in the country.

Efforts taken by the Ministry of Tourism to ease, enhance and elevate the tourist experience in India are as follows:

- Tourism infrastructure - Swadesh Darshan-Integrated Development of Theme-Based Tourist Circuits and PRASHAD - Pilgrimage Rejuvenation and Spiritual, Heritage Augmentation Drive for development of tourism infrastructure in India including historical, religious and heritage sites.<sup>439</sup>
- Special Tourism Zones (STZs) - STZs anchored by SPVs in partnership with State Governments to develop respective states and regions to make them more attractive for tourists.
- A 24x7 toll free multi-lingual tourist infoline in 10 international languages besides English & Hindi; to provide information to tourists and travelers and for traveler safety.
- E-visas - The Ministry of Tourism is working with the Ministry of Home Affairs and the Ministry of External Affairs for easing visa regimes for foreign travelers to India. As on December 2017, e-Visa facility had been extended to nationals of 163 countries under 3 sub - categories i.e. 'e- Tourist Visa', 'e - Business Visa' and 'e - Medical Visa'. The number of tourists who came on e-visas increased by 57% to 1.7 million (2017).
- In order to combat the seasonal nature of the tourism industry and to position India as an all year-round destination, the Ministry is identifying, developing and diversifying niche tourism offerings such as adventure, cruises, lifestyle and wellness, exhibitions, etc.
- Re-curation of the Indian Museum in Kolkata was announced by the Prime Minister in January 2020. Additionally, 4 other museums from across the country will be taken up for renovation and re-curation. A few other projects include, a Tribal Museum that is expected to be set up in Ranchi (Jharkhand) and a Maritime museum at Lothal (the Harrapan age maritime site) near Ahmedabad, by the Ministry of Shipping.

## Opportunities for Australian Investments in India

The Indian tourism sector presents various investment opportunities for Australian investors. The Indian Government has laid emphasis on boosting investments in the hospitality and tourism sector. 100% FDI in the sector is now permitted via the automatic route.

As per Invest India, the National Investment Promotion and Facilitation Agency of India, opportunities worth USD 5.46 billion exist in the Indian tourism sector. A large number of these opportunities exist in heritage and religious tourism (entertainment parks, film city projects, museums, statues etc.), eco and coastal tourism (development of river fronts, tourist islands etc.) and hotels.

The Indian government is actively looking at increasing foreign investment in the tourism sector with the liberalization of the visa regime (tourist, business, medical and employment visas), initiatives like the UDAAN scheme and introducing 'Tejas' trains for iconic tourist destinations, all expected to boost investments into this sector.

Some specific segments within the tourism sector that offer investment opportunities to Australian investors include the budget hotels and medical and cruise tourism. Initiatives such as liberalization of FDI rules in the construction sector further incentivize foreign investments into these areas. Specifically, the budget/mid-market hotels segment faces a significant supply gap in the country as it attracts a large share of demand by volume in India.

Furthermore, the government, in the Union Budget 2020 has identified iconic destinations for Indian tourism with onsite museums. The Indian Government has laid down a budget of Rs. 2,500 crore (USD 357 million) for tourism in the Union Budget 2020. Additionally, Rs. 3,150 crore (USD 450 million) has been proposed for the Ministry of Culture in FY2020-21. An Indian Institute of Heritage and Conservation under Ministry of Culture has been proposed with the status of a deemed University. Furthermore, under the Union Budget 2020, State governments are also expected to develop a roadmap and formulate financial plans for specified destinations in 2021, against which specified grants can be made available to the States in FY2020-2021. Australian investors should therefore be encouraged to invest in the upcoming tourism projects in India as well as to develop budget and mid-market hotels in the country.

<sup>439</sup> Press Information Bureau, Ministry of Tourism, Government of India, 2019

## Opportunities for partnership with Australia

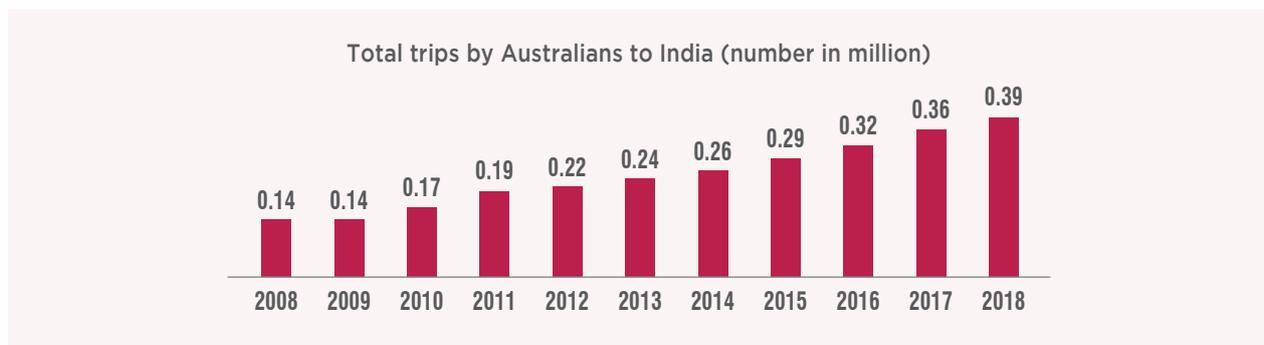
### Increasing the flow of Australia's tourists to India

In 2018, a total of 11 million international trips were made by Australians. The top five overseas destinations visited by Australians in 2018 were New-Zealand (1.4 million), Indonesia (1.28 million), the US (1.0 million), UK (0.66 million) and China (0.59 million)<sup>440</sup>.

**Table: Total outbound trips by Australians by country in 2017 and 2018**

Country	Total outbound international trips by Australians (2017)	Total outbound international trips by Australians (2018)	% growth from 2017 to 2018
New Zealand	1,436,200	1,435,900	0.0%
Indonesia	1,178,800	1,283,600	8.9%
US	1,075,500	1,091,800	1.5%
UK	630,300	665,500	5.6%
China	544,200	592,200	8.8%
Thailand	581,000	571,900	-1.6%
Japan	400,100	465,500	16.3%
Singapore	402,500	413,600	2.8%
India	364,400	393,900	8.1%
Fiji	344,700	340,800	-1.1%
Hongkong	223,500	247,200	10.6%
Malaysia	272,800	263,000	-3.6%
South Korea	72,600	75,500	4.0%
Other countries	3,030,100	3,223,000	6.4%
<b>Total</b>	<b>10,556,700</b>	<b>11,063,400</b>	<b>4.8%</b>

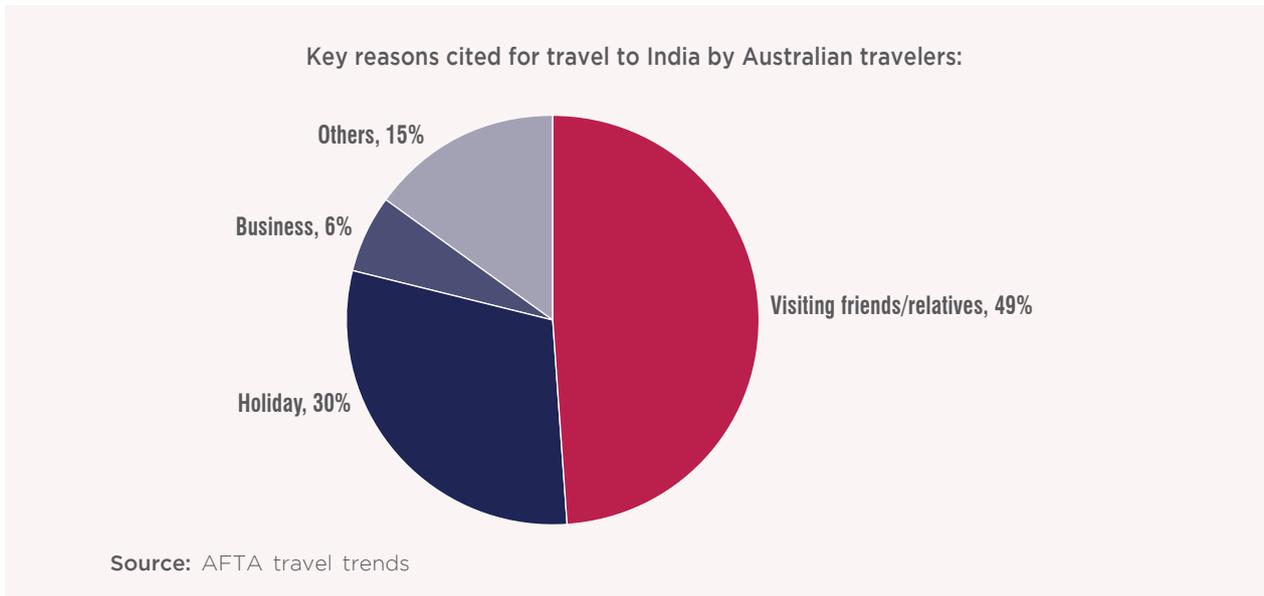
Source: AFTA travel trends



<sup>440</sup> AFTA travel trends



Over the past decade, the number of trips by Australians to India has grown at 11% CAGR from 140,000 in 2008 to 390,000 in 2018. India was the 9th largest destination for overseas trips by Australians in 2018.



A considerable proportion of the travelers (40-50%) had their roots in India and travelled to India to visit their friends/relatives. However, travelers also visited India for other reasons such as business (5-10%), to experience Indian culture, heritage, festivals and cuisine (10%), yoga and spiritualism (20%) and India's picturesque locations, wildlife, etc. (5-10%)<sup>441</sup>.

With its diverse culture, rich history and beautiful landscapes, India has significant potential to increase the inflow of Australian tourists.

India can attract Australian tourists to visit India through targeted measures such as:

### **1. Addressing the key concerns faced by Australians in India:**

In a survey conducted by the Ministry of Tourism, India, a few key concerns were cited by Australians for not preferring India as a travel destination.<sup>442</sup> Some of them included perception of India as an expensive tourist destination, lack of information, lesser availability of good facilities such as hotels, food and transport and difficulty in obtaining visas.

The Ministry of Tourism in India can collaborate with its counterpart in Australia to promote India as a tourist destination through public events and branding activities. The Ministry can also undertake efforts to guide incoming tourists regarding places that can be explored within India for a varied set of experiences. The Ministry is already focusing on enhancing infrastructure facilities at popular tourist destinations. In addition to this, the Ministry can identify and tie-up with hotels, restaurants and transport providers to provide suggestions to inbound travelers. The ongoing effort by the Government to ease the visa regime will also aid in boosting the tourist inflow from Australia.

### **2. Increasing direct flights between India and Australia**

Limited availability of direct flights between India and Australia is one of the key factors restricting the growth of tourists from Australia to India. Air India operates 5 direct flights

<sup>441</sup> AFTA travel trends

<sup>442</sup> Study on tourism in the overseas market of Australia and New Zealand, Ministry of tourism, India;

a week on the Sydney-New Delhi route and 3 direct flights on the Melbourne-New Delhi route.<sup>443</sup> Since, no other airline operates a direct flight between the two countries, the existing direct flights are often more expensive than other carriers. There is also no direct connectivity from Australia to other major Indian cities such as Mumbai, Bangalore and Chennai. The paucity of direct flights not only limits expansion of tourism, but also acts as a significant hindrance to Australian business travelers and tourists who spend excessive number of hours on indirect routes and layovers. For example, a direct Perth to Chennai flight would have a duration of only 7 hours, which is significantly elongated via indirect routes to Malaysia, Singapore, Hong Kong and even the Middle East.

India and Australia have signed an 'Open Skies' agreement in June 2018. The arrangement allows airlines from both countries to deploy unlimited seats to six Australian cities (including Melbourne, Perth, Sydney, Brisbane and Adelaide) and six Indian cities (Mumbai, Hyderabad, Chennai, Delhi, Bangalore and Kolkata). With availability of unlimited access to major Australian cities, coupled with high future demands in the sector, Indian airlines should therefore consider initiating direct flights to Australia. Direct flights would considerably simplify the travel travails of Australian travelers and aid in increasing the number of Australian tourists to India.

In line with the measures implemented by governments across the world to contain the global Covid-19 pandemic, air-traffic and tourism has significantly dropped. While some of the recommendations for direct flights between India and Australia may not be feasible immediately, such measures can be implemented by the respective governments on both sides in the long term, once a state of normalcy is established.

### **3. Promoting India as a transit location:**

Currently, Singapore is one of the most popular transit locations for flights between USA/Europe and Australia. India is at a strategic location between Australia and the East coast of USA as well as between Australia and European nations. The Indian Government can leverage this advantage to promote India as a transit location. This will increase awareness regarding India not only among Australian travelers but also among travelers from other countries across the world. The state-of-the-art airport infrastructure under development in India can be expected to play a significant role in promoting India as a destination for layovers. Indian airline companies can thus initiate the process of operating such routes via India. These measures can be implemented once a state of normalcy after the Covid 19 pandemic is established.

### **4. Access to tourism infrastructure and systems in Australia**

India requires a consolidated strategy to promote itself as a global travel destination. While the Ministry of Tourism has introduced campaigns such as "Incredible India", "Make in India", "God's Own Country", etc., these need to be focused on a specific strategy for Australia.

The Department of Resources, Energy and Tourism in Australia set up Tourism Australia in 1967 to attract international visitors to Australia for both leisure and business events. The aim of the body is to actively market Australian tourism in key target geographies through promotions via different media, advertising, trade shows, industry programs, consumer promotions and consumer research. Tourism Australia has identified 15 key markets, which present a strong potential to increase inbound tourism to Australia. With dedicated ad campaigns, celebrity associations, trade and road shows, etc., Tourism Australia has designed a unique strategy for each market.

For instance, Tourism Australia released the India 2020 Strategic Plan, which is a detailed analysis of India's potential to contribute towards Australian tourism.<sup>444</sup> The document presents a strategy to identify the target customer, target key geographies in India, develop

<sup>443</sup> India and Australia enter an Open Skies agreement, Business Traveller, 2018

<sup>444</sup> 2020 Summary of Tourism Australia's India Strategic Plan



aviation services and build experiences for the Indian customer. Besides this, Tourism Australia also conducts “India Travel Mission”, which facilitates communication between Australian tourism representatives and Indian travel/tour agencies present across various cities. The purpose of the trade show is to display Australia’s strengths as a holiday destination and build on strong trade relationships to position Australia as an ideal destination for business events.

The Ministry of Tourism in India can collaborate with Tourism Australia to set up a similar body in India to develop short, mid and long-term roadmaps to enhance tourism in India. The agenda of this body should be to target key geographies, improve infrastructure for tourists and build a roadmap to tap the market in these identified regions. This can be done in alliance with the tourism body of that state, Indian High Commissions, Indian Consulates and large tour operators based out of the target country. The strategy implemented must be unique for each state to address the specific needs of travelers from that particular region. For instance, Australian youngsters enjoy outdoor activities and adventure sports rather than just sightseeing.

Additionally, the Ministry of Tourism in India can also collaborate with Tourism Australia to introduce travel missions, on the lines of the India Travel Mission by Tourism Australia. The purpose of the travel mission could be to undertake Indian roadshows in major cities in Australia.

## 5. Indian restaurant chains in Australia

As per the 2016 Australian census, ~489,410 people of Indian origin were living as permanent residents in Australia.<sup>445</sup> Of these, 48% were also Australian citizens. This makes India the second largest migrant community in Australia accounting for about 1.8% of the population.<sup>446</sup> Indian cuisine is gaining prominence worldwide with greater exposure to Indian food and with the growing popularity of vegan and vegetarian diets. The establishment of smaller Indian restaurants as well as luxury Indian diners in various cities across the world has also led to growth in popularity of Indian food.

The presence of a large Indian diaspora coupled with an increasing number of tourists from India and the growing popularity of Indian cuisine internationally also offer a big opportunity for Indian restaurant chains to set up outlets in Australia. The business model of successful Indian restaurant chains in Australia, such as Moti Mahal, Saravanaa Bhavan, etc., can be studied by other Indian operators in the restaurant space to make inroads in this segment in Australia.

## 6. Australia as a filming destination

Australia has significant bio-diversity, expansive locations and is a popular filming destination. The country is well equipped with support infrastructure for cinematography and videography, including state of the art equipment and skilled crew members. During the period 2015-17, many big budget Hollywood movies such as Pirates of the Caribbean: Dead Men Tell No Tales, Thor: Ragnarok and Aquaman were shot in the country.

Currently, the Australian Government offers tax incentives in the form of a 16.5% rebate known as the ‘Location Offset’, on the production cost of high budget films and television series shot in Australia.<sup>447</sup> While the rebate has been provided to incentivize foreign filmmakers and to promote the country as a filming destination, higher tax rebates offered by the UK and US Governments implies that Indian filmmakers favor these locations over Australia. As a consequence, the Media, Entertainment and Arts Alliance (MEAA), which is an industry advocate for this sector in Australia, has appealed for a higher rebate of 30% recently.<sup>448</sup>

<sup>445</sup> Australian Government, Department of Home Affairs

<sup>446</sup> ABS 2061.0.55.001 - 2016 Census QuickStats Country of Birth

<sup>447</sup> Tax rebates for film and television producers, Australian Government, Department of Communications and the Arts,

<sup>448</sup> Screen production incentives must be raised in Federal Budget, Media Entertainment and Arts Alliance, 2018

The Indian entertainment industry is expected to become a USD 20.6 billion industry by 2020.<sup>449</sup> Currently, India produces ~1,500 movies annually in several languages.<sup>450</sup> In 2017, TV viewership increased 21% to approximately 780 million viewers.<sup>449</sup> ‘Bollywood’ is one of the largest production industries in the world with an estimated value of USD 2.3 billion.<sup>451</sup> Bollywood producers and Indian TV shows regularly shoot their films in foreign locales such as in Europe, the UK, US, Africa, etc. Apart from ‘Bollywood’, India also has several large and established regional film industries in various languages such as Tamil, Malayalam, Telugu, Marathi, Punjabi, etc. that contribute significantly to this sector.

Appealing to India’s filmmakers provides a significant opportunity to Australia to promote itself as a film making destination. The Australian Government and film associations can thus be encouraged to enter into an arrangement with Indian film makers to provide specialized tax incentives, similar to those provided by the UK and US.

Filming in Australia could also increase viewership and popularity of Indian films amongst Australians. This will further provide an international platform to Indian films and enable them to reach a wider audience in Australia, which has some of the world’s oldest and most popular film festivals that include Australian International Film Festival, Melbourne Film Festival, Melbourne International Animation Festival, Sydney Film Festival, etc.

Indian films have a high viewership around the world, on account of the presence of a large Indian diaspora globally. Several countries such as Spain, Switzerland, etc. have witnessed an influx of Indian tourists after being showcased extensively in Indian films. Encouraging collaborations with India’s large and booming film industry not only provides the Indian film industry access to Australian audience and specialized technical crew from Australia but also provides significant momentum to the tourism industry between India and Australia.

