CONNECTING SYSTEMS OF SECONDARY CITIES

How Soft and Hard Infrastructure Can Foster Equitable Economic Growth among Secondary Cities

Cities Alliance
Cities Without Slums

UKaid
from the British people

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Cover Photographs:
Top left: Lightrail construction in Addis Abeba, Cities Alliance 2014
Middle right: Roads and wind farm in Hawassa, Cities alliance 2014
Bottom left: Medellin Metrocable station, Cities Alliance 2008

Abstract

Systems of secondary cities play a vital intermediary role as economic, administrative and logistics hubs within national and global systems of cities. They have three basic spatial typologies: regional hubs, metropolitan clusters, and corridors. The pattern, rate of development, and role of systems of secondary cities are changing rapidly in response to urbanisation, globalisation, structural economic change, new technologies, and the rapid development of transport and communications systems. These changes have resulted in a growing gap and inequities in sub-national regional economic development, income, wealth, investment, and employment opportunities within systems of secondary cities. Closing the gap has become a significant challenge for governments. Much of the literature on the development of secondary cities has tended to focus on enhancing the competitiveness of infrastructure, industry clusters, and enabling environments; however, there has been a tendency to overlook the importance of external factors: connectivity, networks, and collaboration, which significantly affect the performance of systems of secondary cities. This book seeks to address this knowledge gap. It examines ways secondary cities can work more collaboratively to improve their development prospects, lift prosperity, and leverage public resources to support equitable and sustainable sub-national economic growth and development. It outlines ways governments and other stakeholders within systems of secondary cities can invest strategically in public goods and services, improve connectivity, develop networks, and leverage common user facilities, infrastructure, and resources at different geographic levels to support inclusive, equitable, and sustainable development.

KEY WORDS:

Secondary Cities, Connectivity, Equitable Economic Growth,
Hard and Soft Infrastructure Networks, Collaboration

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Abbreviations and Acronyms

ADB	Asian Development Bank
AI	Artificial Intelligence
ASEF	Asia Europe Foundation
BRI	One Belt One Road or Belt and Road Initiative
CA	Cities Alliance
CEDS	City Economic Development Strategies
CPCI	Container Port Connectivity Index
EC	European Commission
EIB	European Investment Bank
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GMS	Greater Mekong Subregion
ICT	Information Communications and Technology
IoT	Internet of Things
JWP	Joint Work Program (Cities Alliance)
LED	Local Economic Development
LGNZ	Local Government New Zealand
LGU	Local Government Unit
3D	Three dimensional
P2P	Peer to Peer
SME	Small and medium-sized enterprises
TOD	Transport-oriented Development
UID	Unique Identifiers
WB	World Bank

Executive Summary

Growing inequalities are emerging between systems of cities and regions in developing and post-industrialised economies. These inequalities are the product of rapid and uncertain external and internal economic, social, and environmental events and change. The effect has been to deprive many people living and businesses located outside of metropolitan areas from enjoying the same benefits and opportunities as those living in larger cities. As a result, many metropolitan regions, especially in developing economies, have prospered at the expense of smaller cities and rural areas in other parts of the country. Subsequently, the significant development potentials of systems of secondary cities, and their associated hinterland economies, to contribute more to national and sub-national regional development have often been overlooked by the predominant focus on metropolitan regions as the engines of economic growth.

Much of the recent literature on supporting the development of secondary cities has focused on enhancing the development of infrastructure, competitiveness, and enabling environments. This focus has tended to overlook the importance of the relationship secondary city economies have to each other. Strengthening the capacity of individual secondary cities to compete for trade, investment, and development, independent of the relationships they have with each other within national or regional systems of secondary cities, is likely to have a marginal impact on lifting national economic performance and prosperity in non-metropolitan areas overall. The importance of connectivity within systems of secondary cities is crucial to lifting their performance, prosperity, and development. Very little research has been undertaken on the roles and importance of—and what governments can do to increase—this connectivity. A key focus of this book has been to identify the investment in public goods and services and infrastructure needed to support more equitable development of systems of secondary cities. It includes case studies of good practice to demonstrate ways to improve connectivity and the development of networks and foster collaboration within systems of secondary cities, and the benefits these can have for the development of trade, investment, tourism, and new endogenous growth industries.

