



UNCTAD PRODUCTIVE CAPACITIES INDEX

Focus on Landlocked Developing Countries



UNITED NATIONS

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Throughout the study, the term “transit country” refers to a country included in the list of transit countries of the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, as follows: Algeria, Angola, Argentina, Brazil, Bangladesh, Benin, Cambodia, Cameroon, Chile, China, Côte d’Ivoire, Democratic Republic of the Congo, Ghana, Guinea, Djibouti, Eritrea, India, Iran (Islamic Republic of), Kenya, Mozambique, Myanmar, Namibia, Nigeria, Pakistan, Peru, Senegal, Somalia, South Africa, Thailand, Togo, Turkey, United Republic of Tanzania, Uruguay, Viet Nam.

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Contents

Acknowledgements	iii
Note	iv
Foreword	vii
Abbreviations	viii
Executive summary	ix
Introduction.....	1
I. Productive capacities: From abstract concept to measurable composite index	7
II. Productive Capacities Index: Measurement and performance.....	13
III. Productive capacities in landlocked developing countries	27
IV. Conclusion and policy recommendations	41
Bibliography	46
Annexes.....	47
Annex 1. Productive Capacity Index global ranks and scores by category, 2018.....	48
Annex 2. Productive Capacities Index country group summary statistics by category	59

List of figures

1. Productive capacities: Three basic elements.....	9
2. Productive Capacities Index: Categories.....	11
3. Global scores map.....	14
4. Correlation with gross domestic product per capita.....	20
5. Developing economy scores by category.....	23
6. Transit country scores by category.....	23
7. Developed economy scores by category.....	24
8. Other developing economy scores by category.....	24
9. Evolution of scores by country group.....	25
10. Correlation with the Merchandise Export Concentration Index.....	29
11. Landlocked developing economy scores by category.....	30
12. Developing economies in East Asia scores by category.....	31
13. Evolution of scores in landlocked developing economies, transit countries and developing economies in East Asia.....	32
14. Landlocked developing economies and developing economies in East Asia scores by category.....	33
15. Evolution of scores in landlocked developing economies by category.....	33
16. Developing economies in East Asia, Botswana and landlocked developing economies scores by category.....	35
17. Evolution of scores in Botswana by category.....	35
18. Developing economies in East Asia, the Lao People's Democratic Republic and landlocked developing economies scores by category.....	37
19. Evolution of scores in the Lao People's Democratic Republic by category.....	37
20. Developing economies in East Asia, Rwanda and landlocked developing economies scores by category.....	39
21. Evolution of scores in Rwanda by category.....	39

List of tables

1. Global ranks and scores, 2018.....	15
2. Summary statistics by category, global.....	21
3. Correlation matrix of categories.....	22
4. Summary statistics by category, landlocked developing economies.....	30



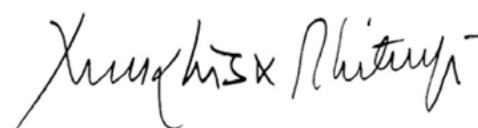
Foreword

Weak productive capacities penalize structurally weak and vulnerable economies, including many landlocked developing countries. This penalty is aggravated by the coronavirus disease pandemic, and the global economic crisis that has accompanied it, wreaking havoc on the production structures, trading relationships and domestic livelihoods of these countries. The deep economic shock is compounding mounting damage from climate change, steep drops in international commodity prices and declining trust in global solidarity, threatening to erase the development gains of the last decades. New pathways for building economic resilience and addressing the root cause of vulnerabilities in these countries are desperately needed.

The Productive Capacities Index is the first comprehensive attempt to measure productive capacities in all economies and construct a multidimensional index that can provide country-specific insights and diagnostics of productive capacity development. The Index draws on decades of extensive research and policy analysis work by UNCTAD, as well as technical support to the most vulnerable countries in developing key aspects of their trade and productive structures. The Index also offers country and region-specific scores to help in understanding the sources of systemic vulnerabilities and the identification of the enablers of economic growth, including progress towards sustainable development in countries and the Sustainable Development Goals.

This study provides an in-depth analysis of the challenges to productive capacity development in landlocked developing countries. It reveals that the average scores of landlocked developing countries lag behind those of developing regions in seven of the eight categories comprising the Index, although landlocked developing countries have scores slightly above the average scores of the least developed countries. The only area in which landlocked developing countries perform better than other developing countries is in terms of their natural capital, which indicates their dependence on the extractive sectors for exports and overall economic growth. As a result, UNCTAD is calling for a new generation of domestic policy strategies that place the fostering of productive capacities at their centre, shifting from current fragmented and project-based interventions towards coherent, economy-wide and programme-based approaches, to remove binding constraints on development. Actions and interventions at the domestic level need to be supported and complemented by new and robust international support measures from development and trade partners.

Developing countries, including the most vulnerable among them, with the support of development partners, need to strive to grow their productive capacities, transforming their economic structures and reversing their continued marginalization in the global economy. The Productive Capacities Index offers indispensable guidance for new policy pathways that can realign incentive structures to revive socioeconomic progress and address persistent vulnerabilities to external shocks, whether economic, health-related or other shocks.



Mukhisa Kituyi
Secretary-General of UNCTAD



Abbreviations

COVID-19	coronavirus disease
GDP	gross domestic product
ICT	information and communications technology



Executive summary

At the fourteenth session of the United Nations Conference on Trade and Development, member States agreed in the Nairobi Maafikiano that UNCTAD should "provide an operational methodology for, and policy guidelines on, mainstreaming productive capacities in national development policies and strategies, including through the development of productive capacity indices, so that productive capacities are placed at the centre of national and international efforts to address the specific needs and challenges of the least developed countries, landlocked developing countries, small island developing States and Africa". The multidimensional Productive Capacities Index, which is comprehensive in both the number of economies evaluated and the range of indicators studied, is a response to this request.

The overall objective in developing the Index was to support the formulation and implementation of holistic, coherent and evidence-based policymaking in developing countries. The Index is designed with the aim of improving the quality of trade and development policies by placing the fostering of productive capacities and structural transformation at their centre. In particular, it assists in the identification of economy-wide gaps and limitations that hinder efforts to foster productive capacities and structural transformation. Therefore, the Index is a valuable tool in identifying key binding constraints on economic development and in realigning policy actions and interventions, as well as incentives, to address such constraints. The Index also serves as a consistent and comprehensive tool for tracking progress towards national and global development targets and goals, including the Sustainable Development Goals.

The results presented provide an assessment of the performance of 193 economies, using 46 indicators across the eight categories of the Index. The study also captures the performance of landlocked developing countries as a group, together with country-specific analyses of performances in selected pilot countries. This provides unique insights into country and group-specific development-related challenges and the interventions needed to address them. With regard to landlocked developing countries, the confluence of geographical, trade-related and development-related challenges are related to weak productive capacities and the lack of structural transformation in their economies. Such structural limitations increase their socioeconomic vulnerabilities to external shocks and undermine their ability to rapidly respond to emergencies such as the coronavirus disease (COVID-19) pandemic.





INTRODUCTION

It is evident that there is no such thing as a one-size-fits-all development path that countries can follow to achieve socioeconomic progress. There are, however, some ingredients that are necessary for the long-term growth and sustainable development of any economy, such as political stability and well-functioning institutions (Acemoglu and Robinson, 2012). Another important ingredient is strong productive capacities, which form the backbone the ability to produce goods and services. There is, therefore, consensus that building productive capacities must be placed at the centre of development policies and strategies (UNCTAD, 2006). Fostering productive capacities and structural transformation has been debated at major international conferences, such as the Fourth United Nations Conference on the Least Developed Countries (Istanbul, Turkey, 2011), the second United Nations Conference on Landlocked Developing Countries (Vienna, 2014) and the fourteenth session of the United Nations Conference on Trade and Development (Nairobi, 2016). Ministerial declarations, as well as the Programme of Action for the Least Developed Countries for the Decade 2011–2020, the Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014–2024 and the Nairobi Azimio and Nairobi Maafikiano, have all underlined that developing productive capacities is key for sustainable development in the least developed countries and landlocked developing countries.

There are three fundamental reasons for the ongoing global discourse on the need to foster productive capacities and structural transformation. First, in structurally weak and vulnerable economies, there has been a lack of substantial impact from the episodes of high economic growth in the early 2000s on job creation, poverty reduction and economy-wide improvement in productivity growth. Second, these economies face continued challenges in fostering industrialization and technological upgrading, which are critical in building productive capacities and accelerating structural transformation. Third, sluggish economic growth means these economies are vulnerable to negative external shocks, whether economic, political or health-related shocks. There is growing recognition of the importance of productive capacities in the development process. Fostering productive capacities is a critical prerequisite

for achieving structural transformation, inclusive economic growth and sustainable development and is essential for building socioeconomic resilience, to withstand the negative consequences of external shocks. Yet there is no simple and uniform universal blueprint that enables developing countries to address persistent and emerging development-related challenges and there is therefore a need to design country-specific development policies and strategies based on national socioeconomic circumstances, resource bases, institutional capabilities and overall local conditions.

The crisis brought about by the COVID-19 pandemic reveals the systemic interconnectedness and interdependence of countries. The pandemic poses fundamental challenges, in particular in structurally weak economies, in coping with its significant and widespread socioeconomic consequences and in launching recovery processes. The crisis also highlights that addressing such global challenges requires coordinated global policy interventions and robust responses. The pandemic is affecting all countries to varying degrees and at different magnitudes and scales and has also provided incontrovertible lessons in terms of both taking swift and collective mitigation action and the need for early warning systems and preparedness planning, to be able to quickly and effectively deal with other such events in the future. More time and rigorous data are required to determine the full scale and scope of the impact. However, emerging trends show that countries with weaker productive capacities and vulnerable economies are more significantly affected. For instance, economies characterized by weak productive capacities face significant challenges in quickly manufacturing and making available the supplies and equipment needed to deal with the spread of the virus. In the absence of domestic productive capacities to quickly manufacture and supply such vital goods, many economies, such as those of the least developed countries, landlocked developing countries and small island developing States, rely heavily on imports. However, importing such supplies during a global pandemic can be difficult, in particular due to the disruption of supply chains, high level of domestic demand in producing and exporting countries, imposition of restrictions or bans on the exports of such items and/or established constraints on foreign currency. This makes the fostering of domestic productive capacities in developing countries more urgent

than ever before, in particular in structurally weak and vulnerable economies.

With regard to the macroeconomic impact, a number of vulnerable economies that depend heavily on the export of raw materials are experiencing declining demand for their exports, decreased flows of remittances and a decline in tourism services. As a consequence, their ability to domestically finance rapid responses to the crisis has weakened. Recent studies provide insights into the short, medium and long-term impacts, including the UNCTAD Investment Trends Monitor issue titled “Impact of the coronavirus outbreak on global foreign direct investment”, the International Monetary Fund report *World Economic Outlook April 2020: The Great Lockdown* and an analysis of impacts in sub-Saharan Africa by the World Bank.¹ Such impacts include, but are not limited to, recessions, disruptions in foreign direct investment flows, production networks and supply chains; decreased global trade flows; increased capital outflows from developing countries; declines in global output and employment; and diminished capacities in developing countries, in particular in Africa, to finance rapid responses to help contain the spread of the virus.

The pandemic poses a serious challenge, in particular to structurally weak and vulnerable economies, as there are trends or indications that, globally, extreme poverty levels may increase for the first time since 1998, reversing the hard-won development gains of several decades. Several net food-importing countries, which include the least developed countries, landlocked developing countries and small island developing States, have seen recent episodes of food scarcity and millions of citizens threatened by food shortages. The *2020 Global Report on Food Crises*, the fourth annual report on food security produced by members of the international humanitarian and development community, facilitated by the Food Security Information Network, stated that in 2019, the number of acutely food-insecure people was 135 million across 55 countries; and Oxfam International stated that more than 52 million people in Africa were experiencing hunger as a result of weather

extremes, compounded by poverty and conflict². Such situations could be further exacerbated by the effects of the pandemic. Vulnerabilities to external shocks, which are inherent in structurally weak economies, and persistent development-related challenges require a new generation of trade and development policies and strategies that place the fostering of productive capacities and structural transformation at their centre. A prerequisite in such a process is to determine the current levels of productive capacities in individual economies.

Measuring and benchmarking productive capacity indicators by using the multidimensional global Productive Capacities Index is, therefore, indispensable, because it provides national policymakers, development partners and other stakeholders, including private sector actors, with the knowledge of how much productive capacities have been developed. It also draws attention to the strengths and weaknesses of past policies, processes and actions, that, in combination with the state of national productive capacities, can suggest a road map for future policy actions and interventions, as well as effective responses to emerging crises. Once Index scores have been obtained for several countries, the resulting cross-country comparisons and analyses can yield valuable insights into best and worst practices that may be relevant for policymakers and development experts. This can be discerned in particular from the Productive Capacities Index performance of developing economies in East Asia, which can provide important lessons for other developing countries, including the least developed countries and landlocked developing countries, in fostering productive capacities and structural transformation as a foundation for sustainable and inclusive growth and development. One important use of the Index and country-specific scores is in the understanding of the sources of systemic vulnerabilities and the identification of the enablers of economic growth, including progress towards sustainable development. For instance, most developing countries, in particular the least developed countries, landlocked developing countries and small island developing States, perform low in the categories of human capital and information and

¹ See <https://blogs.worldbank.org/opendata/impact-covid-19-coronavirus-global-poverty-why-sub-saharan-africa-might-be-region-hardest>.

² see <https://www.wfp.org/publications/2020-global-report-food-crises> and <https://www.oxfam.org/en/press-releases/more-52-million-people-across-africa-going-hungry-weather-extremes-hit-continent>



communications technologies (ICTs). These are key capabilities in responding rapidly to health-related crises, as the availability of medical professionals is vital and ICTs are indispensable tools in providing commercial and other critical services, such as online learning, telemedicine and teleworking, in particular in situations where physical distancing and restrictions on movement are required.

There have been previous attempts to measure productive capacities and construct an index. Freire (2011) develops an index that covers all global economies, but the focus is on productive capacities in Asia and the Pacific and the methodology differs from that used in the Productive Capacities Index, analysing the results of productive capacities (that is, trade data) rather than the capacities themselves. UNCTAD (2016) analyses productive capacities by collating data on energy, ICTs, private sector development, structural change and transport. However, the focus of the study is limited to the least developed countries. Several other indices exist that are more or less relevant to productive capacities, such as that of Simoes and Hidalgo (2011) on economic complexity and that of the International Institute for Management Development and the World Economic Forum on national competitiveness, as well as the Competitive Industrial Performance Index of the United Nations Industrial Development Organization. However, these are not directly concerned with productive capacities, which makes the present study the first of its kind.

Indicators under the Sustainable Development Goals can be used to measure socioeconomic progress or the lack thereof through a multitude of development variables. However, the multidimensional (economic, social and environmental) nature of the Goals and the number of indicators require the development of coherent and composite indices. In other words, single variables or indicators, while important in measuring progress, do not provide indications of the sources of change or the underlying factors driving performances, such as the growth or development potential of countries. In contrast, a composite index such as the Productive Capacities Index measures not only the economic and social performance or progress of each economy, but also provides indications of untapped potential or unexplored areas for further socioeconomic improvement. The Index also allows for cross-

country and regional comparisons by measuring the driving forces that fuel progress towards the Goals at the country level. For all of these important reasons, composite indices are valuable tools in monitoring progress towards the targets of the 2030 Agenda for Sustainable Development and outcomes of domestic policies and strategies. The Index serves as an important policy tool in building socioeconomic resilience to unexpected shocks and enabling policymakers, development partners and other stakeholders to forecast expected scenarios of future performance or policy outcomes. Therefore, the Index is consistent with and complementary to the Sustainable Development Goals and the related indicators. It is vital in providing a coherent statistical tool for measuring the outcomes of policy interventions at the national and international levels. The Index does not duplicate any of the indicators under the Goals and instead delivers a consistent, readable Index, to measure progress and national capacity to reach the targets under the Goals.

This is the first comprehensive attempt to measure productive capacities in all economies and construct a multidimensional global index. The starting point was to map data sources and collate data for 106 indicators across eight categories, namely, energy, human capital, ICTs, institutions, natural capital, the private sector, structural change and transport. The data were subsequently analysed and the number of indicators was first reduced to 58 and then to 46, after adjusting for dimensionality, data consistency, complementarity and the outcomes of detailed peer review processes. The scores for each category were aggregated and synthesised to provide an overall Productive Capacities Index score for each of the 193 economies.

A series of peer reviews were undertaken at several stages of the development of the Index, including the following: a brainstorming meeting with experts from relevant United Nations entities, international organizations and academia, as well as national experts from selected countries and institutions (Geneva, 2017); a peer review meeting with policy experts, advisers, government experts and statisticians from several international organizations and countries in Africa (Windhoek, 2019); academic reviews by selected academics and specialists with expertise in developing composite regional or global indices; and a peer review of the methodology and



indicators used and the statistics collected for the construction of the Index by a United Nations team of experts, including from the United Nations Development Programme and United Nations Statistics Division. Further national and regional reviews and validations of the Index took place in Abuja (2019), Almaty, Kazakhstan (2018), Bangkok (2019), Gaborone (2015; 2019), Kigali (2017; 2019; 2020), Santiago (2019), Ulaanbaatar (2018), Vientiane (2018; 2019) and Windhoek (2019). In addition to data availability, consistency and dimensionality, the 46 indicators used in the Index have direct relevance or link to the conceptual and analytical work of UNCTAD on fostering productive capacities and structural transformation (see UNCTAD, 2020 for the methodology used in the construction of the Index and the indicators under each category). For instance, lack of access to and effective use of energy (that is, electricity) is among the key challenges faced in structurally weak and vulnerable economies in enhancing economy-wide productive capacities and capacity utilization, as well as by firms and industries in these economies in enhancing their productivity (UNCTAD, 2017). Notwithstanding its importance, as with any study of this kind, there are limitations to how well the Index depicts reality. The scores are ultimately a reflection of the accuracy and availability of the data used and the available data is significantly limited for some countries and indicators. The results are also dependent on the methodology used and the assumptions made. However, sensitivity analysis suggests that a different methodology or other assumptions would not produce widely different estimates.

Overall, the Index summarizes the state of productive capacities in economies worldwide by computing scores that range from 0 to 100 (the boundaries are not included). Intergroup and intragroup comparisons are based on the latest actual data available up to 2016 and estimates obtained through solid time series models for the period 2017–2018. The results are as expected, insofar as developed countries frequently achieve higher scores and developing countries, comparatively lower scores. Within the latter group, the weakest performers are the least developed countries and landlocked developing countries.

The Index suggests that it is primarily the productive capacities related to energy, human capital, ICTs,

institutions and structural change that underlie the differences in scores between economies and groups. Addressing the related gaps and underlying challenges can help in resilience-building in structurally weak economies, to address persistent development-related challenges such as widespread poverty and allow for quick and effective responses to emergencies such as the COVID-19 pandemic. The Index, in addition to monitoring or measuring country-level performance, can help in forecasting future national economic trajectories, such as the level of productive capacities needed in a given economy, based on current performance, to generate a higher level of gross domestic product (GDP) growth in the future, assuming that a certain level of growth in the Index score is maintained. As discussed in the present study, there is a strong, positive correlation between the Index score and GDP per capita, confirming a clear association between productive capacities and the level of economic development.

The Index is not meant to be a perfect and the only definitive assessment of productive capacities in economies worldwide and should not be taken as such. Rather, its value lies in its aptness, methodological rigour and robustness, as a pointer that enables national decision makers to gain a sense of the current state of productive capacities. Moreover, taking into account the inherent limitations and the admission that no estimates of this kind can be absolute, the Index is at its most useful as an indication of the types of productive capacities leading the way and, conversely, those falling behind. It also serves a powerful purpose in cross-country comparisons to aid benchmarking. For these reasons, policymakers are encouraged to use the Index to identify and evaluate the strengths and weaknesses of the productive capacities in their economies and to formulate policies and strategies for the effective building of productive capacities. Development partners and other national stakeholders, such as private sector and civil society actors, can also contribute to national efforts to address the gaps and limitations identified by the Index.

In addition to developing the Index, UNCTAD has also developed the manual *Building and Utilizing Productive Capacities in Africa and the Least Developed Countries: A Holistic and Practical Guide*, which builds on the work of UNCTAD,



including the Index, and draws on cross-country evidence to provide a comprehensive framework for developing productive capacities and building socioeconomic resilience to shocks. The Index identifies areas in which countries are progressing or lagging and provides statistical evidence and the manual serves as an operational guide on how to build and utilize productive capacities for inclusive growth and sustainable development.

Building on the Index, the present study assesses the level of productive capacities in 193 economies in the period 2000–2018, allowing for cross-country and regional comparisons to help draw out policy lessons from successful experiences on how to best foster productive capacities and structural transformation. The advantage of country or group-specific analysis is that it provides unique insights into specific development-related challenges and the interventions needed to address them.