## Recommendations

- Australian investment should be encouraged in heritage and religious tourism, eco and coastal tourism and hotels in India.
- Direct flights should be started between Indian cities such as Mumbai, Bangalore, Hyderabad, Chennai, Kolkata, etc. to Australian cities such as Perth, Brisbane, Adelaide, etc. which will be a key enabler to improve tourism, business and trade relationships
- India’s tourism bodies such as the India Tourism Development Corporation (ITDC), set up by the Ministry of Tourism, should enter into a collaborative arrangement with Tourism Australia to adopt best practices and strategies for promoting India as a tourist hub, both in Australia and the rest of the world. In addition, this collaboration should also involve upgrading regional tourist campaigns in India
- India should restore the office of the Ministry of Tourism in Australia
- An MoU was signed between the two countries for tourism in 2014 which has now lapsed and should be renewed to encourage partnerships between the two countries. Under the MOU, Australia and India shared information on tourism policy and encouraged cooperation between tourism stakeholders in both countries. A joint Australia-India working group (JWG) on tourism met across cities such as Sydney and New Delhi to discuss visas, aviation links, traveler safety and opportunities for collaboration in tourism research.

<sup>449</sup> Investing in India’s Entertainment Industry – Digital Streaming, Regional Content, Film and TV India Briefing, From Dezan Shira & Associates

<sup>450</sup> Media and Entertainment, Film Segment, Care Rating

<sup>451</sup> Bollywood: India’s Film Industry By The Numbers [Infographic]



# Chapter 6

# **Emerging Sectors**



Given the increasing advent of technology, there are future opportunities in certain niche sectors such as labour intensive services, defence, sports and sports technology, textile and textile designing, digital gaming and animation, water management and commercial shipbuilding, space and education technologies.

The labour market in Australia has a rising demand for semi-skilled jobs in specific sectors like healthcare, agriculture and facility management sectors. Since India has a large workforce, which can be trained, India can assist Australia with its labour requirements.

The defence industry in both countries can increase technology collaborations, research partnerships and aim to increase defense exports.

Australia and India are both known for their passion for sports, specifically cricket. In the field of sports and sports technology, the two countries can encourage sports partnerships among sports technology firms and consider setting up a sports university in India.

India is globally well-known for its diverse and indigenous design forms and patterns in the textile industry. There exists an opportunity for Australia and India to develop large-scale manufacturing base for textile designing in India. Additionally, the demand for smart textiles further widens the opportunity for Indian textile manufacturers and Australian designers.

The Indian digital gaming industry, while still nascent, is developing rapidly and is currently witnessing a surge of investments from global giants. In comparison to this emerging market in India, Australia has a mature market in the video game industry. Companies in India and Australia are now at a stage where they can benefit from the exchange of expertise through collaborations between technologically advanced companies in the gaming industry. In addition to this thriving gaming industry, India and Australia are also well-positioned to collaborate in the animation and computer graphics space.

Given that India and Australia are facing similar issues with respect to water management, the two countries can collaborate on issues such as conservation of water, ground water management, etc. Trade delegations between the two countries can also be organized around this theme to further augment the discussion. Additionally, India and Australia can also collaborate on commercial shipbuilding.

Space technology is another area where India and Australia can increase collaborations. Indian space missions and ISRO have been highly successful in recent years. Australian organizations such as the Australian Space Agency can collaborate with ISRO for launching their own space missions.

Lastly, technology in education is an upcoming sector where Indian companies can collaborate with Australian educators to enhance the quality of education provided and invest in Australian ed-tech start-ups to bring technologies such as artificial intelligence (AI), machine learning, etc. to India.



## Labour intensive services

### Synopsis

The labour market in Australia is experiencing a shortage of workforce for semi-skilled jobs in specific sectors like healthcare, agriculture and facility management sectors. This is further challenged by Australia's ageing population. Wages in Australia are also higher when compared to other developed economies. These factors have resulted in a rise in labor costs for Australian businesses and difficulty in filling gaps in workforce.

In comparison to Australia, India has a large workforce, which can be trained such that it can assist Australia with its labour requirements.

Some opportunities in this sector include:

- Increasing tie-ups between facility management agencies in Australia and Indian companies to provide labor from India.
- Assisting Australia with covering shortages of healthcare workforce.
- Establishing interactions between shipbuilding industries in India and Australia.
- Increasing exports of defence equipment to Australia and other nations.

## 6.1 Labour intensive services

The demand for labour workforce in Australia is rising rapidly. Replacement demand in semi-skilled jobs is high due to Australia's ageing working population. The average age of working population in Australia is close to 37 years.<sup>452</sup> The gap in workforce is also witnessed in occupations requiring low skill levels. Such occupations typically attract workers for shorter period, thereby creating a continuous demand for new workers on the job.

The high labour wage rate in Australia is a deterrent for business owners to employ higher number of workers for semi-skilled jobs. The average wage for semi to low skilled jobs in Australia is approximately ~AUD 27 (USD 18) per hour.<sup>453</sup> In other developed countries like the US and the UK, the average wage for low skilled jobs is ~USD 14 and ~USD 13 (€10) per hour, respectively.<sup>454</sup>

By 2020, Australian requirement for labour force is expected to reach 1.2 million and by 2030, Australia is likely to experience a shortage of 2.3 million workers.<sup>455</sup> Healthcare, agriculture and facility management are key sectors where Australia is currently facing a gap in skill requirement.

In comparison, India has an extensive workforce with a wide range of skills, especially in agriculture, healthcare and other semi-skilled jobs. The demography of Indian workforce is also young, with the average age of the Indian population reaching 29 years by 2020, compared with 40 in the US and 47 in Japan.<sup>456</sup> About 104 million people are expected to join the Indian labour force by 2020.<sup>457</sup> In addition, vocational training programs initiated by the Government are also expected to provide a large trained workforce with semi-skilled jobs in numerous fields. India's wage rates are also significantly lower.

**Average labour rates by occupation in Australia**

Occupation	Average weekly hours	Average hourly earnings (AUD)	Average hourly earnings (USD)
Clerical and administrative workers	32	34	22.7
Sales workers	25.6	28.5	19
Machinery operators and drivers	38.8	35	23.4
Labourers	29.6	29.5	19.7
Accommodation and food services	25.9	22.6	15.1

**Source:** : Australian Business Statistics

<sup>452</sup> Australian Bureau of Statistics, no. 3101.0

<sup>453</sup> Australian Bureau of Statistics, no. 6333.0

<sup>454</sup> United Kingdom Wages Low Skilled, Trading Economics

<sup>455</sup> Australia to face a skills shortage of 2.3 million workers by 2030; June retail figures buck downward trend: Midday Roundup, smart company

<sup>456</sup> Harnessing India's Demographic Dividend through Skilling: Challenges and Way Forward, 2018, New Delhi Publishers

<sup>457</sup> Imperfect skills programme no match for India's army of workers, The Economic Times



### Average labour rates by occupation in Australia

Occupation	Average weekly hours	Average hourly earnings (AUD)	Average hourly earnings (USD)
Agriculture	350/ 5	2,100 / 30	43 / 28.8
Mining	600/ 8.5	3,600 / 51.4	74 / 49.6
Sweeping and Cleaning	450/ 6.4	2,700 / 38.6	55 / 36.9
Security	650/ 9.2	3,900 / 55.7	80 / 53.6
Other Labour	450/ 6.4	2,700 / 38.6	55 / 36.9

**Source:** Ministry of Labour, Government of India  
 Number of working days: 6 days per week  
 AUD-INR Exchange Rate: 1 AUD=48.8 INR

## Demand for agriculture workforce in Australia

In Australia, during 2011-16, there has been a decline in workers employed as livestock farmers (47%), crop farmers (28%) and mixed crop and livestock farmers (16%). Despite year-on-year increment of 4% in new agricultural job postings in Australia, the job posts remain unfulfilled. The vacant positions clearly indicate that despite availability of applications, the posts remain unoccupied due to lack of suitable skills.

India has a large workforce in agriculture. There has also been an emphasis on skill development in recent years, with organizations such as the Agriculture Skill Council of India (ASCI), which functions under the Ministry of Skill Development & Entrepreneurship (MSDE). These organizations have been working towards building and upgrading the skills of agricultural workers. Indian workforce can potentially meet the requirement generated in Australia.

## Demand in the facility management industry

Facility management services include cleaning, security, administration, catering services, etc. There is also a significant shortage of electricians and plumbers in Australia, particularly in New South Wales' metropolitan areas and Western Australia's regional areas. This demand is rising rapidly due to new infrastructure projects in Australia. Almost 35% of the job listings remain unfilled even after 60 days of job placement.<sup>458</sup> There is thus a high demand with inadequate supply.

Indian labour workforce is already employed in various Middle-Eastern countries. In 2018, more than 300,000 workers were cleared by immigration to work in the Middle East. Australia has high demand for trade workers, technicians, labour, carpenters and masons. India can assist Australia with meeting its labour requirement.

Australia's Medium and Long-term Strategic Skills List (MLTSSL) includes plumbers and electricians. To be eligible for foreigners to apply for a visa, they have to pass a skills assessment through Trades Recognition Australia (TRA), the appointed assessing authority in Australia for all trade workers. The Indian Government should work with Australian authorities to moderate norms for providing work visas for Indian workers to enable Indian labour force to meet the demand for these jobs in Australia.

The Covid-19 outbreak in early 2020 is likely to reduce the occupancy of physical office spaces, with public and private corporations gravitating towards digitization and virtual operations in the foreseeable future. However, there may also be a greater emphasis by corporations on sanitation and disinfection post the pandemic, which will result in an increased demand for resources in the facility management industry.

<sup>458</sup> Skill Shortage: Electricians in Australia

Some of the facility management services present in both India and Australia are: G4S, SIS, Securitas and ISS. SIS is one of the largest security service companies in Australia. Facility management companies in India can tie up with Australian counterparts to provide economical labour to meet Australian demand.

## Demand in the healthcare sector

Healthcare sector accounts for ~10% of the job postings in Australia, of which 30% are for nurses. Every year there is a 2.5% year-on-year growth in demand for midwifery and nursing professionals. The Australian Department of Health has projected a shortfall of 85,000 nurses by 2025, which is further expected to reach 123,000 by 2030.<sup>459</sup>

India has 2,958 institutions for general nurse midwives with an annual admission capacity of 118,406 students, 1,921 institutions for auxiliary nurse midwives with an annual admission capacity of 54,859.<sup>460</sup> Indian nurses and midwives are currently working in various countries like United Arab Emirates, Canada, Australia, European Continent, etc. In some parts of Australia, there is already a significant Indian population that works in the healthcare sector such as Alice Springs in the Northern territory.

The medical support in regional areas is deficient, and emergency services, as well as expert medical advice, particularly after work hours is poor.

## India can assist Australia with its labour requirements

As the regional territories in Australia are becoming more urban, the demand for workers is continuously growing. There are Designated Area Migration Agreements (DAMA) across Australian states, which match overseas workers to requirements specific to regions in the country, in addition to the standard skilled migration programs. Such a program is established between the Government and a regional, state or territory authority. Through the scheme, two types of visas programs are available i.e. Temporary Skills Shortage (TSS) and Employer Nominated Scheme (ENS). Currently, there are seven DAMAs in place.<sup>[1]</sup> The benefit of DAMA over the previous migration program is the openness to semi-skilled labour migrants. This has been done to fill employment gaps in regional areas in Australia.

### Recommendations

- Movement of semi-skilled workers from India to Australia can be encouraged by including India as a partner under the Designated Area Migration Agreements (DAMA) in Australia and by updating Australian visa norms for Indian workers
- Indian personnel management and supply companies should tie up with Australian authorities and designated agencies to impart necessary job and language skills with certification in the required and specific areas of shortages in the Australian economy

<sup>459</sup> Is a Nursing Shortage Placing Australia's Healthcare Sector at Risk? 2018, Hiring Lab Australia

<sup>460</sup> India Short Of Nearly Two Million Nurses, NDTV

[1] Designated area migration agreements, Department of Home Affairs



## Defence

### Synopsis

Australia and India have outlined similar strategic objectives in defence, i.e., focus on indigenization and increasing defence exports.

The following opportunities exist in defence collaboration:

- Increasing technology collaborations and research partnerships.
- Increasing participation by Indian companies in supply chains of global defence companies.

## 6.2 Defence

### Overview

Australia and India are both committed to a peaceful and prosperous Indo-Pacific region and share several strategic and economic interests. Australia plans to increase its presence in the region and invest in its defence capability and its defence relationship. Furthermore, according to Defence Minister Linda Reynolds, Australia sees potential in increasing the depth and complexity of joint activities with India on land, at sea and in the air domains.

As part of the Comprehensive Strategic Partnership (CSP), India and Australia concluded arrangements on defence and maritime cooperation, including a Mutual Logistics Support Arrangement and a Defence Science and Technology Arrangement.

The Mutual Logistics Support Arrangement (MLSA) will pave the way for deeper and more sophisticated operational cooperation. It will enhance military interoperability, enabling increasingly complex military engagement, and greater combined responsiveness to regional humanitarian disasters.

Also signed as part of the CSP, the Defence Science and Technology Arrangement will facilitate improved collaboration between Australian and Indian defence science and technology research organisations, both of which have made important contributions to addressing the COVID-19 pandemic.

Further, India and Australia conduct a bilateral maritime exercise codenamed AUSINDEX to strengthen and enhance mutual cooperation and interoperability between the Indian navy and Australian navy. From 2016 to 2018, armies of the two countries have conducted a joint military exercise dubbed Austra Hind. There is also ongoing cooperation between Defence Research and Development Organization (DRDO) and Defence Science and Technology group of Australia in new defence technologies.

As a result of the decisions the Government made in the 2016 Defence White Paper, Defence has made substantial progress in building a more potent, capable and agile ADF.

Australia's capability investment will grow to \$270 billion over the next decade. (An increase from the \$195 billion committed in the decade following the 2016 Defence White Paper.)

Australia will acquire sophisticated maritime long-range missiles, air-launched strike and anti-ship weapons, as well as additional land-based weapons.

Australia's defence industry is growing with over 4,000 businesses employing approximately 30,000 staff. An additional 11,000 Australian companies directly benefit from Defence investment and, when further downstream suppliers are included, the benefits flow to approximately 70,000 workers in total.

As per the Australian 2016 Defence White Paper, a capability modernization program is underway in Australia, which will provide the defence industry with new opportunities. The defence budget is expected to rise from AUD 32.4 billion (USD 21.7 billion) in 2016-17 to AUD 58.4 billion (USD 39.1 billion) in 2025-26 with an aggregate investment of AUD 195 billion (USD 130.7 billion) in defence capability over this period.

To implement the defence industry policy, the Australian Government will set up a center for defence industry capability and build closer collaboration between defence, industry and research organizations with AUD 1.6 billion (USD 1.1 billion) to be spent till 2025-26 on innovation.<sup>461</sup> The country is undertaking an ambitious ship building and submarine program over the next two decades. Global defence companies account for half the employment in the Australian defence industry, supported by 3,000 small to medium enterprises.

The size of Defence & Aerospace Industry in India is currently estimated to be INR 80,000 Crore (~USD 10.7 billion). While the contribution of Public sector companies is estimated to be INR 63,000 Crore (~USD 8.4 billion), the estimate for Private Sector has steadily increased to INR 17,000 Crore (~USD 2.43 billion). Indian Defence companies such as HAL,

<sup>461</sup> Centre for Defence Industry Capability, Department of Defence, Australian Government

<sup>462</sup> New policy to boost private sector defence manufacturing, Economic Times, 2019



BEL, OFB and BDL routinely feature in Stockholm International Peace Research Institute's (SIPRI) list of Top 100 Arms-producing and Military Services Companies list. Indian companies are growing their capabilities in the defence sector and can provide competitive solutions to Australian companies. India has strategized for greater indigenous manufacturing to address domestic and export markets. The Government's Strategic Partnership policy, which is a partnership between the Government and private players, may commission ~USD 20 billion worth of defence projects.<sup>462</sup> India plans to spend USD 130 billion on defence modernisation in the next 5 years, as achieving self reliance in defence production is a key target for the Government of India.

With rising capacity and competitiveness in the Indian defence sector, private sector enterprises can explore the innovation and manufacturing potential in Australia and build on increasing defence cooperation and investment programs between the two countries.

While Indian defence firms may not yet be considered significant players globally, given the promotional programs of the Indian Government, this situation could change. While the Government has prioritized indigenization and localization of defence production, it also has plans to expand exports in the sector.

The Indian Government has opened up the defence industry for private sector participation to provide impetus to indigenous manufacturing. This also paves the way for Australian defence manufacturers to enter into strategic partnerships with Indian companies in niche areas. 100% Foreign Direct Investment is allowed in the defence industry, wherein 49% is allowed under the automatic route and beyond 49% through the Government route.

In the face of the ongoing COVID-19 pandemic, several reforms were announced by India's Finance Minister to revive the Indian economy in mid-May 2020. To boost 'Make in India' in defence production, the Government of India has raised the FDI limit in defence manufacturing to 74% from 49%. The country will notify a list of weapons that will be banned from being imported.

## **Key Initiatives taken by Government of India to attract investment in Defence Sector**

### **Opportunities for Australian Companies in India**

In line with India's 'Make in India' program, India's defence procurement policy also accords first priority to "Buy Indian - Indigenously Designed, Developed and Manufactured (IDDM)". Apart from the IDDM category, the categories of "Buy Indian" and "Buy and Make Indian" are the other most preferred modes of acquisition which imply India's clear preference for defence products manufactured in India. Australian firms can invest in India or establish joint ventures with Indian companies to not only meet India's defence requirements but also to meet their domestic requirements and also export from India to friendly foreign countries.

### **Defence Corridors in India:**

India has created two Defence corridors in Uttar Pradesh and Tamil Nadu. The State Governments of Uttar Pradesh and Tamil Nadu are actively promoting these corridors as investment destinations for defence manufacturing by providing several incentives under Uttar Pradesh Defence and Aerospace Manufacturing and Employment Promotion Policy, 2018 and Tamil Nadu Aerospace and Defence Industrial Policy, 2019. Both the State Governments have formulated investor friendly investment policies by offering attractive incentives in the form of tax discounts, rebates, land at subsidized rates, allied infrastructure development, single window clearances, capital subsidies, incentives on transportation, readily available skill and labour force etc. Details of complete incentives and other facilities are given in the respective investment policies.

## Defence Investor Cell

The Defence Investor Cell under the Department of Defence Production of Ministry of Defence, Government of India are ready to provide necessary information including investment opportunities, procedures and regulatory requirements for investing in the Indian defence sector and also assist foreign companies keen on investing in India.

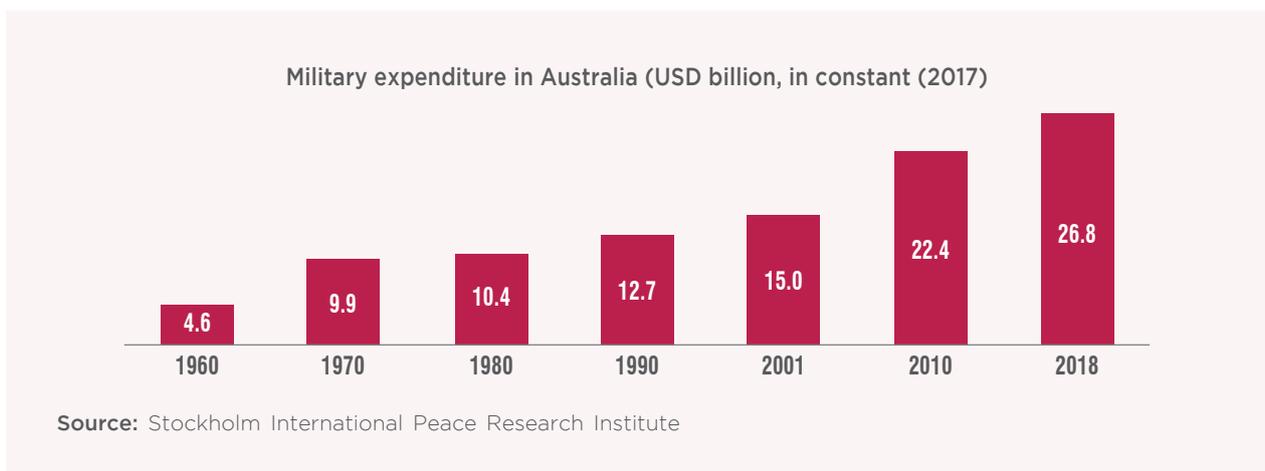
(d) FDI Policy: With the revised FDI policy for the defence sector, up to 49% of foreign investment is allowed through the automatic route and up to 100% is permitted with government approval.