This book seeks to pave a new way of thinking on approaches to the development of systems of secondary cities. It challenges much of the traditional thinking on the subject, and it calls for change in the way governments approach national, regional, and local development policy and planning to support more equitable regional economic development. It argues the need for a systemic and less structured hierarchical approach to the way governments support the development of systems of cities. If systems of cities are to be more resilient, prosper, and develop more equitably, a new kind of 'strategic architecture' must be introduced to support their development and link their economies in order to create more opportunities for the development of new markets.

The book calls on multiple levels of governments, business, institutions, organisations, and civil societies within systems of secondary cities to strategically target and support public and private investment in local and national public goods and services. It seeks to foster not only the creation of crucial 'hard and soft infrastructure' to improve local capacity to produce and trade goods and services, but also to improve connectivity, collaboration, and networking within national and regional systems of cities. It argues that a focus on these factors will speed up the flows and exchanges of activities within systems of cities, leading to the creation of new opportunities for investment and development, increased prosperity, and better use of resources. In so doing, this will help to address growing inequities and gaps in development within systems of cities.

The Metrocable in Medellín allowed for better connectivity between uphill slums and the city, promoting access to labour, public goods and services.

Location: Medellin, Colombia
Photo Credit: @Cities Alliance, 2008

Foreword

Rapidly urbanising countries often face various types of inequalities resulting from the accelerated population growth in their cities. Of major consequences for development is the limited access to public services and goods within the city, especially for the urban poor; and distorted investment priorities nationally, between metropolitan regions and smaller cities. Too many governments neglect these economic and spatial inequalities, undermining the creation of a sustainable foundation for structural economic and political transformation. Yet, the global challenge to *leave no one behind* requires both public and private decision makers to significantly rethink the role that providing key public services and improving collaboration between cities can play to foster more equitable economic growth.

A product of collaboration between UK Department for International Development (DFID) and the Cities Alliance, this publication demonstrates the crucial link between access to connective infrastructure and services in cities of all sizes and the potential for equitable economic growth. Based on case studies across the globe, it makes a compelling case for a new paradigm that moves beyond the economic competitiveness of cities to find alternative economic growth models. It examines ways secondary cities can work more collaboratively to improve their development prospects, lift prosperity, and leverage public resources to support equitable and sustainable sub-national economic growth and development. Given the continued growth of secondary cities, what passes as a local issue is both nationally and globally significant.

We hope that this publication will generate fresh thinking and new policies. We would like to thank Cities Alliance members and partners, and reiterate our commitment to this collaboration.

William Cobbett
Director
Cities Alliance

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UK Department for International Development

Preface

The key to unlocking the development potential of secondary cities is to overcome local and external factors that are constraining their growth and development. The focus of this book is to identify why the levels of inequity in the development of systems of secondary cities are widening and to explore ways to reduce this. The book is comprised of five chapters.

Chapter 1 Provides the background, context, rationale, and intent of the book while focusing on inequities and systems of cities.

Chapter 2 Outlines typologies for systems of secondary cities. It describes three figurations of a system of secondary cities: regional, clustered and corridor. It also discusses new and emerging systems of regional and global networked systems of secondary cities. Cities within these different, and sometimes overlapping, systems of cities play many roles in national and global markets and supply chains. For secondary cities to prosper and develop, local governments must understand what public goods and services are needed to tap into the supply chains that connect cities in these networks.

Chapter 3 Analyses the crucial role of connectivity and networks to support the economic development of systems of secondary cities. The chapter sets holistic indicators of connectivity among secondary cities for the three types of secondary cities: regional, cluster and corridor—and the different network systems that connect them (Annexe). These can be adapted and applied to assess connectivity within hinterland economies. These indicators are a tool that will enable secondary cities to conduct an analysis and develop connectivity indicators in the form of an index to indicate how well they are connected.

Chapter 4 Includes a series of case studies that describe the different approaches adopted by secondary cities in a variety of regions to support their development and improve their connectivity. In some cases, this has involved cities collaborating on economic, governance and social initiatives which are focused on reducing externality costs to business. In other cases, it focuses on models that create collaborative-advantage for smaller businesses, to generate economies of scale, by collaborating and competing collectively to gain access to larger markets and trade in goods and services, which might not otherwise have been secured by acting independently.

