

Applying the Growth Identification and Facilitation Framework to the Small Island Developing States

The Case of Timor-Leste

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Abstract

Small Island Developing States (SIDs) face unique obstacles in economic growth due to geographic isolation, limited domestic market demand and insufficient infrastructure. By applying the Growth Identification and Facilitation Framework (GIFF) to the case of Timor-Leste, this paper aims to identify untapped growth potentials and provide policy recommendations for structural economic transformation. Building on literature review and comparative analysis with existing data, this paper pinpoints the latent comparative advantages and indicates the key constraints to industrialization. Based

on a factor endowment analysis, the paper suggests that Timor-Leste should focus on light manufacturing sector with the support of increased revenue from natural resources projects such as hydropower plants. The authors argue that Timor-Leste should seek industrial transfer opportunities from China in light manufactured goods. To address the detected limitations, the paper recommends a shift in public expenditure to building industrial parks and transportation infrastructure, as well as making use of external funding to kickstart industrialization and facilitate structural transformation.

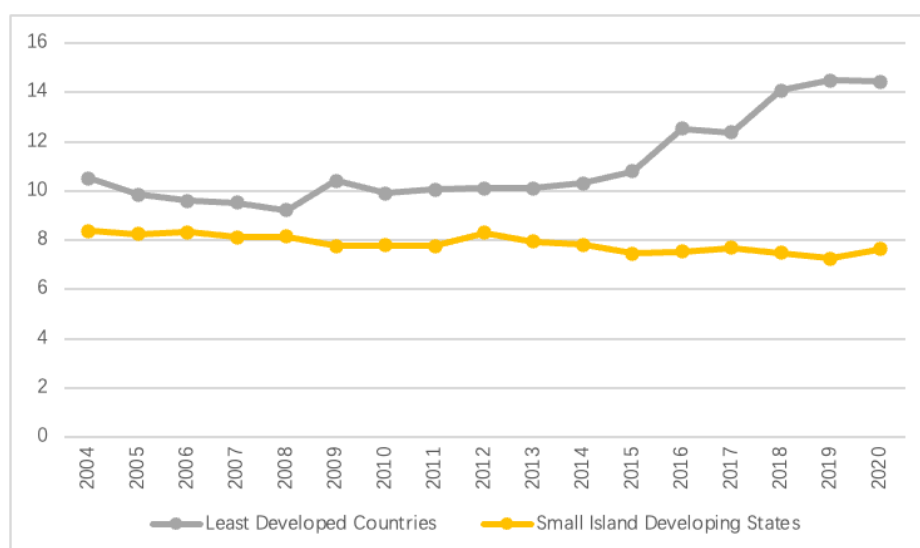
Keywords: Structural Transformation, Industrialization, Manufacturing, Diversification, Small Island Developing States

1. Introduction

At the 1992 United Nations Conference on Environment and Development, a distinct group of 38 member states and 20 non-members/associate members of United Nations Regional Commissions that face unique social, economic, and environmental vulnerabilities was officially grouped as the “Small Island Developing States” (SIDS hereafter). Timor-leste is one of them. Although Small Island Developing States include

countries ranging from Least Developed Countries such as Timor-Leste and Comoros to High-Income Economies such as Singapore and Seychelles, the average manufacturing value-added (MVA) of these states is lower than the Least Developed Countries (LDCs hereafter) average. What is even more alarming is that while the MVA in LDCs is climbing over the years, the MVA in SIDSs is exhibiting a slight decline (see Figure 1).

Figure 1: Manufacturing Value Added, % GDP



Source: The World Bank 2021. World Development Indicators, as accessed Sep. 2022.

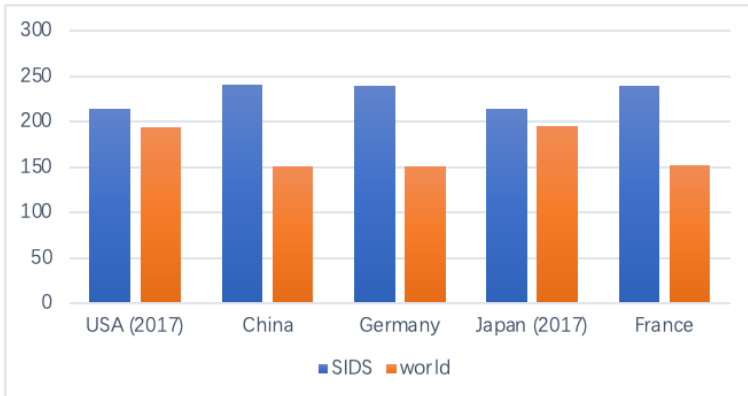
This corroborates the claim that SIDSs are faced with unique obstacles. On one hand, they face limited domestic market demand. In 2021, the average population in SIDSs is 1.79 million, which is a mere 4.95% of the world average. As a result, the ratio of total trade (including exports and imports) relative to GDP is much higher in SIDS than the average ratio of the LDC group (McGillivray et al., 2010). The limited country size (see Figure 3) deems it necessary for SIDSs to look beyond their borders for opportunities that drive economic growth, including foreign aid, remittances, and export revenues (Heger et al., 2009; McGillivray et al., 2010). On the other hand,

geographic isolation from foreign markets may leave them disadvantaged in the global market. Compared with the world average, SIDSs' trade costs with the top 5 importers (the USA, China, Germany, Japan, France) are much higher (see Figure 2). This results in reliance on a few trade partners (UNCTAD, 2022a). Due to a limited resource base and infrastructure (UNCTAD, 2022a), they may also rely on the export of a limited number of agricultural commodities or resources (Heger et al. 2009; McGillivray et al., 2010). The resulting vulnerability to economic shocks, combined with the higher exposure to environmental shocks (UNCTAD, 2022a), further

dampens both domestic investment and foreign direct investment (FDI hereafter) (Guillaumont,

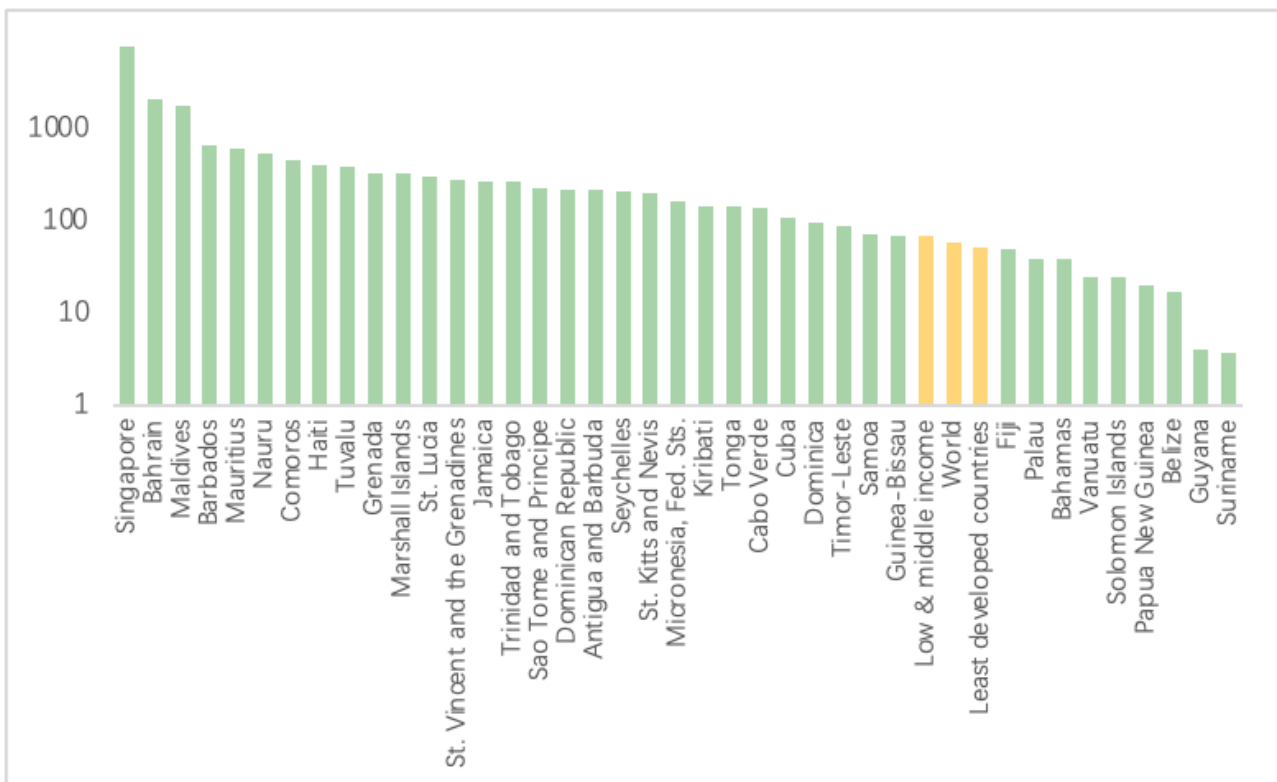
2010), which is fundamental for facilitating industrialization.

Figure 2: Trade Cost¹ of Manufactured Goods with Top 5 Importers, ad valorem equivalent (as a percentage of price), 2018



Sources: ESCAP World Bank. International Trade Costs.

Figure 3: Population density, people per sq. km of land area, logarithmic scale, 2020



Source: The World Bank 2021. World Development Indicators, as accessed Oct. 2022.

There is a vast variation in the population density of SIDS. Economies such as Singapore, Bahrain, and Maldives are more than 100 times denser than

the world average. Yet countries like Guyana and Suriname have a population density that is only around one-tenth of the world average.

¹ Computed by using the Inverse Gravity Framework (Novy, 2011), which covers all costs adding up to the traded goods as a percentage of the price of the goods.

Therefore, apart from the common reasons that lead to the failure to industrialize, such as the first mover problem (Lin and Xu, 2016), the challenges faced by SIDSs make it even more difficult to industrialize without strong policies to foster and facilitate the industries that are more likely to succeed based on its latent comparative advantages. In the present paper, we use the Growth Identification and Facilitation Framework (GIFF hereafter) to analyze how to foster economic transformation in SIDSs.

2. Background Analysis: What is Holding Timor-Leste Back?

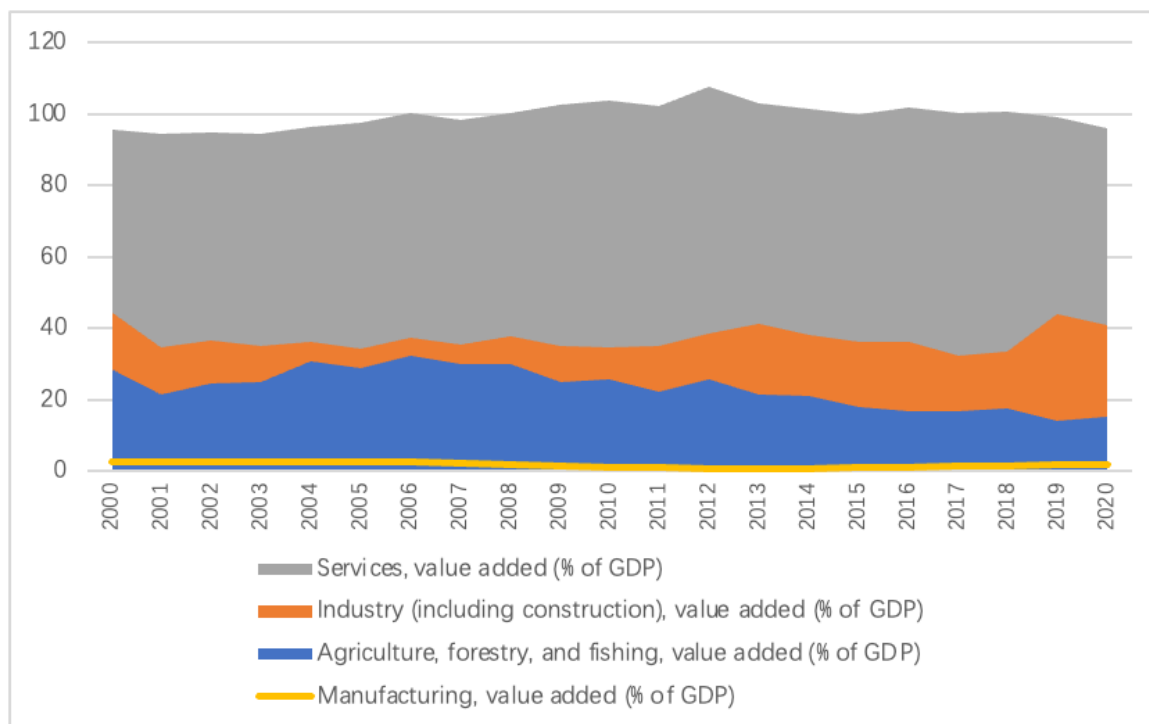
Currently, the contribution of the manufacturing sector is trivial to the whole economy, hovering at 1-2% each year (see Figure 4). It has also been on the declining trend in recent decades, with an especially rapid decrease from 2.45% in 2005 to 0.97% in 2015.