## Innovations for Defence Excellence (iDEX)

Innovations for Defence Excellence (iDEX) launched by the Government in April 2018, primarily aims to create an ecosystem to foster innovation and technology development in Defence and Aerospace by engaging Industries including Micro, Small and Medium Enterprises (MSMEs), start-ups, individual innovators, R&D institutes & academia, and to provide them grants/funding and other support to carry out R&D for future Indian defence and aerospace needs. Key Functions of iDEX are co-Innovation/co-creation, piloting of candidate technologies in important platforms and indigenization of various defence and aerospace related platforms being manufactured in the country.

## Australia's defence industry

Australia is a net importer of defence equipment. It is the sixth largest importer of arms in the world, constituting 3.8% of the global arms imports during 2013-2017. The industry employs 27,000 people and is characterized by the presence of large foreign players and several SMEs. The key players in the Australian defence industry include BAE systems, Raytheon Australia, Boeing Defence Australia, Airbus Australia Pacific and Thales Australia and Australian Submarine Corporation.<sup>463</sup> The revenue of the top 40 defence contractors in Australia was estimated to be USD 7.4 billion in 2017.<sup>464</sup>



<sup>463</sup> Australian Defence Industry, Australian Trade and Investment Commission

<sup>464</sup> ADM's Top 40 Defence Contractors 2017, Australia Defence Magazine



## Key Government initiatives

The Australian Government has envisaged the development of a resilient and internationally competitive defence industry by focusing on indigenization and increasing defence exports. The country's defence industry policy has launched initiatives to support and deliver defence related innovation. The Government will invest AUD 800 million (USD 520 million) to fund the defence innovation hub, which will bring together various innovation programs and the Centre for Defence Industry Capability for promoting competitiveness and research to develop next generation technologies. An investment of USD 143 billion<sup>466</sup> has also been planned to modernize defence capabilities. Australia announced its 'Defence Export Strategy', which highlights the country's strategic goals to explore new markets and opportunities to enable growth of the Australian defence industry. Australia is also investing in new naval capabilities such as advance frigates and superior submarines. Additionally, Naval Group, a French-building company, has been contracted to produce twelve submarines for Australia. It is expected to pioneer joint research partnerships with Australian universities and CSIRO.<sup>467</sup>

## Opportunities for collaboration

The key areas of collaboration between India and Australia would be participation in global supply chains, technology sharing and R&D. The defense equipment export opportunity from India to Australia would be limited as Australia's defence strategy hinges on indigenization and increasing exports.

This will also enable India to participate in demands from Australia as well as from global defence projects.

### Case Study: Hindustan Aeronautics Limited (HAL)

Hindustan Aeronautics Limited (HAL) is a premier aerospace company in Asia, under the Department of Defence Production, Ministry of Defence, Government of India, with a diverse portfolio of services which includes design, development, manufacture, maintenance, repair, overhaul of aircraft, manufacture of allied equipment, avionics, Line Replaceable Unit (LRU), ground handling equipment etc. HAL excels in both fixed and rotary wing aircrafts and helicopters. HAL responded to a Request for Information (RFI) for 29 numbers of Armed Reconnaissance Helicopter Replacement Project, LAND 4503, issued by Department of Defence, Australian Government in August 2019 by offering its Light Combat Helicopter (LCH).

The LCH supplied by HAL meets all criteria specified by the Australian government and can be modified to meet customer service requirements. HAL can also offer the design technology to the Australian government so that the LCH can be manufactured in Australia.

<sup>465</sup> Centre for Defence Industry Capability, Australian Government

<sup>466</sup> Defence Industrial Capability Plan, Australian Government, Department of Defence

<sup>467</sup> The Australian

In India, a large part of the equipment used in the defence industry requires modernization. With favorable FDI policy, India is encouraging collaboration with foreign companies for technology transfer. The Government of India now intends to increase its focus on defence R&D to achieve self-reliance and indigenization. Moreover, India is expected to fund over 250 defence-based start-ups over the next five years. The Defence Ministry is expected to ear-mark -USD 7 million for its innovations for Defence Excellence Initiative (DEI) to target at least 50 tangible innovations by start-ups over the coming years.<sup>468</sup>

The Indian defence Industry is currently undergoing a transition with increased participation from the private sector for direct bids. The Ministry of Defence (MoD) is trying to bring together a consortium of domestic firms to compete for manufacturing medium transport aircraft as formation of such consortiums will promote collaboration between domestic companies and the OEMs. MoUs / JVs are likely to lay the road for future joint ventures. India and Australia are both collaborating with France on a submarine program. Australian companies can collaborate with India in the joint production of components and Indian shipyards, bringing into play economies of scale in bringing down labour costs.

Australia has huge deposits of rare earth metals of strategic importance. India should explore seamless supply of rare earth metals from Australia for its defence and electronics applications.

## **India can participate in global supply chains of defence equipment**

Australia's Department of Defence introduced the 'Global Supply Chain (GSC) Program' in 2007. The purpose of this program was to identify opportunities for companies in Australia's defence sector to work with multinational defence companies. As a result of this program, specific capabilities of Australian companies are being used to comply with requirements of global defence companies.

Currently, the following companies are involved in Australia's Global Supply Chain Program (also known as 'Primes'):

- BAE Systems
- Boeing
- Lockheed Martin
- Northrop Grumman
- Raytheon
- Rheinmetall
- Thales

<sup>468</sup> India to Fund 250 Defence Start-ups Over Next 5 years, 2019, The Economic Times



These companies are required to set up manufacturing facilities in Australia. In addition, these 'Primes' are also required to identify and award contracts to Australian SMEs along with conducting mentoring and training programs.<sup>469</sup>

The GSC program in Australia has been largely successful and has increased the competitive edge of the Australian defence industry. As of 2017, contracts worth ~AUD 950 million (USD 636 million) had been awarded to 151 Australian businesses under this scheme.<sup>469</sup>

India already exports defence equipment to the US, Middle-East, South Asia and African nations and domestically manufactures warships, fighter jets, trainer aircrafts and helicopters.<sup>470</sup> In order to provide an impetus to India's defence manufacturing capabilities and exports, a strategic partnership with these global defence companies could significantly boost India's domestic defence sector. This will also enable India to participate in demands from Australia as well as from global defence projects.

Further, Indian defence production corridors are underway and can serve as destinations for setting up facilities for meeting Australian requirements in the defence space. India has invested ~USD 457 million to set up defence corridors in the states of Tamil Nadu and Uttar Pradesh. The defence corridors in Tamil Nadu connect 5 cities and the defence corridors in UP connect 6 cities to ensure connectivity amongst various industrial units in each state.

## **Collaboration across defence technologies and investment into start-ups**

There has been some traction in the Indian defence sector towards integration of defence equipment with technology. Some initiatives in this space include the Defence Procurement Procedure, easing of FDI norms for access to modern technologies and entering into global collaborations.

The Australian Government is also supportive of start-ups in the defence sector looking at the use of big data and analytics, sensors, unmanned aerial systems, rocket propulsion, cyber and physical security and performance improvement.

For example, Adelaide has a defence start-up accelerator program, known as Techstars Adelaide, that supports start-ups that build innovative applications in IoT, big data, sensors and robotics in the defence sector. The accelerator has collaborated with global defence giants such as Boeing, Codan, Saab and Thales. The accelerator aims to assist the start-ups with commercializing defence and security technologies developed by them.

Co-production and development of defence technology offers opportunities for collaboration. This provides Indian investors and defence companies a significant opportunity to invest in these upcoming start-ups and SMEs to utilize the technologies for application in the Indian context.

<sup>469</sup> Defence Export Strategy, 2018, Department of Defence, Australian Government

<sup>470</sup> India stressing on increasing export of defence equipment to friendly countries: Defence Ministry official, India Today

## Collaboration in defence research & development and manufacturing

A Joint Working Group on Defence Research and Material Cooperation (JWG-DRMC) between India and Australia has been set up to discuss potential areas for cooperation in defence equipment and related technologies, including projects for R&D cooperation namely:

- Advanced Sensors
- Underwater Technologies – Sensors
- Quantum computing and Cryptography
- Laser Technologies
- Hypersonic technologies
- Technology cooperation in shipbuilding between Hindustan Shipyard Limited (HSL), Goa Shipyard Limited (GSL), Mazgaon Dockyard Limited (MDL) and Australian shipbuilding industries.

To deepen the defence cooperation between both countries, two MoUs on Mutual Logistics Support Arrangement and Implementing Arrangement concerning Defence Science and Technology between India's DRDO and Australia's Department of Science and Technology Group (DSTG) have been proposed during the forthcoming Summit talks to be held in 2020.

This will enable DRDO to advance its existing R&D capabilities and specialize in the development of niche defence technologies. Further, Indian defence companies could also collaborate with the Australian R&D organizations to develop innovative technologies, which could be leveraged for domestic defence manufacturing. The city of Ipswich has a strategy laid out collectively with the defence Industry, Queensland Government and the Australian Defence Force to align it with the national vision. The Indian Central and State Governments can also develop collaborations with the Ipswich defence industry.

A partnership between the proposed Australian Centre for Defence Industry Capability, Next Generation Technologies Fund and Defence Innovation Hub and Indian companies could also be considered.

## Establishing interactions by Shipbuilding industries of India and Australia

Promising scope exists in joint design, development and construction of high-end technology warships and host of other naval vessels. Indian shipyards- namely Goa Shipyard Limited (GSL), Hindustan Shipyard Limited (HSL) and Mazagon Dock Shipbuilders Limited (MDL) can collaborate with Australian firms in the following areas:

- GSL can collaborate in design, development and production of high-end technology warships.
- HSL can collaborate for design and construction of future programs namely Fleet Support Ships, Submarines, Next Generation Corvettes, Next Generation Offshore Patrol Vessel, Air Cushion Vehicles and High-Speed Landing Crafts.
- MDL can have technology cooperation agreements with its Australian counterparts in areas such as:
  - Design, development and construction of warships and auxiliary ships, boats and ferries
  - Refit, overhaul and life extension refits of existing ships and crafts
  - Training the technical teams from Australia in the field of ship repairs and ship trials.



## Recommendations

- Regular interaction between Indian and Australian defence industries via exhibitions in the respective countries, industry associations etc. should be encouraged. Regular meetings of joint working groups should also be held. Visits by team experts of Australian shipyards to Indian shipyards can also be held.
- There are clear opportunities for collaboration in defence research and development / manufacturing and between the shipping industries of the two countries.
- Both governments can jointly sponsor design and development of niche technologies in Artificial Intelligence applications and for modular construction for ships and submarines.





## Sports and Sports technology

### Synopsis

Australia is renowned for its advancements and innovations in the field of sports and sports technology. It has many sports technology firms that have globally grabbed the attention of sports executives, investors and scientists. In contrast to the Australian sports industry, the Indian industry is still nascent but is expected to experience rapid growth in future. This growth is expected to be fueled by a rising popularity of major leagues across sports such as cricket, badminton, football, etc. Other sports such as cycling and marathons are also growing in popularity. This has led to growth in demand for wearable technologies, sports analytics and digital solutions, which offer an attractive market for Australian sports companies.

The sector thus presents the following opportunities for collaboration which include:

- Understanding and adoption of best practices in sports infrastructure, sports administration, sports marketing and sports medicine from Australia.
- Encouraging sports partnerships between Australian sports technology firms and Indian counterparts.



## 6.3 Sports and Sports technology

Australia is a global giant in the fields of sports and sports technology. Australia is one of the most active sporting nations in the world and is reputed for its sporting excellence through its performances across a wide range of sports. Australia has nurtured sports at the grass roots level through strong emphasis on sporting activities and investments in sports infrastructure.

Australia has developed state of the art infrastructure across various sports such as football, rugby, cricket, tennis, basketball, formula 1 racing and athletics. A few notable manifestations of Australia's world class infrastructure are the Melbourne Cricket Ground, The Adelaide Oval, Stadium Australia, Suncorp Stadium, Qudos Bank Arena and The Rod Laver Arena. The stadiums/courts developed for each of these sports are also monetized to the optimum through leasing for multi-disciplinary sports leagues, entertainment events, corporate conferences and so on.

Australia is renowned for its sports administration and sports marketing practices. The agencies overseeing various sports are run by professionals with experience in sports as well as execution in other non-sporting fields, resulting in implementation of efficient and systemic administrative practices. Australian sports marketing companies have developed strong expertise in the development of sports and entertainment business solutions, branding for various sports events and sportspersons.

Australia has a multi-disciplinary sports medicine body named "Sports Medicine Australia", which is responsible for overseeing the health of sportspersons across various sports. Many sports medicine professionals trained in Australia are sought after by sportspersons across the world due to their exceptional expertise. In India, Australia based physiotherapists and trainers have been hired by various IPL teams.

Australia's sports tech industry is known for its innovative, advanced products and solutions. Many Australia based sports tech firms have grabbed the attention of sports executives, investors and scientists in the US, China as well as of big leagues such as FIFA. Some of the prominent names in this sector are Catapult Sport, Fusion Sport, Brooklyn Dynamics, Champion Data, Belgravia Technologies, Interact Sport, DMC Sport, POD Active, Planet Innovation, InfoPlum, and Ventou. Australia also has supportive infrastructure for the sector with bodies such as 'The Australian Institute of Sport' (AIS) and 'Australian Sports Technologies Network' (ASTN) providing adequate encouragement and assistance to the sector. Australian offerings in sports technologies include performance and protective wear, sports equipment, stadium and facility technologies, wearable technologies, sports analytics (data and video) and sports digital solutions (club management and fan engagement).

While Australia has a well-developed and established industry, the Indian sports industry is in a nascent stage and is witnessing high growth. The Indian sports industry was valued at USD 2.7 billion in 2018, having grown at 16% CAGR from USD 1.3 billion in 2013. Although cricket remains the most popular sport in India, the popularity of several other sports such as badminton, kabaddi, football and hockey has seen a huge increase in the recent past. Establishment of well-equipped sporting academies and emergence of domestic leagues have led to the surge in popularity of other sports. By 2016, Sports and camping equipment spending in India had reached USD 0.5 billion<sup>471</sup> and is expected to grow to USD 0.8 billion by 2020. Besides mainstream sports, there is an increasing interest in other sports such as marathons and cycling in India.

India can collaborate with Australia on multiple avenues in the sports industry. The key areas for collaboration could be sports infrastructure, sports administration, sports marketing, sports medicine, sports technology and sports education.

India can significantly improve the current practices followed across sports infrastructure, marketing, administration and medicine by collaborating with Australia to organize workshops, training sessions and courses to understand and implement the best practices.

<sup>471</sup> EMIS Research Database, Sport and camping equipment spending (India)

In India, the sports technology industry is still developing. However, in recent years there has been some traction in this space with Government encouragement to sports start-ups. Indian sports technology developer Spektacom Technologies has partnered with Microsoft to create the “power bat” that has an AI enabled chip, which provides meaningful data insights into a batsman’s game. Sports365 is another Indian start-up that caters to the sports and fitness sector with its one stop solution for sporting requirements such as apparel, equipment and even services such as event planning, consulting and merchandising services to school, clubs, colleges, etc. Retinsense, an early stage start-up, is using biomechanics and sensors to predict the chances of injury for its athletes.

The number of domestic leagues in India across kabaddi, football, wrestling, boxing, and badminton have gone up from 2 in 2013 to 15 in 2018. Australian sport start-ups with a key focus on audience engagement, can collaborate with various sport agencies to tap into India’s growing sport viewership market.

Collaboration in sports technology can be carried out at multiple stakeholder levels for application in the Indian market. This can be carried out between Governments, training academies, private players as well as ICT companies operating in this sector. Indian stakeholders can work with their Australian counterparts to develop and adopt innovative and advanced sports technologies, utilizing Indian cost-effective manufacturing techniques. Australian technology for sports, particularly for training, monitoring, performance enhancement has already been successfully implemented in Gujarat’s Sports University located at Gandhinagar. Similar technologies may be replicated at a larger scale across other sports universities in India.

While the sports scenario is gradually changing, with sports such as badminton and football gaining popularity, India still requires a stronger impetus and a heightened focus on sports to fully realize its potential. The Government of India has set up its first National Sports University (NSU) at Manipur, Imphal and has laid the foundation stone for the University’s proposed 325-acre campus on 16th March 2018. Bachelor of Physical Education & Sports (BPES), B.Sc (Sports Coaching) and MA (Sports Psychology) courses have been started at the Khuman Lampak Sports Complex. At present, there are 185 students studying at NSU. The University functions with the following departments:

- School of Sports Science and Sports Medicine
- School of Sports Management and Technology
- School of Sports Education
- School of Interdisciplinary Studies

The University will be the first one of its kind to promote education in the areas of sports sciences, sports technology, sports management and sports coaching. A Memoranda of Understanding (MoU) has been signed by the National Sports University, Government of India with the Australian Universities of Canberra and Victoria in April 2017. India can work with Australia in the establishment of a similar sports university to support the development of diverse sports and to improve access to infrastructure and sports-related specializations for upcoming athletes and students in India. This proposition was included in the Joint Statement made by the respective countries’ Prime Ministers in 2015. A cohesive action plan should be initiated by the Ministry of Youth Affairs and Sports in India, in correspondence with the relevant Australian universities and institutions.

Sports collaboration between the NSU and Australian Sports Universities may be initiated in the following identified areas:

- Assessment of curricula of the present courses of NSU and development of new courses
- Exchange of faculty between the Universities of Canberra and Victoria and NSU
- Accreditation of laboratories for sports science research programmes for NSU
- Short duration courses for faculty of NSU at the Universities of Canberra and Victoria



Australian universities have one of the best programs in the world for sports management, sports administration and sports marketing. Many Indian students are opting for such courses in Australia. The collaboration with Australia to set up a sports university will help to introduce similar curricula in India and will prove to be immensely beneficial for Indian students.

### **Note: Impact of Covid-19 on Sporting Sector**

The outbreak of Covid-19 has led to the rescheduling of one of the largest, most-viewed sporting events in the world- the Olympics. In addition, the general decline in live sports viewership and sporting events in the coming year will be felt significantly in this sector. National resources are expected to be prioritized to critical sectors such as pharmaceutical, healthcare, agriculture, education, etc. However, with time, as the world transitions back to normalcy, the opportunities discussed in this section can be implemented to bring desired results.