The study provides a focus on productive capacities in landlocked developing countries, because the building of productive capacities seems to be crucial and urgent in these countries, as they face multiple development-related challenges such as geographical limitations, remoteness from international markets, overdependence on the export of primary commodities and an overall lack of export competitiveness. Many of these countries have a greater need to develop their productive capacities, to overcome such geographical, trade-related and development-related challenges and improve conditions for the production of goods and services. Most landlocked developing countries also face a significant challenge in structurally transforming their economies as their exports are more commodity dependent, compared with other developing countries. These factors are clearly reflected in the overall performance of landlocked developing countries as measured by the Index. The scores of the least developed countries and landlocked developing countries in all categories are low, except for in the natural capital category. On the whole, the level of productive capacities in landlocked developing countries is slightly higher than the average score of the least developed countries and is low in comparison with transit

countries and other developing countries. Productive capacities related to energy, institutions and structural change are particularly weak. Building productive capacities is an integral part of dealing with these challenges, as recognized in the Programme of Action for the Least Developed Countries for the Decade 2011–2020 and the Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014–2024.

The study also highlights country-specific challenges based on the performance of selected countries, in which the Index was tested, verified, validated and subsequently experimented with in domestic policymaking processes, namely, Botswana, the Lao People's Democratic Republic and Rwanda. Performances are analysed based on country-specific scores and compared with the scores for relevant groups. The pilot countries are landlocked and heavily dependent on primary commodities for exports and share other similarities. Botswana has built institutions capable of formulating and implementing sound development policies. The Lao People's Democratic Republic has made tangible progress towards meeting the criteria for graduation from the least developed country category. Rwanda has consistently improved its economic performance and become one of the fastest growing economies among developing countries. However, as may be observed from their Index performances, the three countries face significant challenges in fostering productive capacities and structural transformation.

The study is organized as follows: chapter I reviews the concept of productive capacities and outlines the methodology used to measure their levels and construct the Index; chapter II presents the results of the Index for 193 economies and discusses the differences between groups; chapter III focuses on productive capacities in landlocked developing countries and compares their performances with those of transit countries and other developing countries, as well as the least developed countries. Chapter III also includes the three country case studies for Botswana, the Lao People's Democratic Republic and Rwanda. Finally, chapter IV draws conclusions and highlights policy recommendations.





PRODUCTIVE CAPACITIES: FROM
ABSTRACT CONCEPT TO MEASURABLE
COMPOSITE INDEX

Economic growth, poverty reduction and sustainable development are the result of complex processes that depend on a multitude of interrelated factors. The notion of productive capacities is developed in recognition of this complexity and the fact that the challenges of development are many and manifold. However, beyond a general understanding that productive capacities involve a range of factors necessary for a thriving society and economy, interpretations of the term vary. To elucidate the concept, this chapter begins by taking a closer look at the definition and the constituent elements of productive capacities. It then addresses why they matter and why putting them at the centre of development efforts provides policymakers and policy analysts with a comprehensive, analytical tool, to help formulate and implement more effective policies and strategies, to build resilience to shocks and promote inclusive growth and sustainable development. Finally, the chapter addresses some of the difficulties in quantifying productive capacities and outlines the general approach taken by UNCTAD to deal with these difficulties.

The concept of productive capacities

There is consensus on the need to foster productive capacities for sustained economic growth and sustainable development, but not on a universally accepted definition of the concept (see UNCTAD, 2006). The notion of productive capacities may seem straightforward, but closer inspection reveals its complexity. It is, for instance, not immediately clear whether the capacities needed for production should be understood in a narrow sense (that is, focusing on the factors of production) or in a broad sense (that is, including the production systems in which actors operate). Nor is the extent to which productive capacities should refer to existing or potential attributes obvious. Should, for instance, fertile but as yet uncultivated land be considered a productive capacity? The term productive capacities may therefore have as many definitions as there are those defining it. For instance, the definition of the World Trade Organization is trade-centred and that of the United Nations Industrial Development Organization is industry-focused. The Human Capacities Index of the World Bank and the Human Development Index of the United Nations Development Programme have definitions that are centred more on human capacities.

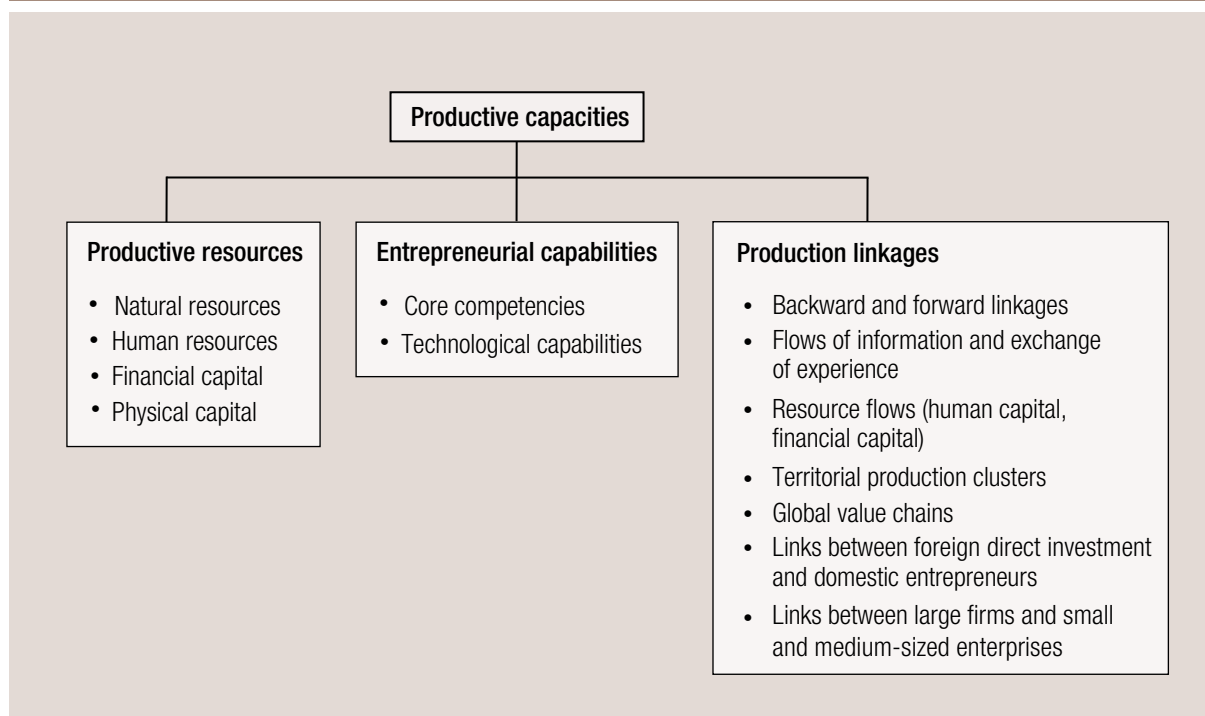
In the simplest sense, a focus on productive capacities can be seen as a holistic approach to the challenges related to economic progress and poverty reduction in developing countries. A definition that captures the broadness of the term is that productive capacities are “the productive resources, entrepreneurial capabilities and production linkages which together determine the capacity of a country to produce goods and services and enable it to grow and develop” (UNCTAD, 2006). This definition stresses the three distinct but interrelated fundamental elements that make up productive capacities (figure 1).

Productive resources are factors of production and include human, natural, financial capital and physical capital resources. Human resources relate to the quantity and quality of labour and therefore involve issues related to education, health and skills. Natural resources encompass agricultural land, water, forest and energy resources, among others. Financial capital resources refer to the availability and cost of financial capital to finance production, investment and innovation. Physical capital resources are capital stock and physical infrastructure such as transport, energy and telecommunications infrastructure.

Entrepreneurial capabilities are the abilities of firms and households to produce goods and services. A distinction is made between core competencies and technological capabilities, as follows: core competencies refer to applying current skills, knowledge and information to existing productive resources, to transform inputs into outputs; and technological capabilities refer to dynamic abilities to advance core competencies and thereby increase productivity, competitiveness and profitability and, as such, are the basis for the creativity, flexibility and dynamism of an economy. Technological capabilities, in turn, are comprised of the following five types of skills: expanding physical facilities (investment capabilities); upgrading products and processes (incremental innovation capabilities); developing new markets (strategic marketing capabilities); benefiting from the transfer of technology (linkage capabilities); and creating new technology (radical innovation capabilities).

Production linkages are the interactions between economic sectors and among enterprises through trade, investment and technology flows and among

Figure 1. Productive capacities: Three basic elements



Source: UNCTAD, 2006, p. 63.

firms and farms within domestic economies as well as between those within domestic and foreign economies. The presence of backward and forward linkages and a shift of productive resources from traditional to modern sectors are considered signs of structural transformation. Similarly, linkages and flows between enterprises have long been suggested as important elements for the productivity and competitiveness of countries, with studies drawing attention to, among others, backward and forward linkages (Hirschman, 1958), global value chains (Gereffi, 1995; Humphrey and Schmitz, 2002) and production clusters (Porter, 1990). Production linkages therefore encompass different types of interactions that affect sectors and all types of enterprises such as, among others, small and medium-sized enterprises, large firms, households, domestically owned enterprises and foreign-owned enterprises.

The definition of productive capacities underlines that these three basic elements determine the capacity of an economy to produce goods and services together. It therefore stresses interactions among the three elements and that their impact on productive capacities is amplified or diminished in the way they influence each other. For instance,

the use of productive resources is more optimal when entrepreneurial capabilities are improved and production linkages are strengthened. The combination of productive resources, entrepreneurial capabilities and production linkages in a country results in a distinctive set of capacities to produce goods and services. Moreover, the attributes of the three elements and their particular mixture determine the types of goods and services produced, because productive capacities are often activity-specific, as they promote certain products and processes and act as a constraint on other activities that can be favourably engaged in. This is similar to the Heckscher-Ohlin theorem that countries export goods that use their abundant factor intensively. For instance, if a country undertakes significant investments in the textile and clothing sector, the resulting skills and physical capital from these investments cannot be utilized in other sectors with different activities.

The concept of productive capacities is thus an important tool in that it takes into account a wide range of factors that contribute to national development. Beyond this holistic approach to the production of goods and services, building productive capacities is valuable in that it

simultaneously addresses multiple development-related challenges and socioeconomic vulnerability. Rather than being limited to a single concern such as economic growth or poverty reduction, the building of productive capacities can have positive repercussions across a wide range of issues. For instance, it has a direct positive impact on relieving supply-side constraints and reducing unemployment, which implies a significant role in supporting economic growth, employment creation and poverty reduction. Similarly, the building of productive capacities is integral to efforts to support diversification and structural transformation, factors that are viewed as fundamental for inclusive growth and long-term development. Moreover, there is the possibility of creating a virtuous circle, whereby building productive capacities helps to achieve development objectives such as economic growth and poverty reduction that, in turn, foster a greater expansion of productive capacities and help reduce systemic vulnerability to negative external shocks, such as those caused by the COVID-19 pandemic.

Therefore, the value of focusing on productive capacities is twofold. First, it provides a broad view of the essential inputs needed for the production of goods and services in an economy. Second, it helps generate outcomes that have an impact on a wide range of development-related challenges. It is this twofold attribute that makes a focus on productive capacities so valuable as an analytical and strategic tool. It is the main reason that policymakers and policy analysts should ensure that productive capacities are placed at the core of development efforts and they have begun to do so, as reflected in the prominence of productive capacities in international agreements and declarations such as the Programme of Action for the Least Developed Countries for the Decade 2011–2020 and the Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014–2024.

Capturing the level of productive capacities through a composite index

The choice of indicators for the Productive Capacities Index was based primarily on their relevance to the conceptual analysis by UNCTAD of productive capacities. The availability of consistent and reliable, as well as internationally comparable, data was also factored into the choice of a given

indicator. Moreover, attention was paid to the ultimate objective of the Index, which is to assist in evidence-based policymaking through the use of a coherent and consistent policy tool. This requires a direct and easy-to-use composite index and, to this end, efforts were made to not overburden or overcrowd the Index by compressing too many indicators into its calculation, in order for the composite indicators to be readable and easy to apply, for policymakers, experts and practitioners. Other indicators that may add value to the Index will be revisited in future processes of expanding, updating and enriching the Index. For instance, indicators under the human capital category that measure the quality of education or health services may be deemed important to examine. The Human Capital Index of the World Bank and the education quality indicators of the United Nations Educational, Scientific and Cultural Organization include harmonized or standardized test scores, learning-adjusted years of schooling and expected years of schooling, disaggregated by gender, and could be considered relevant indicators. The Productive Capacities Index, because of the reliability of the data and relevance to productive capacities, uses expected years of schooling and research and development expenditure as a share of GDP, as well as health-adjusted life expectancy and health expenditure as a share of GDP. In order to include the gender dimension in the Index, instead of gender-disaggregated data under other indicators, fertility rates are used as proxy for several indicators used in the Gender Equality Index developed by the European Institute for Gender Equality, which uses about 15 indicators for which consistent and comprehensive global data are not readily available (see Barnat, MacFeely and Peltola, 2019). This does not mean that other indicators do not exist or are less important. However, obtaining data on all relevant indicators for all countries is not straightforward, in particular with regard to the least developed countries, landlocked developing countries and economies in Africa. Moreover, although other indices are available for several categories covered by the Productive Capacities Index, the use of indices within the Index was deliberately minimized or avoided, for methodological consistency and analytical relevance. Similarly, a limited number of indicators were selected for the transport category and it may be argued that other indicators could have been chosen. Revenue passenger kilometres, revenue ton-kilometre, destinations served by direct

flights and other indicators have been extensively used in transport studies, by other academic researchers and by industry practitioners and, in the context of the study of productive capacities, such indicators could be useful. However, with regard to such data, there are challenges related to availability, consistency and comparability.

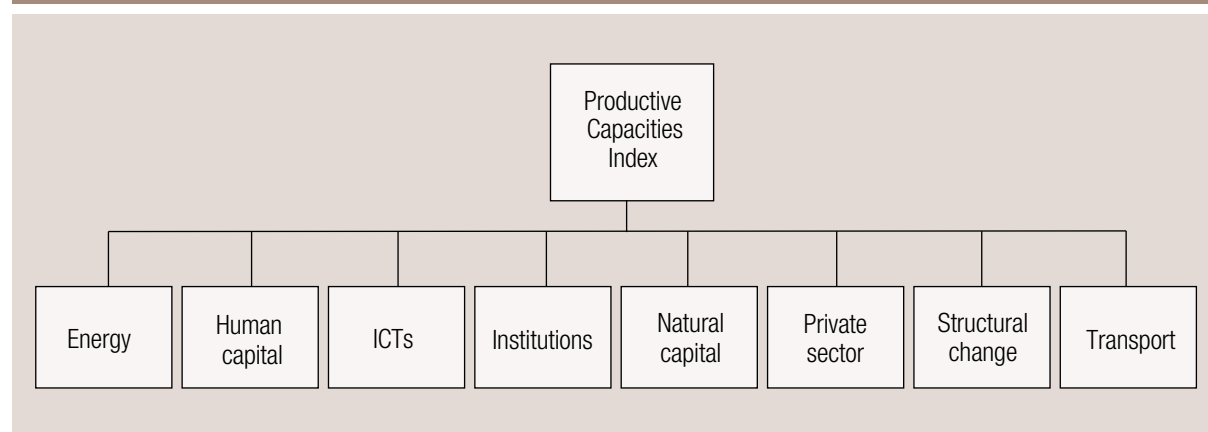
Beyond data limitations, assessing productive capacities in order to construct a composite index presents several challenges. Operationally, the broad extent and scope of productive capacities, albeit a key strength conceptually, makes it difficult to determine the specific indicators that should be included in an assessment. Moreover, determining how to measure certain indicators is not always straightforward, in particular with regard to indicators related to entrepreneurial capabilities, since they primarily concern soft skills and knowledge capital within firms or industries that are multidimensional and embedded in the production structure. Measuring structural transformation through the lens of export complexity, that is, the technological embodiment and sophistication of exports, makes it difficult to determine the degree and extent of structural transformation in a given economy in order to formulate and implement appropriate policies to foster further transformation.

To select variables that build on the theoretical framework, previous UNCTAD research on productive capacities (UNCTAD, 2006; UNCTAD, 2016) and relevant international agreements and declarations were consulted, resulting in the identification of eight distinct categories that constitute the Productive Capacities Index (figure 2).

The process of developing the composite multidimensional global Productive Capacities Index involved rigorous statistical steps, techniques and methodologies.

First, data are frequently unavailable and a strategy was developed to impute the missing values, involving a two-step process of data extension and data computation. In the first step, missing data was inferred by way of interpolation or extrapolation. If, for instance, data were available for 2007 and 2010, but not for 2008 and 2009, then the existing values were used to fill in the missing data. In the second, unobserved values were computed based on the observed values of immediate neighbouring economies, based on the assumption that, after considering income differences, the trajectories of growth of two neighbouring States with comparable economies would be similar.

Figure 2. Productive Capacities Index: Categories



Note: The categories (and some indicators) are energy (electricity and oil), human capital (education and health), ICTs (broadband and mobile telephones), institutions (government effectiveness and rule of law), natural capital (agriculture and material intensity), the private sector (domestic credit and cost and time to import and export), structural change (economic complexity and gross fixed capital formation) and transport (air transport and rail lines). Gross fixed capital formation is used rather than capital or investment flows as a share of GDP; the former is usually defined as the value of acquisitions minus disposals of new or existing fixed assets, which consist of tangible or intangible assets that have come into existence as outputs from processes of production and that are themselves used repeatedly or continuously in other processes of production over periods of time longer than one year.

Source: UNCTAD.

Second, indicators are often correlated, implying that there should be a scheme for dimensionality reduction in multivariate analysis, which includes principal component analysis. Such analysis effectively produces axes that are linear combinations of the original data, which are used to reduce dimensionality. This means that the principal component analysis methodology helps to extract the latent factors that best represent the original data and facilitates the understanding of explanations for variation in indices (Barnat, MacFeely and Peltola, 2019). However, as discussed during the various peer reviews, the principal component analysis approach alone is not enough for the intended purpose. This means that an explanation is required of further proven statistical methodologies beyond the principal component analysis. The approach selected is that discussed in *Global Burden of Disease 2016 Healthcare Access and Quality Collaborators (2018)*, which was employed to compute the scores for the Index categories through weighting, normalization and aggregation of the corresponding latent factors. In this regard, the factor scores were extracted for each category and, to reduce the potential impact of less relevant or irrelevant factors, they were weighted by their capacity to explain the variance of original data. However, latent factors usually vary considerably in both distribution and moments, that is, variables can differ considerably in their values, which makes it necessary to impose a similar scale across all the factor scores in order that they can be compared. Variation in distribution and moments therefore requires normalization techniques and, for the present study, the common approach of computing deviations using the maximum and minimum values observed in the data across each country-year was adopted. For each of the factor scores, the deviation of the observed value was taken from the minimum observed and the resulting value was divided by the deviation of the minimum value from the maximum observed, giving scores normalized into an interval between 0 and 100. The minimum and maximum scores were used to normalize variations in distribution and instances of latent factors. The methodology involved a statistical method that took the deviation of the observed value for any given factor from its observed minimum and divided it by the difference between the observed minimum and

maximum (the statistical formula used is available on the UNCTADStat database).

Third, once factor scores were all in the same comparable range, they were aggregated into a unique score that delivered a value for each category of the Index. The final Index score was the geometric average of the values of the eight categories. The advantage of using the geometric mean over the parallel arithmetic mean is that the former offers balanced policy insights across the three elements of productive capacities. In other words, it guides development policies to place equal emphasis on each of the elements of productive capacities, which in turn requires the formulation and implementation of coherent and consistent multisectoral strategies complemented by microeconomic and macroeconomic policies.

Finally, it is important to ensure the internal consistency and robustness of each of the categories using sensitivity analysis. The impact of different data selections on Index scores was assessed by comparing rankings across various categories and specifications. The specifications varied in terms of imputation technique and normalization strategy. The results were encouraging in that the correlations between the Index and the categories were positive and often at 0.7 or higher, with the exception of the natural capital category. In addition to using rankings based on correlations, the Cronbach's alpha technique was applied as an alternative approach, to check the robustness and internal consistency of each category (see UNCTAD, 2020). This technique helps to understand how closely related the variables are to each underlying indicator. There is no statistical cut-off value in using the technique, but the correlation was far above 0.5 for almost all of the categories, with the only exceptions being the energy (0.3) and natural capital (-0.1) categories. Relatively lower or negative Cronbach's alpha values, in particular in the energy and natural capital categories, may be explained by the higher dimensionality of variables in these categories, which include weakly or negatively correlated variables from different domains. The results of the use of this technique are consistent with assessments based on internal correlations among the categories and between the categories and the Index.