The MVA of Timor-Leste is much lower than its peers (see Figure 5). In 2020, its MVA is 22.74% of average SIDS performance, 12.07% of average Least Developed Countries (LDCs) performance, 8.63% of average low- and middle-income countries performance. This suggests that

challenges exist in Timor-Leste that restricts its performance in the manufacturing sector.

One unique challenge facing Timor-Leste is the declining revenue from the Bayu-Undan field, the main oil and gas field that is currently in production in Timor-Leste. The economy has been historically dependent on its petroleum resources as a major source of government revenue and economic growth. Exports of crude petroleum and petroleum gas amount to around 65-85% of total export annually (see Figure 6 and 7).

Figure 4: Share of Value Added by Sector, % GDP

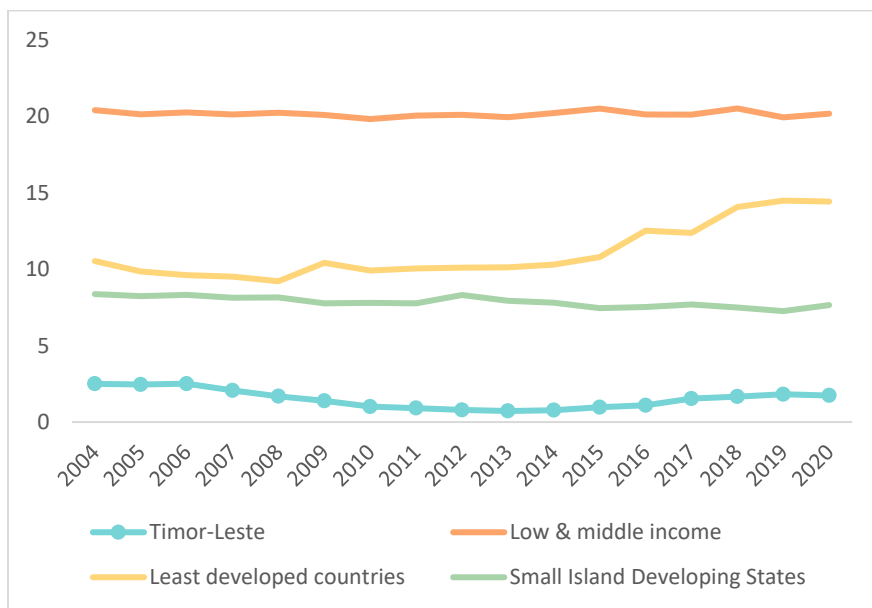


Source: The World Bank 2021. World Development Indicators, as accessed Aug. 2022.

The lack of diversification of export contributes significantly to economic volatility, as the economy is highly susceptible to oil prices and production output. It also renders the economy reliant on the import of other products. As a result, Timor-Leste is experiencing a persistent trade deficit (see Figure

8). This deficit has historically been compensated by the high net primary income abroad, remittances, and foreign aid.

Figure 5: Comparison of Manufacturing Value Added, % GDP

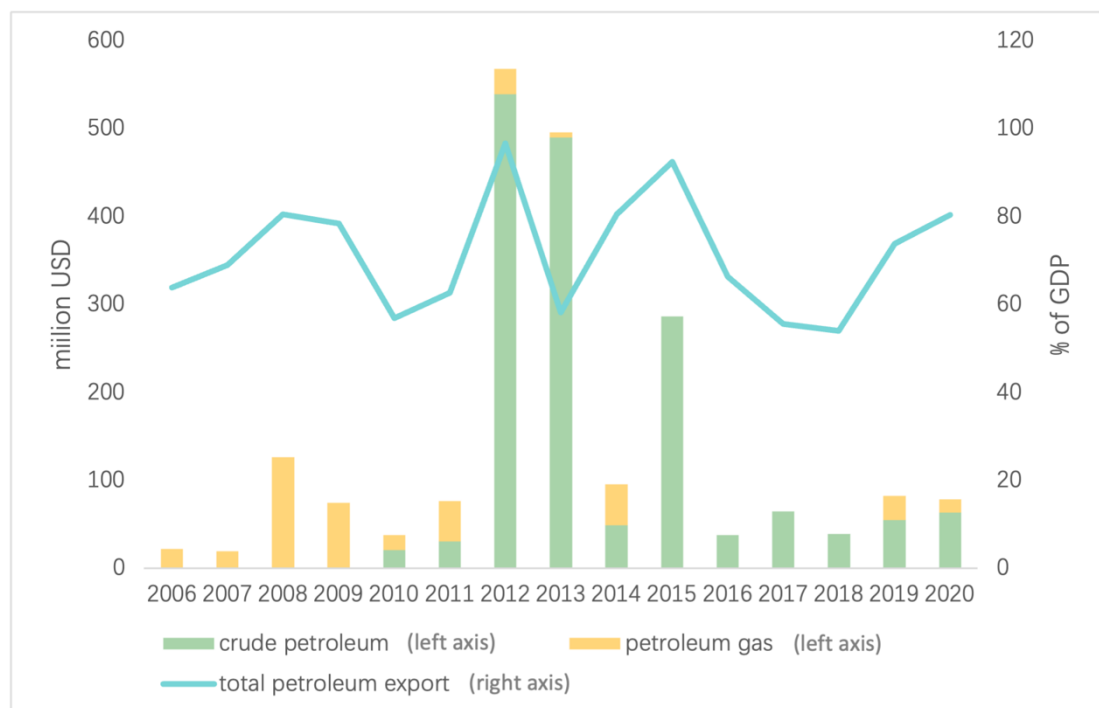


Source: The World Bank 2021. World Development Indicators, as accessed Aug. 2022.

There are two sources of primary income. Firstly, the Petroleum Fund of Timor-Leste is fully invested abroad in financial assets, generating a large amount of financial return. The Petroleum Fund was set up in 2005 to improve the

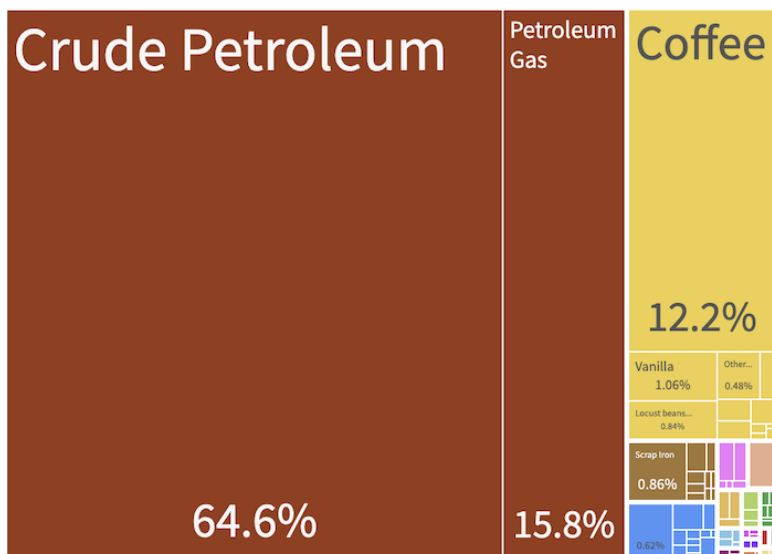
accountability of government spending using oil revenue. However, the shrinking size of the Fund has contributed to the diminishing primary income.

Figure 6: Export of petroleum product



Source: The World Bank 2021. World Development Indicators, as accessed Sep. 2022.

Figure 7: Composition of Export, Timor-Leste, 2020



Source: MIT. The Observatory of Economic Complexity (OEC), as accessed Oct. 2022

Secondly, it is common for people in Timor-Leste to work and even migrate abroad (McWilliam and Monteiro, 2019). The 2015 National Census shows that of the 1,183,643 population in Timor-Leste in 2015, 5,350 people (0.45%) were reported to be

living in European countries excluding Portugal. As a result, personal remittances including labor income abroad and transfer payments are another factor that contributes to the positive current account balance.

Figure 8: Decomposition of Current Account Balance, 2006-2020

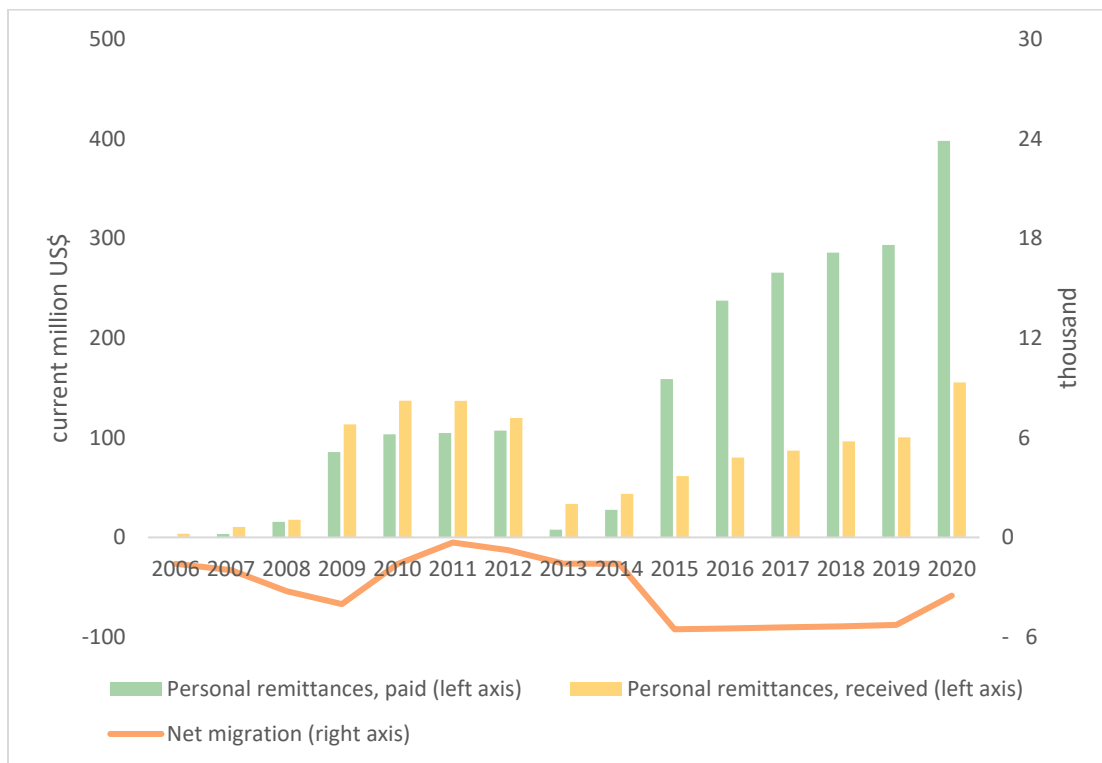


Source: The World Bank 2021. World Development Indicators, as accessed Sep. 2022.

However, as more people are starting to migrate to other countries starting from 2015, personal remittances paid have overtaken those received. Combined with the reduced interest revenue from the Petroleum Fund, it has resulted in a deficit in the current account balance (see Figure 8). This suggests the possible existence of brain drain and wealth drain as more and more people choose to

immigrate to other countries (see Figure 9), which to a large extent is due to the lack of employment opportunities within the country (McWilliam and Monteiro, 2019). It is therefore imperative for the economy to facilitate industries that can provide sufficient job opportunities to prevent further brain drain.

Figure 9: Personal Remittances and Migration in Timor-Leste, 2006-2020



Source: The World Bank 2021. World Development Indicators, as accessed Sep. 2022; United Nations, as accessed Sep. 2022.

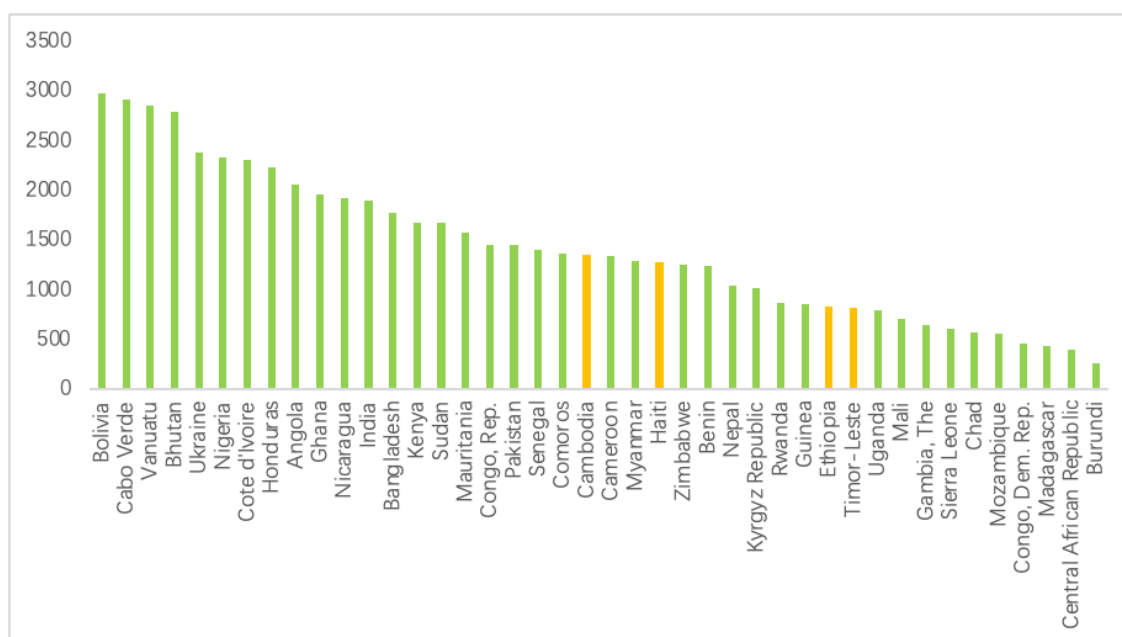
3. Factor Endowment Analysis: What Does Timor-Leste Have?