Chapter 5 Presents a framework for public goods and services in support of secondary cities. It provides a guide on what businesses, governments, and local communities can do to develop hard and soft infrastructure networks with connectivity to existing external networks, which will enable secondary cities to gain better access to the markets, resources, and information needed to support their development. This framework can be used for the preparation of city development strategies and action plans to guide investment in public goods and services in order to create infrastructure networks to enhance connectivity and improved opportunities for local economic development in secondary cities.

Annexe Includes material for developing an index of connectivity among secondary cities, as well as a case study drawn from the Mekong River Economic Development Corridor.

The Métro léger de Tunis was a unique type of transport infrastructure for Africa when it began operating in 1985.

Location: Tunis, Tunisia
Photo Credit: @Cities Alliance, 2019

1| Inequities and Systems of Secondary Cities: An Introduction

Growing disparities are emerging between systems of cities—especially in rapidly developing and de-industrialising economies (Kanbur & Venables, 2005). In Indonesia, the ratio of GDP per capita between the Metro Jakarta and Denpasar (Bali) is a factor of 4.5. Similar order disparities can be found between megacities and secondary cities in Asian and other developing countries. In post-industrialised economies, regional disparities within systems of cities are less, but are widening (Organisation for Economic Cooperation and Development, 2018). The growing disparities in the development of systems of cities deprive many businesses, organisations and people living in secondary cities and more impoverished rural areas of an equitable share of national growth, wealth and prosperity, and access to public services, jobs, and wealth compared to those living in metropolitan regions.

The wealth, development opportunities and economic power of nations are increasingly being concentrated in metropolitan regions (Dobbs et al., 2012). Urban areas comprise 56 per cent of the world's population and produce around 75 per cent of its GDP. However, it is predicted that by 2025, 600 urban centres, with a fifth of the world's population, will generate 60 per cent of global GDP (McKinsey Global Institute, 2014). Smaller urban centres, representing 30 per cent of the world's population will generate little more than 15 per cent of GDP. This gap will widen unless governments introduce policies to foster equitable economic growth within systems of secondary cities.

In 2014, the Cities Alliance book, Managing Systems of Secondary Cities (Roberts, 2014) identified a potential framework for formulating policies for the development of regional, metropolitan cluster, and corridor secondary cities. Managing Systems of Secondary Cities focused mainly on the development of local infrastructure and strong enabling environments for three spatial types of secondary cities (regional, cluster and corridor) to enhance their competitiveness and attractiveness in order to encourage investment and development.

Since the completion of that book, there have been new developments in thinking and approaches on ways governments can foster the development of secondary cities (Ammann & Sanogo, 2017; ESPON, 2016). The development of enabling infrastructure, services, innovation, human capital, economic diversity, good government and strong enabling environments and economics are crucial to making secondary cities more competitive and attractive as places for investment (Parkinson et al., 2012); however, such investments are not enough to overcome economies of scale, logistics and transaction cost issues.

There are other factors that are essential to fostering more equitable development of national systems of secondary cities. One of these involves connectivity, i.e., the way cities within systems of secondary cities are linked or connected economically, socially, politically, and by language, culture, infrastructure, and physical geography. Connectivity includes factors related to communications, collaboration, networks, and accessibility (Ammann & Sanogo, 2017; Besson, 2018; Parkinson et al., 2012; Sassen, 2019).

The scale, scope, efficiency and effectiveness of linkages and flows within systems of cities are explained in more detail in the book, but they are crucial to fostering economic growth and development and to reducing inequities within systems of cities.

This book seeks to break new ground in thinking on approaches to the development of systems of secondary cities. The book challenges current thinking. It argues the need for a systemic approach and a less structured hierarchical approach to the way governments support the development of systems of secondary cities.