### **Case Study: Sports Collaboration between India and Australia**

Victoria University and the University of Canberra have collaborated with India to share their experience on sport expertise, research and development. This partnership serves to strengthen India's sporting capacity by building on sport administration, talent identification and athlete development. Victoria University has an ongoing project with the Australian Institute of Sport for a sport and technology business incubator allowing Australian sport companies to explore commercial opportunities in India. The University also conducted a joint research initiative on physical literacy in India as a part of the 2017 Mumbai Marathon.

**Source:** UC to help set up India's national sports university, University of Canberra website

### **Opportunity for Australian companies to invest in the Sports and Sports technology sector in India**

In 2019, India based Somras Ventures entered into a cooperation agreement with Israel based sports accelerator Hype Sports Innovation, one of the largest ecosystems in sports innovation, in order to bring in investment and technology to the Indian sports industry. The Indian Government has implemented various initiatives such as the Mission Olympic Cell to improve the performance of sports in the country. Indian sports technology start-ups like Tapp, Rooter have also attracted investments from global funds such as ADvantage SportsTech Fund that has invested USD 10 million in India. Australian funds and investors can also explore potential opportunities for investment in this sector.

### **Recommendations**

- India should work with Australia to set up a sports university to support the development of diverse sports and to improve access to infrastructure / sports-related specializations for upcoming athletes and students in India.
- A cohesive action plan should be initiated by the Ministry of Youth Affairs and Sports in India, in correspondence with the relevant Australian universities and institutions.
- The Indian government should encourage Australian companies to invest into the sports tech space in India.



## Textiles and Textile Designing

### Synopsis

Demand for smart textiles provides a two-fold collaboration opportunity for Indian textile manufacturers and Australian designers. Australia has developed the expertise for development of integrated design capabilities and unique fabrics supported by its universities, design education programs and industrial design teams.

India is globally recognized for its diverse and indigenous design forms and patterns. However, the traditional Indian textile industry lacks the presence/use of modern and smart textile technologies that have reshaped the international fashion market. India should also ramp up its textile garments, apparel, table and home linen exports to Australia.

Some opportunities in this sector include:

- Developing India's large-scale manufacturing base for textile designing.
- Establish India as a sourcing hub of textiles for Australian companies.



## 6.4 Textiles and Textile Designing

Australia's Textile and Apparel (T&A) industry's contribution to the national economy was ~ AUD 12 billion (USD 8 billion) in 2017.<sup>472</sup> With the shift in consumer requirements, increased thrust on sustainability in fashion and the trickling down of technology to the fashion sector, Australia has developed a keen expertise for development of integrated design capabilities and unique fabric development supported by its universities, design education programs and industrial design teams. Australian advanced textiles have varied applications across sectors such as internet of things, healthcare and high-performance apparel. Some examples of advanced textiles include fire-resistant textile technologies (developed by RMIT) and denim dyeing project that reduced water usage by up to 2,000 litres per garment (by Deakin University). Australia's design schools are at the forefront of the industry's rapid progression. Australia's fashion institutes have produced several world-renowned fashion designers that have placed the country on the global fashion map. The country's institutes are amongst the best in the world, with Royal Melbourne Institute of Technology (RMIT) and Fashion Design Studio ranked 17th and 23rd globally, respectively. Australian textile companies are constantly evolving and spend a lot of time carrying out research to develop textiles that can resolve industry issues. These research activities span across various sectors such as technical textiles for products used in the medical industry, automotive industry, sports, etc. In addition, Australian companies have also collaborated with other countries for developing technical and synthetic fabrics for military purposes. Some successful international Australian fashion brands include Billabong, Rip Curl, Cotton On, Millers, Crossroads and Just Jeans, etc.

Technical textiles, which is an emerging area for investment in India, accounts for around 12% of the Indian textile market. The market size is estimated to be around USD 17.9 billion and is expected to grow to USD 31 billion by 2020-21. India is the second largest producer of man-made fabrics<sup>473</sup> and is the largest producer of cotton in the world (26% of the world cotton production)<sup>474</sup>. India is also a key exporter of textiles to the world. The total textile exports including apparel, linen and other textile articles of India were valued at ~USD 21 billion in 2018, making it one of the top ten exporters of textiles to the world. Given India's global technical textiles exports, which have increased at 15% CAGR to about 1.7 billion (2016- 17), a huge potential for further market growth exists in India. India benefits from its lower wage costs and therefore can export low cost textiles to the world<sup>475</sup>.

In order to promote integrated value-chains in the textiles sector, the Ministry of Textiles has been supporting various infrastructure projects in this realm in India. Brandix India Apparel City (BIAC), near Visakhapatnam is a state of the art vertically integrated Textile & Apparel Supply Chain Park. It is one of the largest textile-industry Special Economic Zones in the world, and the only one of the scale and concept in South Asia. The concept of 'Fibre-to-Store' integration in the park offers unique advantages to global apparel chain partners. BIAC is a key supplier to international retailers such as Victoria's Secret, H&M, M&S, etc. At present, an area of ~500 acres is available. The Ministry of Textiles has also established the Integrated Skill Development Scheme (ISDS) to focus on the development of skilled workforce in the textile industry. Further, India is globally recognized for its diverse and indigenous design forms and patterns such as Bandhani, Patola, Batik, Kalamkari, Madhubani, etc. However, the traditional Indian textile industry lacks the presence/use of modern and smart textile technologies that have reshaped the international fashion market.

Demand for expanded use of smart textile opportunities provides a two-fold collaboration opportunity for Indian textile manufacturers and Australian designers. Indian companies can benefit from access to modern and smart textile technology via such a partnership with Australia. On the other hand, India's expertise in low cost manufacturing, coupled with Australia's

<sup>472</sup> Australian Trade and Investment Commission Report, Mar'18

<sup>473</sup> Bangladesh keen to expand relationship in textile sector with India, Yarns and Fibres.com

<sup>474</sup> Cotton Textile Industry in India, Invest India, National Investment Promotion and Facilitation Agency

<sup>475</sup> HS codes 60,61,62,63; Trade Map

advanced and new-age textile technology, can offer Australian textile manufacturers the chance to look at large scale manufacturing set ups at a cost competitive level. Further, there should be a focus on supplying sports garments such as swim suits , track suits etc to the Australian market though investments by Australian brands in manufacturing such garments in India. Additionally, India can also emerge as a sourcing hub for textile companies as seen in the case of Wesfarmers’ brand K-Mart in Australia. K-Mart sources garments from India and Bangladesh and has a team located in New Delhi focusing on sourcing and designing of garments. In 2018, India was already the 3rd largest exporter of T-shirts and 2nd largest exporter of kitchen linen to Australia. India is already exporting knitted jerseys and pullovers to Australia. India should fill the gap in Australian demand for products such as blankets, sacks, bed linen and a wide variety of apparel.

### **Opportunity for Australian investments in the Textiles sector in India**

India has established itself as a global textile hub. The New Textile Policy, which is to be rolled out in 2020, is expected to lay special focus on apparel and garment manufacturing, technical textiles and exports for the next 10 years. The policy is in line with the Indian Government’s “Make in India” strategy to position India into a well-integrated and globally competitive manufacturing and exporting textile hub. 100% FDI is allowed in the textiles sector under the automatic route. The Ministry of Textiles is also planning to establish 10 Mega Textile Parks as a part of the policy in order to boost infrastructure development for the textiles sector and attract foreign investment. Favourable government policies and availability of abundant labour and natural resources make this an attractive investment opportunity for Australian companies.

### **Recommendations**

- Technical and training collaborations between Indian textile manufacturers and Australian designers should be encouraged to leverage India’s expertise in low cost manufacturing and Australia’s new age textile technologies
- Encourage Australian companies to invest in the textile sector and textile parks in India



## Digital Gaming and Animation

### Synopsis

The Indian digital gaming industry is developing rapidly and is currently witnessing a surge of investments from global giants. In comparison to this emerging market in India, Australia has a thriving video game industry that has been operative for around 40 years. The Australian gaming industry, known for developing their own content and design, includes revenues from sales of interactive games, e-sports and in-game advertisements. Companies in India and Australia are now at a stage where they can benefit from the exchange of expertise through collaborations between technologically advanced companies in the gaming industry.

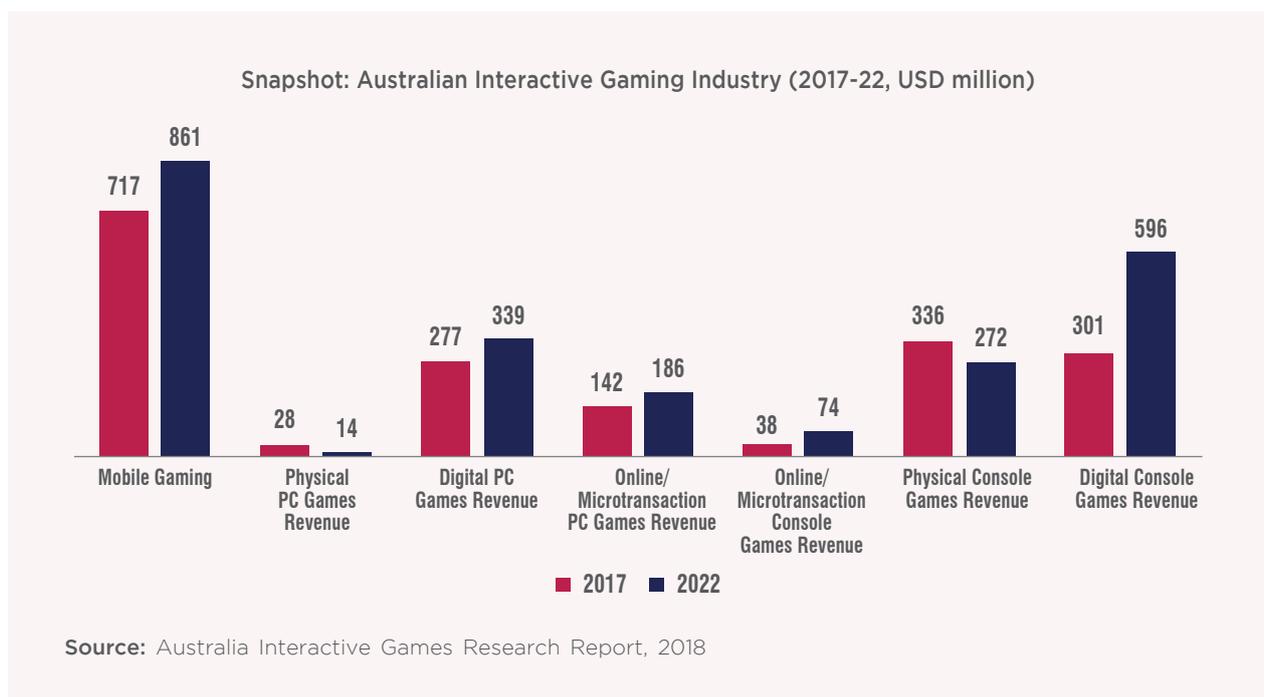
An opportunity in this sector includes:

- Collaborating on digital gaming and animation between India and Australia.

## 6.5 Digital Gaming and Animation

### Digital Gaming

Australia has a thriving video game development industry that has been operative in the country for several years.<sup>476</sup> The digital gaming industry in Australia grew at 9% to reach ~AUD 4.5 billion (USD 3 billion) in 2017. The industry includes revenues from sales of interactive games, e-sports and in-game advertisements. Interactive games form the biggest sub-segment accounting for ~55-60% of the market. The interactive games market is expected to grow at ~5% annually to reach ~AUD 3.3 billion (USD 2.2 billion) in 2022 from ~AUD 2.6 billion (USD 1.7 billion) in 2017.<sup>477</sup>



Initially, the Australian gaming industry operated on contracts from international clients. However, the industry has now evolved to game designing and development. As a result ~75% of the 225 gaming companies operating in Australia develop their own content and copyrights.<sup>476</sup> Some of the popular games developed in Australia include Fruit Ninja, Ski Safari, Jetpack Joyride, Crossy Road, Antichamber, L.A. Noire, De Blob, Golf Story, BioShock, Hollow Knight, etc. One of the most prominent game studios in Australia is Tantalus Media that has produced licensed games for Nintendo, DreamWorks, Disney and Nickelodeon. Big Ant Studios and Wicked Witch Software also make licensed content for third parties. In addition, the use of games in varied applications in education, medicine, architecture, supporting disability services, etc. has been gaining popularity in Australia. This has been supported by the education sector as well as by universities. For instance, the University of Melbourne has included Virtual Reality (VR) surgery in its medical curriculum, which allows medical students to perform virtual surgery on digital patients.<sup>478</sup>

<sup>476</sup> Digital Games, Austrade

<sup>477</sup> Australia Interactive Games Research Report, 2018

<sup>478</sup> Virtual Reality Surgery Simulation, University of Melbourne



The Indian digital gaming industry is also developing rapidly and is currently witnessing a surge of investments from companies such as Alibaba, Tencent, Youzu, etc. Indian game developers have gradually started catering to the global gaming industry, in addition to servicing the local market. With the growth of digital infrastructure and increase in smartphone penetration, the country's gaming sector has grown substantially, with as many as 250 game development companies in 2018.<sup>479</sup>

Companies in India and Australia are now at a stage where they can benefit from the expertise provided by each other in the gaming industry. Collaboration with Australian companies will provide Indian companies access to knowhow and modern application methods, which will enable them to upscale technologically. In turn, Australian companies can benefit significantly through access to the Indian market, which is expected to host 310 million gamers by 2021.<sup>479</sup>

## Opportunity for Australian investments in the Digital Gaming sector in India

The Indian digital gaming industry is witnessing rapid growth fueled by overseas investments. As per estimates, the industry is valued at USD 890 million in 2018 and is expected to reach USD 1.1 billion by 2020. The All India Gaming Federation (AIGF) along with the government is working on introducing FDI up to 26% in the segment. Australian investors can therefore look at investment opportunities in Indian gaming companies.

## Animation

The Australian animation industry has skilled professionals, who have worked with leading Hollywood animation productions. Australia produced 69 animated TV drama titles during FY2001-10, compared to just 40 in the prior decade. Some popular films with Australian animation include Happy Feet Two and Legend of the Guardians: The Owls of Ga'Hoole. However, the sector, in recent years, has witnessed a decline. The production in 2009-10 went down significantly.<sup>480</sup> Between FY1991 and FY2018 Australia produced only 14 animated feature films with a total duration of ~21 hours.<sup>480</sup> By 2017-18, total budgets declined by 59% and total hours lowered by 44%.<sup>480</sup>

On the other hand, the Indian animation and VFX sector has recorded an annual growth of 16% in 2017 to reach ~Rs 60 billion (USD 0.86 billion). Factors such as animation and VFX skillset of Indian professionals, combined with the cost advantages of Indian studios, are increasingly drawing Hollywood projects to India. Some large Hollywood VFX projects executed in India include movies such as Immortals, the Planet of the Apes, Life of Pi, Alvin and the Chipmunks, The Golden Compass, etc. International projects account for ~70% of the Indian VFX revenue.<sup>481</sup> The industry is estimated to grow at a CAGR of 17% during FY2017 and FY2021 to reach ~Rs 132 billion (USD 1.9 billion).<sup>481</sup>

Given the individual positioning of both countries in this sector, collaborations can further enhance the sector in both countries. Australia can benefit from India's global reputation to revive its animation industry. Australian animation companies can tie up with their Indian counterparts to get access to the technical expertise required for developing top quality animation and VFX. The combined specialization of both countries in this sector could become a formidable force to cater to the animation market, both domestically as well as to the broader international requirement.

<sup>479</sup> How Digital Gaming In India Is Growing Up Into A Billion-Dollar Market, 2018, Forbes

<sup>480</sup> All Drama Production Focus on Australia, Production of Australian Animated Features and TV Drama 1990/91-2017/18, Screen Australia

<sup>481</sup> Indian animation and VFX industry is getting bigger and better, 2017, The Economic Times

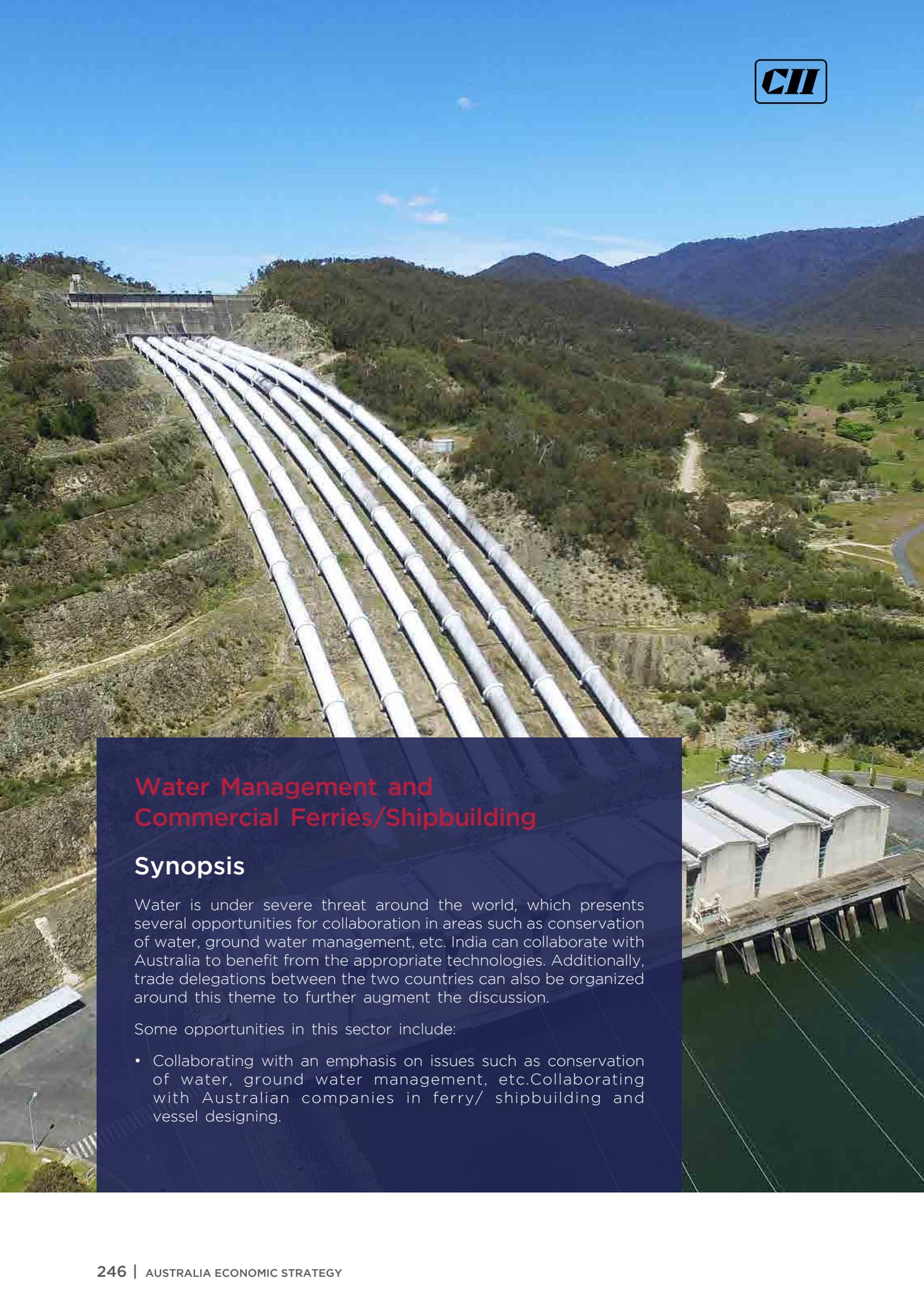
## Opportunities for Australian investments in Animation in India

FDI norms for the Indian animation and VFX sector are expected to be relaxed by the government. As per KPMG India's Media and Entertainment Report 2019, the Indian Animation and VFX market is expected to double to USD 2.6 billion very rapidly. This will result in several investment opportunities for Australian investors in the Indian animation and VFX sector.