3.1 Factor Endowment - Labor

Timor-Leste has a small population size of over 1 million people. Its population density is 90.37 people per square kilometer in 2021, relatively dense compared with 39.98, the average of Pacific Island small states². However, it is still relatively less densely populated compared with its potential competitors at a similar level of GNI per capita (see Figure 10) that seek industrial transfer of light manufacturing sectors from China (101.87 in Ethiopia, 413.73 in Haiti, 94.71 in Cambodia, in 2020)³. As a result, it still needs to identify its niche to gain competitiveness as it tries to attract the light manufacturing industry.

According to the projection of the United Nations Population Division, the working-age population of Timor-Leste will remain at a high level through the twenty-first century, increasing from the current 59.41% in 2021 to 68.91% by 2050. As the population pyramids have shown that while the population is aging, the majority of the population has mostly moved from teenagers (in 2010, 2020, 2030) to the working population (in 2050) (see Figure 11). Therefore, the nation still has high potential for labor-intensive industries, and it would need to provide more job opportunities for the growing number of young people entering the labor force.

Figure 10: GNI per capita (constant 2015 US\$, 2021)

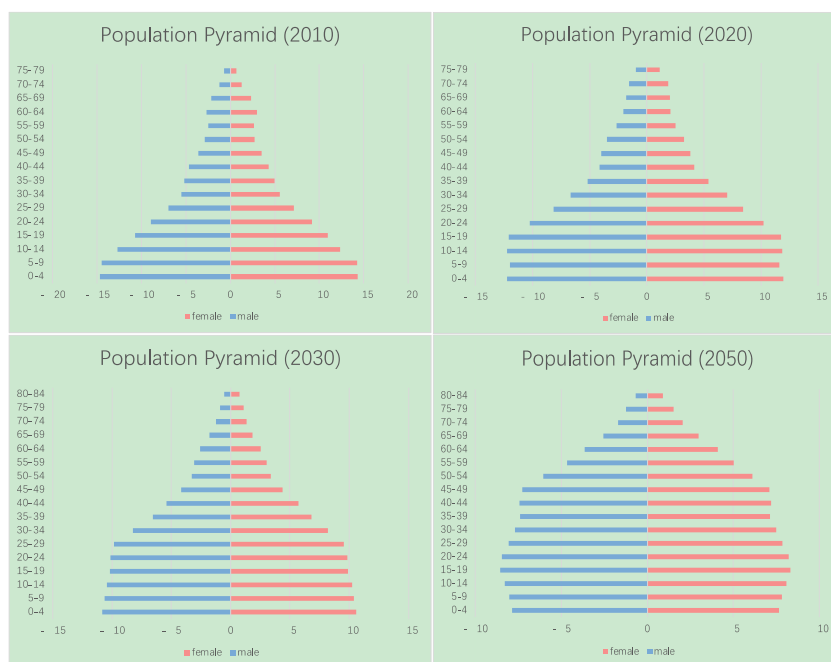


Source: The World Bank 2021. World Development Indicators, as accessed Jan. 2023

² The World Bank 2021. World Development Indicators, as accessed Aug. 2022.

³ We look at representative countries with the closest GNI per capita level to Timor-Leste in the UN's LDC list from different regions.

Figure 11: Population Pyramids by Age and Sex, % of respective sex

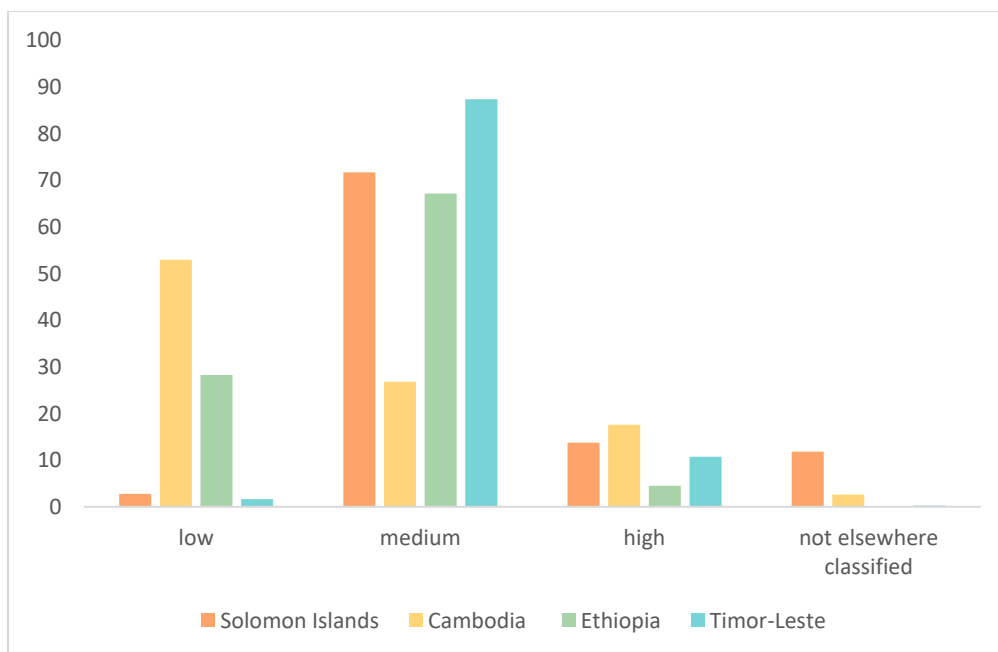


Source: United Nations. World Population Prospects 2022.

The nation also has a medium level of skills (see Figure 12). In 2013, only 10.72 % of the working-age population are high-skilled workers, which is a

typical level for an LDC country (17.57 % in Cambodia, 13.73 % in Solomon Islands, 4.51 % in Ethiopia) ⁴.

Figure 12: Comparison of Working-Age Population by Skill Level, % of total working-age population, 2013



Source: ILOSTAT 2022.

⁴ We look at representative countries with the closest GNI per capita level to Timor-Leste in the UN's LDC list from different regions.

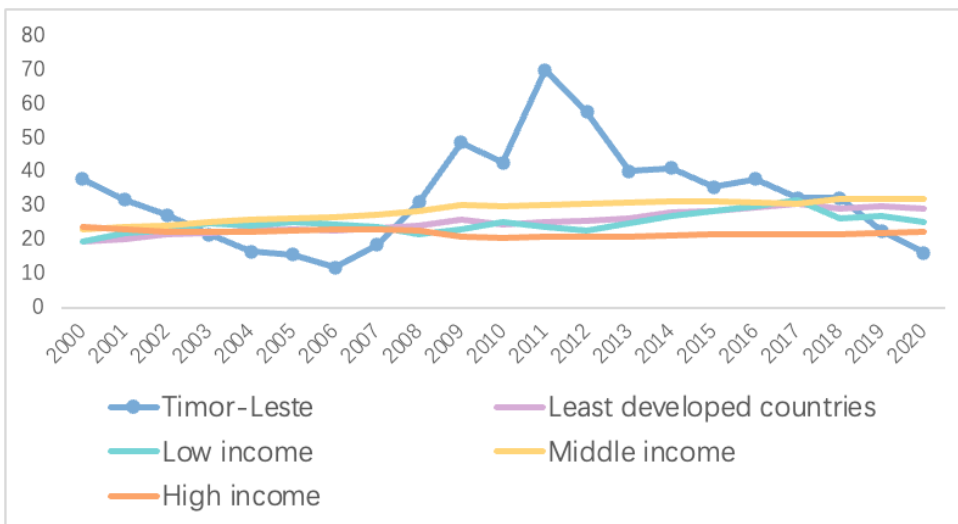
3.2 Factor Endowment – Capital

Fixed capital formation has been exceptionally high from 2007 to 2018. The proportion to GDP is even higher than that of the middle-income countries' average, which is usually the income-level group with the highest capital investment (see Figure 13). The high government expenditure started in 2007, when rebuilding was rendered necessary by the 2006 civil unrest. In 2011, the government set up the Infrastructure Fund, and placed a large budget

on infrastructures such as electricity, transportation, health, and education (Ministry of Finance, 2011). However, the high expenditure proves unsustainable. The percentage quickly fell in 2013, and is currently below the LDC average.

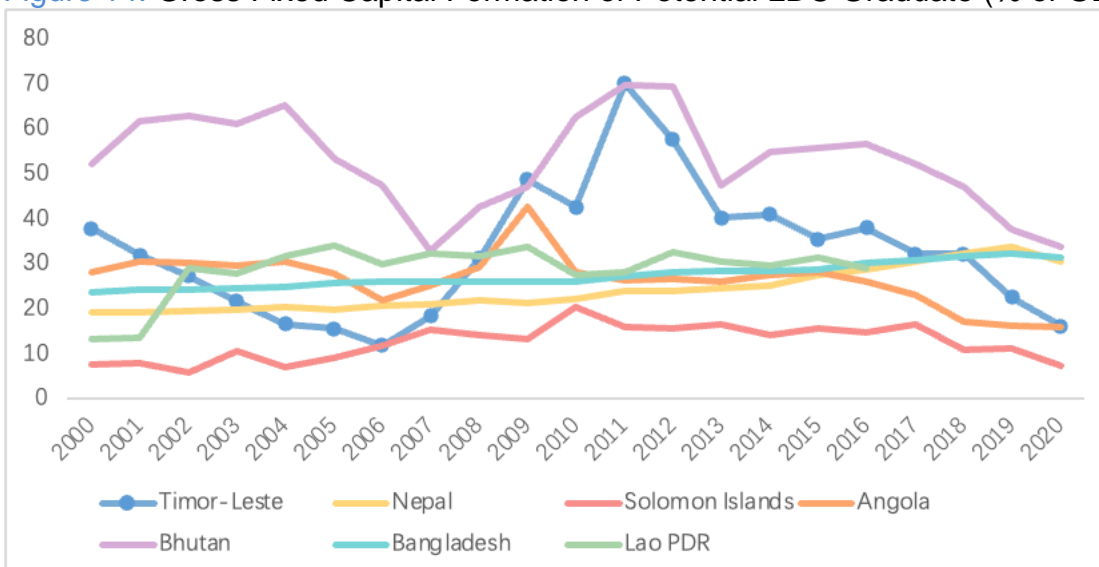
Timor-Leste's capital formation is also much higher and much less stable than most of the other potential LDC graduates, only second to Bhutan, another economy heavily driven by public expenditure (see Figure 14).

Figure 13: Gross Fixed Capital Formation of Timor-Leste Compared with Income Level Average, % of GDP



Source: The World Bank 2021. World Development Indicators, as accessed Aug. 2022.

Figure 14: Gross Fixed Capital Formation of Potential LDC Graduate (% of GDP)



Source: The World Bank 2021. World Development Indicators, as accessed Aug. 2022.