If systems of secondary cities are to be more resilient, prosper and develop more equitably, a new kind of 'strategic architecture' (Hamel & Prahalad, 1994) must be introduced to support the development of secondary systems of cities and link their economies in order to create more opportunities for the development of new markets. It calls on multiple levels of governments responsible for managing cities, business, institutions, organisations and civil societies in cities to strategically target public and private investment in local and national public goods and services to create crucial 'hard and soft infrastructure'. These investments improve local capacity to produce goods and services and improve connectivity, collaboration and networking within national and regional systems of cities. The book argues that a focus on these factors will speed up the flows and exchanges of activities within systems of cities, create new opportunities for increased prosperity and development and begin to address growing inequity within systems of cities.

The need for cities to become more prosperous and networked as systems of cities—to help foster more equitable prospects for growth and development—has been extensively documented (WEF, 2016). Improvements to local infrastructure and services are essential to enhancing the performance, growth and development of local economies, but those improvements alone are not enough to create a competitive advantage. Similarly, the emphasis being given by local governments and researchers to make cities smarter, by investing in knowledge and innovation, creating stronger governance and enabling environment arrangements alone, is not the answer. Many cities that are investing heavily in these areas have experienced improved growth, revitalisation and development. However, others have not witnessed the growth and development outcomes expected. Other factors of performance, beyond fixing the hard and soft infrastructure of local economies, such as tacit knowledge and cultural capital among others, also have a critical role to play in realising a more balanced and sustainable growth and development of cities and regions.

Increasingly, new evidence indicates that enhanced connectivity and collaboration between towns and cities, especially systems of secondary cities, play a critical role in the development and improvement of elements of performance and prosperity needed to foster new trade, investment, innovation, and endogenous growth opportunities in cities (Cox & Longlands, 2016; Lee, 2016; Neal, 2010; Neal, 2013). The key to unlocking the development potential of secondary cities is to overcome local and external factors that are constraining their growth and development.

The focus of this book is to identify why the levels of inequity in the development of systems of secondary cities are widening and to explore ways to reduce this. Two important goals of this investigation are to develop a deeper understanding of first, the roles of connectivity and networks within systems of secondary cities in supporting their development and second, of strategic interventions and investments in public goods and services that help close the inequity gap in the development of systems of cities. It is vital to know how secondary cities can overcome the economy of scale, the tyranny of distance, high transaction costs of government, institutions and private business transactions, to become more prosperous and collaborative. With the move toward a more globally networked system of cities and economies, the question of how to encourage greater policy, business, trade, collaboration, networking, and cultural and economic exchanges are core to the investigations of the research.

Comparatively little has been written about connectivity and networking in supporting the growth and development of systems of secondary cities, compared to megacities and metropolitan regions. Five questions are posited for an investigation to identify potential solutions to support more equitable development of systems of secondary cities:

1. How important is connectivity to the development and prosperity of systems of secondary cities?
2. How are systems of secondary cities connected?
3. What connectivity factors impede secondary cities from having access to markets and expanding trade, information, commerce, knowledge, and improved flows within systems of cities?
4. What approaches have some secondary cities taken to improve connectivity that have increased their prosperity and competitiveness?
5. What collaborative investment in hard and soft infrastructure can secondary cities make to support their development and prosperity, especially in the context of developing and post-industrialised economies?

The research draws on current literature, analysis of data and good practice case studies to demonstrate ways to improve connectivity among secondary cities and the benefits this can have for the development of trade, investment, tourism, and new endogenous growth industries.

JARGON BUSTER

System of Cities

A system of cities is a network of urban hubs and nodes of varying size, separation and dependency which are connected by a wide range of agents, links and functions which drive the growth and development within a country or geographic region. Systems of secondary cities are subsystem or network of cities within the System of cities which pay a crucial role as centres of economic activities and an interface in supporting the functions and development of metropolitan regions, systems of intermediary cities, small cities, and towns and their hinterland economies.

Secondary Cities

Secondary cities are medium-sized administrative, political, industrial, military, transportation, tourism and historical centres which function at a level below primate order or metropolitan region cities. They range in population from 100,000 to 2.5 million but may be larger or smaller depending on the size of a nation's population. Secondary Cities play a crucial role as economic, social and logistics hubs or centres in linking more than half the world's population living in smaller regional cities, towns and rural areas to markets, materials, goods and services needed or produced by primate order cities and vice versa. The size, management and functionality of secondary cities have a significant influence on the development and prosperity of national systems of cities, rural and regional areas.