PRODUCTIVE CAPACITIES INDEX: MEASUREMENT AND PERFORMANCE

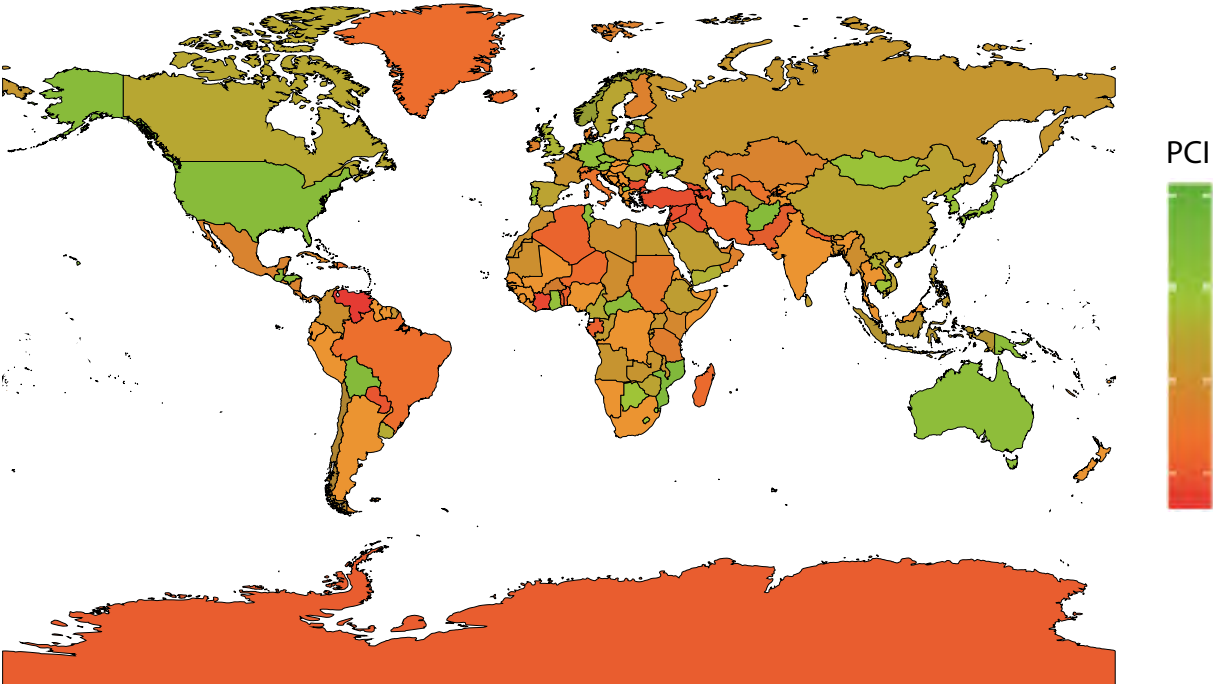
This chapter discusses the Productive Capacities Index scores and the level of productive capacities in 193 economies. Overall scores range from a minimum of 0 to a maximum of 100 (the boundaries are not included) and are based on the scores for each of the eight categories that make up the Index, namely, energy, human capital, ICTs, institutions, natural capital, the private sector, structural change and transport. The period in which productive capacities are measured and benchmarked for the 193 economies is 2000–2018. Actual data and statistical information are available for 2000–2016 but not for 2017 and 2018 and the values for the latter two years are estimates obtained through an automatic forecasting system that generates observations for each of the indicators used in the Index.

Table 1 shows the global ranks and Productive Capacities Index scores of the 193 economies in 2018 (see annex 1 for the scores for each of the eight categories). The global simple average Index score is 26.76 and the median score is 27.81. The highest ranked economy (United States of America) has a score of 50.51 and the lowest ranked economy (Chad) has a score of 17.14. As expected, developed economies are likely to be located towards the top of the ranking, followed

by developing economies in East Asia, and less developed economies are located towards the bottom of the ranking. This is also seen in the summary statistics for the different groups, namely, while the median scores of developed economies and developing economies in East Asia are 41.73 and 40.00, respectively, the median score of other developing economies is 32.45, the median score of transit countries is 26.65 and the median score of the least developed countries is 23.66 (see annex 2). Finally, the median score for landlocked developing countries is 26.1 (productive capacity levels in landlocked developing countries are discussed in chapter III).

Figure 3 provides an overview of the Productive Capacities Index scores of specific regions and individual economies in 2018. As expected, developed economies in North America, namely, Canada and the United States, have high scores, of 50.51 and 42.30, respectively, followed by Europe, with a median score of 41.27. Among developing economies, the highest median score is that of Latin America (32.14), followed by Oceania (31.67), Asia (31.18) and Africa (23.84). Such broad regional groupings mask considerable intragroup variations. For instance, the median score of East Asia is 40.00, that is, close to the median score

Figure 3. Global scores map



Source: UNCTAD calculations.

Table 1. Global ranks and scores, 2018

Rank	Economy	Productive Capacities Index
178	Afghanistan	22.12
102	Albania	31.65
133	Algeria	27.76
23	Andorra	41.85
177	Angola	22.16
85	Argentina	33.03
96	Armenia	32.16
19	Australia	42.59
15	Austria	43.97
119	Azerbaijan	30.22
51	Bahamas	36.28
39	Bahrain	39.03
140	Bangladesh	26.85
40	Barbados	38.40
66	Belarus	34.39
12	Belgium	44.98
69	Belize	34.26
163	Benin	23.84
120	Bhutan	30.11
129	Bolivia (Plurinational State of)	29.08
88	Bosnia and Herzegovina	32.86
116	Botswana	30.59
100	Brazil	31.69
58	Brunei Darussalam	35.19
59	Bulgaria	35.09
183	Burkina Faso	21.70
188	Burundi	20.79
108	Cabo Verde	31.11
142	Cambodia	26.46
166	Cameroon	23.60
20	Canada	42.30
192	Central African Republic	18.06
193	Chad	17.14
49	Chile	36.61
33	China	40.00
8	Hong Kong SAR	45.81
36	Macao SAR	39.46
91	Colombia	32.45
156	Comoros	24.60
180	Congo	22.06
56	Costa Rica	35.48

Table 1. Global ranks and scores, 2018 (cont.)

Rank	Economy	Productive Capacities Index
159	Côte d'Ivoire	24.43
50	Croatia	36.48
115	Cuba	30.62
34	Cyprus	39.80
27	Czechia	41.27
190	Democratic Republic of the Congo	19.85
7	Denmark	46.12
134	Djibouti	27.41
70	Dominica	34.15
92	Dominican Republic	32.45
106	Ecuador	31.38
125	Egypt	29.39
93	El Salvador	32.42
170	Equatorial Guinea	23.47
185	Eritrea	21.64
30	Estonia	40.26
135	Eswatini	27.40
169	Ethiopia	23.53
101	Fiji	31.67
24	Finland	41.81
14	France	44.36
146	Gabon	26.01
155	Gambia	24.61
75	Georgia	33.89
5	Germany	47.38
139	Ghana	26.90
44	Greece	37.91
65	Grenada	34.60
130	Guatemala	28.91
165	Guinea	23.66
111	Guyana	30.94
176	Haiti	22.49
131	Honduras	28.04
38	Hungary	39.13
3	Iceland	47.96
112	India	30.90
121	Indonesia	29.94
114	Iran (Islamic Republic of)	30.69
175	Iraq	22.92
9	Ireland	45.54
31	Israel	40.20



Table 1. Global ranks and scores, 2018 (cont.)

Rank	Economy	Productive Capacities Index
53	Italy	35.99
89	Jamaica	32.63
10	Japan	45.29
110	Jordan	31.01
118	Kazakhstan	30.48
148	Kenya	25.73
132	Kiribati	27.94
74	Kuwait	33.98
136	Kyrgyzstan	27.37
138	Lao People's Democratic Republic	27.12
43	Latvia	37.96
78	Lebanon	33.68
128	Lesotho	29.15
172	Liberia	23.31
162	Libya	24.16
42	Lithuania	38.04
4	Luxembourg	47.62
179	Madagascar	22.10
171	Malawi	23.44
62	Malaysia	34.94
72	Maldives	34.13
187	Mali	21.11
26	Malta	41.62
113	Marshall Islands	30.71
174	Mauritania	22.98
46	Mauritius	37.39
95	Mexico	32.18
94	Mongolia	32.29
83	Montenegro	33.24
117	Morocco	30.51
167	Mozambique	23.59
158	Myanmar	24.49
123	Namibia	29.48
143	Nepal	26.32
2	Netherlands	48.22
18	New Zealand	42.77
109	Nicaragua	31.03
189	Niger	20.08
184	Nigeria	21.65
82	North Macedonia	33.32
25	Norway	41.65

Table 1. Global ranks and scores, 2018 (cont.)

Rank	Economy	Productive Capacities Index
64	Oman	34.60
151	Pakistan	25.17
80	Palau	33.45
60	Panama	35.08
152	Papua New Guinea	24.97
127	Paraguay	29.16
98	Peru	31.91
122	Philippines	29.88
35	Poland	39.65
37	Portugal	39.37
29	Qatar	40.81
11	Republic of Korea	45.21
87	Republic of Moldova	32.87
67	Romania	34.30
76	Russian Federation	33.85
150	Rwanda	25.42
77	Saint Lucia	33.84
71	Saint Vincent and the Grenadines	34.14
103	Samoa	31.54
48	San Marino	36.66
141	Sao Tome and Principe	26.73
63	Saudi Arabia	34.73
144	Senegal	26.31
55	Serbia	35.65
54	Seychelles	35.68
186	Sierra Leone	21.62
13	Singapore	44.46
45	Slovakia	37.48
32	Slovenia	40.05
145	Solomon Islands	26.21
191	Somalia	19.37
73	South Africa	34.05
157	South Sudan	24.58
28	Spain	41.02
105	Sri Lanka	31.44
181	Sudan	22.01
104	Suriname	31.54
17	Sweden	43.48
22	Switzerland	42.25
154	Syrian Arab Republic	24.67



Table 1. Global ranks and scores, 2018 (cont.)

Rank	Economy	Productive Capacities Index
168	Tajikistan	23.55
61	Thailand	34.99
126	Timor-Leste	29.28
182	Togo	21.85
86	Tonga	32.95
47	Trinidad and Tobago	36.68
84	Tunisia	33.24
68	Turkey	34.29
147	Turkmenistan	25.88
79	Tuvalu	33.55
153	Uganda	24.91
90	Ukraine	32.63
21	United Arab Emirates	42.30
6	United Kingdom of Great Britain and Northern Ireland	46.18
161	United Republic of Tanzania	24.22
1	United States	50.51
52	Uruguay	36.05
137	Uzbekistan	27.18
124	Vanuatu	29.44
149	Venezuela (Bolivarian Republic of)	25.59
99	Viet Nam	31.71
173	Yemen	23.28
160	Zambia	24.24
164	Zimbabwe	23.70
107	State of Palestine	31.34
57	Aruba	35.45
16	Bermuda	43.68
81	Cayman Islands	33.40
97	Curaçao	32.14
41	Guam	38.27

Abbreviation: SAR, Special Administrative Region.

Note: Landlocked developing countries are shown with shading. With regard to the ranking and Productive Capacities Index scores, small island developing States appear to perform better than other developing countries. However, this performance must be interpreted with caution and understood in the context of their unique geographical and structural characteristics. Due to their demographic features (small population) and smaller size and/or surface area, small island developing States perform better statistically when measured using indicators that utilize population-related or geographical ratios as units of measurement. An additional substantive reason for the better-than-expected performance of small island developing States compared with other developing countries is the relative shift of their economic activities towards the services sector, in particular financial intermediation and tourism and other intangible services.

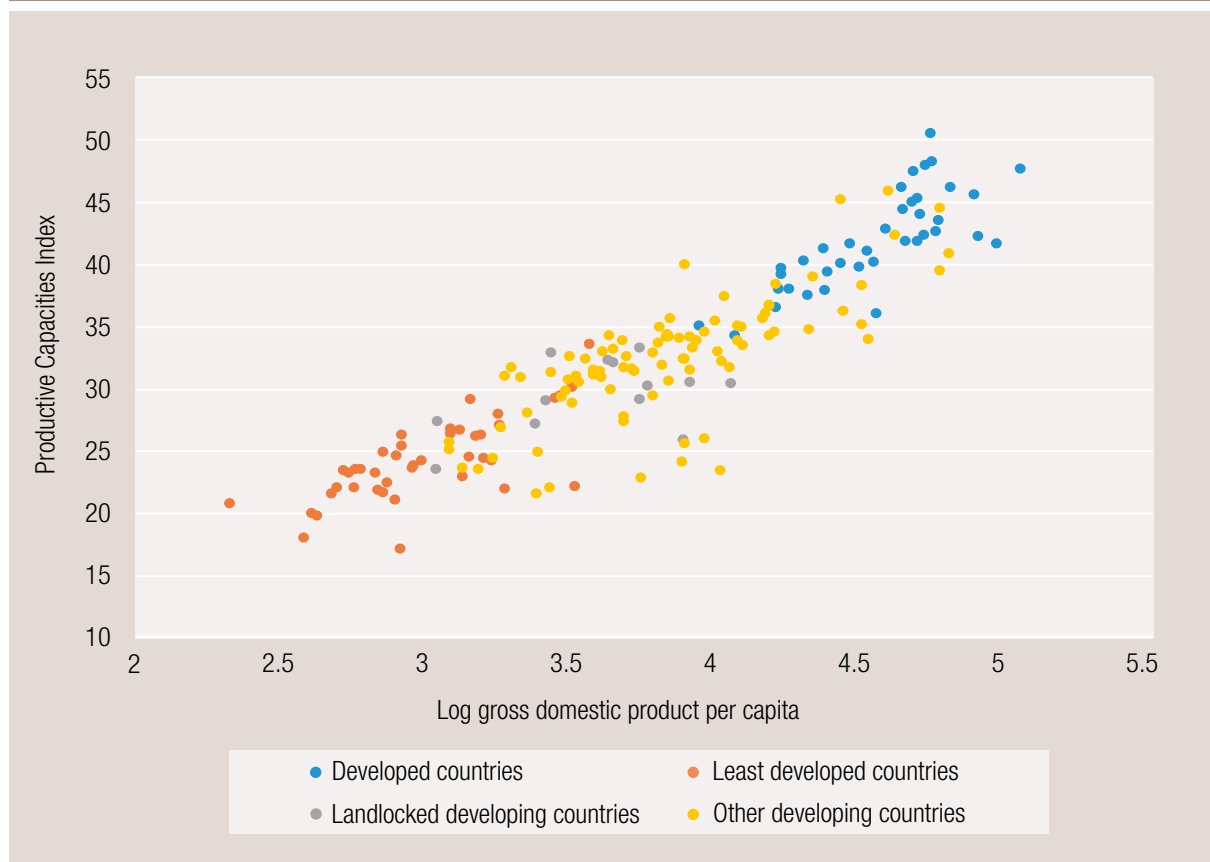
Source: UNCTAD calculations.

of developed economies; and the median scores of South Asia and West Asia are 28.48 and 33.94, respectively. Similarly, in Africa, the median score of northern Africa is 29.39 and the median score of sub-Saharan Africa is 23.63. Overall, economies or regions that have lower Index scores are generally characterized by underdevelopment, high poverty and unemployment levels and significant vulnerabilities to negative external shocks, including those related to the COVID-19 pandemic.

At the individual economy level, a significant result is the high Index score (40.00) and rank (33) of China. The score and rank of Hong Kong (China) are 45.81 and 8 and the score and rank of Macao (China) are 39.46 and 36. The simple average of the score of China is about 41.76. These rankings are considerably higher than the rank of China (81) in terms of GDP per capita (purchasing power parity), which suggests that the fundamentals for future economic growth in China are strong (data

on GDP per capita is from the World Development Indicators database of the World Bank). China is among the best performing economies in terms of productive capacities in structural change and transport. India ranks noticeably higher on the Index (112) compared with its position in terms of GDP per capita (121). The Index rankings of two other economies in the group of Brazil, China, India, Russian Federation and South Africa are also reflective of their global GDP per capita rankings, namely, Brazil, which ranks 100 on the Index and 83 in terms of GDP per capita, and the Russian Federation, which ranks 76 on the Index and 58 in terms of GDP per capita. Developing economies in East Asia also perform substantially higher on the Index than the global average, which is a reflection of their overall socioeconomic transformation over a relatively short period of time. As noted, there is a positive correlation between Index scores and income levels. Figure 4 shows the correlation of Index scores with GDP per capita. It is clear that a higher

Figure 4. Correlation with gross domestic product per capita ($\rho = 0.91$)



Source: UNCTAD calculations.



score is associated with a greater GDP per capita, with a strong correlation between the two scores. This is only to be expected since measurements of productive capacities, by definition, indicate the capacity to produce goods and services. Notwithstanding the strong, positive correlation, there are differences between the two measures, not least of which is the broadness implied by productive capacities and the multidimensional index.

A comparison of the summary statistics for all 193 economies, under the Index and by category, is shown in table 2. As noted, the variables are normalized by using the deviation of minimum and maximum values observed in the data across each country-year. Beyond the mean or median values, of note in the summary statistics is the range between the minimum and maximum values, the dispersions or standard deviations and the distribution of values along the eight categories. These values provide further insights into and category-specific information on gaps and limitations in fostering productive capacities. For instance, the gap between the minimum and maximum values, that is, between the best and worst performers, is significantly high in the human capital, institutions, private sector and transport categories, followed by the energy, ICTs and structural change categories. Similarly, the standard deviations show that dispersions are the highest in the institutions, human capital and private sector categories. Therefore, it is critical for policymakers to take such statistical analysis and information into account in formulating policies

and strategies centred on fostering productive capacities and structural transformation.

A correlation matrix, to help consider the relationships among and between the Index and the categories, is shown in table 3. A notable feature is the negative correlation of natural capital with the overall Index and with all other categories. The remaining categories are all positively correlated with the Index, with ICTs ($\rho = 0.93$), human capital ($\rho = 0.89$), institutions ($\rho = 0.88$) and energy ($\rho = 0.82$) having the highest correlations. These categories are also in many cases strongly correlated with one another; the main exception is transport, which is not strongly correlated with structural change or the private sector. Moreover, developing countries, individually and as a group, perform better in the natural capital category. The negative correlation of natural capital with the Index and with the other categories is the result of the high dimensionality in indicators used, which capture unrelated or negatively correlated phenomena. That is, the category is composed of five indicators, namely, agricultural and forest land as share of land area, the share of all extraction flows in GDP, material intensity and total natural resources rent as share of GDP, which have different dimensions and are weakly or even negatively correlated with each other and the other broader economic development indicators. For instance, greater forest coverage means less arable or agricultural land and greater areas devoted to mineral extraction or excavation yield little forest area and/or agricultural land. Moreover, dependence on natural capital such as commodities means less diversification, higher

Table 2. Summary statistics by category, global

	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
Minimum	8.20	26.53	3.14	7.90	31.92	37.97	4.10	5.49	17.14
Twenty-fifth percentile	22.04	41.35	7.44	39.93	46.77	75.01	15.76	13.41	26.11
Median	27.81	48.12	11.97	51.52	51.62	80.02	19.02	16.27	32.14
Mean	26.76	50.55	13.27	54.00	52.29	77.72	19.57	18.43	32.12
Seventy-fifth percentile	30.84	56.11	17.17	67.96	57.34	83.81	22.73	21.98	36.64
Maximum	47.11	89.13	36.06	97.44	85.12	94.93	45.32	60.59	50.51
Standard deviation	6.74	12.98	6.92	19.98	8.38	9.79	5.90	8.05	7.32

Source: UNCTAD calculations.

Table 3. Correlation matrix of categories

	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
Energy	1.00								
Human capital	0.73	1.00							
ICTs	0.75	0.85	1.00						
Institutions	0.62	0.79	0.81	1.00					
Natural capital	-0.35	-0.40	-0.42	-0.45	1.00				
Private sector	0.50	0.59	0.58	0.67	-0.41	1.00			
Structural change	0.59	0.73	0.65	0.59	-0.34	0.56	1.00		
Transport	0.42	0.39	0.53	0.49	-0.48	0.41	0.35	1.00	
Productive Capacities Index	0.82	0.89	0.93	0.88	-0.45	0.71	0.77	0.63	1.00

Source: UNCTAD calculations.

export concentration and low export complexity, all of which lead to weak productive capacities. For this reason, economies that rank higher in material extraction or that may be over-reliant on agricultural production are frequently at the bottom of the Index ranking, as well as with regard to other socioeconomic indicators. In sum, the negative correlation does not imply causation or a causal relationship nor does it imply a negative impact from natural capital wealth on development. Rather, it highlights missed opportunities in capturing natural resources wealth in fostering productive capacities and structural transformation.