3.3 Factor Endowment – Natural Resources

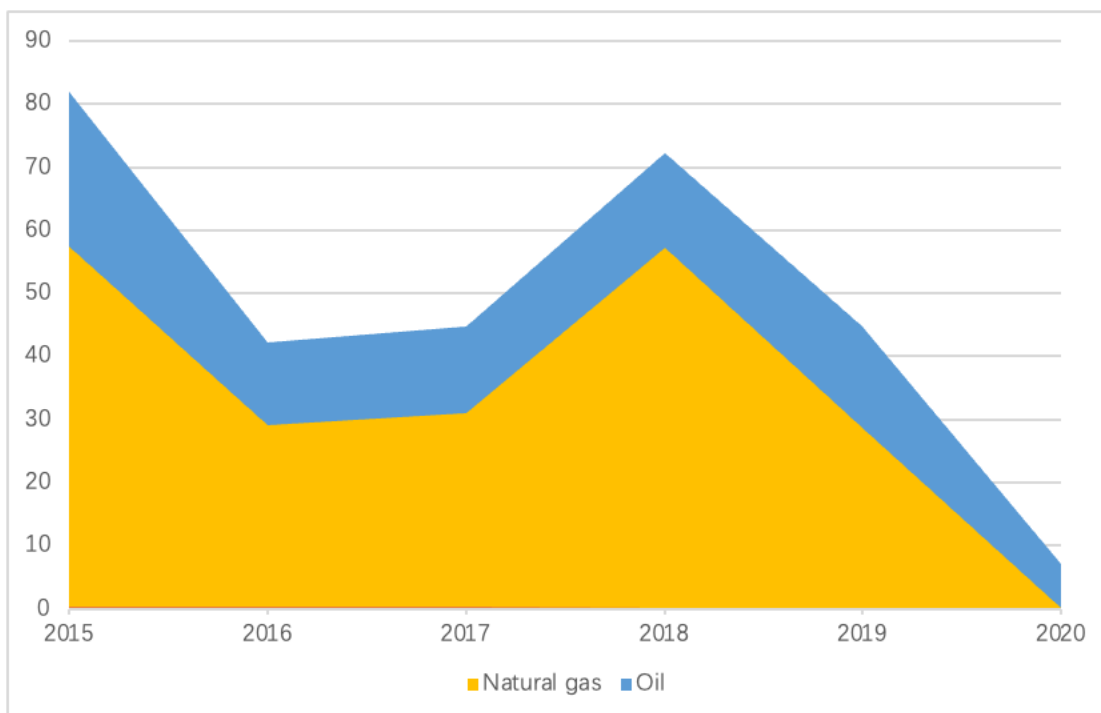
The nation’s output is highly reliant on the exploitation of natural gas and offshore oil resources (see Figure 15). However, revenues from Bayu-Undan field are already experiencing declines - although recent successful infill drilling is expected to provide additional revenue and extend the field’s production life a few more years (Lopes, 2021). As of January 2021, the value of the Petroleum Fund will be about US\$ 18.3 Billion (Ministry of Finance, 2021). Under the country’s current budget, the Petroleum Fund is expected to run out by 2034 (Ministry of Finance, 2021).

Currently, the public-expenditure-driven economy is still largely reliant on withdrawals from the Petroleum Fund. In 2021, 72.7% of the public expenditure budget is composed of withdrawal fund (including estimated sustainable withdrawal

and excess withdrawal)⁵. The government has been withdrawing beyond the estimated sustainable rate annually over the last decade, in the hope of improving infrastructure. In 2021, the government exceeded the estimated sustainable withdrawal by 151.4%, more than two-fold of the sustainable rate⁶. For the economy to establish a manufacturing base before the Petroleum Fund runs out, it is important to identify specific target sectors, and efficiently allocate funds for infrastructure in support of these sectors in line with Timor-Leste’s latent comparative advantages.

Timor-Leste is also rich in resources including arable land, forests, and water. Most of the country’s rivers are short and flow rapidly, with great potential for hydropower plants. However, while areas such as Guariui, Iralalara, Gleno, Belulic, and Lacto have long been identified to be ideal locations for hydropower plants, the latter three areas are left untapped.

Figure 15: Natural Resources Rent by Type (% of GDP)



Source: The World Bank 2021. World Development Indicators, as accessed Aug. 2022.

⁵ Source: Ministry of Finance, Timor-Leste.

⁶ Source: Ministry of Finance, Timor-Leste.

4. Benchmark and Transfer Country: Who Should Timor-Leste Learn From?

We identify the benchmark countries of Timor-Leste using 3 criteria:

- It has a GDP per capita that is about 100%-300% higher than that of Timor-Leste, or has a similar per capita GDP 20 years ago to Timor-Leste's current GDP per capita.
- It enjoys a high GDP growth in recent years (an average 20-year growth rate of over 5% from 2000 to 2020)
- It has a higher proportion of manufacturing value added than Timor-Leste (over 1.74% of GDP)

The preliminary list includes Armenia, Azerbaijan, Bhutan, China, Kazakhstan, and Vietnam. While the average GDP growth of Indonesia is slightly below our threshold of 5%, we include it in the preliminary list due to the geographically and politically close relationship between the two nations. Timor-Leste is currently in discussion with Indonesia to set up an export processing zone that will bring in investors from Indonesia. The incentive for Indonesia is Timor-Leste's favorable position as an LDC and its preferential access to markets such as the EU and less stringent rules of origin requirements.

Table 1: Economic Indicators in Timor-Leste and Benchmark Countries

Country	Ratio of GDP per capita (PPP) (2021) to Timor-Leste (2021)	Ratio of GDP per capita (PPP) (2000) to Timor-Leste (2021)	20-year average GDP growth (%)	Manufacturing Value-Added (2021, % of GDP)
Timor-Leste	1	0.28	4.72	1.74
Armenia	3.20	0.43	5.66	11.34
Azerbaijan	3.69	0.45	7.57	6.82
Bhutan	2.06	0.58	6.30	5.95
Kazakhstan	6.89	0.84	5.84	13.33
China	4.38	0.66	8.69	27.44
Vietnam	2.62	0.57	6.41	16.70
Indonesia	2.92	1.41	4.90	19.25

Sources: The World Bank 2022. World Development Indicators, as accessed Aug. 2022.

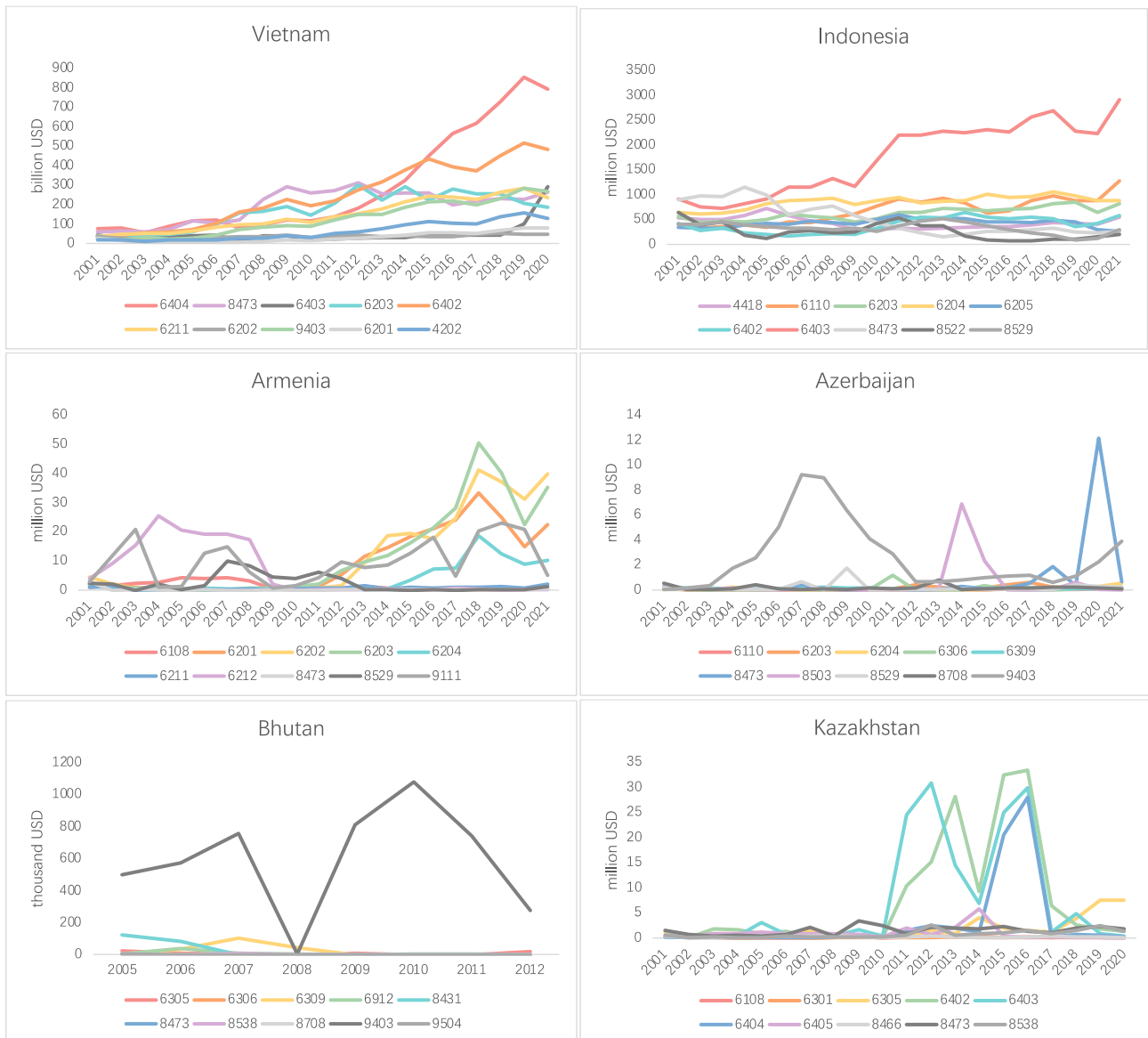
It has already been established that China is losing its comparative advantage in certain light manufacturing sectors (Lin and Xu, 2016; Xu and Hager, 2017). We also look at whether light manufacturing sectors in the other potential benchmark countries are losing their comparative advantage. Tracking over time the top 10 exports in the light manufacturing sector in 2001 (2005 for

Bhutan) of each country (including footwear, parts and accessories, suits, coats, etc.) shows that they are either remaining strong and growing, as in Vietnam, Armenia and Indonesia, or never contribute stably to high volumes export, as in the case of Azerbaijan, Kazakhstan and Bhutan (see Figure 16).

This shows that they are not yet at a turning point of outsourcing its manufacturing industry. Take Vietnam as an example, in 2021, processing and manufacturing is still the top sector that attracts foreign direct investment, with total investment capital of over 18.1 billion USD, accounting for

58.2% of total registered investment capital⁷. Therefore, light manufacturing in Vietnam is not yet losing its comparative advantage, and there may be little incentive for Vietnam to outsource to Timor-Leste.

Figure 16: Export of Top 10 Light Manufacturing Sectors in 2001



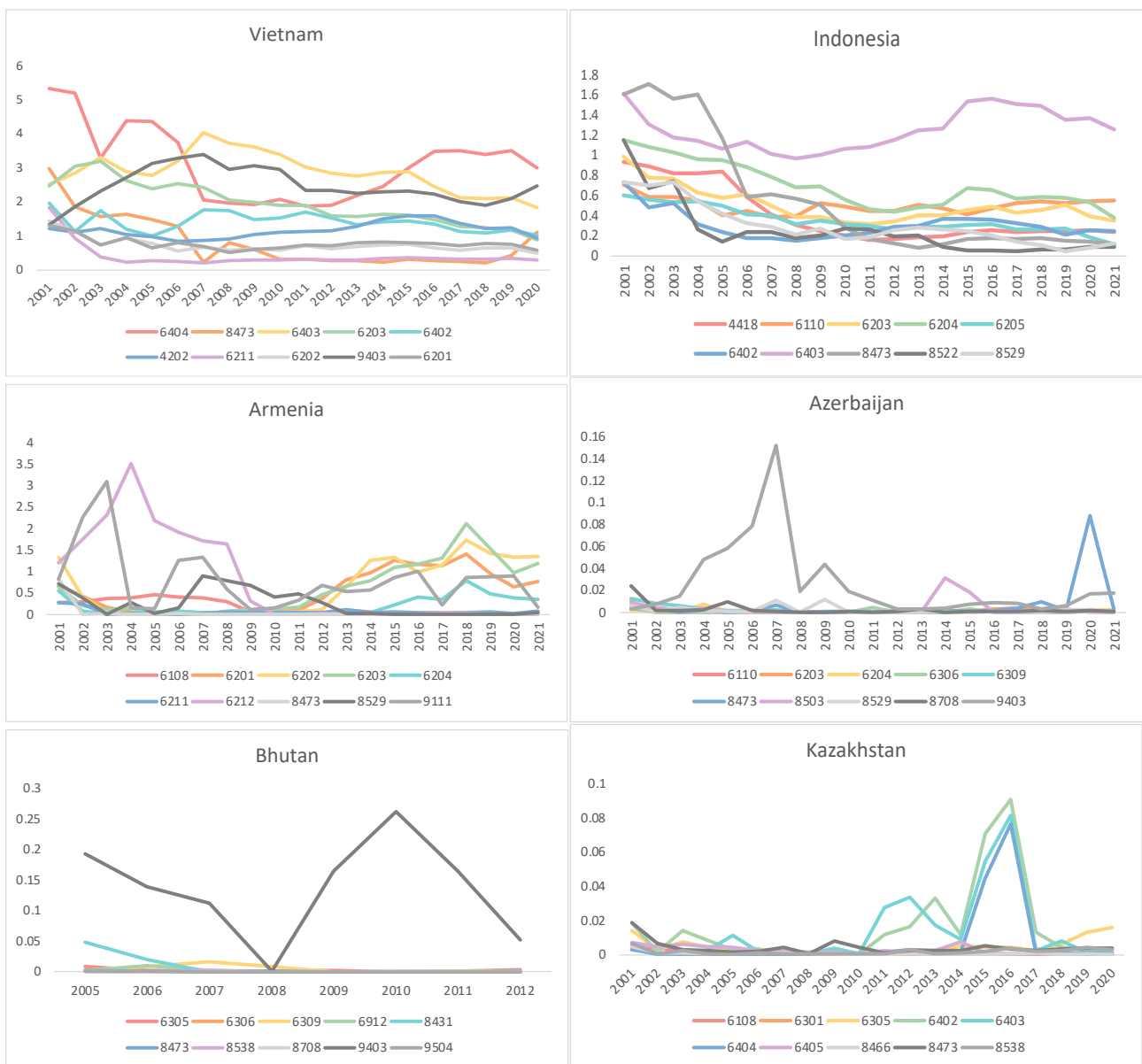
Source: UN Comtrade

⁷ Ministry of Planning and Investment, Vietnam, available from <https://www.mpi.gov.vn/en/Pages/tinbai.aspx?idTin=52660>.