### Recommendations

- Australian investors should be encouraged to look at opportunities in the fast growing digital gaming and animation/VFX sectors in India . Australia and India should partner each other in the digital gaming, animation/VFX sectors for mutual benefit.





## Water Management and Commercial Ferries/Shipbuilding

### Synopsis

Water is under severe threat around the world, which presents several opportunities for collaboration in areas such as conservation of water, ground water management, etc. India can collaborate with Australia to benefit from the appropriate technologies. Additionally, trade delegations between the two countries can also be organized around this theme to further augment the discussion.

Some opportunities in this sector include:

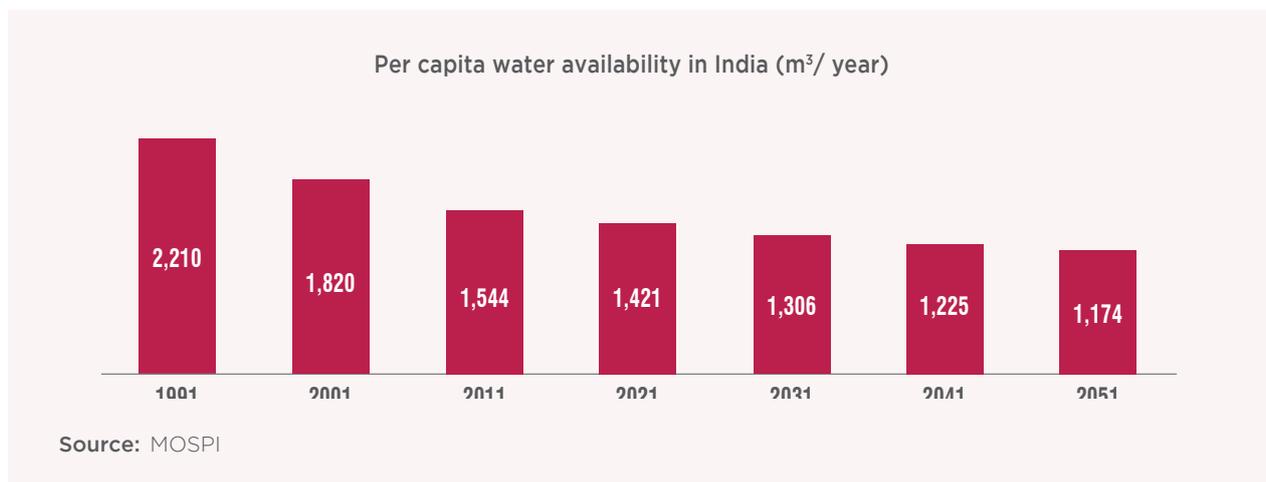
- Collaborating with an emphasis on issues such as conservation of water, ground water management, etc. Collaborating with Australian companies in ferry/ shipbuilding and vessel designing.

## 6.6 Water Management and Commercial Ferries/Shipbuilding

### Water Management

Water is fundamental to life. However, this seemingly endless resource is under severe threat around the world. Growing populations, changing consumption patterns and climate change have resulted in extreme water shortages and it is predicted that by 2040, at least 33 countries, including India and Australia will face extremely high strains on their existing water reserves.<sup>482</sup> If the current levels of consumption without adequate conservation are not changed, two thirds of the global population will face acute water shortages as early as by 2025.<sup>483</sup>

India is running out of water at a rapid pace. The per capita availability of water has dropped from 5,177 cubic metres in 1951 to merely 1,545 cubic metres in 2011. India is therefore encouraging solutions in water conservation, ranging from desalination plants to smart water management systems.



The Department of Agriculture, Cooperation & Family Welfare (DAC&FW) of India implemented the Pradhan Mantri Krishi Sinchayee Yojana-Per Drop More Crop (PMKSY-PDMC) for enhancing water usage efficiency and promoting micro-irrigation systems such as drip and sprinkler irrigation systems. In addition to this, micro-water storage structures, drought proofing and ground water replenishment measures and restoration potential of existing water bodies were also promoted by this program.

Existing groundwater reserves in India are also being utilized aggressively. Preparing for a future with considerably less water resources is a serious issue that therefore requires urgent attention and concrete steps to address this issue. India and Australia, while possessing different industrial, economic, geographic and cultural traits, can put up a united front to tackle this global phenomenon.

Unlike India, Australia does not depend extensively on rainfall for its water requirement, as rainfall is highly variable in the country, both in terms of volumes and geographic distribution. ~40% of the country receives rainfall less than 300 mm per annum.<sup>484</sup> Several regions in Australia are severely drought prone. There are also large distances between water bodies and resident populations in Australia. Water harvesting, storage and distribution have therefore been essential to urban and rural development in the country.

<sup>482</sup> World Water Day: India is 3rd largest groundwater exporter, India Today

<sup>483</sup> The approaching crisis: Is the world running out of water?, 2017, News Corp Australia

<sup>484</sup> Water Management, Parliament of Australia



Collaboration on water management is not new to India and Australia. In December 2004, five leading Australian universities (University of South Australia, Adelaide University, Flinders University, Central Queensland University and Deakin University) together with financial support from the South Australian Government, were awarded Federal Government funding from the Department of Education, Science and Training to establish an International Centre of Excellence in Water Resources Management (ICEWaRM) in Adelaide.<sup>485</sup> ICE WaRM creates synergies between three core areas for water conservation, which include water resources management, education and training and international development. It is globally recognized for its leadership in developing sustainable solutions for water and economic development.

The states of South Australia and Rajasthan already have a sister state agreement in place and have established a Centre of Excellence in Water Resources Management (RaCE WaRM) with water conservation as their core priority.<sup>486</sup> It is a two-way partnership for exchange of research, policy and technical capabilities.<sup>487</sup> The partnership led to a successful evaluation of a disinfection plant in a 400-student accommodation unit in Jaipur that is being installed in other parts of India as well. Other states, such as NSW have also established Memorandums of Understanding (MoUs) with Maharashtra and Gujarat.

The Maharashtra Water Resources Department and the NSW Department of Primary Industries have signed an AUD 800,000 (USD 536,000) contract for water management and knowledge sharing on water governance.<sup>488</sup>

The Ironwood Institute in Australia has also worked with the Government of Rajasthan to establish ecosystems around hydroponics, which is a technique used in the cultivation of vegetables without using soil and using at least 10 times less water than traditional field cropping methods.

### Case Study: South Australia – Rajasthan Fellowship

The International Centre of Excellence in Water Management in Rajasthan, in partnership with the South Australian Government, offered three fellowships to deserving applicants from Rajasthan. This fellowship enabled the participants to undertake research at the South Australian Water Corporation, The South Australian Department of Environment, Water and Natural Resources (DEWNR), Flinders University and CSIRO. The program was developed to promote a personal connect and support on behalf of the Australian Government to the international water community. Their aim was to develop new innovative ventures based on water technology to secure water management. The program included excursions that showcased South Australia's advanced infrastructure and technology. One of the areas of interest was to achieve sustainable water use and design a Smart Water Distribution Network. As a part of this program, the fellows were able to present their research worldwide. Continuing the successful work done by the fellows, they are now a part of an extensive cooperation in projects for the International Center of outstanding Water Resources Management in Rajasthan.

**Source:** ICE WaRM, Annual Review, 2018

<sup>485</sup> ICEWaRM Website

<sup>486</sup> India Business Mission and RaCE WaRM opening, ICE WaRM

<sup>487</sup> South Australia signs Sister-State agreement with Rajasthan India, Austrade

<sup>488</sup> Finding a 'state mate' may be the key to deeper economic relations, 2017, Department of Foreign Affairs and Trade

International Water Resources Association (IWRA) is a non-profit, non-Governmental, educational organization established in 1971 in Wisconsin, USA and has an executive office in Paris, France. It provides a global, knowledge-based forum for bridging disciplines and geographies by connecting professionals, students, individuals, corporations and institutions who are concerned with the sustainable use of the world's water resources.<sup>489</sup> The IWRA published a report, in collaboration with several institutes such as Commonwealth Scientific and Industrial Research Organisation (CSIRO), which provides a series of case studies for Smart Water Management (SWM). Indian state Governments can also collaborate with CSIRO<sup>490</sup> in its research efforts that include various kinds of sensors, geographic information systems (GIS), satellite mapping and data sharing tools for water conservation.<sup>491</sup>

Further, Australia has several companies in the recycling sector that are focused on providing sustainable solutions to recycle water, waste and energy. These companies also have several innovative solutions focused on reducing pollution and recycling of construction waste and storm water. India can collaborate with these companies for knowledge and technology transfers.

## Commercial Ferries/Shipbuilding

India has an extensive coastline and is ranked as the sixteenth largest maritime country in the world. ~90% of India's trade (by volume) is carried out via the maritime route.<sup>492</sup> India's ships carried ~7% of the global overseas trade by volume.<sup>493</sup> ~92% of this global overseas cargo was carried out by global shipping companies operating in India. The current Indian fleet requires upgradation in technology and size. Thus, in order to realize the economic potential of the maritime industry, India will be required to further build its capabilities in shipbuilding, ports and relevant maritime infrastructure. Moreover, the Indian Government has undertaken several initiatives to increase the share of coastal shipping and inland water transportation in the country under the ongoing 'Sagarmala' project, which will witness an investment of USD 123 billion in 415 projects, import modernization, new port development, port connectivity enhancement, port-linked industrialization and coastal community development. In all these projects, Australia could participate as a partner.

The Australian maritime industry is globally recognized for its innovative and modern manufacturing capabilities and designs. The shipbuilding and maintenance repair overhaul (MRO) segment is expected to be valued at AUD 3.8 billion with exports accounting for 7% of the revenue as of March 2018. Australian companies have gained a reputation for their workmanship, sea ferrying capabilities, fuel economy and other manufacturing advantages. A number of Australian companies like Austal, Incat and Strategic Marine operate in this sector. Incat Tasmania is globally recognized for building the fastest ship in the world running on LNG. The heavy investment made in research and development has given Australian companies the edge when compared with other players in this space in the world.<sup>494</sup>

Moreover, realizing the commercial potential of India's inland waterway network, the Government of India has announced the development of National Waterways across 111 rivers across the country<sup>495</sup>. Out of the 111, 3 waterways, viz., National Waterway -1 (Ganga-Bhagirathi-Hooghly river system from Allahabad to Haldia), National Waterway-2 (River Brahmaputra from Dhubri to Sadiya) & National Waterway-3 (West Coast Canal from Kottapuram to Kollam along with Udyogmandal and Champakara Canals) are already operational.

<sup>489</sup> IWRA

<sup>490</sup> Environmental informatics, CSIRO

<sup>491</sup> IWRA Promotes Smart Water Management for SDGs, 2019, IISD

<sup>492</sup> Sagarmala Website, Government of India

<sup>493</sup> Shipping: Industry and outlook, Care rating, 2018

<sup>494</sup> Australia's Capability in Commercial Shipbuilding and Services, Austrade 2017

<sup>495</sup> Ministry of Shipping - India



Coastal and inland water transportation is a focal area of the Indian Shipping Ministry. India can consider leveraging technology developed by Australia for building specialized aluminum vessels such as high speed ferries, fishing boats, patrol boats, cruise vessels and defense vessels. With the government's ambitious plans to develop this sector, the requirement for ferries and ships in the country is expected to increase. India can partner with Australia to develop expertise regarding design of vessels appropriate for inland waterways and vessels driven by alternate fuels like LNG. India is currently in need of Foreign Direct Investment for inland waterway vessels, coastal shipping vessels and specialised small ships/ ferries. Investment is also required in coastal shipping under the 'Sagarmala' project. There is a requirement for collaboration and design of LNG coastal carriers. Australian companies should be encouraged to examine all these possibilities. A bilateral group comprising of experts from the shipbuilding sector of the two countries can be formed for knowledge transfer. Further, Indian companies can partner with Australian companies such as Austal, which has significant contracts in Vietnam and China for ferry building. While highlighting the availability of cost efficient skilled labour, India can position itself as a manufacturing destination for innovative Australian technology. This would help to cater to the growing Indian market, as well as to develop competitive products for the world market.

## Recommendations

- Indian government should encourage Australian companies like Austal, Incat and Strategic Marine to invest into ship building in India. India can position itself as a manufacturing destination for innovative Australian technology.
- A bilateral group with Australian experts can be set-up to facilitate knowledge transfer regarding vessel design and building of vessels.
- Indian government should collaborate with organizations like CSIRO for research and development in water management technologies.





## Space Technology

### Synopsis

Space technology is an area where India and Australia can increase collaborations in applications and launch technologies.

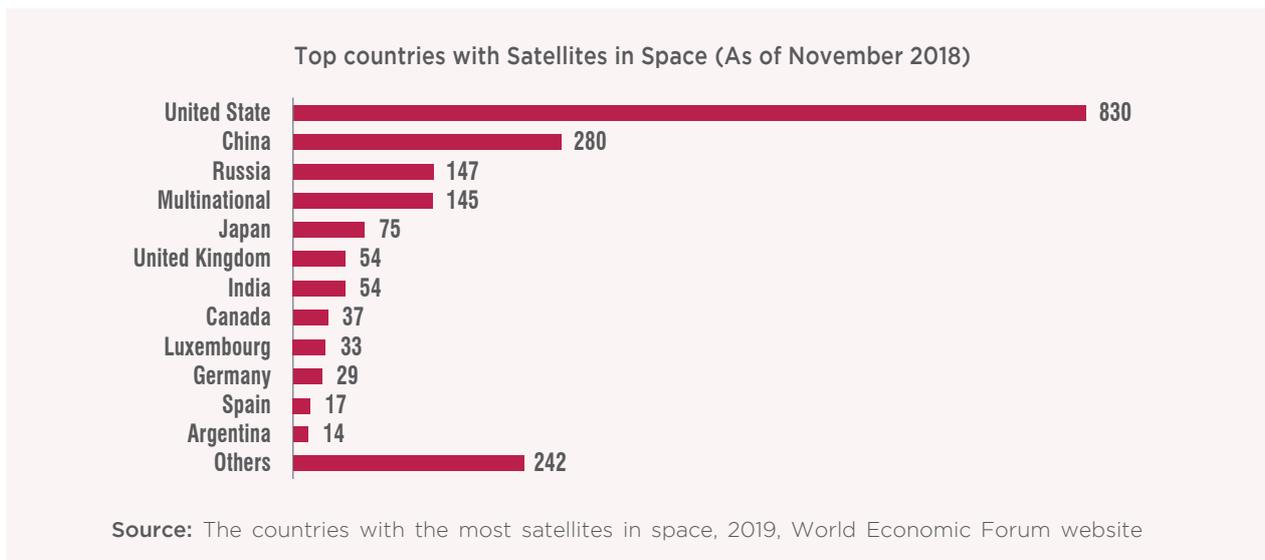
Some opportunities in this sector include increasing collaborations between Indian and Australian Space entities in:

- Earth observation applications including weather modelling;
- Space debris monitoring; and
- Advanced propulsion technologies to reduce cost of access to space.



## 6.7 Space Technology

Indian space missions under the ambit of India's space agency, Indian Space Research Organisation (ISRO), have been highly successful in recent years. Since its formation in 1969, ISRO has undertaken a large number of spacecraft missions, which include communication satellites, earth observation satellites, space exploration satellites and navigation satellites. From launching small rockets with only 30-40 kg payload to the transport of 4,000 kg payload into space, ISRO has achieved significant progress in space technology. As of November 2018, India had the 7th largest number of satellites in space. India has succeeded in its maiden attempt to put a satellite in the Mars orbit.



The Indian Government spend on space programs has been on the rise, from USD 588.1 million in 2009-10 to USD 16,301 million in 2018-19. The increased spend has been on account of an improved push on capital expenditure. Revenue expenditure on space research grew by 27% from 2014-15 to 2018-19, while capital expenditure quadrupled in the same period.<sup>496</sup>

Some upcoming space missions by ISRO include the organization's ambitious manned mission, Gaganyaan in 2022, science missions like Aditya L-1, India's first solar mission and interplanetary missions to Mars and Venus.<sup>497</sup>

Since outcomes in this sector are dependent on complementary information from multiple sensors on ground and in space, space technology benefits immensely from international partnerships. In the past, India has successfully collaborated with its international counterparts such as NASA, ROSCOSMOS, CNES, the European Space Agency, Canadian Space Agency (CSA) etc. Chandrayaan-1, India's maiden mission to the moon, was one such example of international collaboration, wherein it carried six scientific payloads from other countries. This mission has helped NASA and ISRO to jointly discover presence of water molecules on the moon's surface.<sup>498</sup>

Australia launched an independent space agency, the Australian Space Agency (the Agency) in 2018. The Agency is the 'front door' to other national space agencies and institutions looking to work with Australia. India and Australia already have an MoU for space cooperation which provides scope for cooperation in many areas. ISRO and Geosciences Australia (GA) have also signed Implementing Arrangements for cooperation in earth observation and satellite

<sup>496</sup> Mission Shakti: India's space research spending triples to Rs 11,538 crore, 2019, Business Standard

<sup>497</sup> Chandrayaan-2 will have no impact on future missions: ISRO, 2019, Livemint

<sup>498</sup> International Cooperation; ISRO

navigation. India has also collaborated with Australia's private companies operating in the sector. Indian PSLV has bagged its first order from Australia.

There are ample opportunities for joint space collaborations between the two countries, both through our space agencies, and through our research institutions, in line with national priorities and as both countries look to recover from the impacts of COVID-19. The Agency and ISRO could collaborate in areas of mutual benefit including earth observation, data analytics, artificial intelligence and robotics, and space life sciences. More broadly, India and Australia's research institutions can also collaborate, including on missions that could include oceanography and remote sensing in the Indian Ocean region.

Recognizing the potential and each other's capabilities, both agencies have identified the following areas for cooperation:

- Space science and technology
- Remote sensing of the Earth
- Satellite communication
- Satellite based position, navigation and timing
- Spacecraft and systems engineering
- Ground stations to support space activities
- Multi-disciplinary forms of cooperation in the practical application of space technology and using the spin-off benefits of space tech
- Research related to the protection of the outer space environment
- Education and training programmes

ISRO has forged a strong relationship with many Indian industrial enterprises, both in the public and private sectors, to implement its space projects. With ISRO undertaking the production of cutting-edge technologies for its missions through Indian industries, there is a tremendous scope of leveraging the industry expertise for establishing global production hubs of space in other countries including Australia. The commercial wings of space like NewSpace India Limited (NSIL) and Antrix can expand their base for the global marketing of space products and services through partnership with Australian space entities.