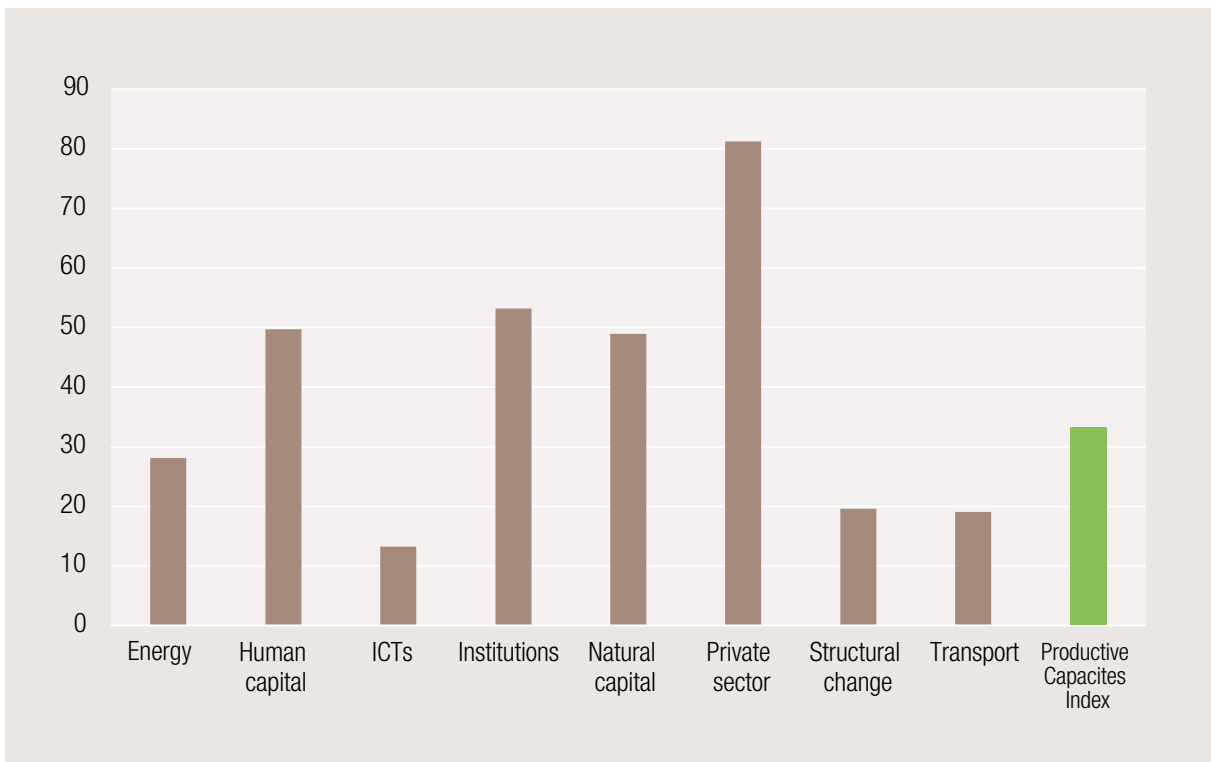
It is challenging to obtain a clear sense of how economies compare at the country level based on a table such as that in annex 1. Figures 5 to 8 are intended to help compare and visualize the scores for developing countries, transit countries, developed countries and other developing countries.

Intragroup differences suggest that productive capacities in developing economies have improved over time, with the greatest improvement in the private sector category. The dispersion of Index scores is highest in the institutions category, as shown in the relatively higher standard deviation, the ranges between the minimum and maximum scores and comparisons between percentiles. Another category in which there are particularly wide variations among developing countries is human capital.

The situation in transit countries is quite different. There are two categories, the private sector and structural change, in which the level of productive capacities is comparable to those in other developing countries, but the score of transit countries in the natural capital category is significantly higher. At the other end of the scale, transit countries lag behind other developing countries in the energy, human capital, ICTs, institutions and transport categories. Intragroup variations among transit countries are highest in the human capital and institutions categories. Overall, transit countries have an average Index score of 27.71, which is slightly lower than the average score of other developing countries, slightly higher than that of landlocked developing countries and far higher than that of the least developed countries. The average score of transit countries is particularly high in the natural capital category (55.59), compared with the average score of other developing countries (49.90). The other category in which the average level of productive capacities in transit countries is comparable with that of other developing countries is the private sector (77.03). At the other end of the scale, in transit countries, productive capacities appear to be the weakest in energy, ICTs, structural change and transport, although their scores in these areas are higher than the average scores of landlocked developing countries.

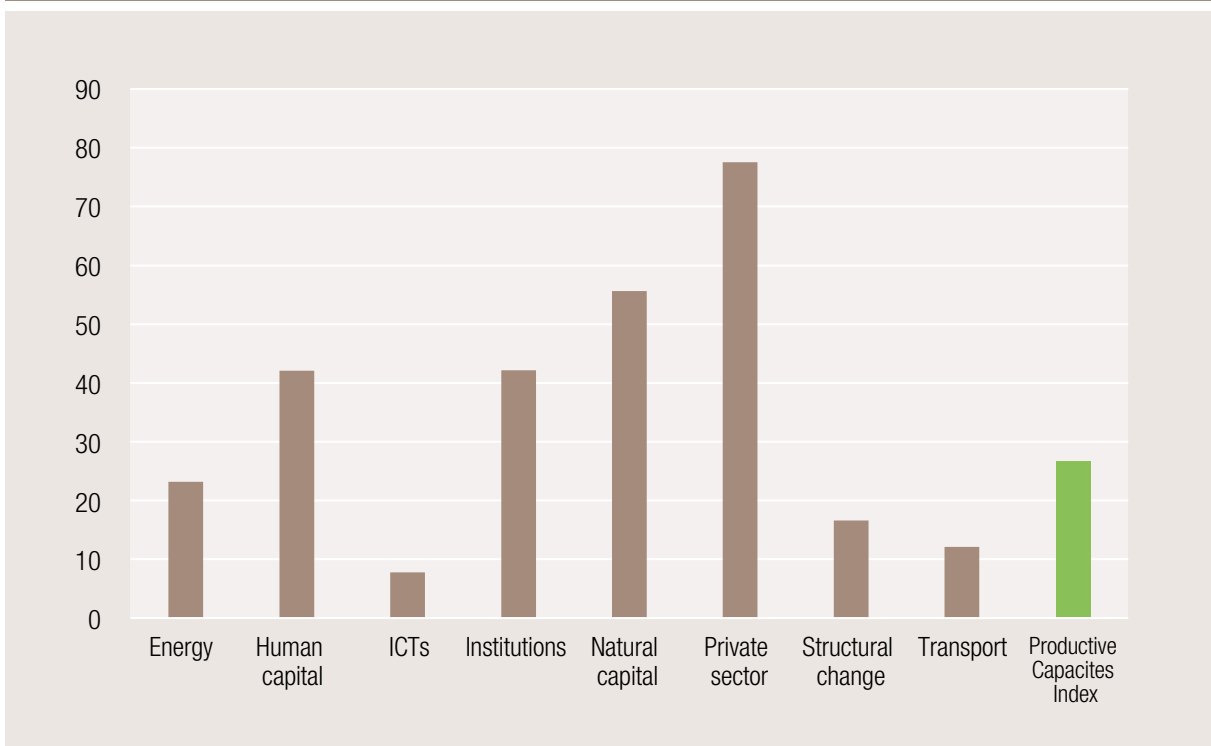
The three highest average scores of developed economies are in the private sector, institutions

Figure 5. Developing economy scores by category



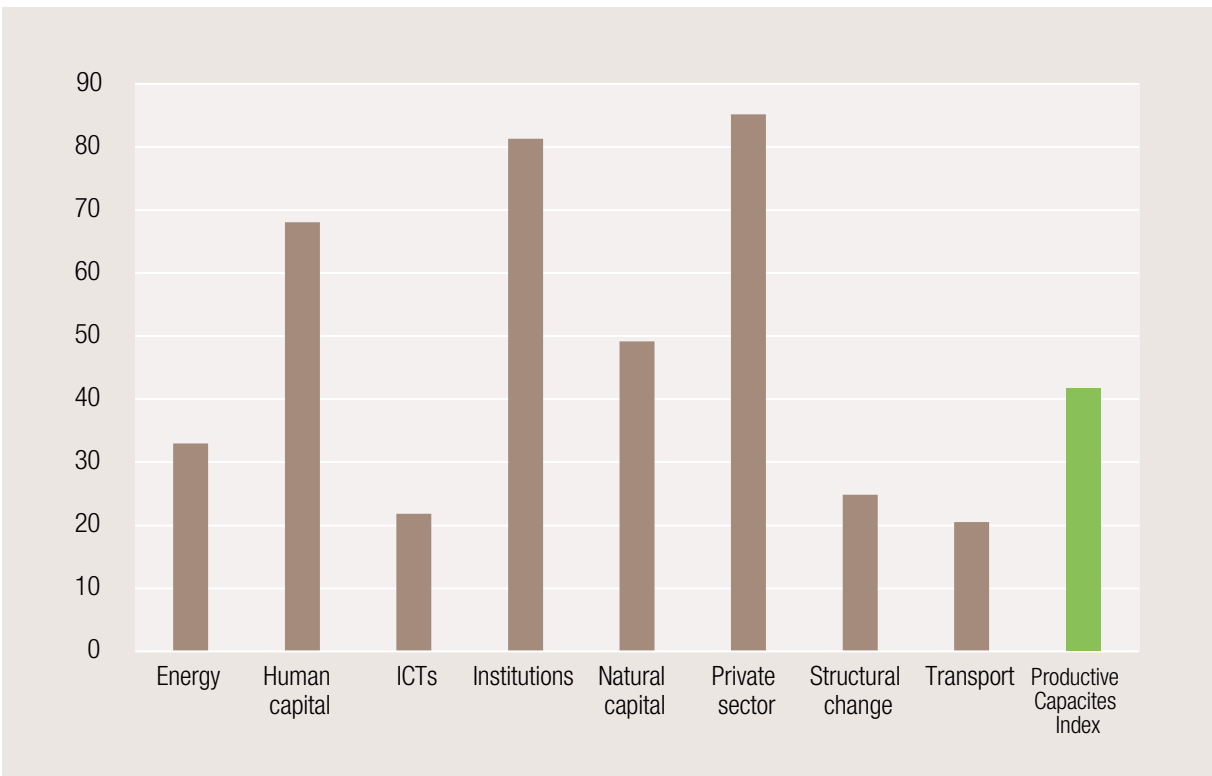
Source: UNCTAD calculations.

Figure 6. Transit country scores by category



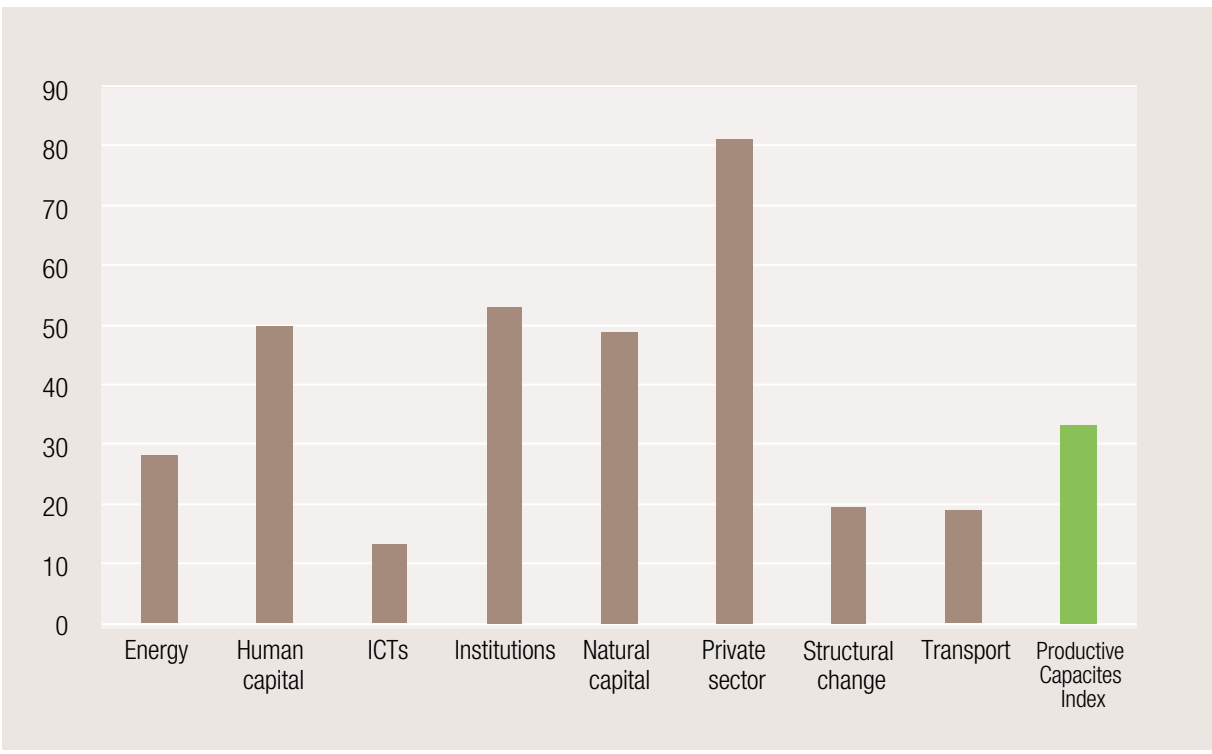
Source: UNCTAD calculations.

Figure 7. Developed economy scores by category



Source: UNCTAD calculations.

Figure 8. Other developing economy scores by category



Source: UNCTAD calculations.



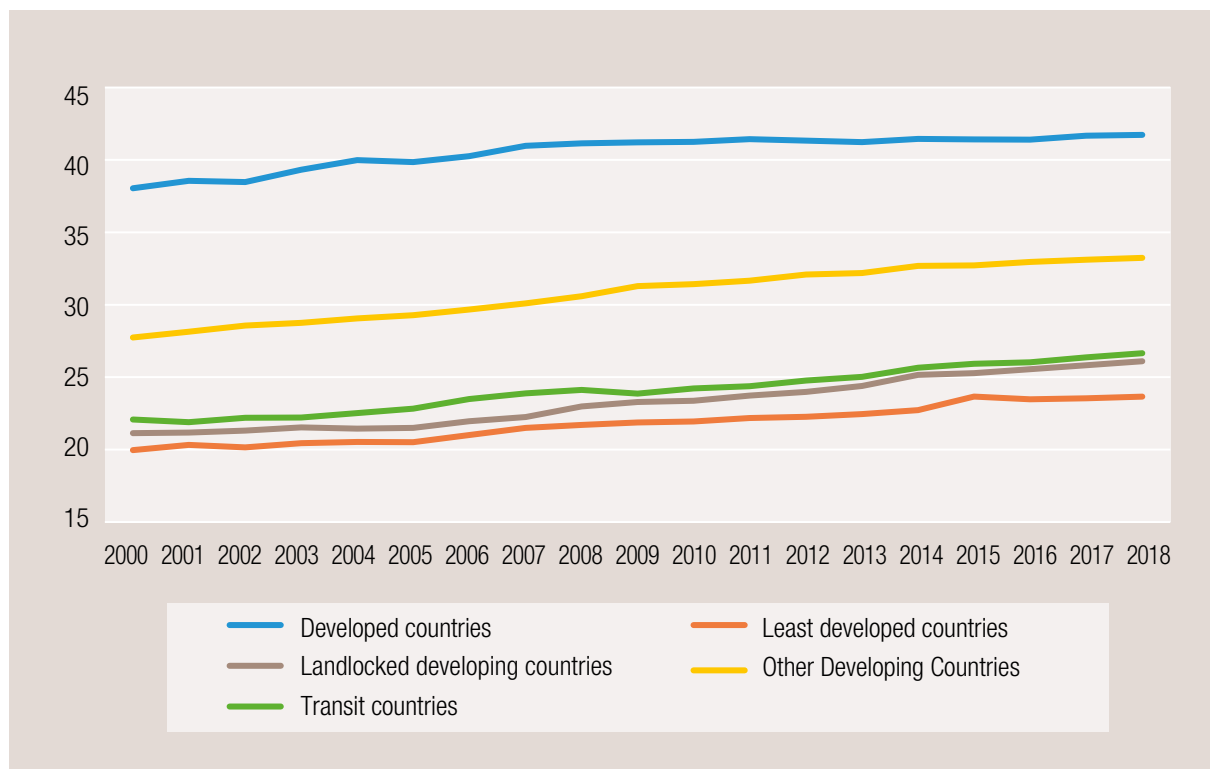
and human capital categories, followed by natural capital, energy and structural change. The lowest scores of developed economies are in the natural capital category. The widest intragroup variations among developed economies are in the energy, institutions and transport categories.

The level of productive capacities in other developing countries is higher than that in landlocked developing countries and transit countries. The categories in which the scores are highest are the private sector, institutions, human capital and natural capital. In contrast to the other two country groups, natural capital is one of the categories in which the average level of productive capacities is among the lowest (49.90). This is a result of the diversity among developing countries in terms of the indicators used to measure natural capital. A cross-category comparison of the performance of landlocked developing countries, transit countries and other developing countries reveals the extent to which landlocked developing countries lag behind. The group has the lowest average score in all but one category (natural capital). Other developing

countries have relatively high average scores in all but one category (natural capital). Notwithstanding the differences, landlocked developing countries, transit countries and other developing countries share some similarities in cross-category performances, notably with regard to their scores in the categories of ICTs, institutions and structural change, which are the lowest compared with the scores of developed economies.

With regard to differences across groups, a comparison of the scores of country groups shows that the least developed countries and landlocked developing countries are at the bottom of the ranking (figure 9). The performance of other developing countries is also lower than the average of developed countries. Developed countries have higher average scores in seven of the eight categories and are lower in only one category compared with developing countries, namely, the natural capital category, in which developed countries have a relatively low score and developing countries a comparatively strong score. Similarly, developing economies in East Asia

Figure 9. Evolution of scores by country group



Source: UNCTAD calculations.

perform higher than the global average in all eight categories. Their performance is almost equal to that of developed countries in the energy, ICTs, private sector and structural change categories. Of note, however, transit countries perform better than the average of the least developed countries and landlocked developing countries but slightly lower than that of other developing countries. One area in which developed and developing countries converge is the private sector category. The improvements are largely driven by advanced developing economies, notably in Asia, which raise the average performance of developing economies to that of developed economies, in particular with regard to the following scores, all of which are closer to the average score of developed economies in the private sector category: Hong Kong (China), 94.93; Singapore, 92.52; Republic of Korea, 91.34; China, 86.21; Macao (China), 84.95. Moreover, several other developing economies, such as Bahrain, Mauritius, Panama, Qatar, South Africa, the United Arab Emirates and Bermuda also have higher scores in the private sector category than the average score of

developing economies. However, the productive capacities of developing economies as a group, in particular in the energy, ICTs, structural change and transport categories, appear to lag behind compared with productive capacities in the other categories.

How have Productive Capacities Index scores evolved in the past two decades? The gaps in average scores across and between the different groups in the period are clear. However, it is encouraging to note that, overall, there was a general upward trend or improvement among the groups, although to different degrees. The trends also show a commonality among the groups of countries, namely, a steeper rise in the first half of the period and a more moderate increase in the second half. The tapering of Index growth appears to begin in 2008, the year of the onset of the global financial crisis of 2008/09. This pattern was the most pronounced in developing countries, among which the average score increased by almost four points in the period 2000–2008, but by only three points in 2009–2018.



PRODUCTIVE CAPACITIES IN
LANDLOCKED DEVELOPING
COUNTRIES

Background

There are significant development-related challenges associated with being landlocked, yet they are not insurmountable. Some of the most successful economies are landlocked, such as Luxembourg and Switzerland, and success stories are not limited to developed countries. For instance, Botswana, one of the three case studies presented in this chapter, is an example of a landlocked developing country that has seen considerable economic progress, although it continues to face significant challenges in diversifying or transforming the economy. However, landlocked developing countries frequently appear towards the bottom of rankings on socioeconomic development. For instance, according to World Development Indicators data, in 2016, the median GDP per capita (purchasing power parity) of landlocked developing countries was \$3,557, which was higher than that of the least developed countries (\$2,130) but below that of all developing countries (\$7,845). With regard to economic complexity, in 2019, the median landlocked developing country ranked 94 out of 133 economies³. Also in 2019, landlocked developing countries were among the bottom three of the 163 countries in the Social Progress Index, with the median landlocked developing country at 117⁴.

Which factors help explain the performance of the group of landlocked developing countries? Being landlocked, notwithstanding the success stories, often implies greater trade costs that, in turn, dampen the integration of an economy into the global economy. In particular, the lower cost of maritime transportation compared with transportation by land implies greater-than-average transport costs for landlocked developing countries. Clearly, this can have a dampening impact on imports as well as exports, with negative consequences for consumer welfare, competitiveness, access to markets and participation in regional and global value chains. Another factor that can compound the challenges related to being landlocked is dependence on neighbours for transit. Issues such as time and cost to cross borders, the state of infrastructure in neighbours with maritime transport access and political relations with neighbours can weigh heavily

on prospects for economic growth and sustainable development.