Changes in light manufacturing export share shows a more mixed picture (see Figure 17). For Armenia, Azerbaijan, Bhutan, and Kazakhstan, it is still clear that their industrial bases are not strong enough to sustain a constant high export share. For Vietnam, 6403 (Footwear, With Outer Soles And Uppers Of Leather) and 6203 (Men's Or Boy's Suits, Not Knitted Or Crocheted) are experiencing declines in export share. However,

closely related industries such as 6201, 6202, 6402, 6404 remain steady, and are even rebounding in recent years, indicating that it has not yet lost its comparative advantage in light manufacturing. For Indonesia, most industries are indeed undergoing declines in export shares except 6403 (Footwear with uppers of leather). We further look at its wage level to determine whether it is a suitable benchmark country for Timor-Leste.

Figure 17: Export Share of Top 10 Manufacturing Sectors in 2001, % of total export

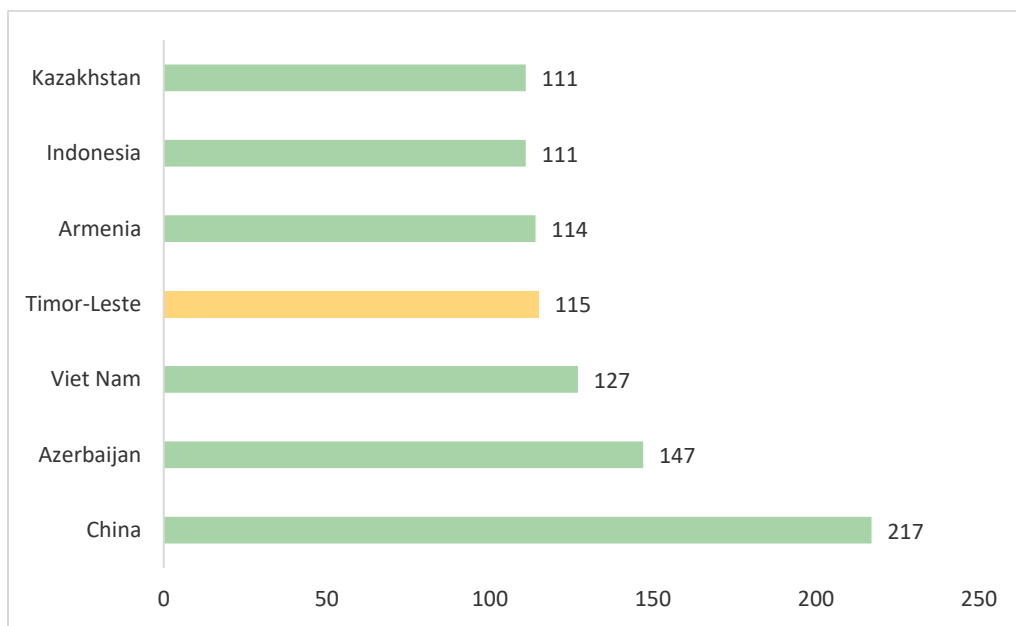


Source: UN Comtrade

The wage level in Timor-Leste is not at particular advantage compared with Kazakhstan, Indonesia, Armenia, and Viet Nam (see Figure 18), so light manufacturing from these countries will not reduce its costs by transferring to Timor-Leste, especially since Timor-Leste has relatively low labor productivity (see Figure 19) and high

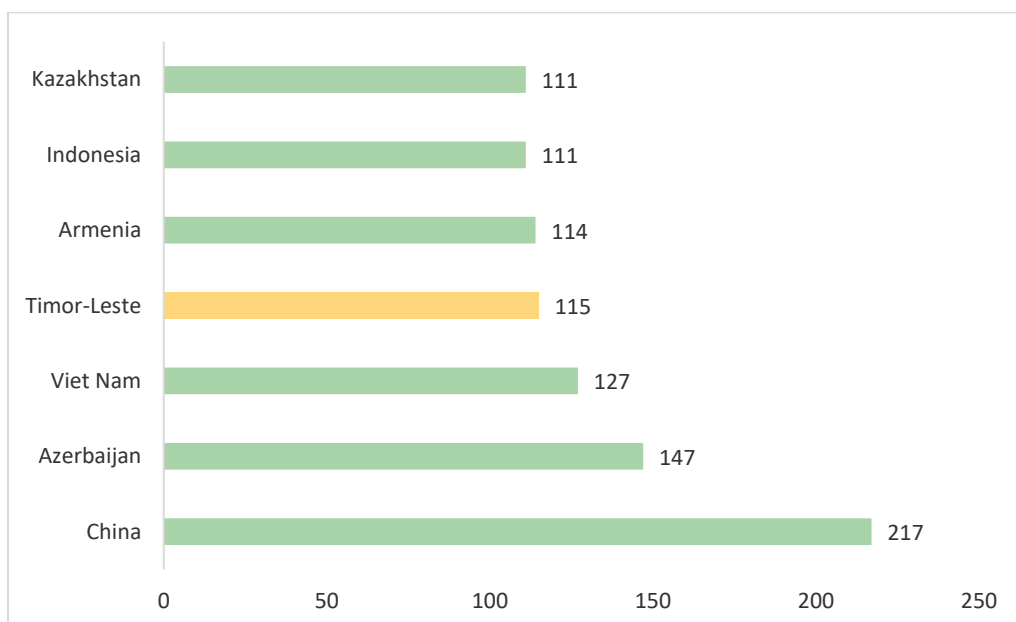
transportation cost (see Figure 2) to many regions, compared with these benchmark countries. Combined with the declining trends in export share of light manufacturing sectors and rising labor costs, China may serve as the suitable benchmark country for Timor-Leste in light manufacturing.

Figure 18: Minimum Wage Comparison, Nominal US\$, 2019



Sources: International Labor Organization. *Global Wage Report 2020-21*.

Figure 19: Labor Productivity, GDP per hour worked (GDP constant 2017 international \$ at PPP), 2021



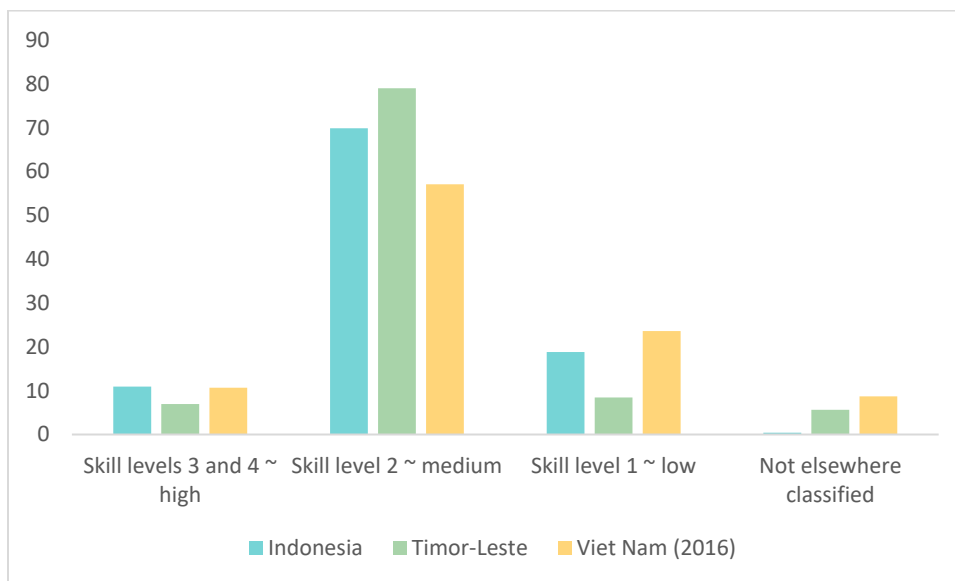
Sources: International Labor Organization. *Statistics on Labor Productivity*.

We also measure whether the labor in Timor-Leste is equipped with sufficient skills for the transfer of industry. As China's data is not available, we compare Timor-Leste (2013) with Vietnam (2016) and Indonesia (2013). Overall, Timor-Leste is equipped with enough skilled labor in order to develop the industry that is historically prevalent in Vietnam and Indonesia (see Figure 20).

Apart from labor-intensive industries, we also look for successful economies that sustainably exploit its

natural resources. Just like Timor-Leste, Vietnam is endowed with rich oil resources. Besides, due to geographical advantages, hydropower has historically been one of the major sources of electricity for Vietnam, contributing to 48%⁸ of its total electricity generation. As has been discussed in Section 3.3, Timor-Leste is also endowed with untapped hydropower resources. The well-developed hydropower system can be a valuable model for Timor-Leste.

Figure 20: Skill Level Comparison, percentage of total working-age population



Source: ILOSTAT 2022.

⁸ International Hydropower Association 2022. Vietnam. As accessed Aug 20, available at <https://www.hydropower.org/country-profiles/vietnam>.

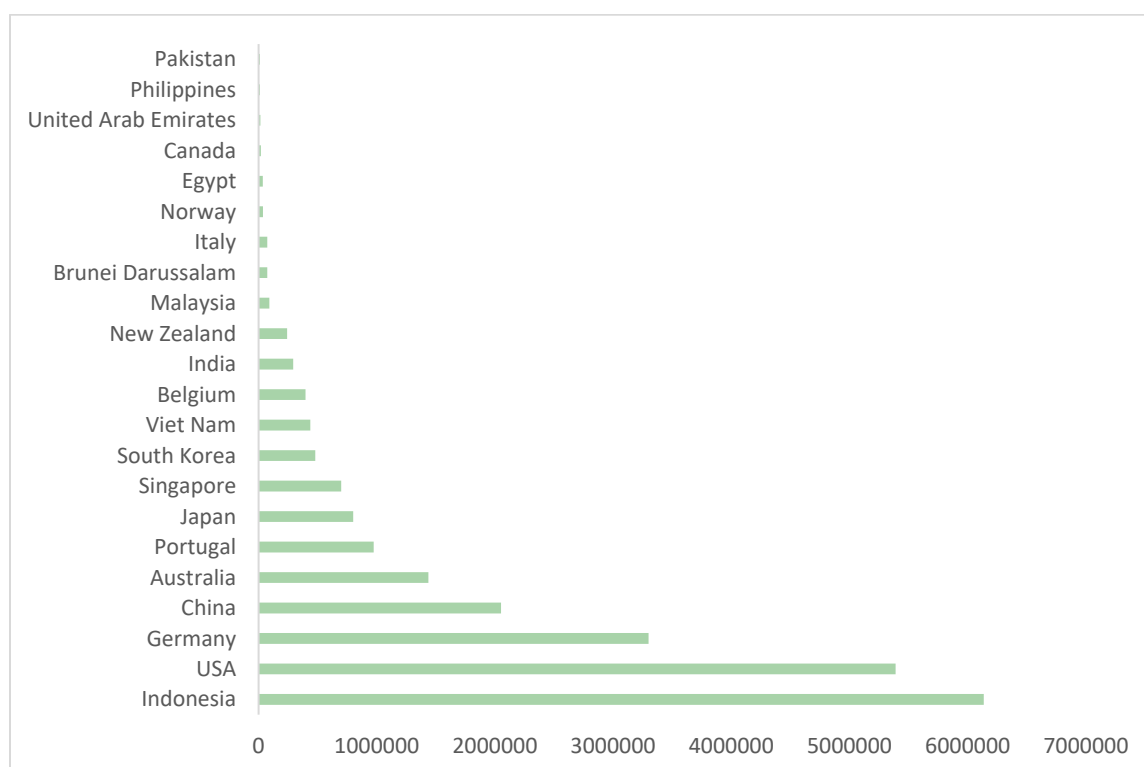
5. Latent Comparative Advantages: What Should Timor-Leste Produce?

We look at the average export percentage data from China. From the 26 industries that have appeared as the top-10 exporter from 2001 to 2021, we have identified 12 decliners whose shares of export are starting to exhibit a declining trend. These include 8 light manufacturing industries such as suits, jerseys, trunks, footwear, and parts and accessories for machines, and 4 technology-based industries (transmission apparatus, monitors, televisions). We then apply a series of pre-screening criteria to the 12 decliners to identify the

Latent Comparative Advantage of Timor-Leste.