In the face of the ongoing COVID-19 pandemic, several reforms were announced by India's Finance Minister to revive the Indian economy in mid-May 2020. The Government of India will offer a level playing field to private companies in satellite launches and other space-based services. Furthermore, private companies will be permitted to use ISRO facilities to improve their own respective capacities. Liberal geo-spatial data policy will further offer remote sensing data to technology-based entrepreneurs. Private companies can thus participate in the space sector in India and increase collaborations with Australian companies.

## Recommendations

- Encouraging collaborations between Australian Space Agency and ISRO in areas of mutual interest to both countries such as oceanography and remote sensing in the Indian Ocean region
- Encouraging cooperation between the Indian and Australian space agencies to foster better linkages to industry and other government agencies to encourage R&D manufacturing and the development of technologies of mutual benefit would be more appropriate for ASA's remit.
- Encouraging R&D and manufacturing collaborations between Indian and Australian commercial companies, to support the growth of the Indian and Australian space industries and broader economies



## Education Technologies

### Synopsis

An opportunity in this sector includes:

- Collaborating in the Edu-tech sector for specific applications in India and Australia.

## 6.8 Education Technologies

### Education Technology in Australia

The expanding network and increased reliability of mobile technology have enabled educational institutions in Australia to offer continuous learning and reskilling opportunities to its students. Australia's national open-access data network project and National Broadband Network will help growth in online education by providing technical efficiency through increased internet connections and speedy data transfers across the country. According to the Australian Trade and Investment Commission, there are over 350 Ed-tech companies servicing the Australian education sector, where there are approximately 1,100 online education providers, generating approximately ~AUD 3.3 billion (USD 2.2 billion) in revenue.<sup>499</sup> With the increase in technological innovation and student demand for digitized education services, the Ed-tech market is expected to grow to ~AUD 1.7 billion (USD 1.1 billion) by 2020<sup>500</sup>. The Australian Government supports the appropriate use of technology in schools by providing AUD 51 million to support a range of education projects undertaken to improve digital literacy amongst students and drive partnerships between information and communications technology (ICT) leaders and schools.<sup>501</sup>

### Ed-Tech in Universities in Australia

Australia is pioneering the way with innovative, world class solutions within the education sector. Leading online providers in Australia include Ducere, Online Education Services, Open Colleges, Open Training and Education Network and Open Universities Australia<sup>502</sup>. A few emerging education technologies that are being applied in schools and universities in Australia include adaptive learning platforms, which are used to measure student progress and engagement; the internet of things, which can be applied to student learning and campus activity to inform the direction of content delivery and institutional planning; artificial intelligence, which is used to help colleges interpret data, improve administrative procedures and enhance online learning and research processes; and cloud computing, which has made the virtual exchange and accessing of data incredibly efficient. In higher educational institutes, Australia has also been fostering innovation by hosting over 110 in-house incubators and accelerator programs based in various universities. The Melbourne Accelerator Program, which is working with the University of Melbourne and ATP Innovations, which is working with the University of Sydney, University of Technology, Australian National University and University of New South Wales, were ranked thirteenth and fourth respectively in the global list of top 25 university incubators.

<sup>499</sup> The Australian edtech industry, Austrade

<sup>500</sup> Edtech in Australia, Government of South Australia

<sup>501</sup> Support for Science, Technology, Engineering and Mathematics (STEM), Department of Education, Australian Government

<sup>502</sup> IBISWorld Industry Report X0008, Online Education in Australia, 2017



## Case Study: Deakin University

In March 2015, Deakin University was the first university in the world to partner with IBM's artificial program, Watson to create a self-learning chat bot that offers information on a wide spread of topics. Watson is the first open cognitive computing technology platform, in which the system is able to decode information like humans do.<sup>503</sup> Within 12 months of implementing Watson, this system has handled more than 55,000 questions from students. By allowing students to access information easily, Watson has extensively contributed to problem solving at the university. The recent upgrade of Watson also allows it to use the Deakin website to generate answers to questions; walk students through generic processes such as submission of assignments and raising requests for enrollment; and tailor its answers to better suit the issues of domestic and international students. Deakin University has also offered an array of degree programs through its worldwide massive open online course (MOOC) provider. It offers a collection of courses in arts, medicine, math, sports and lifestyle among many other self-development programs.

## Schools

Schools in Australia have also integrated world-class solutions, platforms and programs to teach and engage students. West Australia has 95 out of the 1000 learning places for children to learn how to code, worldwide. South Australia has integrated robots and artificial intelligence in aiding its delivery of first-class world education. For instance, 3P learning is a world-wide online education company that offers cloud-based resources to help students in grades K-12 to improve their academic performance. Victoria and Melbourne have adapted their K-12 curriculum and made it mandatory to accommodate machine learning and coding in their curriculum for children in grade 10. They have made it mandatory to offer courses on digital and design technologies to enable students to think computationally and critically and arrive at solutions. Initiation of such an academic regulation will ensure that the youth of Australia is in pace with the growing technological demands of the economy.<sup>504</sup>

## Private Sector

More than 15% of Australian start-ups are focused on the education industry, making education technology the second largest start-up industries in Australia.<sup>505</sup> There are more than 350 ed-tech companies servicing the entire education ecosystem. A large proportion of the ed-tech solutions provided include Software as a Service (SaaS) and app-based solutions that cater to businesses and consumers<sup>506</sup>. EduGrowth is a non-profit organization, which brings together leading innovators that aim to accelerate Australia's borderless education to over 100 million students each year by 2025. Their vision is focused on three key areas, which include - connecting Australian education ecosystems, developing new products and services and driving global awareness and adoption of Australian education innovation.

<sup>503</sup> IBM Watson helps Deakin drive the digital frontier, Deakin University website

<sup>504</sup> Universities Australia, University Start-up Support Programs, 2017

<sup>505</sup> Start-up Muster, 2017 Annual Report

<sup>506</sup> Australian Education Technology Report, 2017, Austrade

Given that education is Australia's third largest export sector, Australia is committed to keep up with the pace of innovation in the hope to deliver world class education. The Australian Government, both at the national and state levels, supports the appropriate use of technology to prepare its students to thrive in the digital world.

## Education Technology in India

The online education market in India is worth USD 247 million and is expected to rapidly grow to USD 1.96 billion by 2021<sup>507</sup>. The projected rapid growth can be attributed to the increase in internet penetration, Government's digital initiatives and demand for low-cost alternatives, quality education and value-added services such as industry interactions and career counselling. The reskilling and online certifications is the largest sector supporting the online education industry, followed by primary and supplemental education and test preparation. Almost one-third of online learners believe that online education does not substitute for traditional learning due to the lack of interaction with peers and teachers.<sup>508</sup> However, there is potential to expand the market for primary and supplemental education by integrating interactive e-learning in traditional classrooms, offering personalized and adaptive learning platforms to cater to all brackets of students in rural and urban areas and creating innovative technology solutions to allow access to offline content in areas that lack adequate infrastructure facilities. Millennials in India are increasingly consuming content on digital platforms due to increasing speed of internet, reduced data prices and easy availability of smartphones. While the industry is still nascent, it is finding its way to minimize risks and cybersecurity concerns. In the private sector, there is a healthy participation of VCs and investors, making India the fourth largest start-up destination. The ed-tech start-ups in India are making significant changes to the education sector and unlike multinational start-ups, they are known to understand the culture and system in India. For instance, the IIMs via NIIT Imperia use Avagmah technology platform that offers solutions centering the learning habits of Indian learners. Byjus is one of India's most popular ed-tech start-ups offering effective learning to students in grade 4 to 12 and has recorded 12 million users on its platform in 2017. The Indian Government, in support of this emerging opportunity, has been implementing various initiatives to promote digital learning. The Government has introduced initiatives such as SWAYAM, India's own MOOC platform, National digital library with 6.5 million books and a subsidized tablet named "AAKASH", which is the cheapest tablet in the world. India has a growing trajectory in the education sector and is giving rise to many opportunities for companies, domestically and internationally, to cater to its rising demand.

## Opportunities in Education Technologies

Technology will increasingly change the way education services are delivered and consumed in India. Online education will be pivotal in helping India meet its extensive educational needs. Australia and India should create platforms to enable collaboration on the online delivery of education in India. Since fund availability and brand recognition are among a few issues that most start-ups within the realm of education technology face, Australia can collaborate with India to build density, capability and global brand recognition of their educational technology products. This collaboration will substantially benefit India by meeting its growing demand for

<sup>507</sup> India's online education industry to reach USD 1.96 billion by 2021, Business Standard

<sup>508</sup> Online Education in India: 2021 Report, 2017, KPMG



Vocational Educational Training (VET). It can partner with the Indian Government and local universities to achieve effective outcomes. Australia's vocational education online training platforms offer highly interactive training and assessment support that can be used to train students in India. For instance, Didasko Learning Resource in Australia offers special courses in hospitality and retail sectors and other comprehensive resources that can help learners achieve high learning results and improve overall operational effectiveness.<sup>509</sup> Collaboration on such education technology fronts will offer flexibility to not only Indian students but also recognition to Australian institutions. Education technology will also offer technology solutions to bridge gaps in India's developing educational sector. These solutions can be used to make up for staffing shortages in schools, maintain uniformity in quality of content, offer varied courses in less developed subject materials like humanities and arts and most importantly provide cost effective and standard quality accessibility of education to all of its students.

### Opportunity for Australian investors in the Edu-tech sector in India

India has a relatively young population with one of the largest populations under the age of 25 and hence a vast market exists for investments into the Indian education and ed-tech space. The Indian government has allowed 100% FDI in the education sector. As per FDI India, the Indian online education sector is expected to reach USD 1.96 billion by 2021 with support from ~9.5 million users. The Indian Ed-tech sector thus offers various attractive opportunities for Australian investors.

### Recommendations

- Indian government should encourage Australian companies to invest into the education tech space in India.

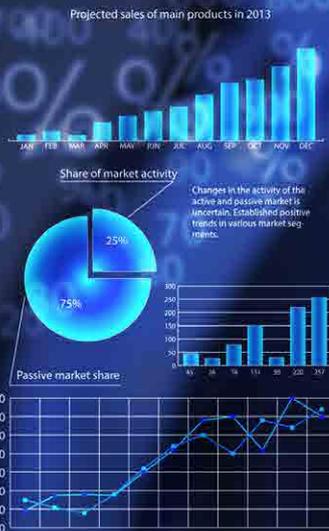
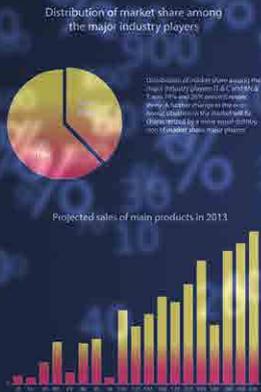
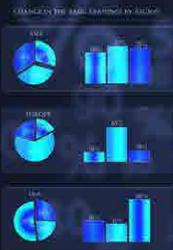


<sup>509</sup> The Australian edtech industry, Austrade



# Chapter 7

# Implementation Strategies



Distribution marketing participation in the securities market.



Distribution of the securities market key players



	TYU d	
GHT	254	55
RDW	650	32
TRG	241	45
RTG	251	65
WEF	784	14
HRT	453	78



Previous chapters have focused on the myriad of opportunities that exist in trade, scientific collaborations and investments in both countries. The current chapter outlines implementation strategies that are action points for the government, corporates and industry associations to realize these potential opportunities. The strategies are classified into three broad categories –

- A. Resolution of Important Issues with Government of Australia.
- B. Short term: Immediate action points, which are expected to have a direct and immediate impact on trade and investment between India and Australia.
- C. Long term: Implementation strategies targeted towards improving the India-Australia relationship in the long run.

## **A. Resolution of Important Issues with Government of Australia**

### **1. Streamlining visa processes**

- Australia currently offers two types of visas for Indian IT professionals in Australia:
  - a. Temporary Work Short Stay Specialist visa (subclass 400) that enables a person to carry out short term work in Australia (valid up to 3 months).
  - b. Temporary Skill Shortage (TSS) visa (subclass 482) that enables a person to work in Australia for a period of 24 to 48 months.
- While there is a requirement for skilled Indian IT staff for projects based out of Australia, there is significant amount of documentation required for visa application, especially for the longer-term visa.
- Streamlining the documentation requirement for the visa as well as reducing the visa processing time would enable easier movement of skilled staff from India to Australia, which will, in turn, have an impact on the project profitability and timelines of the Australian projects.
- Currently, there is absence of an ‘intermediate term’ visa with a duration longer than the Subclass 400 visa but shorter than Subclass 482 visa. Introduction of such an intermediate term visa with lesser documentation requirement and shorter timelines for processing would enable easier staffing of skilled Indian IT professionals on short duration projects of 6 months to a year thereby improving the project profitability and execution speed. This issue needs to be resolved at the Governmental level.

### **2. Addressing taxation concerns of Indian companies**

- Indian companies have raised concerns over double taxation issues faced by them.

- Indian IT companies providing service to Australian clients, at times, provide a part of these services using their teams located in India.
- The Australian Tax Authority (ATO) treats the income earned on these services, as 'royalty' and levies taxes on it under Article 12(3)(g) of the Double Taxation Avoidance Agreement between India and Australia. This follows a Federal Court of Australia ruling to treat such payments as 'Royalties'.
- Additionally, companies are also required to pay taxes in India as the services are rendered from India.
- The relevant Ministries in India, along with Indian associations such as NASSCOM, need to resolve this issue with the Australian taxation authorities to facilitate appropriate credits and avoid double taxation.
- Similar issues faced by Indian banks in Australia, where Indian banks are required to pay withholding taxes in Australia on borrowings from their Indian parent, need to be resolved.

### **3. Easing out regulations for Indian banks operating in Australia**

- The State Bank of India (SBI) has been denied the status of an Approved Security Provider under the Financial and Performance Management Standards 2009 (FPMS).
- As per the FPMS 2009, minimum long-term credit rating of A-/A3 from an approved credit rating agency is required.
- SBI has been denied this status on account of a lower rating of BBB-, which is due to the lower sovereign rating of India and not due to any company specific issues.
- However, SBI is India's largest public bank and is only one of three banks recognised as Domestic Systemically Important Banks (D-SIBs) by the Indian Government.
- Under Section 41 of the FPMS, the Treasurer can provide exceptional approval to SBI as a Security Provider.
- The two Governments should actively resolve this issue of an approval for SBI since the latter not getting the status of an Approved Security Provider significantly affects funding requirements of new Indian businesses operating in Australia.

## **B. Short-Term Implementation Strategies**

### **4. Engaging with Australia as a key supply partner in line with India's Critical Minerals Strategy for 2030**

- The Critical Minerals Strategy for India focuses on identifying minerals that would be essential for India's resource requirements in 2030.
- The Strategy has identified 49 minerals that will be vital for India's economic growth, of which Australia has reserves of 21.
- Indian companies and Government should evaluate entering into offtake agreements/ investments/ joint ventures with Australian mining assets / mining companies to secure access for India's critical mineral requirements.

### **5. Investing in existing mines and resource exploration projects in Australia**

- Australia offers several investment opportunities for mining of resources such as coal,



iron ore, copper, gold ,potash ,phosphate etc. and supports multiple entry options for an entity looking at such investments, including acquisitions, investments with off-take agreements, etc.

- These investments will assist in securing India's resource requirements for two of the Indian Government's largest initiatives - 'Make in India' and the 'National Mobility Mission'
- India should invest in mining and exploration projects either independently or through partnerships to secure access to these resources.

#### **6. Developing funds to promote Entrepreneurship, Humanities and Social Sciences, Start-ups across both countries**

- Australia India Strategic Research Fund (AISRF) is an example of a successful research fund set up between India and Australia. Both countries should further commit to contributing USD 20 million (AUD 29.8 million), each over a period of five years.
- On the lines of AISRF, joint funds should be set up between the two countries for the following:
  - a. A joint Start-up and Innovation Fund with a contribution of USD 10 million by each country over five years
  - b. A joint research fund to promote the humanities and social sciences sector with a contribution of USD 10 million by each country over five years
- Further, under the Start-up India programme, joint entrepreneurship programs for start-ups should be organized and facilitation centers such as research parks, incubator precincts, etc. should be established to provide a boost to the start-up environment. Australia has a precedence of successfully establishing such precincts and can collaborate with the Indian Government in this regard.

#### **7. Encouraging investments by Australian Super Funds**

- The Indian Government should engage with Australian super funds to encourage investments in Indian infrastructure projects.
- This will require conducting awareness initiatives in Australia to provide information on regulatory policies in the country, execution potential of the projects, returns on investments, tax structures etc.

#### **8. Enhancing cooperation and research collaboration under the Scheme of Promotion of Academic and Research Collaboration**

- The Scheme for Promotion of Academic and Research Collaboration (SPARC), an initiative of the Ministry of Human Resource Development (MHRD) of India aims at upgrading the research capabilities of India's higher educational institutions by enabling research collaborations between Indian and foreign Institutions.
- Top 500 universities from 28 nations (including Australia) will be selected for such research collaborations.
- This Scheme supports various areas of development of research environment that include facilitating visits by international faculty to India, organising visits by Indian students to international universities and joint development of courses.

#### **9. Setting up a Sports University in India**

- India should work with Australia to set up a sports university to support the development of diverse sports and to improve access to infrastructure / sports-related specializations for upcoming athletes and students in India.
- This proposition was included in the Joint Statement made by the respective countries' Prime Ministers in 2015.
- A cohesive action plan should be initiated by the Ministry of Youth Affairs and Sports in India, in correspondence with the relevant Australian universities and institutions.

#### **10. Collaborating on Phytosanitary measures**

- Inadequate understanding on Australian sanitary and phytosanitary (SPS) regulations is negatively affecting India's export potential for agricultural products. Indian agencies can work with Australian counterparts to communicate and educate Indian exporters and corporates about the Australian requirements in this field so that they can gain access to the Australian market.
- Indian companies should seek assistance from Australian agencies in understanding and meeting the SPS requirements of Australian markets for identified products. A mechanism to facilitate an increase in Indian agriculture and marine exports to Australia should be initiated by the two governments.

#### **11. Re-establishing the MoU between India and Australia for cooperation on tourism**

- The MoU was signed between the two countries for tourism in 2014 which has now lapsed and should be re-established to encourage partnerships between the two countries.
- Under the MOU, Australia and India shared information on tourism policy and encouraged cooperation between stakeholders involved in the tourism sector in both countries. A joint Australia-India working group (JWG) on tourism met across cities such as Sydney and New Delhi to discuss visas, aviation links, traveller safety and opportunities for collaboration on tourism research.

#### **12. Encouraging participation of Australia under Study in India**

- The 'Study in India' program was announced in the 2020 Union Budget of India in order to attract foreign students to Indian universities.
- The program aims to offer seats in select reputed Indian universities and Institutes via fee waivers and scholarships to meritorious students.
- A centralized web portal has also been launched to facilitate single-window admissions of foreign students to more than 160 private and public Indian universities.
- This program can also be extended to include Australia in order to increase inflow of Australian students to India.