Being “landlocked with bad neighbours” is one of the four poverty traps identified in Collier (2007). In addition to a lack of direct maritime transport access, most landlocked developing countries face another significant challenge, namely, that of commodity dependence. A significant reliance on commodities, or the natural resources trap, is also highlighted in Collier (2007). For instance, in 2011–2018, primary commodities accounted for more than half of exports in 26 of the 32 landlocked developing countries and resource-based goods, that is, primary goods and resource-based manufactures, accounted for some three quarters of all exports of goods and services of landlocked developing countries as a group. There are five potential problems associated with commodity dependence. First, the prices of commodity exports are on a long-term falling trend compared with the prices of manufactured goods (Prebisch–Singer hypothesis). Second, commodities are subject to greater and more frequent price volatility than other types of goods. Third, an abundance of natural resources is more prone to lead to rent-seeking behaviour than abundance in other sectors, which can result in greater corruption and weaker governance. Fourth, exports can become less internationally competitive as a result of the Dutch disease phenomenon (see UNCTAD, 2013). Finally, the transport cost for high-volume and low-value primary commodities is higher than that for transformed or value-added products, irrespective of the distance transported or mode of transport.

As discussed in the present study, productive capacities have a key role to play in poverty reduction, economic progress, inclusive growth and sustainable development. With regard to the specific challenges faced by landlocked developing countries, productive capacities can have a direct impact on the trade costs arising from being landlocked and commodity dependent, as all three elements of productive capacities, namely, productive resources, entrepreneurial capabilities and production linkages, have a bearing on these issues. Trade costs, for instance, are intimately related to the development of key categories of productive capacities such as energy, ICTs, institutions, structural change and transport.

³ see <http://atlas.media.mit.edu/en/>.

⁴ see <http://www.socialprogressimperative.org/>

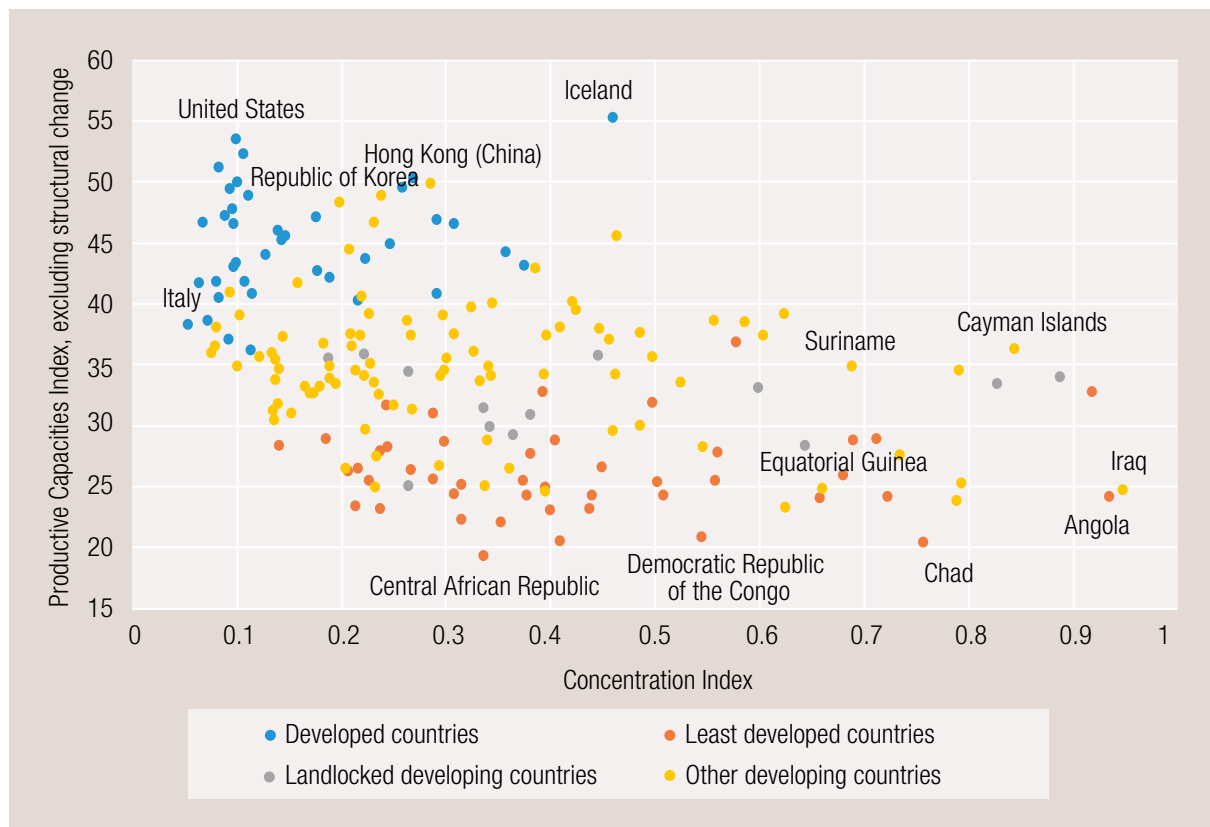
Moreover, commodity dependence can be diminished by building productive capacities that increase diversification and advance structural transformation. Economic diversification and structural transformation are closely interrelated and recognized as two crucial components of poverty reduction, inclusive economic growth and development (see McMillan and Rodrik, 2011, and UNCTAD, 2006). As discussed in UNCTAD (2006), both features are intimately connected with the building of productive capacities and structural change is one of the core processes that spur the development of productive capacities; the other two are capital accumulation and technological processes. All three processes are closely interrelated and the relationship is mutually reinforcing; causes and consequences can go in both directions, for instance, as seen in the positive impact of strengthened productive resources on diversification and structural change. The Productive Capacities Index captures some of this process; a higher score is associated with a lower degree of

product concentration (figure 10). Economies with a higher Merchandise Export Concentration Index score and that are highly vulnerable to external economic shocks are characterized by a low Productive Capacities Index score and vice versa. The Index is therefore valuable, as it indicates the relationship between productive capacities and concentration and structural change.

Productive capacities by category

Table 4 and figure 11 provide further information on the level of productive capacities in landlocked developing countries. The overall average Productive Capacities Index score of landlocked developing countries (26.1) is one of the lowest among the comparable groups. The minimum score within the group is 17.14 and the maximum is 33.32. The overall average score of the group is only slightly higher than that of the least developed countries (24.04), despite significant variations in

Figure 10. Correlation with the Merchandise Export Concentration Index ($\rho = -0.43$)



Source: UNCTAD calculations.

Table 4. Summary statistics by category, landlocked developing economies

	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
Minimum	13.24	26.53	3.7	19.13	41.55	37.97	5.19	8.39	17.14
Twenty-fifth percentile	16.56	37.44	5.95	33.55	56.24	54.06	13.66	11.91	23.51
Median	21.88	41.76	7.51	40.66	59.38	69.48	15.62	13.66	26.1
Mean	22.14	41.32	8.4	40.83	60.22	64.54	15.32	13.36	26.1
Seventy-fifth percentile	27.17	46.61	9.81	46.73	63.4	73.12	17.75	14.59	29.4
Maximum	34.18	52.53	16.75	70.34	85.12	81.54	20.57	21.74	33.32
Standard deviation	6.11	6.71	3.5	12.07	8.61	12.07	3.7	2.62	4.33

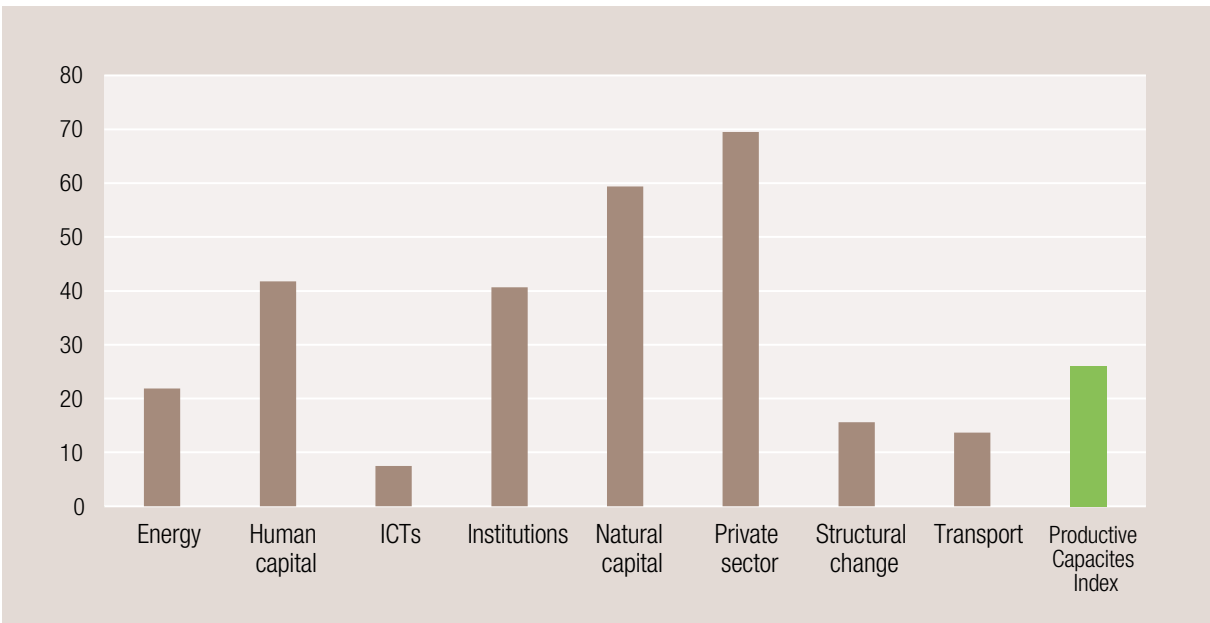
Source: UNCTAD calculations.

income levels between the two groups. Moreover, the two groups have an average score above the other groups in only one of the eight categories, namely, natural capital. Similarly, in the seventy-fifth percentile, the Index score of landlocked developing countries is above 60 in only two categories, namely, the private sector (73.1) and natural capital (63.4). Within the group, the dispersion is the highest in the institutions and private sector categories. North Macedonia is the top ranked landlocked

developing country in the latter category, at 81.5, and has an Index score of 33.32, which is similar to the average score of other developing countries. Among landlocked developing countries, scores in the ICTs, transport and structural change categories are low even compared with those of other developing countries.

Landlocked developing countries frequently perform poorly in cross-country rankings that relate to socioeconomic development (figure 11).

Figure 11. Landlocked developing economy scores by category



Source: UNCTAD calculations.

The results of the Productive Capacities Index are no different, with the group of landlocked developing countries scoring lower than other developing countries both overall and in each of the eight categories except for natural capital. Only five landlocked developing countries, namely, Armenia, Azerbaijan, Kazakhstan, North Macedonia and the Republic of Moldova, have Index scores that are close to or slightly higher than the global median (32.14). Landlocked developing countries in particular appear to lag behind global scores in the human capital, ICTs, institutions, private sector, structural change and transport categories. Productive capacities in natural capital are the notable exception, with 30 out of the 32 landlocked developing countries having scores in this category above the global median (51.62). This level of productive capacity in natural capital, in combination with the low score in the structural change category, is a reflection of the high level of commodity dependence in many landlocked developing countries.

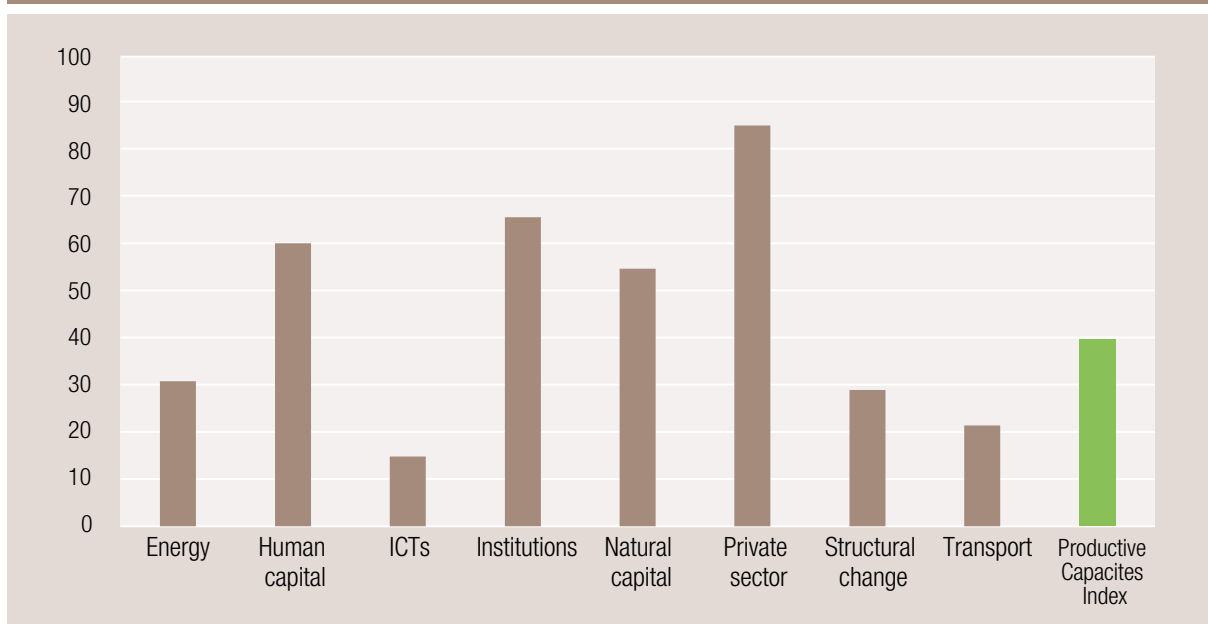
Evolution of Productive Capacities Index scores

As noted in chapter II, the evolution of Productive Capacities Index scores in country groups since

2000 consists of two parts, namely, faster growth in the period 2000–2008 and slower growth in the period 2008–2018. This pattern seems to fit the performance of other developing countries as a group but appears less applicable to the development of productive capacities in landlocked developing countries and transit countries. In the period 2000–2018, the overall Index score of landlocked developing countries was lower than that of transit countries and other developing countries. There was a greater increase in the score of the latter two groups in the first half compared with in the second half, but the difference between the two scores was less pronounced. The dip in 2008 and 2009 in the overall Index score of all groups is a reflection of the impact of the global financial crisis, as well as the economic crisis, following which the trend was a fairly steady improvement in productive capacities, although the levels were far lower than the average score of developed economies. The pandemic is expected to adversely affect the overall performance of developing countries, in particular the least developed countries, landlocked developing countries and transit countries.

A sharp contrast emerges when comparing developing economies in East Asia with different groups of developing countries (figure 12). The former are, by far, the best performers among

Figure 12. Developing economies in East Asia scores by category



Source: UNCTAD calculations.

developing countries with regard to Index scores. The average score of developing economies in East Asia is 39.99, which is higher than the global average score (32.12) and converges towards the average score of developed countries (41.82). Developing economies in East Asia perform above the global average score in all eight categories. As a group, their performance nearly equals that of developed economies in energy, ICTs, the private sector and transport, which are among the main drivers of productive capacities and structural transformation.

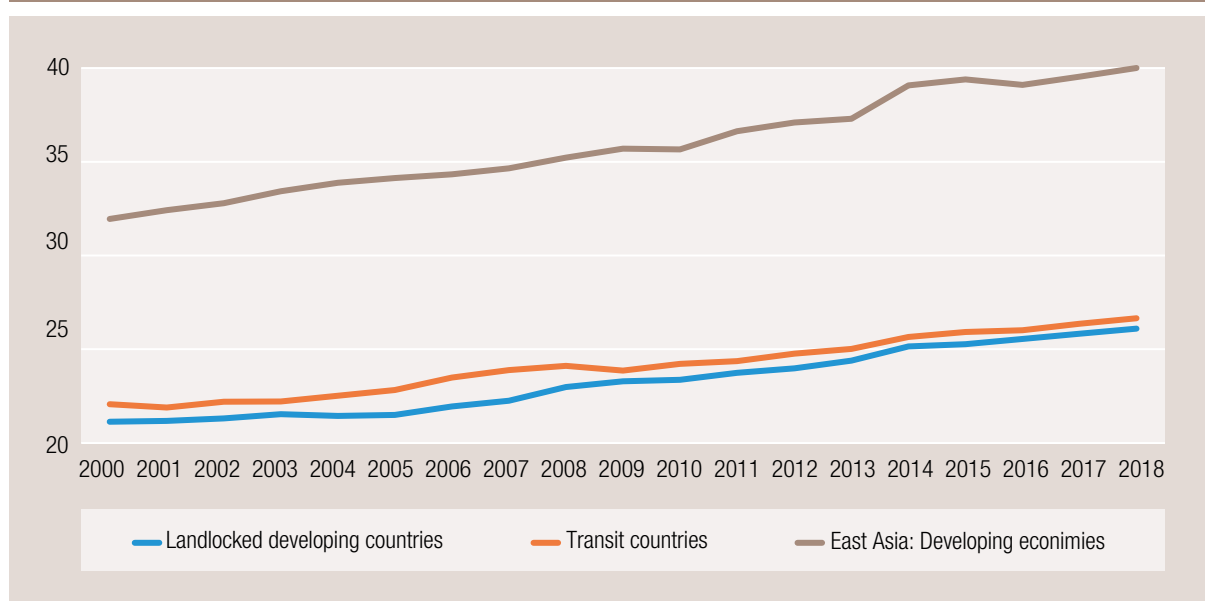
The progress observed in East Asia occurred in a relatively short period of time and is in line with the transformational growth and development observed in the region in the last five to six decades (figure 13). Two critical policy lessons can be drawn from the performance of developing economies in East Asia. First, fostering productive capacities and structural transformation is a possibility for developing countries as a whole, including the least developed countries and landlocked developing countries, given the right development framework. Second, without fostering productive capacities and structural transformation, it is difficult to achieve sustainable and inclusive growth and development.

Overall performance of landlocked developing countries

Landlocked developing countries share a set of common challenges based on their lack of access to the sea, namely, greater trade-related costs and a reliance on neighbours for transit. Moreover, they are heavily dependent on a few commodities. Building productive capacities is key to overcoming such challenges. However, landlocked developing countries on average have low Productive Capacities Index scores and rank on average at 142. In 2018, landlocked developing countries had an average score of 26.1, below the global average score (32.12) and lower than the average of developing economies in East Asia (39.99), as shown in figure 14.

In 2018, landlocked developing countries had a higher than average score in only one of the eight categories (natural capital), compared with the global average score and the average score of developing economies in East Asia (figure 15). Scores lower than the global average score were observed in all of the other categories. There was considerable variation among landlocked developing countries, with several scoring above the global average with regard to energy, human capital and the private sector. However, across these three categories,

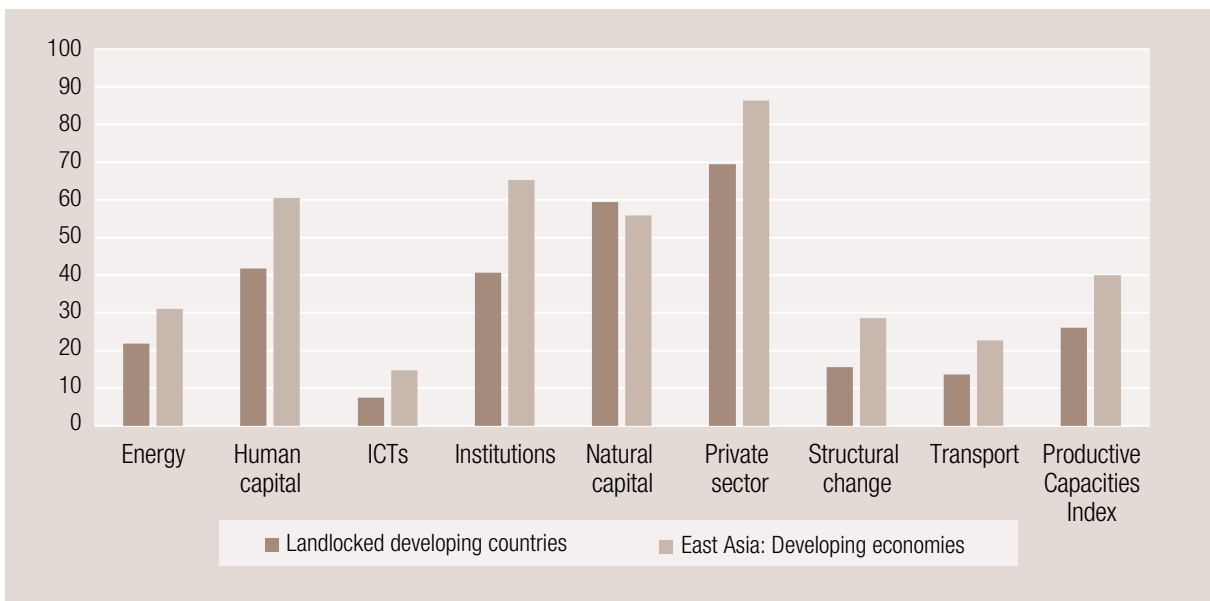
Figure 13. Evolution of scores in landlocked developing economies, transit countries and developing economies in East Asia



Source: UNCTAD calculations.