Firstly, we measure the potential of the 12 industries. This is mainly measured by market demand. As an SIDS, Timor-Leste is heavily dependent on international trade, with trade accounting for 162.96% of GDP in 2020⁹. Therefore, we take into consideration domestic market demand, as well as the demand of its top 5 importers: Indonesia, the USA, Germany, China, and Australia (see Figure 21).

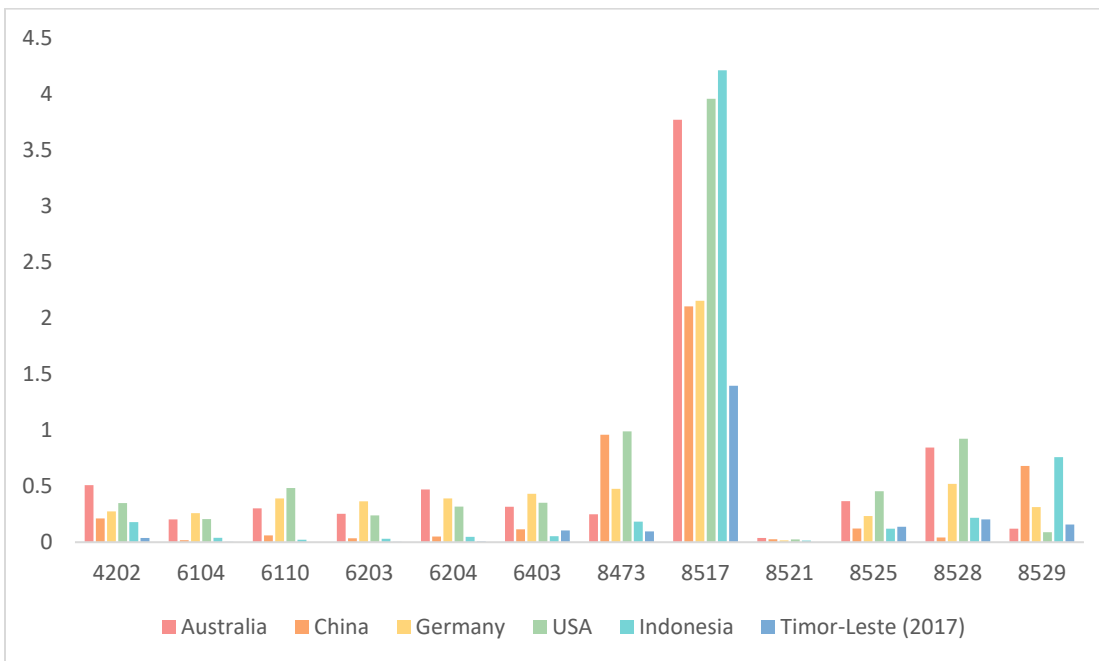
Figure 21: Import Value of Timor-Leste’s Top Importers, 2017 (latest year)



Sources: United Nations. 2022. UN Comtrade Database, as accessed Aug, 2022.

⁹ The World Bank 2021. World Development Indicators, as accessed Aug. 2022.

Figure 22: Import Share of Decliners in Domestic Market and Top Trade Partner, % of total import, 2020

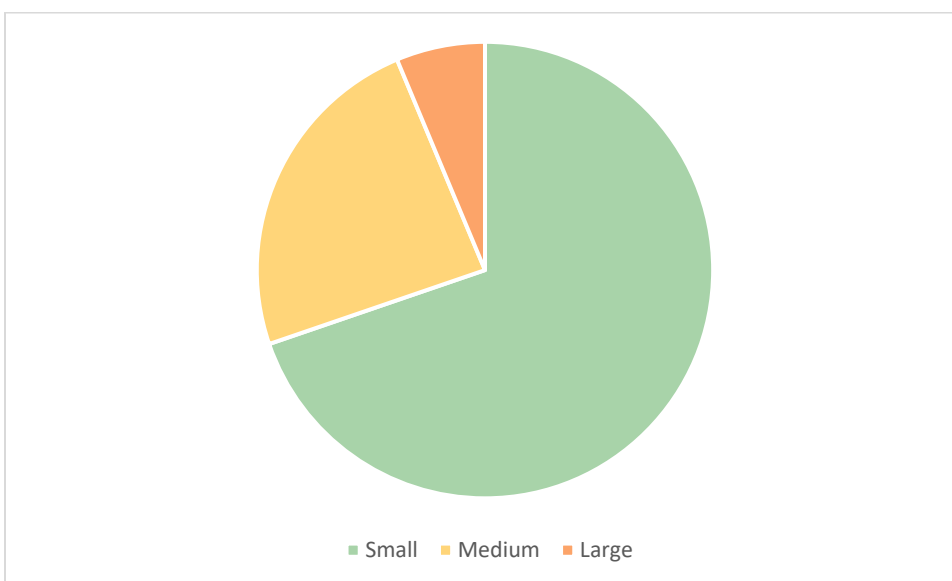


Sources: United Nations. 2022. UN Comtrade Database, as accessed Aug, 2022.

The result indicates that all commodities except for video recording or reproducing apparatus (HS code 8521) have sufficient demand for further development (see Figure 22). In particular, telephone sets (HS code 8517) face especially high demand both domestically and abroad. Some light

manufacturing commodities (footwear 6403, jerseys 6110, trunks 4202, and toys 9503, parts and accessories 8473, 8529) have high demand in the USA, Australia, and Germany, but relatively low demand domestically and in China and Indonesia.

Figure 23: Size of Enterprises, 2021



Sources: World Bank. Timor-Leste Enterprise Surveys (2021).

Secondly, we discuss the feasibility of these industries. As 94.70% of firms in Timor-Leste are small- and medium-sized enterprises (SMEs) (see Figure 23), the economy’s supporting arrangement (such as its financial system) is more well-adapted to the development of SMEs. We therefore check whether the decliner product has been produced by small SMEs in China. We also check whether the industry is capital-intensive, which is not suitable for Timor-Leste as it is more abundant in labor

Next, we look at whether any specific factor endowment or skills is required in the production of a certain commodity that are not available to

Timor-Leste. Finally, as Timor-Leste is an island nation, most cargoes are transported via the sea, which is slower than land transportation. Besides, border compliance and documentary compliance in Timor-Leste takes approximately 129 hours (over 5 days), among which port or border handling takes 90 hours. This is longer than an average East Asia and Pacific country, which takes 113.1 hours¹⁰. We therefore consider whether the transportation difficulty will significantly impact how Timor-Leste develops its industry. However, it is worth noting that due to geographical vicinity, cargoes can be transported to Australia and Indonesia in a short amount of time.

Table 2: Screening Result of Potential Products in line with Latent Comparative Advantages (LCAs)

4-digit HS code	Commodity	Criteria 1: sufficient market demand	Criteria 2: low capital intensity and produced by SMEs	Criteria 3: factor endowment and skills	Criteria 4: impact of transportation difficulty
8473	Parts and accessories for use with machines of heading 84.69 to 84.72	High demand both domestically and abroad, especially in the United States, China, and Germany.	While the production is more and more automated, some exquisite parts such as the polishing of optical readers are still largely produced manually.	While the process is exquisite, the skill is transferrable after training. Raw materials can be imported.	Neutral, as it's not time-sensitive.
6403	Footwear with outer soles of rubber, plastics, leather or composition leather and uppers of leather.	Large domestic market demand and high demand in Germany, the USA, and Australia.	Yes.	Yes.	Neutral, if these clothes are relatively less time-sensitive.

¹⁰ World Bank. 2022. Doing Business Archive, as accessed Dec, 2022.

6203	Suits, ensembles, jackets, blazers, trousers, bib and brace overalls, breeches and shorts (other than swimwear); men's or boys' (not knitted or crocheted)	Small domestic demand and medium international demand in Germany, Australia, and the USA. Lower demand than its alternative, 6204.	Yes.	Yes.	Neutral, if these clothes are relatively less time-sensitive.
8517	Telephone sets, including telephones for cellular networks or for other wireless networks; other apparatus for the transmission or reception of voice, images or other data, including apparatus for communication in a wired or wireless network	High demand both domestically and abroad, especially in the United States, Indonesia, and Australia.	No.	No.	Neutral, the item is usually not time-sensitive.
4202	Trunks; suit, camera, jewellery, cutlery cases; travel, tool, similar bags; wholly or mainly covered by leather, composition leather, plastic sheeting, textile materials, vulcanised fibre, paperboard	Medium domestic demand and large international demand in Germany, Australia, and the USA.	In some cases.	Yes.	Negative for bulky items like trunks. Neutral for smaller bags.
6204	Suits, ensembles, jackets, dresses, skirts, divided skirts, trousers, bib and brace overalls, breeches and shorts (other than swimwear); women's or girls' (not knitted or crocheted)	Small domestic demand but high demand in Australia, Germany and the USA.	Yes.	Yes.	Neutral, if these clothes are relatively less time-sensitive.
6110	Jerseys, pullovers, cardigans, waistcoats and similar articles; knitted or crocheted	Small domestic demand but high demand in Australia, Germany and the USA.	Yes.	Yes.	Neutral, if these clothes are relatively less time-sensitive.

8521	Video recording or reproducing apparatus, whether or not incorporating a video tuner.	Low demand both domestically and abroad.	No.	No.	Neutral, the item is usually not time-sensitive.
8525	Transmission apparatus for radio broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras, digital cameras and video camera recorders	High demand both domestically and abroad, especially in the United States, Germany, and Australia.	In some cases.	Yes. Export already exists in Timor-Leste.	Neutral, the item is usually not time-sensitive.
6104	Suits, ensembles, jackets, dresses, skirts, divided skirts, trousers, bib and brace overalls, breeches and shorts (not swimwear), women's or girls', knitted or crocheted	Small domestic demand and medium international demand in Germany, Australia, and the USA. Lower demand than its alternative, 6204.	Yes.	Yes.	Neutral, if these clothes are relatively less time-sensitive.
8528	Monitors and projectors, not incorporating television reception apparatus; reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus.	Medium domestic demand and large international demand in Germany, Australia, and the USA.	No.	No.	Neutral, the item is usually not time-sensitive.
8529	Parts suitable for use with the apparatus of headings 85.25 to 85.28.	Medium domestic demand and large international demand in Germany, Australia, and the USA.	Yes.	Yes.	Neutral, the item is usually not time-sensitive.

To briefly conclude this section, the recommended subsectors for Timor-Leste include light manufacturing of clothing items such as

suits, footwear, and jerseys. Due to the long transportation time on average, manufacturing unfashionable clothing is more suitable. However,

as transportation between Timor-Leste and Australia is favorably fast, it also has an advantage in exporting to Australia fashionable suits and bags, which are two commodities that have especially high import demand there. Scalability is also an important factor that determines the more detailed products to be produced within the identified industries. Instead of aiming at the same scale of Chinese manufacturers, Timor-Leste can target small volume demands with fast turn-around that are likely to be rejected by large producers like China, as they tend to require a minimum volume for sales. These small-volume orders are usually accompanied with customizing requirements, often seen in products such as sportswear, suits and workwear. Fostering domestic firms' capability in Just-in-Time (JIT) production can help gaining an advantage in

exporting to nearby high-income economies such as New Zealand and Australia. Timor-Leste can refer to the successful example of Fiji for reference (Xu and Guo, 2023).

Apart from the Latent Comparative Advantage, we also look at whether certain Revealed Comparative Advantages (RCAs) have emerged through self-discovery. By 2021, 41 3-digit HS code sectors exhibit RCA in Timor-Leste. Among these, 6 products belong to the category of miscellaneous manufactured articles¹¹, such as photographic equipment, optical equipment, and office equipment. As has been discussed above, telephone sets face high demand at home and abroad, and share a similar production process with these industries. Therefore, it is advisable to tap further into this industry.

¹¹ United Nations. 2022. UN Comtrade Database, as accessed Dec, 2022.

6. Policy Recommendation: How to Remove Key Constraints?

6.1 Discovering Timor-Leste's Niche

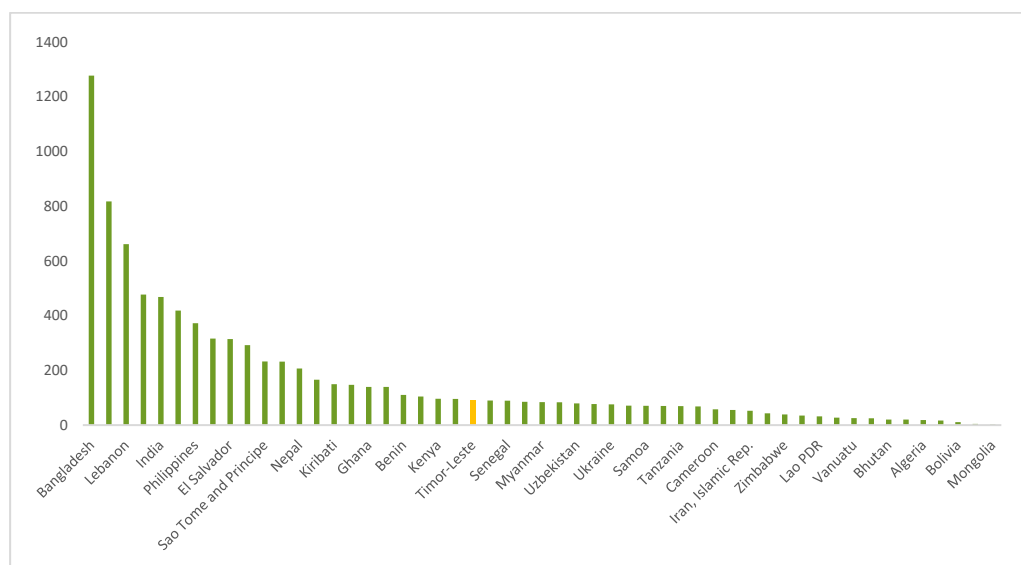
While Timor-Leste has a latent comparative advantage in light manufacturing in terms of its factor endowment, several factors in play have hindered Timor-Leste from turning its latent comparative advantages into actual advantages.