#### **13. Regular interaction between Indian and Australian defence industries via exhibitions in the respective countries, industry associations etc. should be encouraged. Regular meetings of joint working groups should also be held. Visits by team experts of Australian shipyards to Indian shipyards can also be held.**



## **C. Long-term Implementation Strategies**

### **14. Encouraging partnerships on mining with Australian institutions**

- Indian institutes / corporates and Government bodies should encourage partnerships with Australian institutes to facilitate joint research and training and knowledge transfer programs in the following areas:
  - a. Mine safety and technology applications
  - b. Mine exploration and mapping in India
  - c. Student exchanges between Indian institutes such as IIT-ISM and Australia's mining universities
  - d. Encouraging two-way consultation programs for specific mining applications and issues

### **15. Collaborating on curriculum development, vocational education and training**

- Australian Technical and Further Education (TAFE) and other Australian bodies such as Australian Curriculum, Assessment and Reporting Authority (ACARA) and Australia Institute for Teaching and School leadership (AITSL).
- Mutual recognition of recognition of Academic Qualifications in Higher Education should be considered by both countries.
- Indian institutes such as National Council of Educational Research and Training (NCERT) and National Assessment and Accreditation Council (NAAC) should collaborate with Australian institutes such as Australian Curriculum, Assessment and reporting Authority (ACARA) and Australian Institute for Teaching and School Leadership (AITSL) for curriculum development programs.
- Indian agencies such as National Council for Teacher Education (NCTE) should collaborate with their Australian counterparts to exchange teaching tools, methodologies and to share teacher training resources.

### **16. Setting up a specialized Agri-university/Agri-universities in India**

- India should leverage Australia's experience and expertise in agriculture by encouraging Australian institutions to set up a specialized agri-university in the country or assist with upgrading existing agri-universities in India.

### **17. Scaling up Australian med-tech start-ups in India**

- Australia has innovative med-tech start-ups that should be invited to operate in India.
- India provides a competitive market for Australian start-ups. Indian companies could explore partnering with Australian start-ups and supporting them with funding requirements for large scale commercialization to target global markets.
- This could be done by way of signing MoUs between Indian and Australian companies as well as setting up med-tech parks.

- Additionally, Australian companies and start-ups should be encouraged to access infrastructure provided by med tech zones in India.
- A pharmaceutical group involving representation from the Departments of Pharmaceuticals in India and Australia should be set up to discuss potential partnerships between Australian and Indian companies and attracting investments by Australian companies into India.

#### **18. Setting up medical tourism infrastructure in India**

- To promote Indian medical tourism in Australia, the Indian Government should establish a medical tourism framework with support infrastructure to ensure a comfortable stay for Australian visitors who come to India for procedures such as dental care, major and minor cosmetic surgeries, etc.
- Large private hospitals, in collaboration with the Indian Ministry of Tourism, need to develop a one-stop service that will provide travel, lodging, cashless direct billing, efficient customer service and post-hospital care for Australian medical tourists.

#### **19. Adopting Australia's best practices in Tourism**

- India's tourism bodies such as the India Tourism Development Corporation (ITDC), set up by the Ministry of Tourism, should enter into a collaborative arrangement with Tourism Australia to adopt best practices and strategies for promoting India as a tourist hub, both in Australia and in the rest of the world.
- In addition, this collaboration should also involve upgrading regional tourist campaigns in India.

#### **20. Addressing common challenges in areas such as Water Management**

- There is a need to encourage collaboration on research programs with Australian agencies such as International Centre of Excellence in Water Resources Management (ICEWaRM), CSIRO, etc. on common water management challenges faced by India and Australia.

#### **21. Both governments can jointly sponsor design and development of niche technologies in Artificial Intelligence applications and for modular construction for ships and submarines.**

### **D. Facilitative Recommendations (Timeline: Short term)**

#### **22. Setting up a coordination mechanism through a consultative inter-ministerial approach**

- There should be a joint team led by the Ministry of Commerce and Industry and the Ministry of External Affairs at the senior officials' level, overseen by the Minister of Commerce and Industry along with appropriate representation from other ministries and chambers of commerce. A follow up mechanism should be built in to launch, adopt and publicize the report amongst key stake holders including State Governments.



- Budgetary support should be extended by the Ministry of Commerce for developing the report, including dissemination of the contents of the report both in India and Australia, and drawing up a time table over the next two years for the implementation and utilization of the report.
- A review mechanism between the Australian and Indian Governments to jointly oversee the implementation of the Australian and Indian economic strategy reports in both countries over a six-month basis at the senior official level from the Ministry of Commerce and Industry and The Ministry of External Affairs with appropriate representation from other Ministries is required.
- The report should be launched and publicized through a series of events organized by CII.

### **23. Commencing direct flights**

- Direct flights between Indian cities such as Mumbai, Bangalore, Hyderabad, Chennai, Kolkata etc. to Australian cities like Sydney, Melbourne, Perth, Brisbane, Adelaide, Darwin, etc. will be a key enabler to improve tourism, business and trade relationships.
- Direct flights would significantly improve the bi-directional flow of tourists between the countries.
- India could be an ideal transit destination for Australian visitors, travelling to European countries, which will also benefit Australian airlines.

## **E. Other Measures**

- 24.** The Indian Consulate presence in Australia should be increased with new Consulates in Brisbane and Adelaide.
- 25.** India should restore the office of the Ministry of Tourism in Australia.
- 26.** Presence of offices of business associations, such as CII, should also be increased in cities other than Melbourne and Sydney. Australia India Business leaders forum should be reactivated and should meet regularly with a specific agenda, and discussions between industry clusters should be held twice a year - once in India and once in Australia. Also, Indian Chambers of Commerce, the Indian High Commission and the Consulates must engage actively with all chambers of commerce in Australia including Business Council of Australia (BCA).
- 27.** Explore the possibility of a Free Trade Agreement (FTA) between India and Australia.



# Annexure I

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## List of Consultations



**Shri Piyush Goyal**

Hon'ble Commerce and Industry Minister  
Ministry of Commerce and Industry, Gol

**Vijay Thakur Singh**

Secretary  
(East) Ministry of External Affairs, Gol

**Anup Wadhawan**

Secretary- Commerce  
Ministry of Commerce and Industry

**Ajay Gondane**

Former High Commissioner of India to  
Australia

**Guruprasad Mohapatra**

Secretary -DPIIT  
Ministry of Commerce and Industry

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**Shailendra Singh**

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Ministry of External Affairs

**P Harish**

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## Consultations within India

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**Raj Kumar**

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**Rakesh Malhotra**

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**HL Malik**

Department of Industries

**NK Joshi**

Department of Pharmaceuticals

**Sandeep Kumar**

Department of Pharmaceuticals

**Ujjawala T Tirkey**

Department of Science & Technology

**D Gowrisankar**

Department of Space

**Nilesh S**

Government of Gujarat

**Vikas Anand**

Government of National Capital Territory of Delhi

**Prem Ravi**

Government of Tamil Nadu

**PS Karthigevan**

Indian High Commission

**RB Kariee**

Indian High Commission

**Raja Singh Khurana**

Invest India

**Prashant Armorikar**

Ministry of Agri & Farmers Welfare

**Shubra Thakur**

Ministry of Agriculture

**Vijay Prakash**

Ministry of Agriculture & Food Processing

**Angshumali Rastogi**

Ministry of Civil Aviation

**Umashankar Thakur**

Ministry of Coal

**Ashish Dutta**

Ministry of Commerce and Industry

**S K Aggarwal**

Ministry of Commerce and Industry

**Amit Sahai**

Ministry of Defence

**MA Shivananda**

Ministry of Defence

**Gautam Pandey**

Ministry of External Affairs

**Manish**

Ministry of External Affairs

**Niharika Tagotra**

Ministry of External Affairs

**Vishvas Sapkal**

Ministry of External Affairs

**Sudir Shyam**

Ministry of Finance

**Atul Saxena**

Ministry of Food Processing Industries

**Lav Agarwal**

Ministry of Health & Family Welfare

**Sachin Mittal**

Ministry of Health & Family Welfare

**Suneet Mehta**

Ministry of Housing and Urban Affairs

**AK Gopal**

Ministry of Human Resources and Development

**Neeta Prasad**

Ministry of Human Resources and Development

**Siljo VK**

Ministry of Human Resources and Development

**Babulal Verma**

Ministry of Information and Broadcasting

**S B Singh**

Ministry of Labour & Employment

**Ajay Kadian**

Ministry of Mines

**Amit Saran**

Ministry of Mines

**Amitesh Sinha**

Ministry of New and Renewable Energy

**Dinesh Jagdale**

Ministry of New and Renewable Energy

**Veena Sinha**

Ministry of New and Renewable Energy

**BN Reddy**

Ministry of Petroleum and Natural Resources

**Praveen Kumar**

Ministry of Power

**Suman Chatterjee**

Ministry of Power

**A K Tiwari**

Ministry of Railways

**RK Singh**

Ministry of Railways

**Kamlesh Chaturvedi**

Ministry of Road Transport and Highways

**Satinder Pal Singh**

Ministry of Shipping

**Shashi Bhushan Shukla**

Ministry of Shipping

**Aman Sharma**

Ministry of Steel

**Binoy Kumar**

Ministry of Steel

**Nandan Singh Bisht**

Ministry of Textiles

**Parmendra Sinha**

Ministry of Textiles

**RK Bhati**

Ministry of Tourism

**Rupinder Brar**

Ministry of Tourism

**Suneet Mehta**

Ministry of Urban Development

**BHP Vaiphei**

Ministry of Water Resources

**Inder Dhamija**

Ministry of Youth Affairs & Sports

**Sujoy Bose**

National Investment & Infrastructure Fund

**Nidhi Batra**

National Skill Development Corporation

**Vineet Kumar**

Punjab Small Industries & Export Corporation Ltd

**Rajiv Dube**

Aditya Birla Group

**A K Tareen**

AKT Strategic Consulting LLP

**Niraj Shah**

ANZ Banking Group

**Sanjeev Bajaj**

ANZ Banking Group

**Anil Pant**

Aptech Limited

**Akhil Kumar**

Aurigene Discovery Technologies Limited

**Murali Ramachandra**

Aurigene Discovery Technologies Limited

**Dr Santosh Yadav**

Ayurveda Yoga

**Kiran Mazumdar Shaw**

Biocon Ltd

**Umang Vohra**

Cipla Ltd

**Vandana Pisharody**

Cochlear Medical Device Company  
India Pvt. Ltd.,

**Venkateswaran Palat Krishnan**

Education Overseas Academy

**Atul Garg JP**

Federation of Indian Association  
of Western Australia Inc.

**Srivatsan Chellappa**

Gemicorn Technologies Pvt Ltd.

**Nadir Godrej**

Godrej Industries Ltd.

**Manoj Paul**

Heat and Control Pvt. Ltd.

**Bhaskar Ramamurthy**

IIT Madras

**Mahesh Panchgula**

IIT Madras

**Mugunthan Siva**

India Avenue Investment Management

**Rajat Kathuria**

Indian Council for Research on  
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**Petula Thomas**

Indo-Australian Chamber of Commerce

**Prakash Challa**

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**Ashok Mysore**

Infosys

**Bhupendra Sethia**

JITO Australia

**Alok Khullar**

Kauvery Hospital

**Rohini Rau**

Kauvery Hospital



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# Annexure II

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## List of CSIRO Projects

Sector	Subsegment	Project Name	CSIRO links
Mining and Resources	Lithium ion and rare earths - mining and processing.	<p>CSIRO scientists, in collaboration with RMIT University and QUT, have demonstrated that pre-treating a battery's lithium metal electrodes with an electrolyte salt solution extends the battery life and increases performance and safety.</p> <p>The research was published in Nature Communications.</p> <p>The simple method is set to accelerate the development of next-gen energy storage solutions and overcome the issue of 'battery range anxiety' that is currently a barrier in the electric car industry.</p> <p>The technology has the potential to improve electric vehicle drive range and battery charge to a point where electric vehicles will soon be competitive with traditional petrol vehicles.</p>	<a href="https://www.csiro.au/en/News/News-releases/2016/Salt-baths-boost-next-gen-batteries-for-electric-cars">https://www.csiro.au/en/News/News-releases/2016/Salt-baths-boost-next-gen-batteries-for-electric-cars</a>
Mining and Resources	Lithium ion and rare earths - mining and processing.	<p>A CSIRO-led innovation that enables fast automated analysis of rock materials directly from drill sites is to be commercialised, opening the way for millions of dollars worth of potential cost and time savings.</p> <p>The Lab-at-Rig® technology that CSIRO has developed in partnership with Imdex and Olympus, under the Deep Exploration Technologies Cooperative Research Centre (DET CRC), enables chemistry and mineralogy of rocks found within a drill hole to be analysed within minutes of drilling.</p> <p>This technology will provide a great advantage over the current process which can take three months and often millions of dollars to set up the drill sites, drill, extract, sample and log the drill cores, send to a lab for analysis, enter data into a database and finally provide information back to the company.</p>	<a href="https://www.csiro.au/en/News/News-releases/2015/Innovation-drills-into-mineral-productivity">https://www.csiro.au/en/News/News-releases/2015/Innovation-drills-into-mineral-productivity</a>
Mining and Resources	Lithium ion and rare earths - mining and processing.	<p>A new partnership between Australia's national science agency, CSIRO, and Japanese specialist chemical manufacturer, Piotrek, will see Australian-developed battery technologies commercialised globally within the next five years.</p> <p>The two organisations have partnered to develop the next generation of Solid Polymer Electrolytes (SPEs) for lithium batteries using CSIRO's proprietary RAFT (Reversible Addition-Fragmentation chain Transfer) polymer technology and Piotrek's Ion Conducting Polymers (ICP).</p>	<a href="https://www.csiro.au/en/News/News-releases/2019/Piotrek-and-CSIRO-to-make-next-gen-lithium-batteries-for-global-market">https://www.csiro.au/en/News/News-releases/2019/Piotrek-and-CSIRO-to-make-next-gen-lithium-batteries-for-global-market</a>



Sector	Subsegment	Project Name	CSIRO links
Mining and Resources	Mining of other resources like – Coal, Iron Ore, Copper, Steel, Aluminium, Cobalt, Nickel, Potash, etc.	<p>Australia is leading the charge towards greener and safer gold production with an environmentally-superior alternative gold recovery process technology, dispensing with toxic cyanide and mercury currently used in most gold production processes worldwide.</p> <p>The CSIRO-developed ‘Going for Gold’ process replaces cyanide with a reagent, known as thiosulphate, creating a relatively cost-effective, non-toxic and safe alternative to conventional cyanide-based gold recovery process.</p>	<a href="https://www.csiro.au/en/News/News-releases/2019/Cyanide-free-gold-goes-into-production">https://www.csiro.au/en/News/News-releases/2019/Cyanide-free-gold-goes-into-production</a>
Mining and Resources	Mining of other resources like – Coal, Iron Ore, Copper, Steel, Aluminium, Cobalt, Nickel, Potash, etc.	<p>CSIRO has released a technology roadmap to underpin growth in Australia’s \$90 billion mining equipment, technology and services (METS) sector, urging companies to take action to unlock five key opportunities.</p> <ul style="list-style-type: none"> <li>• Data driven mining decisions</li> <li>• Social and environmental sustainability</li> <li>• Exploration under cover</li> <li>• Advanced extraction</li> <li>• Mining automation and robotics.</li> </ul> <p>Underpinning the success of each of these opportunities is a raft of new technology developments, as well as critical changes to people, skills, culture, collaboration, processes and business models.</p>	<a href="https://www.csiro.au/en/News/News-releases/2017/Roadmap-to-drive-growth-for-Australian-METS">https://www.csiro.au/en/News/News-releases/2017/Roadmap-to-drive-growth-for-Australian-METS</a>
Mining and Resources	Mining of other resources like – Coal, Iron Ore, Copper, Steel, Aluminium, Cobalt, Nickel, Potash, etc.	<p>Copper miners can slash their energy and water use for every tonne of the metal produced thanks to a breakthrough ore sorting analyser developed by CSIRO. Taking advantage of magnetic resonance technology, the analyser rapidly identifies ore grade so that large volumes of waste rock (gangue) can be rejected before it enters the plant, significantly reducing the amount of energy and water needed for processing.</p> <p>The analyser is available to the international copper market through NextOre, a new company created by RFC Ambrian, Advisian Digital and CSIRO.</p>	<a href="https://www.csiro.au/en/News/News-releases/2018/MRI-for-mining-to-sort-out-copper-waste">https://www.csiro.au/en/News/News-releases/2018/MRI-for-mining-to-sort-out-copper-waste</a>

Sector	Subsegment	Project Name	CSIRO links
Mining and Resources	Mining of other resources like - Coal, Iron Ore, Copper, Steel, Aluminium, Cobalt, Nickel, Potash, etc.	<p>An environmentally friendly processing method that uses and recycles nitric acid could unlock 70 per cent of the world's nickel supply.</p> <p>Full-scale testing of the process has commenced at a A\$3.5 million pilot plant at CSIRO in Perth. The process, developed by Sydney-based company Direct Nickel, could deliver a huge boost to the global nickel industry by making millions of tonnes of untapped nickel laterite reserves economically viable to mine.</p>	<a href="https://www.csiro.au/en/News/News-releases/2013/New-processing-method-to-deliver-huge-benefits-to-global-nickel-industry">https://www.csiro.au/en/News/News-releases/2013/New-processing-method-to-deliver-huge-benefits-to-global-nickel-industry</a>
Mining and Resources	Mining of other resources like - Coal, Iron Ore, Copper, Steel, Aluminium, Cobalt, Nickel, Potash, etc.	<p>A CSIRO-led innovation that enables fast automated analysis of rock materials directly from drill sites is to be commercialised, opening the way for millions of dollars worth of potential cost and time savings.</p> <p>The Lab-at-Rig® technology that CSIRO has developed in partnership with Imdex and Olympus, under the Deep Exploration Technologies Cooperative Research Centre (DET CRC), enables chemistry and mineralogy of rocks found within a drill hole to be analysed within minutes of drilling.</p> <p>The new technology features automated analysis of mineralogy and geochemistry of drill-hole cuttings direct from the drill site, while still offering the relevant sampling methods and quality control current processes use.</p>	<a href="https://www.csiro.au/en/News/News-releases/2015/Innovation-drills-into-mineral-productivity">https://www.csiro.au/en/News/News-releases/2015/Innovation-drills-into-mineral-productivity</a>
Mining and Resources	Mining equipment and technology services (METS)	<p>Emesent, a drone autonomy spin-out from CSIRO, the technology arm of Australia's national science agency, has raised \$3.5 million in venture capital to commercialise its first product, Hovermap.</p> <p>Developed by former researchers from CSIRO's Data61, Emesent's world-leading Hovermap technology automates the collection of valuable data in underground areas too dangerous or difficult for people to survey or navigate, such as stopes or ore passes in mines.</p> <p>Drones installed with Hovermap can be deployed in GPS-denied environments without a human controller to create 3D maps, and record gas readings, videos and images.</p>	<a href="https://www.csiro.au/en/News/News-releases/2018/underground-mines-drone-start-up">https://www.csiro.au/en/News/News-releases/2018/underground-mines-drone-start-up</a>