Figure 14. Landlocked developing economies and developing economies in East Asia scores by category

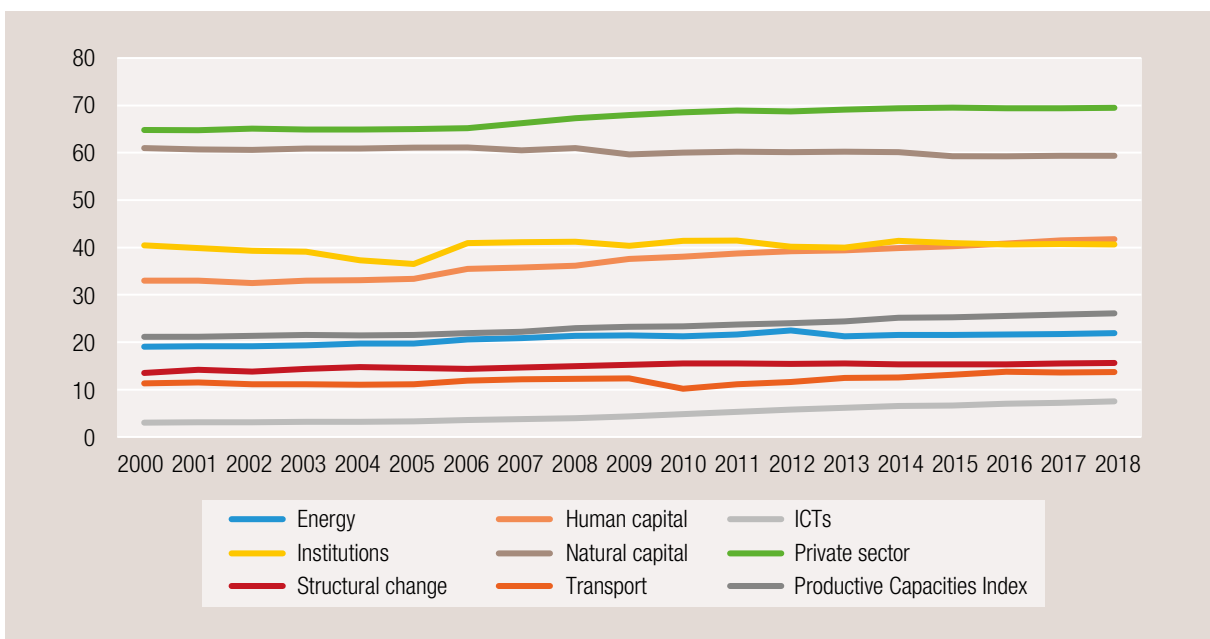


Source: UNCTAD calculations.

landlocked developing countries scored lower than other developing countries and developing economies in East Asia. In the period 2000–2018, the average score of landlocked developing countries rose from 21.14 to 26.1. Encouragingly, the score increased steadily over the period, even after the onset of the global financial crisis of 2008/09, suggesting that productive capacities

have continuously improved. This improvement is largely attributed to the relative rise in the scores in two categories, namely, ICTs and human capital. The score in the former category picked up from the lowest levels in early 2001 and the rise was largely driven by the increase in mobile telephone subscriptions. The scores in the other categories remained fairly constant.

Figure 15. Evolution of scores in landlocked developing economies by category



Source: UNCTAD calculations.

Country performance: Botswana

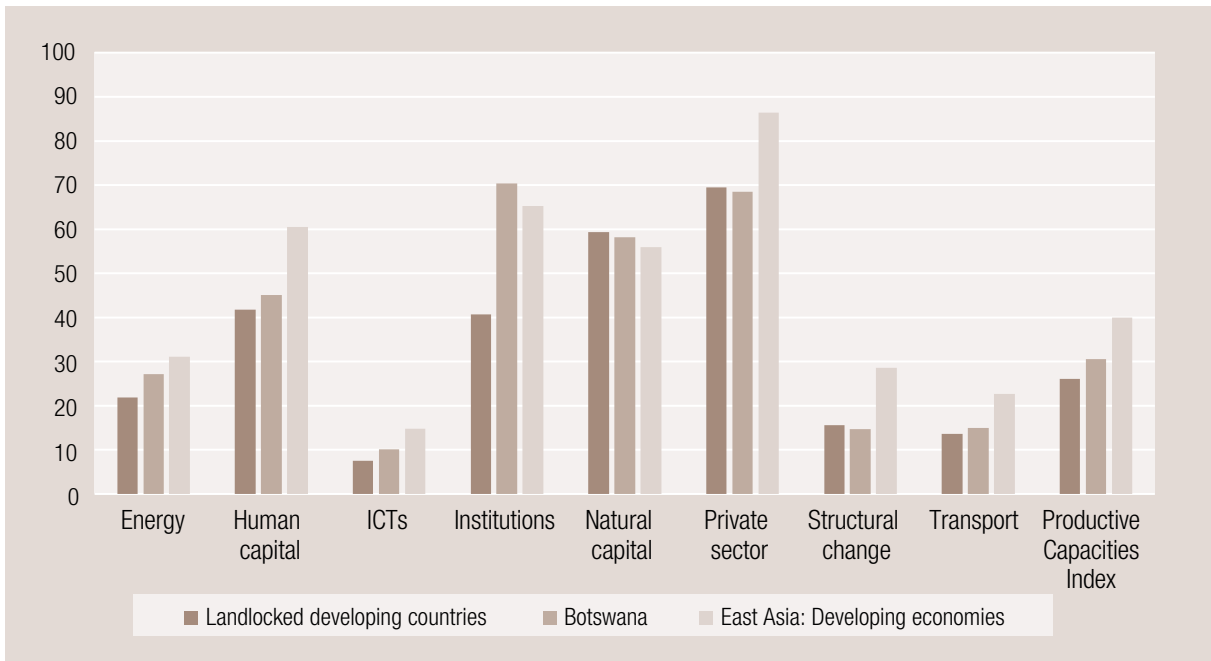
Botswana is a success story among landlocked developing countries and has had one of the highest GDP growth rates in the developing world in the past 50 years. However, the country continues to face several challenges, not least of which is a high level of reliance on the export of a single commodity (diamonds). Botswana ranks at 116 on the Productive Capacities Index, performing better than other landlocked developing countries in Africa, Central Asia and Latin America but lagging behind others, such as Armenia and the Republic of Moldova (figure 16). Compared with landlocked developing countries in Asia, Botswana performs better than all countries in this group except Mongolia (94) and ranks slightly above Kazakhstan (118).

In 2018, Botswana had a Productive Capacities Index score of 30.59, which was above the average score of landlocked developing countries

(26.1) but below the global average score (32.12) and the average score of developing economies in East Asia (39.99). The overall score of Botswana was boosted by strength in institutions, natural capital and the private sector. In contrast, productive capacities related ICTs, structural change and transport were weaker (figure 17).

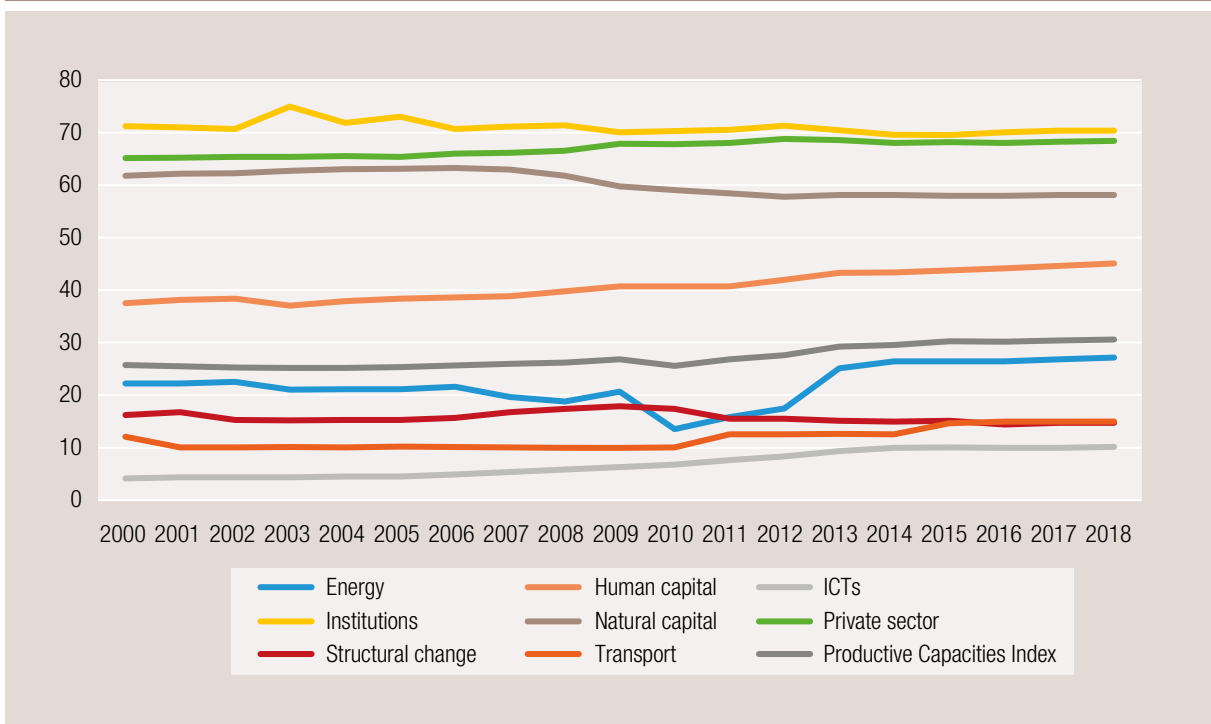
In the period 2000–2018, the scores related to energy, human capital and ICTs showed significant growth rates or improvement and the private sector category also followed similar trends. As a result, the overall Index score of Botswana rose from 25.75 in 2000 to 30.59 in 2018. The scores in the other categories did not greatly change in the same period. In three categories the scores dipped slightly, namely, institutions, natural capital and structural change. The dip in the natural capital category was the result of the closure or suspension of copper mines and streamlining or rationalization of diamond operations by the Government.

Figure 16. Developing economies in East Asia, Botswana and landlocked developing economies scores by category



Source: UNCTAD calculations.

Figure 17. Evolution of scores in Botswana by category



Source: UNCTAD calculations.

Country performance: Lao People's Democratic Republic

The Lao People's Democratic Republic has been one of the world's continuously improving economies in the recent past. Consequently, it is on track to graduate from the least developed country category by 2024, following the 2021 review. The building of productive capacities in the country is reflected in improvements in energy, ICTs and transport, as well as positive trends in economic diversification from agriculture and forestry that has led to an industry and services-driven economy. However, primary commodities still make up some four fifths of the export basket. The Lao People's Democratic Republic ranks at 138 on the Productive Capacities Index. In 2018, the country had a score of 27.12, which was lower than the global average, the average score of landlocked developing countries and the average score of developing economies in East Asia, but higher than the average score of the least developed countries, at 24.04 (figure 18).

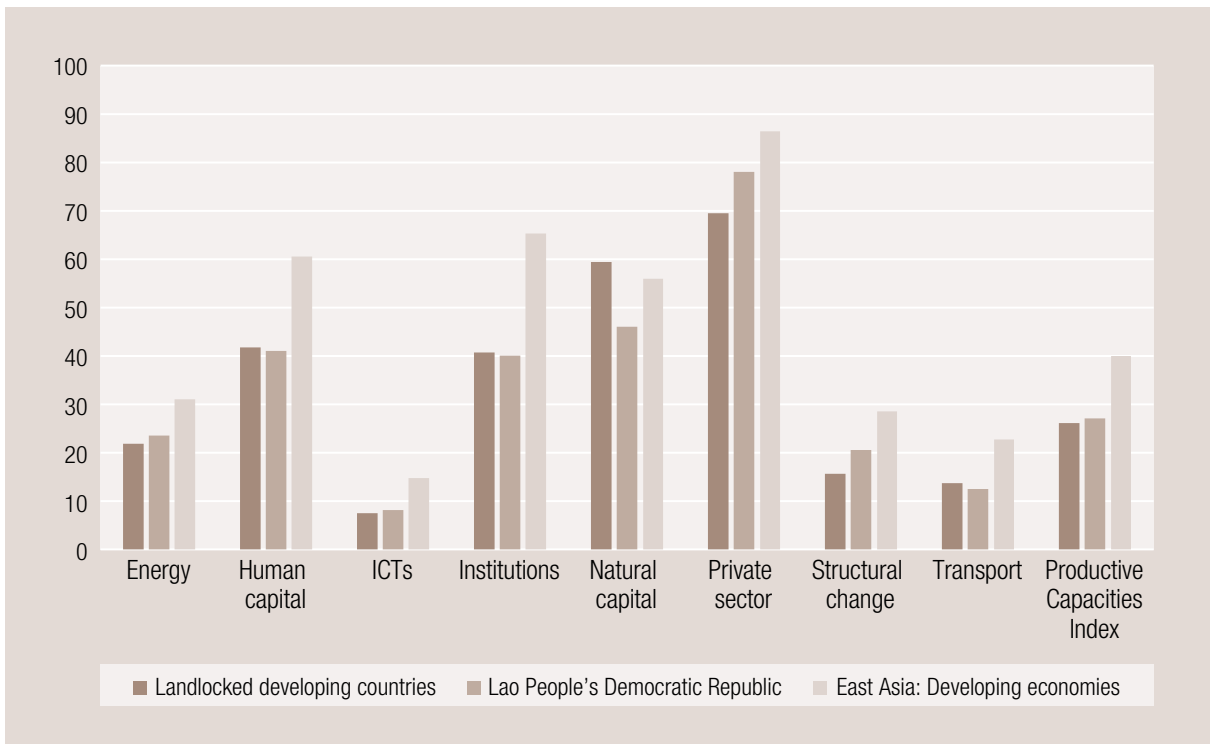
In 2018, the Lao People's Democratic Republic performed well within the landlocked developing

countries group with regard to the categories of energy, natural capital, the private sector and structural change (figure 19). However, the score was dragged down by low scores in the ICTs, institutions and transport categories. The scores in the ICTs and transport categories were low despite improvements in these areas over the years. The overall low level of productive capacities in the Lao People's Democratic Republic suggests that the fostering of productive capacities should be addressed, as key elements in achieving inclusive growth and sustainable graduation from the least developed country category.

In the period 2000–2018, the overall Index score of the Lao People's Democratic Republic rose from 20.42 to 27.12. Productive capacities appear to have improved in several categories, in particular, human capital, ICTs, the private sector and structural change. The score with regard to institutions also increased, notwithstanding a drop near the start of the period. The only category for which the score did not greatly rise was transport. However, the Government is focusing on addressing transport-related challenges.

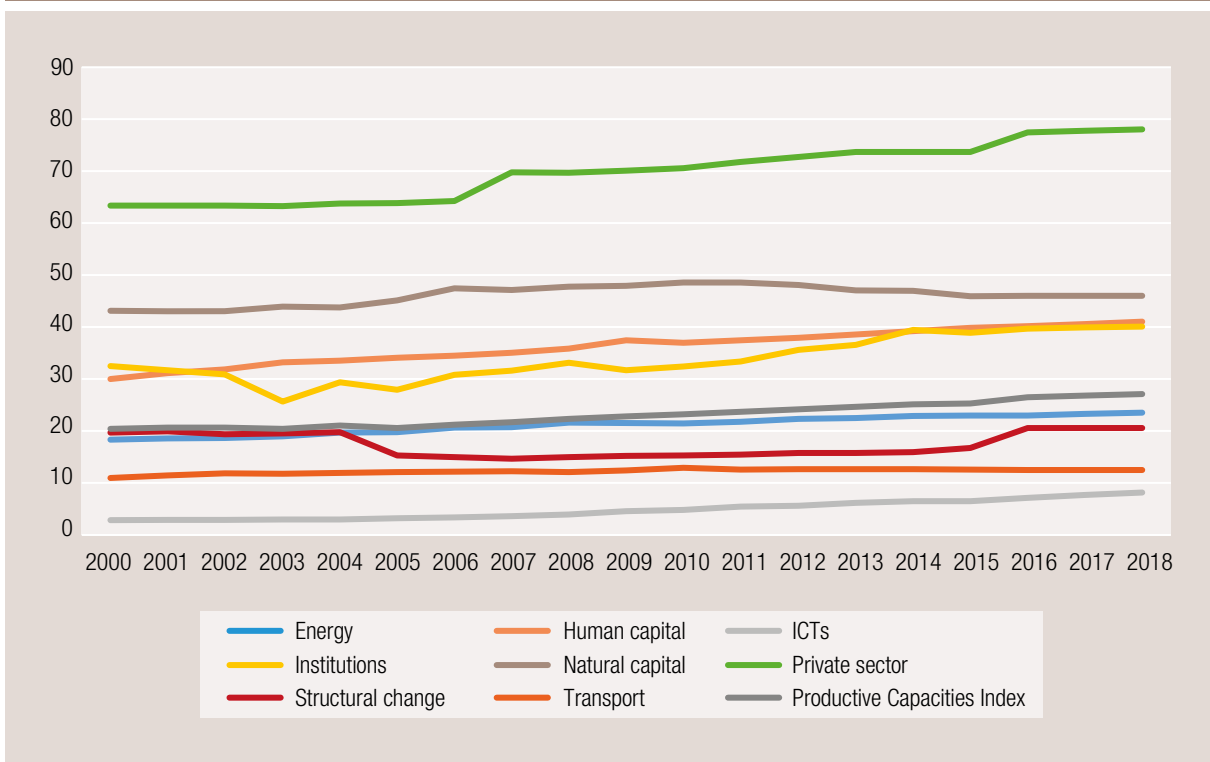


Figure 18. Developing economies in East Asia, the Lao People's Democratic Republic and landlocked developing economies scores by category



Source: UNCTAD calculations.

Figure 19. Evolution of scores in the Lao People's Democratic Republic by category



Source: UNCTAD calculations.

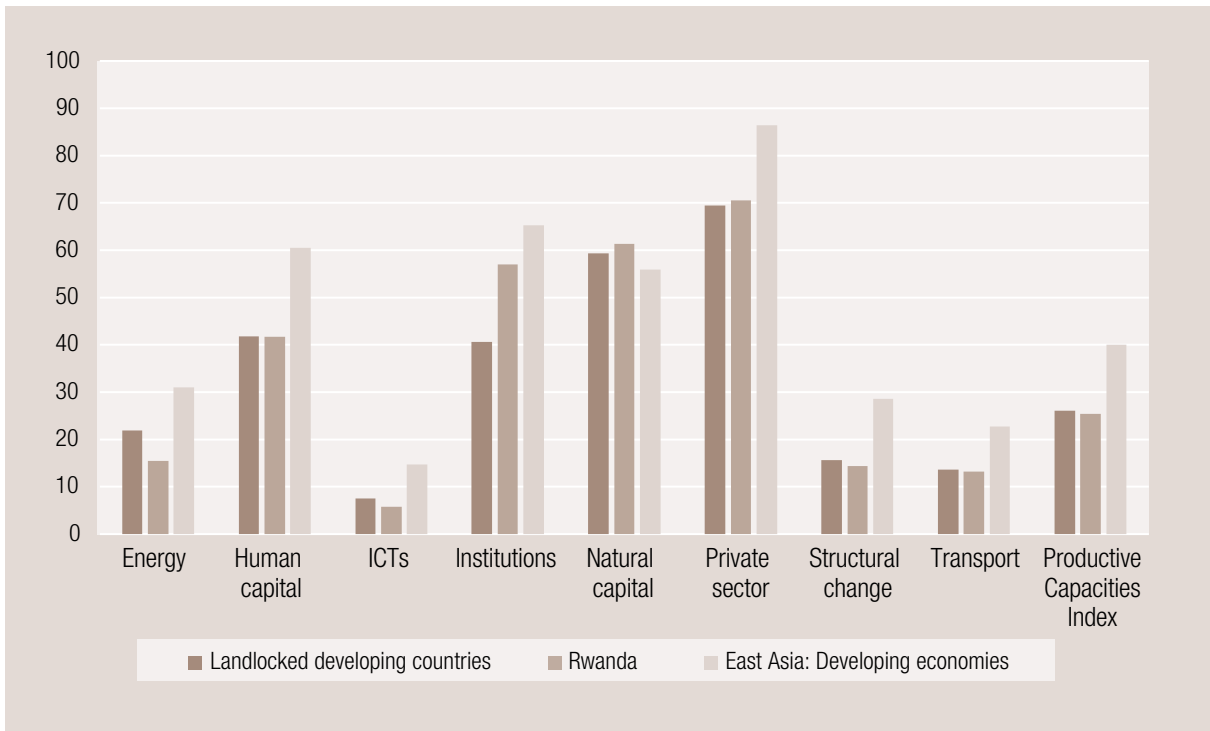
Country performance: Rwanda

The economy of Rwanda has been one of the fastest growing in sub-Saharan Africa since 2000, with an annual average GDP growth rate of 7.8 per cent. Fostering productive capacities and enhancing inclusive and employment-led growth remains a priority. Some four fifths of exports are comprised of primary commodities, with minerals and agricultural products making up the bulk of exports. Rwanda ranks at 150 on the Productive Capacities Index and is one of the best performers in sub-Saharan Africa after Botswana. In 2018, Rwanda had a score of 25.42, which was lower than the global average score and slightly lower than the average score of landlocked developing countries, but higher than the average score of the least developed countries (figure 20).