First, not only are its nominal wages relatively high compared with its potential benchmark countries (see Figure 20), its population density is also not

advantageous compared with its competitors with similar income level that hope to attract the industrial transfer of China (see Figure 24).

However, there are lower-middle-income countries with population density similar to or lower than Timor-Leste that has achieved an MVA of over 15% and a 20-year average GDP growth of over 5% (see Table 3), indicating that there is a possibility of removing this key constraint.

Figure 24: Population Density Comparison of Lower-Middle Income Countries, 2021



Source: The World Bank 2021. World Development Indicators, as accessed Sep. 2022.

Table 3: Economic Indicators in Timor-Leste and Industrialized Lower-Middle-Income Countries

Country	MVA (% of GDP, 2020)	Population Density (people per sq. km of land area, 2020)	20-year average GDP growth (%)
Timor-Leste	1.74	90.37	4.72
Cambodia	17.86	96.00	7.03
Myanmar	24.76 (2016)	83.96	9.34
Tajikistan	15.63	70.25	6.84
Uzbekistan	19.64	79.25	5.92

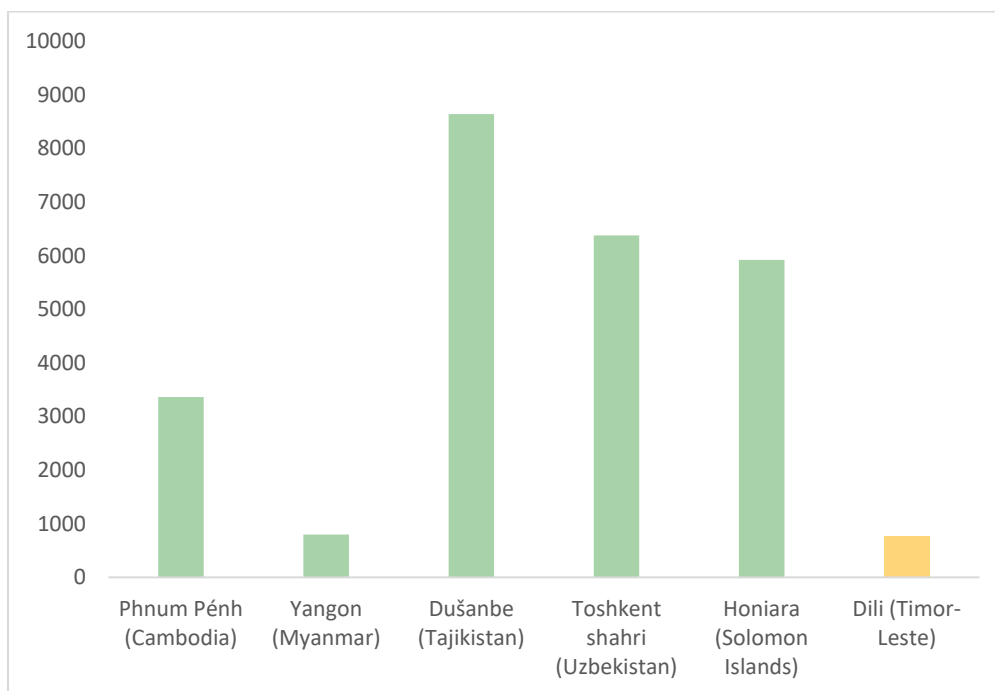
Source: The World Bank 2021. World Development Indicators, as accessed Sep. 2022.

A closer look at these successful countries indicates that most firms that have emerged in the industrialization phase are spatially distributed in areas with dense populations, and cities that are more densely populated tend to host a larger number of medium or large firms, whereas less densely populated cities have more micro firms (Chhair and Ung, 2013). Besides, while the average population density is low, the population density in major cities that have highly developed manufacturing sector is much higher. The population density of Dili, the largest city of Timor-Leste, is similar to that of Yangon in Myanmar, which means that it already has the potential of becoming a national manufacturing hub. However, comparisons with the other cities indicate that it is reasonable for Dili to expand its capacities even further (see Figure 25).

As the only district in Timor-Leste with a population density of over 200 people per squared

kilometer of land area, and where the only international airport (Presidente Nicolau Lobato International Airport) and the only international port (Port of Dili before Sep, 2022, and Tibar Bay Port from then on) are based, it is the most suitable breeding bed for the initial development of labor-intensive manufacturing. A major constraint holding back the agglomeration of Dili is the lack of job opportunities. Internal migrants from other Timor-Leste cities to Dili represent 37.3% of Dili's total population (National Statistics Directorate 2016), and 14% of the migrants engaged in the labor force are unemployed (National Statistics Directorate 2012). Therefore, if Timor-Leste sets up Dili as a new manufacturing center, and a possible special economic zone, with special emphasis on labor-intensive light manufacturing, it will be able to absorb more migrations. Urban and industrial infrastructure should be in place to support such an arrangement.

Figure 25: Population Density Comparison of Major Cities in Lower-Middle Income Countries, 2021



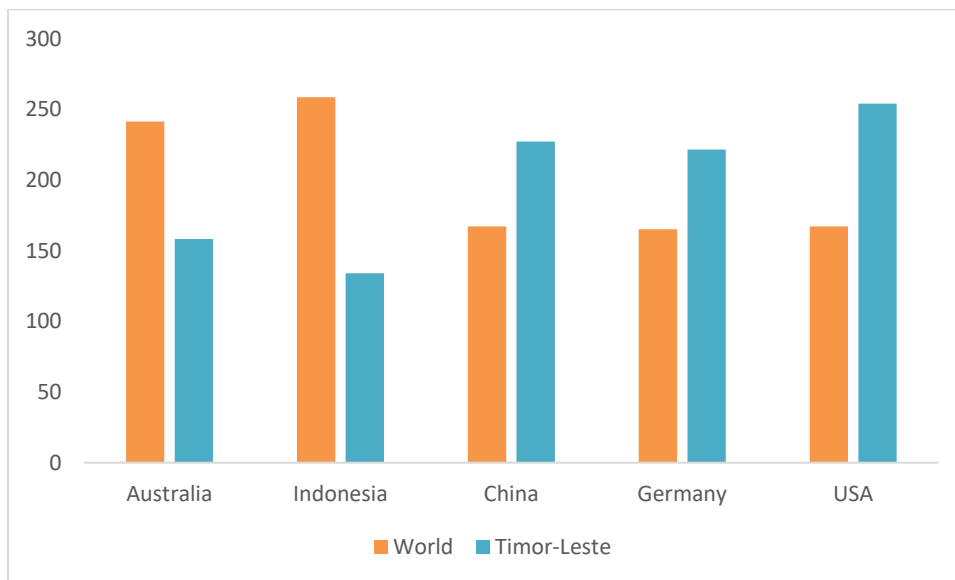
Source: National Directorate of Statistics Timor-Leste; Myanmar Central Statistical Organization; State Committee of Uzbekistan on Statistics; State Statistical Committee of the Republic of Tajikistan; National Institute of Statistics of Cambodia. Solomon Islands National Statistical Office.

Meanwhile, as the other districts in Timor-Leste have lower population densities, they are more suitable to host micro firms (Chhair and Ung, 2013). Therefore, a nationwide policy encouraging Micro-, Small, and Medium-sized Enterprises (MSMEs) can be helpful to encourage the emergence of small textile workshops in those areas.

Apart from a low level of agglomeration, high transportation cost is another factor that hinders Timor-Leste’s industrialization. The

transportation cost from Timor-Leste is generally higher than the world average (see Figure 26). However, it is advantageous for Timor-Leste to trade with Australia and Indonesia. Besides, Section 5 indicates that industries where Timor-Leste has latent comparative advantage tend to have higher demand in its developed trade partners, such as the United States and Europe. It is therefore advisable to strengthen the trade agreements with these nations, in order to kickstart domestic light manufacturing sector.

Figure 26: Transportation Cost, 2018



Sources: ESCAP World Bank. *International Trade Costs*.

Currently, Timor-Leste is a beneficiary of the Everything but Arms (EBA) scheme granted by the European Union (EU hereafter) to LDCs, and is therefore eligible for the preferential tariff treatment of the EU. However, with the prospects of eventually graduating from the LDC category, accession to the Interim Economic Partnership Agreement (EPA) between the European Union and Pacific Islands is becoming increasingly important. Its preferential status with the United States and Australia is granted by their respective Generalized System of Preferences (GSP), which provides duty-free tariff treatment to certain products. However, most textile and garment

products are excluded from the U.S. list. Therefore, further bilateral relationship with the U.S. needs to be explored for the facilitation of the light manufacturing sector. Besides, Timor-Leste is currently eligible for Australia’s preferential treatment due to its status as an LDC, which may not sustain upon its potential graduation. Along with Indonesia and Australia, Timor-Leste has also established the Timor-Leste – Indonesia – Australia Growth Triangle in 2012, but the growth triangle currently does not entail a free trade agreement. Timor-Leste has also been attempting to join ASEAN since its establishment. A milestone was reached in 2022 when Timor Leste

was admitted as an ASEAN membership "in principle" and gained observer status in all high-level ASEAN meetings. With Indonesia selected as the Chair of ASEAN 2023, Timor-Leste should take this opportunity to strive for full membership once more, or negotiate with Indonesia to allow expanded preferential treatment of goods. It should also consider lowering export customs with major trade partners and reinforcing the bilateral trade agreement with them, despite the trade-off between lowered state budgets, as it will provide Timor-Leste with the market size necessary for facilitating domestic industries.

In the long run, however, more transportation infrastructure is needed to bring down transportation costs in general, in order to avoid the volatility that is commonly caused by over-reliance on a few nearby nations in SIDSs (UNCTAD, 2022a). In September 2022, Tibar Bay Port began its container operations, taking the place of the Port of Dili with a larger capacity. The aviation industry, however, is more backward. Currently, Presidente Nicolau Lobato International Airport in Dili is the only airport providing international services, which does not house separate cargo handling facilities and only allows for personal carry-ons.

To sum up, three types of expenditure can be helpful in Timor-Leste's industrialization process: industrial parks and related infrastructure, financial incentives for MSMEs, and transportation infrastructure.

6.2 Utilizing Natural Resources

As a resource-rich nation (see Section 3.3), Timor-Leste can leverage its rich natural resources for development. In particular, natural resources can

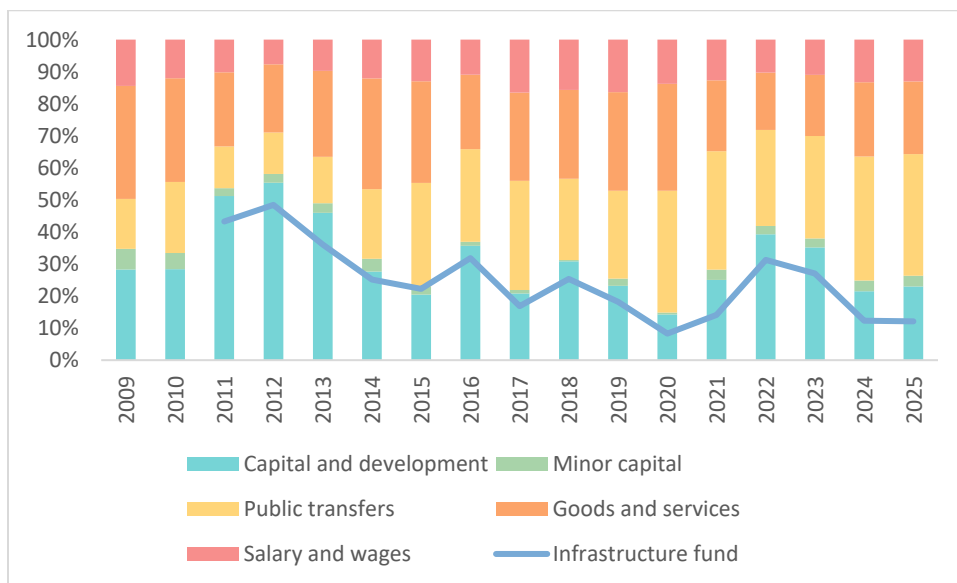
be further explored in two ways.