Sector	Subsegment	Project Name	CSIRO links
Mining and Resources	Mining equipment and technology services (METS)	<p>An Australian technology that provides new knowledge on ore bodies and associated alteration rapidly and cost-effectively could soon benefit the global mining industry, thanks to a commercialisation deal that will open doors to international markets.</p> <p>CSIRO's advanced mineral analysis and logging technology - HyLogger - has been licensed to Australian Mining, Equipment, Technology and Services (METS) company Corescan, who operate a network of hyperspectral mineralogy labs across Australia, South East Asia, Canada, USA, Mexico, Peru, Chile and Argentina.</p> <p>HyLogger uses the spectra of reflected light from mineral surfaces to interpret the mineralogy of the material. It is far more reliable for systematic mineral identification than visual techniques used in most drilling programs.</p>	<a href="https://www.csiro.au/en/News/News-releases/2017/Australian-exploration-tool-into-global-market">https://www.csiro.au/en/News/News-releases/2017/Australian-exploration-tool-into-global-market</a>
Technology and services		<p>Researchers from CSIRO's Data61 and Macquarie University, in collaboration with Nokia Bell Labs and University of Sydney have developed a comprehensive dataset of the global cybersecurity threat landscape, spanning a decade (2007 - 2017), which will enable cybersecurity specialists to derive new insights and predict future malicious online activity (or mal-activity).</p>	<a href="https://www.csiro.au/en/News/News-releases/2019/Decade-of-mal-activity">https://www.csiro.au/en/News/News-releases/2019/Decade-of-mal-activity</a>
Technology and services	Start-up ecosystem	<p>Companies developing new ways to diagnose cancer, platforms to connect work and learning, next generation WiFi chips and quantum computing firmware are among the first to receive investment from Main Sequence Ventures, manager of the \$200 million CSIRO Innovation Fund. Main Sequence Ventures will support new spin-out and start-up companies, and SMEs engaged in the translation of research generated in the Australian publicly funded research sector.</p>	<a href="https://www.csiro.au/en/News/News-releases/2017/jobs-of-the-future-csiro-innovation-fund">https://www.csiro.au/en/News/News-releases/2017/jobs-of-the-future-csiro-innovation-fund</a>
Pharmaceutical and bio-tech sector	Clinical research of drugs	<p>Thanks to a creative risk-sharing agreement with CSIRO, Melbourne start-up biotech company MecRx has secured a \$4 million investment from the Medical Research Commercialisation Fund (MRCF) to advance its breakthrough technology for accelerating drug discovery.</p> <p>Under the agreement, CSIRO is assisting MecRx in validating its technology platform, which is being used to create promising starting points for new anti-cancer drugs.</p>	<a href="https://www.csiro.au/en/News/News-releases/2016/4m-investment-to-accelerate-drug-discovery">https://www.csiro.au/en/News/News-releases/2016/4m-investment-to-accelerate-drug-discovery</a>

Sector	Subsegment	Project Name	CSIRO links
Pharmaceutical and biotech sector	Clinical research of drugs	<p>Mimicking nature, Australian scientists have developed a protective seashell-inspired capsule to preserve the active biological ingredients needed to create promising new drugs.</p> <p>The new shell developed by CSIRO, The University of Adelaide and the Australian Synchrotron, could hold the key to cost-effectively preserving and extending the shelf-life of vaccines in extreme temperatures without refrigeration.</p> <p>This could significantly benefit healthcare in developing countries where life-saving vaccines often need to be transported over long distances to reach everyone who needs them.</p>	<a href="https://www.csiro.au/en/News/News-releases/2015/Seashells-to-deliver-new-drugs-and-vaccines">https://www.csiro.au/en/News/News-releases/2015/Seashells-to-deliver-new-drugs-and-vaccines</a>
Healthcare	Primary healthcare	<p>A new partnership between CSIRO's Data61 and regional allied health network Health Team Australia (HTA) will help address inequities in rural and remote areas by providing an easy to use telehealth solution, expected to connect up to 20,000 patients with online healthcare professionals.</p> <p>An alliance between HTA and CoviU, a CSIRO Data61 project, will see CoviU's real-time communication online video platform rolled out to HTA customers across Australia from November 2018.</p> <p>The new video consultation service will extend existing healthcare solutions and services from professionals such as exercise physiologists, dieticians, psychologists, mental health nurses and occupational therapists.</p>	<a href="https://www.csiro.au/en/News/News-releases/2017/Remote-Australians-connected-to-healthcare">https://www.csiro.au/en/News/News-releases/2017/Remote-Australians-connected-to-healthcare</a>
Healthcare	MedTech Devices	<p>Patients around the world will soon benefit from a unique Australian invention, with emergency pain killer Pentrox (commonly known as 'the green whistle') receiving initial regulatory approval for sale in the European and UK markets. CSIRO and MDI have been working together for more than 15 years, having developed the initial production process together, to now vastly improving it. The technology will secure their market position as the only global manufacturer of methoxyflurane.</p>	<a href="https://www.csiro.au/en/News/News-releases/2015/Euro-vision-turns-reality-for-Australias-iconic-green-whistle">https://www.csiro.au/en/News/News-releases/2015/Euro-vision-turns-reality-for-Australias-iconic-green-whistle</a>
Healthcare	MedTech Devices	<p>A new 3D printed device is set to end the suffering for thousands of sleep apnoea patients.</p> <p>Using a 3D scanner to map a patient's mouth, CSIRO researchers and Australian dental company, Oventus, can now print a mouthpiece which prevents dangerous pauses in breath during sleep.</p> <p>Printed from titanium and coated with a medical grade plastic, the breakthrough mouthpiece is customised for each patient.</p>	<a href="https://www.csiro.au/en/News/News-releases/2014/3D-printed-first-to-treat-sleep-apnoea">https://www.csiro.au/en/News/News-releases/2014/3D-printed-first-to-treat-sleep-apnoea</a>



Sector	Subsegment	Project Name	CSIRO links
Agribusiness	agro-tech technologies and mechanization	<p>The CSIRO and ASX listed agribusiness, Ruralco, announced a partnership that will see the latest digital technology, including drones and long-range sensing, applied to Australian agriculture.</p> <p>The partnership will draw on CSIRO's expertise in data science research and engineering, and proven track record of agricultural innovation. Combined with Ruralco's on-ground network, the partnership offers potential to deliver new digital solutions to farmers throughout the country.</p>	<a href="https://www.csiro.au/en/News/News-releases/2017/CSIRO-and-Ruralco-partnership-to-drive-digital-farming">https://www.csiro.au/en/News/News-releases/2017/CSIRO-and-Ruralco-partnership-to-drive-digital-farming</a>
Agribusiness	agro-tech technologies and mechanization	<p>CSIRO and rural technology start-up Digital Agriculture Services (DAS) launched an innovative new platform that combines artificial intelligence, machine learning and cloud-based geospatial technology to deliver reliable, independent and robust farm data and analytics.</p> <p>The platform uses satellite imagery to track paddocks and their performance over time. Information from Australia's digital soil map is incorporated and climate information interpreted to show drought, frost, heat stress for livestock and other risks.</p>	<a href="https://www.csiro.au/en/News/News-releases/2019/analytics-platform-to-help-future-proof-farms">https://www.csiro.au/en/News/News-releases/2019/analytics-platform-to-help-future-proof-farms</a>
Agribusiness	Dairy processing	<p>A cybertongue that can rapidly detect lactose and spoilt milk, developed by CSIRO, has today been licensed to start-up PPB Technology. The next-generation diagnostic tool uses biological sensors to detect substances like lactose on the spot.</p> <p>It has potentially game-changing applications across food safety, environmental monitoring and human health.</p>	<a href="https://www.csiro.au/en/News/News-releases/2018/Cybertongue-to-transform-milk-market-and-help-lactose-sufferers">https://www.csiro.au/en/News/News-releases/2018/Cybertongue-to-transform-milk-market-and-help-lactose-sufferers</a>
Agribusiness	Supply chain / logistics enhancement	<p>Researchers have provided the most detailed map of routes and costings across Australia's entire agricultural supply chain, potentially saving the industry millions of dollars annually. The CSIRO researchers have applied the logistics tool TraNSIT (Transport Network Strategic Investment Tool) to 98 per cent of agriculture transport across Australia including commodities such as beef, sheep, goats, dairy, pigs, poultry, grains, cotton, rice, sugar, stockfeed, horticultural and even buffalo.</p> <p>The TraNSIT tool identifies ways to reduce travel distance and time, save fuel costs, cut down on wear and tear to vehicles and produce and minimise stress for both truck drivers and livestock.</p>	<a href="https://www.csiro.au/en/News/News-releases/2017/Paving-the-way-to-cutting-market-costs">https://www.csiro.au/en/News/News-releases/2017/Paving-the-way-to-cutting-market-costs</a>

Sector	Subsegment	Project Name	CSIRO links
Agribusiness	Bio-fuels	<p>Research by CSIRO now makes it possible to produce oil in the leaves and stems of plants as well as the seeds which promises to be a game changer in the global production of renewable oils.</p> <p>US-based company Amfora and CSIRO this week signed an agreement that will advance development and commercialisation of the technology to produce energy-rich feed for livestock.</p>	<a href="https://www.csiro.au/en/News/News-releases/2017/Australias-next-oil-boom-might-just-come-from-plants">https://www.csiro.au/en/News/News-releases/2017/Australias-next-oil-boom-might-just-come-from-plants</a>
Power and renewables	complex grid engineering technology	<p>New technology from Australia's national science agency, CSIRO, will link rooftop solar and batteries to support electric vehicle (EV) charging, even in the height of summer. New solar-powered EV charging stations will maximise use of renewable energy, with the potential to alleviate stress on the grid during peak periods.</p> <p>Funded by the Victorian Government and in collaboration with Delta Electronics and Nissan Australia, CSIRO researchers developed and tested the system, incorporating a range of heat management strategies to ensure batteries are charged and discharged efficiently.</p>	<a href="https://www.csiro.au/en/News/News-releases/2019/PV-for-your-EV-solar-tech-powers-electric-cars-through-summer">https://www.csiro.au/en/News/News-releases/2019/PV-for-your-EV-solar-tech-powers-electric-cars-through-summer</a>
Power and renewables	complex grid engineering technology	<p>CSIRO launched its Centre for Hybrid Energy Systems, a collaborative facility to research cutting edge renewable and hybrid energy technologies.</p> <p>The centre will be a hub for researchers and industry to identify, improve and then tailor energy technologies to meet specific requirements.</p> <p>Combining two or more forms of energy generation, storage or end-use technologies, hybrid systems deliver overall cost and efficiency benefits, compared with single source energy systems.</p> <p>Configurations include renewable or non-renewable energy sources, electrical and chemical energy storage and fuel cells, often connected via a smart grid.</p>	<a href="https://www.csiro.au/en/News/News-releases/2016/New-hybrid-energy-centre-transforming-low-emission-technologies">https://www.csiro.au/en/News/News-releases/2016/New-hybrid-energy-centre-transforming-low-emission-technologies</a>
Power and renewables	Hydrogen fuel	<p>An economically-sustainable hydrogen industry could soon be on the cards according to a blueprint released by CSIRO, the national science agency, which found that cost competitiveness is firmly on the horizon. The National Hydrogen Roadmap sets out a path to develop the action and investment plans required to realise the full benefits of a hydrogen economy. Hydrogen is a clean-burning fuel with a range of uses, from powering vehicles, to storing energy.</p>	<a href="https://www.csiro.au/en/News/News-releases/2018/Roadmap-finds-Hydrogen-Industry-set-for-scale-up">https://www.csiro.au/en/News/News-releases/2018/Roadmap-finds-Hydrogen-Industry-set-for-scale-up</a>



Sector	Subsegment	Project Name	CSIRO links
Power and renewables	Hydrogen fuel	<p>CSIRO research will fill a gap in the global energy technology chain to supply fuel cell vehicles with low-emissions hydrogen sourced from Australia. The two-year project will build on CSIRO's expertise in separating pure hydrogen from mixed gas streams, in this case converting ammonia to high-purity hydrogen for use in fuel cell vehicles (FCVs).</p> <p>CSIRO's membrane reactor technology will fill the gap between hydrogen production, distribution and delivery in the form a modular unit that can be used at, or near, a refuelling station.</p> <p>The project recently received \$1.7 million from the Science and Industry Endowment Fund (SIEF), which will be matched by CSIRO.</p> <p>The research has also been welcomed by industry and is supported by BOC, Hyundai, Toyota and Renewable Hydrogen Pty Ltd.</p>	<a href="https://www.csiro.au/en/News/News-releases/2017/Membrane-for-hydrogen-fuel-cells">https://www.csiro.au/en/News/News-releases/2017/Membrane-for-hydrogen-fuel-cells</a>
Water Management		<p>Sydney's iconic harbour has played a starring role in the development of new CSIRO technology that could save lives around the world. Using their own specially designed form of graphene, 'Graphair', CSIRO scientists have supercharged water purification, making it simpler, more effective and quicker.</p> <p>The new filtering technique is so effective, water samples from Sydney Harbour were safe to drink after passing through the filter.</p>	<a href="https://www.csiro.au/en/News/News-releases/2018/Tiny-membrane-makes-Sydney-Harbour-drinkable">https://www.csiro.au/en/News/News-releases/2018/Tiny-membrane-makes-Sydney-Harbour-drinkable</a>

Sector	Subsegment	Project Name	CSIRO links
Water Management		<p>A unique new facility launched today at the University of Adelaide will help protect Australia's precious groundwater from overuse and contamination, and contribute to our understanding of the impact of climate change through measurements on Antarctic ice cores.</p> <p>A collaboration between CSIRO and the University of Adelaide, the Atom Trap Trace Analysis (ATTA) facility uses advanced laser physics to count individual atoms of the noble gases, such as Argon and Krypton, that are naturally found in groundwater and ice cores.</p> <p>Measuring the ultra-low concentrations of these radioactive noble gases allows researchers to understand the age, origin and interconnectivity of the groundwater and how it has moved underground through space and time.</p> <p>This is the first Atom Trap Trace Analysis facility in the Southern Hemisphere and, combined with CSIRO's complementary Noble Gas Facility at the Waite campus in Adelaide, gives Australia one of the most comprehensive noble gas analysis capabilities in the world.</p>	<a href="https://www.csiro.au/en/News/News-releases/2019/Trapping-atoms-to-protect-Australias-groundwater">https://www.csiro.au/en/News/News-releases/2019/Trapping-atoms-to-protect-Australias-groundwater</a>
Water Management		<p>CSIRO's Data61 Australia's data innovation network and Radiant.Earth have announced today that they will partner to develop joint research into satellite imagery and earth observation data for disaster resilience, in areas such as human disaster management, health, climate change and sustainable water management.</p>	<a href="https://www.csiro.au/en/News/News-releases/2017/Data61-and-Radiant-Earth-team-up-to-improve-disaster-resilience-from-space">https://www.csiro.au/en/News/News-releases/2017/Data61-and-Radiant-Earth-team-up-to-improve-disaster-resilience-from-space</a>
Space Technology	Space Exploration, oceanography, remote sensing, satellite missions, mapping weather, etc.	<p>The CSIRO Centre for Earth Observation will help Australian researchers maximise the benefits of observing Earth from space and further develop Australia's space sector, which is estimated to be worth over \$3 billion per year. The Centre will coordinate a range of Earth-observing activities within CSIRO and also be a catalyst for engagement with Australian businesses, other government agencies and research organisations.</p> <p>Data about Earth, collected by satellites orbiting the planet, is critical to understanding how our world works.</p>	<a href="https://www.csiro.au/en/News/News-releases/2018/new-earth-observation-centre">https://www.csiro.au/en/News/News-releases/2018/new-earth-observation-centre</a>



Sector	Subsegment	Project Name	CSIRO links
Space Technology	Space Exploration, oceanography, remote sensing, satellite missions, mapping weather, etc.	<p>The latest industry roadmap published by CSIRO, Australia's national science agency, encourages the growing domestic space sector to join with international partners to adopt a bold challenge — providing technological expertise to help to establish a human base on the Moon.</p> <p>A sector-wide 'lunar challenge' is an exciting opportunity for Australian industry to contribute to a common goal aimed at growing the size of our domestic space industry to \$12billion by 2030.</p> <p>Australian space sector support for the lunar challenge would be an opportunity to grow our existing relationships with global partners, including international space agencies.</p>	<a href="https://www.csiro.au/en/News/News-releases/2018/CSIRO-asks-space-industry-to-support-bold-lunar-challenge">https://www.csiro.au/en/News/News-releases/2018/CSIRO-asks-space-industry-to-support-bold-lunar-challenge</a>
Space Technology	Space Exploration, oceanography, remote sensing, satellite missions, mapping weather, etc.	<p>It's an exciting time for Australia in space: the establishment of a new Australian Space Agency, the growth of new businesses in the local space industry, and collaboration with international agencies including NASA on their inspirational missions to the Moon and Mars that will create jobs and opportunities for Australians.</p> <p>CSIRO manages and operates the Canberra Deep Space Communication Complex, one of NASA's three spacecraft tracking stations around the world, and is exploring new collaborative research opportunities with NASA on optical communications, medical science, autonomous robotics, remote asset management, in situ resource utilisation, batteries and advanced manufacturing.</p> <p>CSIRO works with leading global companies and more than 30 small-to-medium businesses on a variety of space-related activities and is a key technology partner to the new Australian Space Agency, supporting the Agency's goal of tripling the size of the Australian space industry by 2030.</p>	<a href="https://www.csiro.au/en/News/News-releases/2019/Australia-NASA-partnership">https://www.csiro.au/en/News/News-releases/2019/Australia-NASA-partnership</a>

Sector	Subsegment	Project Name	CSIRO links
Space Technology	Space Exploration, oceanography, remote sensing, satellite missions, mapping weather, etc.	<p>CSIRO announced that it would be extending its Earth observation capabilities by acquiring Australia's first CubeSat designed to detect invisible infrared light.</p> <p>To be known as CSIROSat-1, the new satellite will allow researchers from CSIRO and other institutions to 'see' features that can't otherwise be seen using satellite imagery in the visible spectrum.</p> <p>CubeSats are miniaturised cube-shaped satellites units, with a single unit being 10cm by 10cm by 10cm. They are lower cost, faster to build and cheaper to launch than larger satellites. With these low barriers to entry, they are a cost-effective option for trialling new technology and space research in low Earth orbit.</p> <p>In addition to enabling scientific research, CSIROSat-1 is a demonstration project, aimed at furthering development of the technology to support growth of Australia's advanced manufacturing, imaging and data processing capabilities for small satellite systems.</p>	<a href="https://www.csiro.au/en/News/News-releases/2018/CubeSat-to-lift-veil-on-our-environments-extremes">https://www.csiro.au/en/News/News-releases/2018/CubeSat-to-lift-veil-on-our-environments-extremes</a>





**Confederation of Indian Industry**  
**125 Years - Since 1895**

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, playing a proactive role in India's development process. Founded in 1895 and celebrating 125 years in 2020, India's premier business association has more than 9100 members, from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 300,000 enterprises from 291 national and regional sectoral industry bodies.

CII charts change by working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for industry through a range of specialized services and strategic global linkages. It also provides a platform for consensus-building and networking on key issues.

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India is now set to become a US\$ 5 trillion economy in the next five years and Indian industry will remain the principal growth engine for achieving this target. With the theme for 2019-20 as 'Competitiveness of India Inc - India@75: Forging Ahead', CII will focus on five priority areas which would enable the country to stay on a solid growth track. These are - employment generation, rural-urban connect, energy security, environmental sustainability and governance.

With 68 offices, including 9 Centres of Excellence, in India, and 11 overseas offices in Australia, China, Egypt, France, Germany, Indonesia, Singapore, South Africa, UAE, UK, and USA, as well as institutional partnerships with 394 counterpart organizations in 133 countries, CII serves as a reference point for Indian industry and the international business community.

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