Rwanda outperformed the least developed countries and the landlocked developing countries in the institutions, natural capital and private sector categories. However, the Index score was lowered by, in particular, weak productive capacities in energy, ICTs, structural change and transport (figure 21).

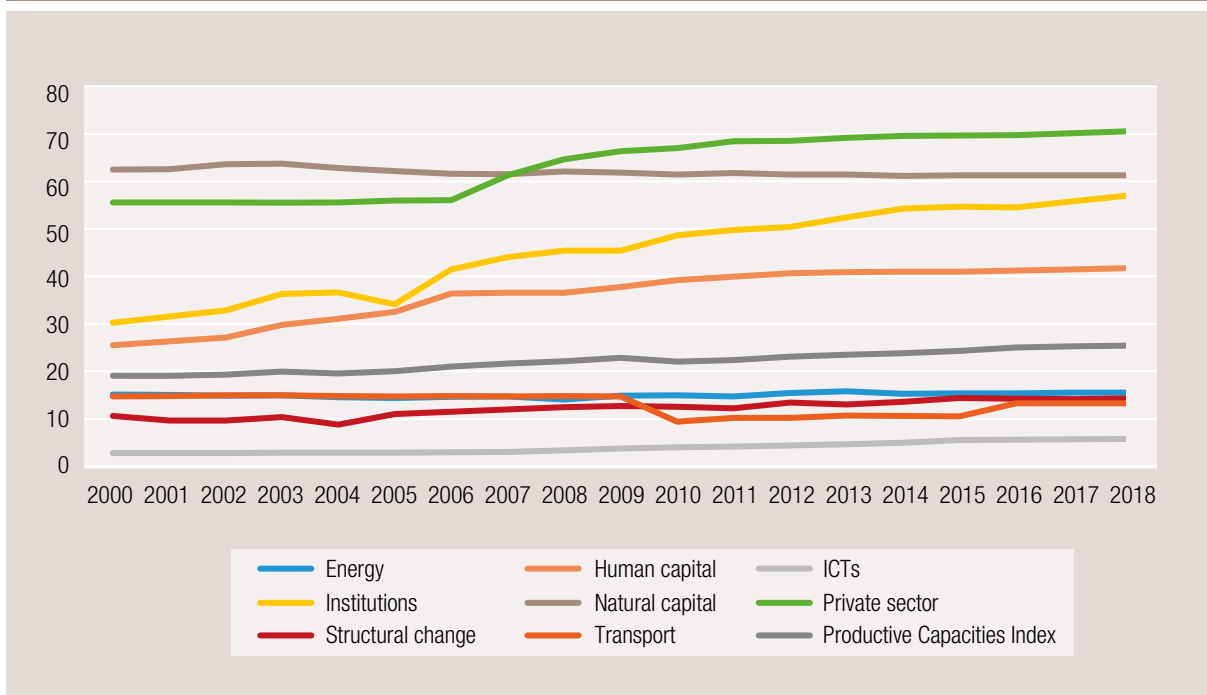
In the period 2000–2018, the overall Index score of Rwanda rose from 19.09 to 25.42. This growth is mainly attributed to the expansion of productive capacities in human capital and, since 2006, institutions and the private sector. Scores in three categories remained at roughly the same level throughout the period, namely, energy, natural capital and transport.

Figure 20. Developing economies in East Asia, Rwanda and landlocked developing economies scores by category



Source: UNCTAD calculations.

Figure 21. Evolution of scores in Rwanda by category



Source: UNCTAD calculations.



CONCLUSION AND POLICY RECOMMENDATIONS

The building of productive capacities is a key strategy in accelerating structural transformation, promoting inclusive economic growth and achieving sustainable development. Only by advancing their productive resources, entrepreneurial capabilities and production linkages can economies enhance their abilities to grow and develop and reduce their vulnerabilities to external shocks, whether economic, political or health-related shocks. The COVID-19 pandemic reveals not only the systemic interconnectedness and interdependence of countries, but also the socioeconomic fragility and inequality within and between countries. As shown in the present study, overall weak performances in human capital, ICTs and institutions make countries more vulnerable to unexpected external shocks such as the pandemic and their impact on socioeconomic performance, further compounding difficulties in containing the virus and addressing the related impacts on development.

In the absence of a global coordinated response to the socioeconomic impact of the pandemic, the precarity of structurally weak and vulnerable economies will be further accentuated, leaving millions behind. Preliminary assessments of the impact of the pandemic on flows of trade, investment and development finance, as well as on poverty trends, indicate that developing countries, in particular countries in Africa, the least developed countries and landlocked developing countries, will be significantly affected. Most of these countries are now less likely to achieve the Sustainable Development Goals by 2030.

In this context, the importance of productive capacities for development has been recognized by the international community, which has taken steps to put the building of productive capacities at the centre of development policies and strategies. An essential part of developing productive capacities is to be clear about where one is and where one should be going. This requires the level of productive capacities to be assessed and measured by using quantifiable indicators. This is a challenging task for two principal reasons. First, the concept of productive capacities is nebulous and the types of indicators that should be included in its measurement are not always clear. Second, even if there is agreement on the indicators to be covered, there are additional challenges in finding reliable,

consistent and internationally comparable data for each indicator used and for every country and year.

UNCTAD, through the development of the Productive Capacities Index, is among a handful of institutions that have taken on the challenge of measuring productive capacities. The Index is the first of its kind in its comprehensiveness, scale and scope. The overall level of productive capacities has been assessed for 193 economies by using 46 indicators in the eight categories of structural change, human capital, natural capital, energy, ICTs, transport, institutions and the private sector. The result is the creation of a composite multidimensional global index that summarizes the state of productive capacities in economies worldwide.

The results of the Index are in many ways, as expected. Developed countries are primarily positioned towards the top of the ranking, followed by the best-performing developing economies in East Asia, and developing countries are lower down. Similarly, with regard to geographical comparisons, many economies in Asia and Latin America have higher Index scores than economies in Africa and the levels of productive capacities among landlocked developing countries are among the lowest of the groups analysed, other than the least developed countries. The average scores of both landlocked developing countries and the least developed countries are below the global averages in seven of the eight categories, except that for the natural capital category, and also below the scores of other developing countries, developing economies in East Asia and transit countries. The only area in which the least developed countries and landlocked developing countries score better than the other comparable groups is in the natural capital category. This means that if landlocked developing countries rich in natural resources capture the rents from such resources in development, they may be in a particularly favourable position to build productive capacities and initiate the process of structural transformation.

Specific priorities in building productive capacities need to be assessed on a case-by-case basis and determined by country-specific conditions and circumstances. Policy interventions, incentives and international support mechanisms aimed at fostering productive capacities need to be

elaborated and articulated based on country-specific opportunities, comparative advantages and binding constraints. This should include the active involvement of non-State actors such as the domestic private sector and civil society and robust support from the international community. The Index indicates that there are particular categories in which landlocked developing countries could strengthen productive capacities, namely, institutions, the private sector and structural change. The cross-category comparison shows that these are the categories in which landlocked developing countries often have the lowest scores and in which these countries as a group have the lowest performance on average compared with all other groups. Moreover, the results of the analysis suggest that most landlocked developing countries also have weak productive capacities in energy, human capital, ICTs and transport. Addressing challenges and limitations identified through the Index requires holistic, multisectoral and systematic approaches to development interventions. This requires a new generation of trade and development policies that place the fostering of productive capacities and structural transformation at their centre. Only by doing so can developing countries achieve inclusive economic growth and sustainable development that is resilient to external shocks such as the impact of the COVID-19 pandemic.

In this regard, the UNCTAD manual *Building and Utilizing Productive Capacities in Africa and the Least Developed Countries: A Holistic and Practical Guide*, which draws on the experiences of successful economies in East Asia, can provide a blueprint that can be adapted to the specific conditions and circumstances of individual countries or groups of countries. A starting point may be to build entrepreneurship and entrepreneurial capabilities, as a basis for a dynamic domestic private sector that learns, innovates and adopts new technologies and new production systems. This can be done on the basis of principles that support and challenge firms at the same time. It can also be achieved through policies that contribute to building effective and mutually supportive public-private partnerships, including through constructive government and private sector relationships.

Enhancing the role of the private sector can also begin by addressing demand-side and supply-side constraints undermining the development of

domestic small and medium-sized enterprises in landlocked developing countries. For instance, policies aimed at alleviating demand-side constraints should involve close interaction between small and medium-sized enterprises and financing institutions including, among others, Governments, development banks and the private financial sector. However, addressing demand-side challenges alone, although important, cannot solve all of the problems faced by small and medium-sized enterprises in landlocked developing countries and other vulnerable economies. There is a need to align demand-side and supply-side policies to ensure that positive impacts on small and medium-sized enterprises are maximized.

Similarly, addressing the gaps and limitations observed in the energy, human capital, ICTs and institutions categories should be linked to implementing other sectoral policies and strategies. That is, sectoral policies such as investment policies should be closely aligned with an overarching national development strategy and with specific industrial policy objectives. This should include the provision of smart and targeted incentives for investors, with a clear understanding of the costs and benefits of such incentives. If incentives aim to promote investment in infant industries, they should be timebound and conditional on performance, to help increase competitiveness, generate quality jobs and engagement in exports with an agreed modality of monitoring and enforcement. Moreover, the choice of sectors in which to attract foreign and domestic investors should reflect the long-term vision for the structural transformation of an economy towards higher value-added activities. The choice of sector should also be based on an assessment of existing resource endowments or comparative advantages and productive capacities, with a clear plan for how they are to be fostered.

In landlocked developing countries, manufacturing and industrialization processes, as well as structural transformation efforts, are undermined by challenges related to energy supplies, breakdowns and outages. Landlocked developing countries that are rich in energy resources such as hydroelectricity, fossil fuel or renewable energy sources, do not perform well in the energy category. Moreover, energy supply restrictions, such as electricity rationing and water shortages, hamper productive capacity development, industrialization and



manufacturing in several landlocked developing countries. It is critical that these countries enhance their capacities to use energy in production and transformation processes. In this context, landlocked developing countries are encouraged to make efforts to implement the blueprint provided by UNCTAD on how to build and utilize productive capacities.

With regard to improving scores in the human capital category, Governments need to prioritize educational spending to meet present and future skills needs in their economies. This requires enhancing public and private spending on education at all levels, with a particular focus on building a skilled workforce capable of supporting the fostering of productive capacities and structural transformation. In most cases, this is likely to involve a focus on science, technology, engineering and mathematics in secondary and higher education, as well as targeted technical and vocational skills development. Such efforts should also include aligning technical and vocational training programmes with private and public sector demand and with the needs of the economy as a whole. It is critical that Governments develop coherent strategies aimed at providing an adequate supply of skilled workers to priority sectors. Governments should also strive to scale up efforts to provide access to quality and affordable health-care services, including in rural or remote areas, as a healthy population and a well-trained, productive workforce is key for transformational development centred on fostering productive capacities. Given the impact of the pandemic on societies and economies in the short term, Governments need to step up expenditures on health and health-care systems. This may include a shift of scarce resources away from addressing development needs towards dealing with the pandemic. However, such actions, and enhanced investment in health, can lay a foundation for improving human capacities for inclusive growth and development.

In fostering technological progress and improving scores in the ICTs category, it is critical to advance the productive utilization of such technologies by businesses and economic sectors, rather than simply ensuring access. Developing institutional capacities and research and development capabilities, including through public–private

partnerships, is vital for economic growth and transformational development. The central function of institutions and research and development facilities is to identify and develop technologies, including ICTs, appropriate for the domestic context and to promote their transfer to local farms and firms. It is important for landlocked developing countries to enhance ongoing efforts to strengthen domestic institutions, not only to ensure accountability and transparency, but also to facilitate the fostering of productive capacities through the mobilization of private savings and the improvement of tax collection systems and by ensuring a balanced allocation of public resources across sectors that are critical for growth and development.

Boosting industrialization, in particular manufacturing as one of the possible avenues, can provide an important economy-wide dynamism through backward and forward linkages with other sectors, in particular agriculture. This requires addressing the gaps and limitations observed in the scores of landlocked developing countries in the areas of energy, ICTs, the private sector, structural change and transport. The experiences of developed countries and advanced developing countries indicate that Governments have an important role to play in inducing industrialization, enhancing the role of the manufacturing sector and fostering structural transformation. Therefore, it is crucial that the Governments of landlocked developing countries have a more proactive and catalytic function, to stimulate productive activities, including by creating enabling environments for business and investment. As in other developing countries, there is a strong case for fostering industrial policies in landlocked developing countries. This implies that Governments in these countries need to put in place deliberate policies to promote industrialization, not only through carefully designed industrial policies, but also by ensuring consistency and coherence between these and other sectoral, microeconomic and macroeconomic policies.

Another important category in which the performance of landlocked developing countries requires effective action is transport. This sector is key for their trade and production integration, at both the regional and global levels. It is vital for these countries to enhance their transport connectivity by modernizing and upgrading current

transport infrastructure. Such efforts should be complemented by modernizing trade logistics, trade facilitation and overall transit systems in collaboration with transit neighbours. Joint regional efforts to reduce transit time through corridor facilitation measures are also crucial, to improve export competitiveness and enhance the business attractiveness of landlocked developing countries.

With regard to the case studies in Botswana, the Lao People's Democratic Republic and Rwanda, the above-mentioned action areas are also relevant in their respective socioeconomic circumstances. At the country level, the Productive Capacities Index analysis suggests that Botswana could prioritize the development of productive capacities related to ICTs, structural change and transport; the Lao People's Democratic Republic could focus on building productive capacities related to ICTs, institutions, structural change and transport; and Rwanda could target the development of productive capacities related to ICTs, structural change and transport. Moreover, there is considerable scope for strengthening in the energy category.

Overall, the findings and policy implications of the Productive Capacities Index should be taken as a useful guide in improving development policies and strategies and not as a definite path for development efforts. In this regard, the above-mentioned areas for domestic intervention and policy action are critical, to foster productive capacities and structural transformation. However, domestic efforts alone are

not adequate to address the gaps and limitations revealed by the Index. Actions and interventions at the domestic level need to be supported and complemented by new and robust international support measures from the development and trade partners of landlocked developing countries and other vulnerable economies. Such support measures should go beyond the confines of official development assistance, market access support and project-oriented technical assistance, to include building vital infrastructure and bridging the digital divide through the transfer of technology and know-how, as well as building technological capabilities and innovation in these countries. Such efforts are key, to foster productive capacities and structural transformation for inclusive growth and sustainable development. It is critical for development and trade partners to pursue fiscal and trade-related policies that are conducive to the development of structurally weak and vulnerable economies. Stimulus packages by developed countries for their firms and farms, to mitigate the impact of the pandemic on their economies, should not put at a disadvantageous position the already weaker private sectors and traditional agricultural sectors in structurally weak and vulnerable economies, such as those in Africa, the least developed countries and landlocked developing countries. Finally, there is also an urgent need to scale up financial support to such economies, aimed at assisting them to deal with the pandemic and its indirect effects on trade and development.



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ANNEXES

Annex 1. Productive Capacity Index global ranks and scores by category, 2018

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
178	Afghanistan	26.57	37.01	5.33	19.13	57.64	40.82	16.65	14.58	22.12
102	Albania	24.55	53.68	12.45	55.09	50.43	81.82	17.32	15.58	31.65
133	Algeria	29.15	51.90	11.25	35.47	54.22	77.94	16.23	8.52	27.76
23	Andorra	29.24	56.20	17.10	63.23	52.93	87.31	40.21	28.48	41.85
177	Angola	22.77	35.89	4.99	32.18	51.94	65.58	12.33	10.54	22.16
85	Argentina	29.75	55.38	16.49	50.41	55.34	73.51	21.86	11.65	33.03
96	Armenia	28.33	48.10	13.13	48.47	57.08	78.71	20.09	14.61	32.16
19	Australia	36.19	78.22	23.64	91.26	57.92	89.25	21.84	15.69	42.59
15	Austria	33.56	80.28	25.97	88.82	44.54	85.34	29.24	20.25	43.97
119	Azerbaijan	29.58	46.83	14.40	39.94	58.87	72.21	15.21	13.51	30.22
51	Bahamas	24.25	51.59	17.63	69.53	38.76	80.47	17.97	34.90	36.28
39	Bahrain	39.22	54.08	20.14	53.35	50.10	84.62	20.21	27.57	39.03
140	Bangladesh	25.30	44.69	6.68	37.74	58.07	72.74	16.50	13.59	26.85
40	Barbados	25.13	53.27	22.32	77.76	49.40	79.80	21.59	23.90	38.40
66	Belarus	31.76	51.73	22.05	41.68	48.07	77.72	22.08	15.72	34.39
12	Belgium	35.01	81.34	23.92	83.70	50.08	84.33	29.83	23.32	44.98
69	Belize	24.48	46.78	9.60	48.24	40.11	77.85	18.94	60.59	34.26
163	Benin	17.20	37.97	6.03	46.85	51.61	77.35	15.09	9.39	23.84
120	Bhutan	22.37	46.53	9.22	63.28	41.55	73.86	16.66	21.74	30.11

Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
129	Bolivia (Plurinational State of)	27.91	47.22	8.99	40.77	53.00	77.64	19.31	13.34	29.08
88	Bosnia and Herzegovina	28.20	54.12	14.21	47.83	50.23	80.21	22.04	14.76	32.86
116	Botswana	27.16	45.09	10.15	70.34	58.15	68.46	14.71	14.96	30.59
100	Brazil	26.91	57.85	14.21	51.74	45.25	75.94	23.07	11.21	31.69
58	Brunei Darussalam	37.13	50.75	14.90	68.71	38.48	82.22	16.81	22.92	35.19
59	Bulgaria	30.25	58.98	15.74	59.52	52.01	80.05	24.38	13.55	35.09
183	Burkina Faso	14.41	32.83	5.98	46.50	61.77	67.04	10.76	8.39	21.70
188	Burundi	14.82	36.61	4.47	25.55	67.55	66.33	9.88	12.72	20.79
108	Cabo Verde	23.90	45.87	10.97	66.63	46.96	82.10	18.06	15.75	31.11
142	Cambodia	19.88	43.53	7.76	38.22	47.08	81.31	15.14	16.15	26.46
166	Cameroon	21.66	38.23	6.98	33.25	47.92	74.72	15.85	8.81	23.60
20	Canada	37.64	72.66	23.83	92.76	42.68	80.75	25.23	19.50	42.30
192	Central African Republic	16.61	28.13	3.70	20.93	56.14	53.32	11.58	9.03	18.06
193	Chad	13.24	29.68	4.41	24.11	60.20	39.59	5.19	14.42	17.14
49	Chile	30.75	56.64	15.10	81.78	54.53	86.89	20.91	15.14	36.61
33	China	31.05	60.53	14.75	46.08	55.96	86.40	34.22	31.03	40.00
8	Hong Kong SAR	34.21	65.48	29.87	87.54	42.17	94.93	25.43	32.53	45.81
36	Macao SAR	28.47	48.80	25.33	74.82	46.84	85.93	17.38	31.92	39.46
91	Colombia	29.69	53.49	13.22	51.52	49.45	75.10	20.00	15.31	32.45



Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
156	Comoros	22.25	40.23	4.95	37.74	57.61	76.47	10.49	17.34	24.60
180	Congo	15.37	37.81	6.03	31.56	48.26	55.99	15.53	12.08	22.06
56	Costa Rica	27.94	57.31	15.25	69.45	44.45	81.72	19.78	20.60	35.48
159	Côte d'Ivoire	20.97	34.24	8.25	42.69	54.88	75.64	13.91	8.68	24.43
50	Croatia	28.91	58.58	18.67	64.41	46.05	81.54	24.59	16.68	36.48
115	Cuba	27.39	55.18	7.68	44.18	52.68	74.94	20.00	19.07	30.62
34	Cyprus	32.17	57.62	23.23	76.74	46.02	89.70	22.71	20.34	39.80
27	Czechia	33.32	67.39	22.42	76.76	51.25	80.96	26.41	19.88	41.27
190	Democratic Republic of the Congo	14.29	32.40	4.16	28.87	53.02	61.24	14.37	9.28	19.85
7	Denmark	32.69	88.38	24.29	94.09	54.69	91.68	26.51	23.32	46.12
134	Djibouti	21.73	41.56	5.55	37.01	59.74	78.48	19.08	19.17	27.41
70	Dominica	24.41	47.43	15.85	69.33	43.37	81.18	16.05	25.72	34.15
92	Dominican Republic	29.64	46.78	11.41	51.28	48.63	82.13	20.00	18.96	32.45
106	Ecuador	29.31	54.63	11.48	44.20	46.50	76.74	17.22	18.82	31.38
125	Egypt	29.47	47.22	9.80	35.05	51.43	81.37	20.39	13.67	29.39
93	El Salvador	27.75	47.16	10.43	50.00	58.09	81.90	21.14	17.81	32.42
170	Equatorial Guinea	21.83	35.14	6.41	24.61	42.01	70.45	16.02	16.07	23.47
185	Eritrea	19.71	30.42	3.14	18.95	67.84	65.43	17.83	17.01	21.64

Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
30	Estonia	32.15	64.03	23.24	82.70	43.36	87.14	24.08	19.17	40.26
135	Eswatini	21.39	42.44	7.11	41.39	56.28	73.99	19.58	14.60	27.40
169	Ethiopia	16.42	37.58	5.89	34.92	61.04	67.27	13.07	13.80	23.53
101	Fiji	27.55	49.00	9.84	53.43	43.05	83.85	19.33	20.45	31.67
24	Finland	35.38	85.89	21.97	95.15	36.52	87.79	24.52	18.70	41.81
14	France	34.91	66.38	20.44	94.70	52.82	85.07	28.70	25.92	44.36
146	Gabon	24.24	40.58	9.90	39.08	41.19	71.80	14.74	12.63	26.01
155	Gambia	17.95	35.30	7.89	37.40	52.45	79.73	14.69	11.71	24.61
75	Georgia	29.00	54.14	14.44	67.69	47.33	84.94	20.31	13.89	33.89
5	Germany	34.47	78.07	27.65	90.71	49.46	85.13	35.62	25.09	47.38
139	Ghana	23.60	38.98	9.03	55.21	58.65	75.74	13.90	9.69	26.90
44	Greece	31.04	67.97	20.88	58.28	52.56	80.39	22.80	17.26	37.91
65	Grenada	23.69	52.19	15.37	64.64	42.57	81.77	19.83	24.20	34.60
130	Guatemala	24.69	43.14	9.94	42.29	49.25	75.79	20.20	14.43	28.91
165	Guinea	15.66	34.37	5.79	34.76	72.46	76.01	14.66	11.21	23.66
111	Guyana	26.54	43.34	10.21	50.07	54.24	81.33	15.44	20.95	30.94
176	Haiti	9.89	37.91	5.16	28.96	59.84	74.69	13.52	19.33	22.49
131	Honduras	19.82	45.03	7.86	40.79	47.75	79.59	18.97	18.54	28.04
38	Hungary	30.56	61.62	20.21	64.25	53.10	81.07	24.77	21.10	39.13



Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
3	Iceland	44.58	78.81	32.56	88.35	49.64	84.88	17.96	36.56	47.96
112	India	24.36	45.98	7.80	49.56	56.08	76.08	25.93	17.36	30.90
121	Indonesia	27.88	44.99	9.07	51.64	50.45	81.64	22.32	11.95	29.94
114	Iran (Islamic Republic of)	31.73	52.32	15.51	35.82	58.72	78.08	16.73	11.13	30.69
175	Iraq	22.28	40.55	7.19	22.65	59.12	54.35	13.62	11.84	22.92
9	Ireland	35.14	72.36	21.30	87.12	55.44	83.85	22.75	37.07	45.54
31	Israel	33.78	84.52	20.67	73.30	49.61	83.89	22.66	16.72	40.20
53	Italy	28.62	66.79	16.61	60.59	46.39	77.61	23.84	17.06	35.99
89	Jamaica	25.30	48.36	11.86	57.87	49.49	77.72	17.69	22.46	32.63
10	Japan	34.14	79.57	25.16	86.31	37.48	90.25	40.67	21.83	45.29
110	Jordan	29.42	51.28	13.44	53.70	50.45	84.11	21.76	8.51	31.01
118	Kazakhstan	33.58	47.47	15.47	45.72	69.54	52.88	17.36	10.34	30.48
148	Kenya	18.70	41.72	7.02	42.00	56.99	74.54	16.47	11.93	25.73
132	Kiribati	25.40	46.22	5.89	57.23	51.62	80.78	9.28	24.30	27.94
74	Kuwait	38.20	48.30	13.48	50.93	60.36	83.15	16.96	16.50	33.98
136	Kyrgyzstan	24.39	45.91	9.48	37.48	63.69	52.73	17.37	13.58	27.37
138	Lao People's Democratic Republic	23.54	41.04	8.17	40.09	46.01	78.05	20.57	12.51	27.12
43	Latvia	30.41	55.76	18.48	73.83	43.96	84.75	24.30	20.58	37.96
78	Lebanon	30.27	50.89	16.71	38.23	55.43	81.07	23.02	16.27	33.68

Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
128	Lesotho	20.31	39.63	7.54	49.74	85.12	72.92	19.07	14.59	29.15
172	Liberia	14.35	39.41	5.56	37.94	61.31	75.26	14.71	10.76	23.31
162	Libya	19.80	47.23	9.47	10.10	60.90	76.01	17.79	15.77	24.16
42	Lithuania	28.29	59.92	18.25	77.38	49.27	85.16	23.42	18.65	38.04
4	Luxembourg	42.02	66.96	30.57	94.03	49.34	86.34	24.92	30.80	47.62
179	Madagascar	18.75	35.12	4.20	38.66	63.73	76.55	15.14	7.20	22.10
171	Malawi	16.77	42.13	4.61	45.35	58.73	69.67	13.12	11.49	23.44
62	Malaysia	32.54	58.08	14.26	63.06	42.08	89.26	21.84	15.94	34.94
72	Maldives	28.50	56.26	14.81	46.59	50.21	76.62	14.82	29.19	34.13
187	Mali	16.11	31.51	6.17	37.35	61.71	69.31	8.27	9.54	21.11
26	Malta	33.13	62.52	29.46	79.93	51.72	85.40	19.02	21.98	41.62
113	Marshall Islands	27.55	50.10	7.50	51.95	45.88	81.36	13.69	28.82	30.71
174	Mauritania	21.50	35.86	6.28	37.27	69.29	74.01	15.32	5.49	22.98
46	Mauritius	31.39	51.06	16.76	73.73	50.73	87.48	21.30	20.40	37.39
95	Mexico	29.45	51.34	12.70	49.05	51.44	81.71	23.51	12.34	32.18
94	Mongolia	28.77	47.41	9.47	54.91	83.29	70.34	16.11	17.68	32.29
83	Montenegro	26.17	53.06	17.18	56.35	40.82	82.58	19.44	16.92	33.24
117	Morocco	28.06	51.13	10.74	49.47	57.94	86.05	19.35	10.20	30.51
167	Mozambique	17.17	34.59	5.55	34.74	55.95	76.64	15.35	12.72	23.59



Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
158	Myanmar	21.22	42.50	7.83	41.97	49.06	78.27	14.56	7.80	24.49
123	Namibia	20.98	44.68	9.33	61.71	57.01	77.71	19.40	12.29	29.48
143	Nepal	18.29	46.23	7.84	39.92	52.26	70.57	15.90	14.83	26.32
2	Netherlands	35.19	75.97	31.04	93.31	53.84	88.36	31.88	24.90	48.22
18	New Zealand	33.17	71.77	24.34	97.44	48.09	91.54	21.88	20.60	42.77
109	Nicaragua	22.84	49.87	8.98	41.85	53.32	80.47	18.08	25.87	31.03
189	Niger	14.84	26.53	4.55	40.56	68.02	58.32	10.44	8.76	20.08
184	Nigeria	20.26	33.11	6.67	31.79	59.41	74.43	11.15	6.88	21.65
82	North Macedonia	26.91	52.53	14.96	53.44	52.05	81.54	20.23	15.65	33.32
25	Norway	30.93	69.44	20.06	91.79	43.84	87.97	27.74	21.42	41.65
64	Oman	36.84	46.38	13.33	60.10	60.23	87.23	18.32	15.59	34.60
151	Pakistan	24.75	36.59	5.88	32.66	56.46	77.75	17.84	11.84	25.17
80	Palau	32.04	43.31	14.56	60.32	31.92	78.97	15.54	32.81	33.45
60	Panama	29.32	48.59	13.88	58.53	42.08	85.22	23.07	23.97	35.08
152	Papua New Guinea	21.78	34.47	5.02	41.83	45.53	75.55	15.67	17.78	24.97
127	Paraguay	27.19	49.77	10.15	46.07	54.97	73.65	17.53	11.64	29.16
98	Peru	28.81	49.64	11.03	53.29	47.58	82.63	20.33	16.00	31.91
122	Philippines	27.86	43.99	10.35	47.07	51.26	81.01	20.02	12.82	29.88
35	Poland	32.22	61.13	20.29	72.25	50.77	81.34	27.89	18.36	39.65

Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
37	Portugal	30.32	69.77	21.68	78.49	47.91	85.75	26.27	14.85	39.37
29	Qatar	47.11	49.58	17.37	67.22	51.26	83.88	19.08	34.41	40.81
11	Republic of Korea	35.57	89.13	30.21	72.89	39.28	91.85	28.56	24.26	45.21
87	Republic of Moldova	26.03	51.84	16.75	46.15	59.89	76.51	19.30	14.78	32.87
67	Romania	29.66	52.07	15.03	51.51	53.42	80.13	23.88	15.68	34.30
76	Russian Federation	33.83	60.72	17.99	38.30	45.75	76.84	22.03	15.73	33.85
150	Rwanda	15.49	41.73	5.76	57.03	61.31	70.55	14.35	13.25	25.42
77	Saint Lucia	24.69	50.37	12.86	68.22	44.44	81.26	18.22	23.93	33.84
71	Saint Vincent and the Grenadines	24.58	49.98	15.01	68.88	39.99	83.03	17.93	24.43	34.14
103	Samoa	26.94	46.62	7.40	66.94	39.71	83.76	18.42	25.70	31.54
48	San Marino	26.51	47.27	18.67	62.37	44.17	85.32	23.71	25.04	36.66
141	Sao Tome and Principe	19.56	43.72	7.17	48.42	46.70	75.81	16.27	15.23	26.73
63	Saudi Arabia	37.98	53.40	13.74	50.07	68.51	81.89	16.87	16.04	34.73
144	Senegal	24.24	39.21	7.32	51.78	51.60	78.64	17.42	9.01	26.31
55	Serbia	28.26	61.50	17.16	57.26	52.39	79.61	22.74	16.10	35.65
54	Seychelles	26.99	46.31	17.14	62.03	32.88	79.45	17.78	42.56	35.68
186	Sierra Leone	13.49	39.56	6.69	39.93	63.17	76.09	6.95	10.02	21.62
13	Singapore	36.93	77.48	21.08	92.87	43.26	92.54	23.15	29.42	44.46



Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
45	Slovakia	32.97	60.84	17.86	72.15	47.00	80.14	23.03	17.36	37.48
32	Slovenia	32.97	71.83	21.02	76.25	41.91	80.52	25.79	20.04	40.05
145	Solomon Islands	21.24	39.97	5.55	46.91	44.71	81.05	13.46	20.68	26.21
191	Somalia	16.20	31.05	4.60	7.90	72.59	74.96	13.04	15.27	19.37
73	South Africa	29.35	49.78	11.33	59.71	63.70	81.86	23.55	14.90	34.05
157	South Sudan	16.04	37.00	6.29	39.09	63.31	69.65	14.34	14.47	24.58
28	Spain	31.64	68.14	20.92	73.55	49.12	85.51	29.43	19.55	41.02
105	Sri Lanka	27.81	47.36	10.07	52.07	49.16	80.61	20.77	16.78	31.44
181	Sudan	21.54	38.59	6.43	18.15	56.74	65.80	11.30	13.48	22.01
104	Suriname	29.63	45.80	14.20	52.86	36.82	72.93	15.84	22.59	31.54
17	Sweden	32.73	85.46	25.99	95.08	37.05	90.12	27.05	20.45	43.48
22	Switzerland	33.78	67.59	20.19	87.61	49.01	83.23	28.02	21.99	42.25
154	Syrian Arab Republic	27.96	36.92	8.54	10.15	60.76	76.96	23.18	14.14	24.67
168	Tajikistan	24.66	41.78	7.49	28.91	56.47	37.97	15.34	12.90	23.55
61	Thailand	30.01	55.87	13.60	49.08	50.45	88.75	26.14	17.14	34.99
126	Timor-Leste	25.18	41.45	7.83	55.60	45.01	76.29	16.34	21.15	29.28
182	Togo	8.20	39.50	6.10	39.43	70.77	79.27	14.73	8.08	21.85
86	Tonga	28.60	47.35	8.78	55.83	53.55	81.94	19.89	23.99	32.95
47	Trinidad and Tobago	41.23	48.12	16.85	57.64	45.60	79.03	19.84	23.77	36.68

Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
84	Tunisia	28.52	56.81	11.22	49.64	58.01	83.75	21.49	15.82	33.24
68	Turkey	29.89	56.82	12.67	44.03	53.13	83.78	24.90	18.22	34.29
147	Turkmenistan	34.18	40.47	9.70	22.82	63.06	52.05	13.83	14.47	25.88
79	Tuvalu	28.35	36.83	12.08	60.54	51.63	86.94	17.65	26.51	33.55
153	Uganda	17.04	38.48	5.98	41.95	63.87	70.30	16.77	12.00	24.91
90	Ukraine	29.97	53.18	13.24	38.38	60.56	75.06	21.57	16.16	32.63
21	United Arab Emirates	39.84	54.31	19.70	70.22	51.37	88.58	21.57	34.85	42.30
6	United Kingdom	33.10	71.73	26.80	89.24	56.05	89.39	31.58	23.03	46.18
161	United Republic of Tanzania	17.67	41.26	5.61	42.35	59.61	69.48	13.91	11.85	24.22
1	United States	38.21	78.83	24.43	83.41	48.70	91.80	33.84	45.60	50.51
52	Uruguay	27.98	55.44	18.95	74.09	61.27	80.02	20.44	13.08	36.05
137	Uzbekistan	29.54	45.56	11.95	29.44	63.79	50.23	14.05	13.96	27.18
124	Vanuatu	23.07	41.23	6.71	55.50	46.21	80.38	17.75	24.18	29.44
149	Venezuela (Bolivarian Republic of)	26.35	49.21	12.20	18.12	46.86	49.65	15.53	17.73	25.59
99	Viet Nam	27.36	50.93	11.53	47.72	51.67	86.71	20.07	14.84	31.71
173	Yemen	25.11	37.50	6.82	13.06	54.74	74.54	17.52	14.38	23.28
160	Zambia	18.02	38.75	6.58	47.44	56.93	54.59	15.20	11.59	24.24
164	Zimbabwe	17.91	38.41	7.06	27.80	53.73	54.30	18.41	13.74	23.70



Annex 1. Productive Capacity Index global ranks and scores by category, 2018 (cont.)

Rank	Economy	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
107	State of Palestine	28.27	45.85	11.72	42.79	54.89	75.26	21.20	16.36	31.34
57	Aruba	23.76	43.53	16.43	82.46	48.25	79.12	18.02	25.86	35.45
16	Bermuda	25.19	51.51	36.06	78.00	44.40	85.06	18.25	52.69	43.68
81	Cayman Islands	19.14	45.30	12.76	52.96	45.53	80.21	19.01	38.10	33.40
97	Curaçao	21.17	42.60	12.60	53.46	50.79	77.91	18.86	25.12	32.14
41	Guam	28.99	56.02	11.97	55.36	40.76	80.77	45.32	28.67	38.27

Abbreviation: SAR, Special Administrative Region.

Note: Landlocked developing countries are shown with shading. With regard to the ranking and Productive Capacities Index scores, small island developing States appear to perform better than other developing countries. However, this performance must be interpreted with caution and understood in the context of their unique geographical and structural characteristics. Due to their demographic features (small population) and smaller size and/or surface area, small island developing States perform better statistically when measured using indicators that utilize population-related or geographical ratios as units of measurement. An additional substantive reason for the better-than-expected performance of small island developing States compared with other developing countries is the relative shift of their economic activities towards the services sector, in particular financial intermediation and tourism and other intangible services.

Source: UNCTAD calculations.

Annex 2. Productive Capacities Index country group summary statistics by category

This annex presents summary statistics for developed countries, the least developed countries, other developing countries, developing economies in East Asia and transit countries. For the global summary statistics, see table 2 in chapter II, and for the landlocked developed economy summary statistics, see table 4 in chapter II.

Developed economies

	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
Minimum	25.19	47.27	15.03	51.51	36.52	77.61	17.96	13.55	34.3
Twenty-fifth percentile	30.52	61.06	20.16	73.04	44.5	81.49	23.32	18.58	39.31
Median	32.97	68.05	21.83	81.31	49.2	85.15	24.84	20.51	41.73
Mean	32.9	68.85	22.77	80.01	48.35	85.14	26.28	22.78	41.82
Seventy-fifth percentile	34.58	78.11	24.61	90.85	52.15	87.83	28.19	23.72	44.52
Maximum	44.58	88.38	36.06	97.44	57.92	91.8	40.67	52.69	50.51
Standard deviation	3.68	10.27	4.67	12.37	5.11	3.71	5.03	7.98	3.91

Least developed countries

	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
Minimum	8.20	26.53	3.14	7.91	41.55	39.59	4.10	5.49	17.14
Twenty-fifth percentile	16.07	35.21	5.08	33.46	51.79	67.15	12.68	10.28	21.93
Median	18.02	38.48	5.98	38.66	57.64	74.01	14.69	12.72	23.66
Mean	18.87	37.96	6.11	38.54	57.92	71.19	14.05	13.67	24.04
Seventy-fifth percentile	21.99	41.25	6.77	6.67	62.47	76.99	16.42	15.25	26.31
Maximum	28.35	46.53	12.09	63.28	85.12	86.94	20.57	26.51	33.55
Standard deviation	4.38	4.69	1.58	12.26	8.71	9.62	3.51	4.78	3.35



Other developing countries

	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
Minimum	15.37	33.11	5.02	10.10	31.92	49.65	11.15	6.88	21.65
Twenty-fifth percentile	24.41	45.30	9.60	44.03	45.25	76.74	16.96	14.14	30.51
Median	27.94	49.00	12.20	51.74	50.21	81.01	19.35	17.78	32.45
Mean	27.95	49.26	12.80	52.74	49.90	79.90	19.75	20.07	32.63
Seventy-fifth percentile	29.69	53.27	15.01	63.06	55.34	83.75	21.49	24.26	34.99
Maximum	47.11	89.13	30.22	92.87	68.51	94.93	45.32	60.59	45.81
Standard deviation	5.47	8.29	4.80	15.84	7.23	6.97	4.58	8.84	5.04

Developing economies in East Asia

	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
Minimum	28.66	47.41	9.47	46.08	37.48	70.34	16.11	17.68	32.29
Twenty-fifth percentile	28.77	49.88	13.59	54.91	39.28	85.85	26.14	21.83	37.13
Median	31.05	60.53	14.75	65.27	55.91	86.40	28.56	22.71	40.00
Mean	31.64	65.30	18.64	65.09	54.39	84.94	29.14	23.50	39.99
Seventy-fifth percentile	34.14	79.57	25.16	72.89	55.96	90.25	34.22	24.26	45.21
Maximum	35.57	89.13	30.22	86.31	83.29	91.85	40.67	31.93	45.29
Standard deviation	3.12	18.39	8.68	16.62	18.40	8.55	9.19	4.86	5.54

Transit countries

	Energy	Human capital	ICTs	Institutions	Natural capital	Private sector	Structural change	Transport	Productive Capacities Index
Minimum	8.2	30.42	3.141	7.905	42.01	61.24	11.15	6.88	19.37
Twenty-fifth percentile	19.98	36.94	6.049	34.924	51.62	74.59	14.82	9.47	23.66
Median	23.18	42.11	7.784	42.18	55.65	77.53	16.62	12.11	26.65
Mean	23.39	44.01	9.092	42.96	55.59	77.03	18.18	13.125	27.71
Seventy-fifth percentile	28.6	51.66	11.48	50.19	58.7	79.83	20.41	15.82	31.71
Maximum	31.73	60.53	18.95	81.78	72.59	88.75	34.22	31.03	40
Standard deviation	5.56	8.85	4.04	14.31	6.69	6.11	4.83	4.62	5.29

Source: UNCTAD calculations.