First, the state-managed Petroleum Fund can be better employed to facilitate industrialization. Currently, a large fraction of the fund is still used for recurrent spendings, such as salary for public-sector employees and public transfers (see Figure 27). An Infrastructure Fund has been set up in 2011, with its current focus on public transportation projects such as ports, airports, bridges and roads, basic living infrastructure such as water and sanitation, public buildings, urban and rural development, electricity, and human capital investment such as youth and sports, health, education, and social solidarity. While it also covers the facilitation of agriculture, financial system, information system, and tourism, the manufacturing sector is not included as a specific target. Therefore, more of the Infrastructure Fund should be directed to the three areas of binding constraints identified in Section 6.1 (industrial parks, and transportation), in order to more effectively facilitate industrialization. While revenue from petroleum can serve as a head start for Timor-Leste, the Petroleum Fund is running low (see Section 3.3). Therefore, the government can be more open to borrowing, owing to its current low level of government debts (see Figure 28).

Second, as has been pointed out in Section 3.3, the country has great potential for renewable energy. However, in 2019, only 8% of the total energy supply comes from renewable energy¹², forming sharp contrast to the nation's envision of a 50% renewable energy supply by 2030. As both Timor-Leste and Vietnam have great potential in hydropower, we take it as an example to demonstrate how renewable energy can be utilized to facilitate growth

¹² IRENA 2022. Energy Profile: Timor-Leste. Available from chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.irena.org/IRENADocuments/Statistical_Profiles/Asia/Timor-Leste_Asia_RE_SP.pdf.

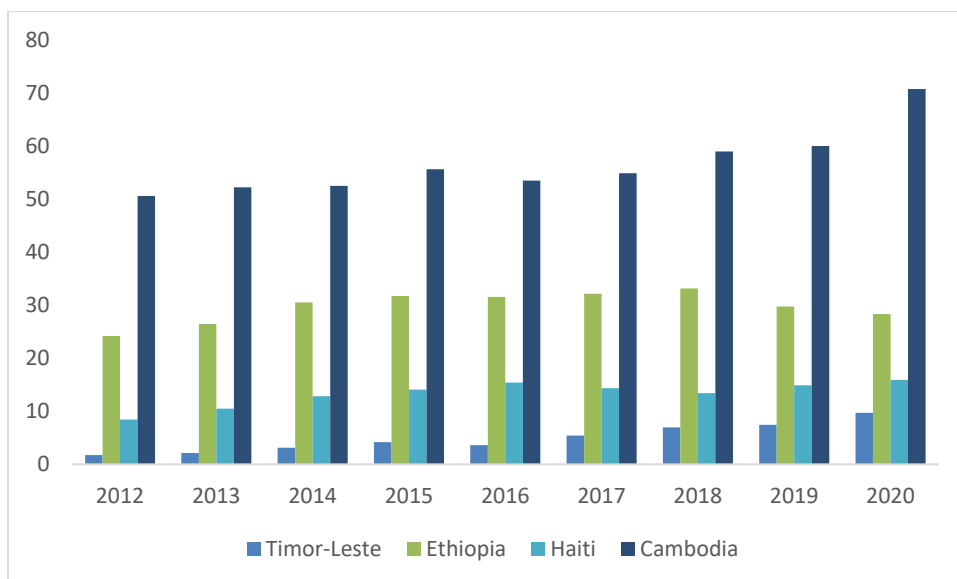
Figure 27: Public Expenditure Budget, % of total budget¹³



Source: Ministry of Finance, Timor-Leste.

Note: The figures are Projected estimates after 2022

Figure 28: External Debt Comparison of Timor-Leste and Competitors¹⁴, 2021



Source: The World Bank 2021. World Development Indicators, as accessed Oct. 2022.

The period from 1986 to 1990 is a turning point in the Vietnamese industrialization path. In 1986, the government launched a comprehensive

reform called Doi Moi (renovation), along with the Third Five-Year Plan (1986-90), which aims at transforming the economy from a central

¹³ According to the definition of the Timor-Leste Ministry of Finance, Minor Capital refers to expenditures on vehicles, furniture and other movable assets; Capital and Development includes funds for infrastructure (in the form of Infrastructure Funds), regional development projects, and COVID-19 Fund; Public Transfers include public grants, social security, and consigned payments; Goods and Services includes financing for RAEOA-ZEESM, special roads, sanitation and flood control projects, and special prevention and mitigation measures related to the COVID-19 pandemic; Salaries and Wages refers to salaries paid to public-sector employees.

¹⁴ We look at representative countries with the closest GDP per capita level to Timor-Leste in the UN's LDC list from different regions.

planning subsidy economy towards a market economy, and where private businesses and foreign-owned enterprises were to be encouraged (Nguyen et al. 2011).

The period kickstarted the high-growth period in Vietnam (see Figure 29), and saw an average annual industry growth rate of 13.7 percent (Nguyen et al. 2011), a pace that was maintained in later years. The revitalized economy means a growing need for energy supply, and it is against this backdrop that some of the major hydropower plants in Vietnam, such as Hoa Binh Hydropower Plant and Tri An Hydropower Plant, were built.

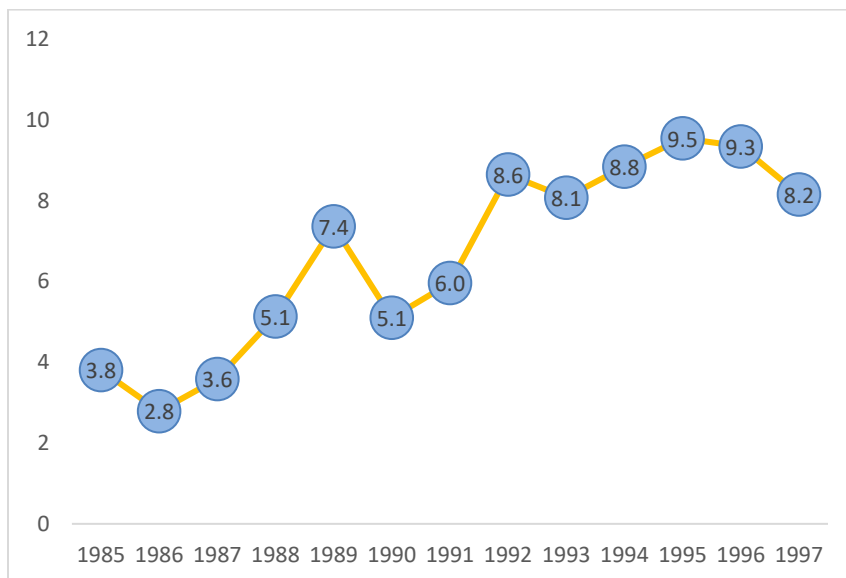
The timeline suggests that the growing need for power due to industrialization, and the transformation to renewable energy can complement each other: while the hydropower plant can supply additional energy from industries when the use of petroleum is restricted, the rising demand can guarantee high revenue for the

hydropower plant, and ensure that investment generates high productivity growth.

A hydropower plant is a large-scale infrastructure project in itself, not to mention the relocation of local residents that may be involved in the construction process. As a small nation, Vietnam actively took advantage of external assistance for the building of hydropower plants. Take the Hoa Binh Hydropower plant as an example, the initial project was funded by the Soviet Union, whereas in 2021, Agence Française de Développement (AFD) signed an agreement for a 70 million euro loan to boost the capacity of the Hoa Binh hydropower plant¹⁵.

Similarly, Timor-Leste can actively resort to external funding sources for investment in hydropower infrastructure, which not only addresses the challenge of raising a large amount of patient capital, but also generates knowledge spillovers.

Figure 29: GDP growth in Vietnam, %



Source: The World Bank 2021. World Development Indicators, as accessed Sep. 2022.

For example, China has been actively promoting green energy investment under BRI. By the first

half of 2020, China's investment in renewable energy in BRI-related countries surpassed

¹⁵ AFD 2021. Available from <https://www.afd.fr/en/actualites/green-energy-vietnam-expanded-hoa-binh-hydropower-plant-will-reduce-co2-emissions?origin=/en/rechercher?query=hoa+binh>.

investment in fossil energy for the first time (Zhou, 2021), rising from 35% in 2017 to 56% in 2020 (Green BRI Center¹⁶, 2020).

China has rich experience in investing in Hydroelectric projects abroad. The China Three Gorge Corporation, for instance, has invested in three hydroelectric power plants in Laos, completed in 2010, 2015, and 2021 respectively. Adopting the Build Own Operate Transfer (BOOT) model, where the BOOT provider designs, builds, funds, owns, and operates the project for a defined period and then transfers this ownership of the project to an agreed party, the risk of the three projects are largely transferred from the host country to the BOOT provider. Recently in 2022, a new Opinion has been issued, encouraging Chinese firms to scale up renewable energy investment and cooperation abroad (National Development and Reform Commission, 2022), which provides a favorable condition for Timor-Leste to cooperate with experienced Chinese corporations to scale up its clean energy infrastructure.

¹⁶ The Green BRI Center is part of the International Institute for Green Finance (IIGF) of the Central University of Finance and Economics (CUFE) in Beijing.

6.3 Taking a Pragmatic Approach to the Opportunity of Digitalization

Digitalization is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business. In the context of the light manufacturing sector, the most relevant part of digitalization is the idea of “smart factories” emerging along with Industry 4.0. This includes interconnected machines and people, information transparency, technical assistance, and decentralized, automated decisions. With the combination of up-to-date data and efficient algorithms, “smart factories” can boost production efficiency and avoid waste.

In this section, we focus on the “smart factories” aspect of digitalization for two reasons: 1) in Section 5, the sectors identified as the LCA’s of Timor-Leste are mostly light-manufacturing sectors; 2) in light of the light manufacturing sector in China and Vietnam, it is the dominant impact of digitalization.

While “smart factories” are no doubt impacting the competitiveness of traditional labor-intensive factories, a study has shown that even in more developed countries, such as Vietnam, when it comes to fabrication, advanced methods for manufacturing related to Industry 4.0 are used by only 6.1% of the firms and robots by 5.9% of the firms. (Cirera et al., 2021). This suggests that traditional manufacturing is still competitive, and that the Latent Comparative Advantage of Timor-Leste is not fundamentally challenged by digitalization.

While the digitalization process is not necessary, it is certainly beneficial to firms’ productivity and the economy’s industrialization (UNIDO, 2020). We therefore look at the specific case of Timor-Leste to determine whether it is ready for some

degree of digitalization in the manufacturing process.

Two important criteria for digitalization-readiness are 1) digitalization opportunities reflected by the development of manufacturing and 2) digitalization skills measured by high-skill employment as a share of the working population (UNCTAD, 2022b).

Realizing digitalization opportunities hinge on the industrial base. As has been discussed in Section 2, the manufacturing sector in Timor-Leste is highly limited (see Figure 4). Without a strong industrial base, the automation potentials related to the production process are small. As a result, automation is unable to fully unleash the increasing return to scale, and will not be profitable. In terms of skills, by 2016 (latest data), only 6.95% of Timor-Leste’s working population are high-skill workers, which is significantly lower than the world average of 23.60% at that time¹⁷. We therefore conclude that Timor-Leste is not yet ready for digitalization in its light manufacturing sector. Instead, it should focus on building a strong industrial foundation, and improving the skills of workers, to equip itself with the necessary prerequisites for digitalization.

¹⁷ ILOSTAT 2022.

7. Conclusion

This report applied the Growth Identification and Facilitation Framework (GIFF) to Timor-Leste, to help identify industries in which it has a latent comparative advantage, and design policies that specifically target these industries. In this way, the countries can kickstart industrialization, and realize long-term structural transformation.

We start by analyzing the country's factor endowment (or what it has). We find that historical capital formation has not been targeted at the manufacturing sector, so it is insufficient to support Timor-Leste in facilitating its heavy industry. As a result, Timor-Leste should focus on developing labor-intensive light manufacturing. It is also rich in natural resources, petroleum in particular, the revenue of which can help to finance public projects that specifically support the light manufacturing sector.

Next, we identify appropriate benchmark countries that can point to the Latent Comparative Advantage of Timor-Leste, and provide opportunities for industrial transfer. Countries selected must have sustained high growth in the past 20 years, and be at a more advanced development stage than Timor-Leste but not too advanced to provide useful benchmarking. In addition, the benchmark countries must have

established a strong industrial base, and are losing their comparative advantages in light manufacturing, thus having potential incentives to reallocate its industries their Timor-Leste. As a result, China may serve as the benchmark country of Timor-Leste.

By looking at the declining industries of China, we determine which industries can be relocated to Timor-Leste, taking into account factors of potential, feasibility, and transportation difficulty. The products most likely to be successful in Timor-Leste are light manufactured goods.

However, the light manufacturing firms are held back by many challenges including sparse population distribution and high transportation costs, and the government is further challenged by the possible straining of the Petroleum Fund. To address these challenges, it is recommended that Timor-Leste shifts its public expenditure focus to building industrial parks that gather workers to labor-intensive production, and to building transportation infrastructure that brings down transportation costs. The country should also actively seek external funding from development agencies and development banks.

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