Intermediary Cities

Intermediary cities are cities with a population between 50,000 and 1 million which play a crucial linking and transformative role in the system of cities between metropolitan regions and smaller regional towns and cities. The term intermediary cities are often interchanged with the term secondary city in Latin America and some European countries. In North America, intermediate and secondary cities are often referred to as middle-sized cities. The differences in the terminology are semantic, although secondary cities can often have a primary functional role in the context of global cities but have a secondary functional role in the national context. Toulouse and Seattle are secondary cities in the national context but are global cities in the context of the airline industry. Functionality has a more significant influence on what constitutes a secondary city, an intermediary or middle-sized city in the current era than population size.

Internet of Things

The Internet of Things (IoT) is a communication paradigm in which many of the objects used of everyday life will be equipped with microcontrollers, transceivers for digital communication, and suitable protocol stacks that will make them able to communicate with one another and with the users, becoming an integral part of the Internet. The IoT will foster the development of some applications that make use of artificial intelligence data generated by such technology devices to provide new services to citizens, companies, and public administrations. It will have applications in reducing routine jobs, industrial manufacturing including automation and 3 D printing, medical aids, healthcare, elderly and disabled assistance, education, intelligent energy management and smart grids, automotive, traffic management, homes and offices.

Public Goods and Services

Public goods are the infrastructure and services provided by governments for the benefit of everyone. Some of these include: water supplies, sanitation, sewerage and drainage, power and electricity, educational and health facilities and services, public transportation, and the provision of land for housing and businesses. The effective, efficient and equitable delivery of these public goods has a very significant impact on the degree to which urban society and economy are strong, inclusive and sustainable (Cities Alliance, 2016).

The well-structured cityscape of La Valeta, Malta.

Location: La Valeta, Malta
Photo Credit: @Cities Alliance, 2017

2| Differentiating Systems of Secondary Cities

A secondary city is mostly determined by population, size, function, and economic status. Commonly, secondary cities are geographically defined urban jurisdictions or centres performing vital governance, logistical, and production functions at a sub-national or sub-metropolitan region level within a system of cities in a country. In some cases, their role and functions may expand to a geographic region of the global realm. The populations of secondary cities range between 10 and 50 per cent of a country's largest city, or between 100,000 and 1.5 million, although some can be larger than this. Almost 20 per cent of the world's population live in secondary cities. Secondary cities are likely to constitute a sub-national or sub-metropolitan second-tier level of government, acting as centres for public administration and delivery of education, knowledge, health, community, and security services; an industrial centre or development growth pole; a new national capital; or a large city made up of a cluster of smaller cities in a large metropolitan region (Hoffman, 2015).

Secondary cities have been variously described as intermediate, intermediary, middle and second-tier cities. However, secondary cities are no longer second-tier cities defined by hierarchy or size. They are a very important sub-set of systems of cities (Berry, 1964). They are the primary location or mid-point in the exchange of goods and services between more than 60 per cent of the world's population who live in rural regional areas, small cities and regional towns, and metropolitan regions/megacities. Robust, well-functioning systems of secondary cities are critical to strong, efficient, and collaborative rural regional economies and those of large metropolises.

Secondary cities are a subset of cities between metropolitan regions and smaller regional cities that primarily service agriculture and resource-based industry activities of their hinterlands. Secondary cities vary significantly in size and function. They play a pivotal intermediary role in the function and operations of national supply chains, value-adding processes, logistics, and government systems of countries and sub-national regions. Their role and importance in the development of national and regional economies are poorly understood and studied, compared to metropolitan regions.

> "The critical importance of many secondary cities stems from and sustains their historical path of development and their shifting positions in national and global urban systems."
>
> *Secondary Cities and the Global Economy (Chen & Kanna, 2012: 48p)*

2.1 Features of Secondary Cities

There are three general spatial features of secondary cities, with variations on and mixes of these. The factors responsible for the typology of secondary city development vary significantly and are shaped by historical, infrastructure, economic, social, political, and environmental factors. The publication *Managing Systems of Secondary Cities: Policy Responses in International Development* (Roberts, 2014) describes the three broad types of secondary cities as follows:

1. Sub-national regional urban centres of administration, manufacturing, and agricultural development.

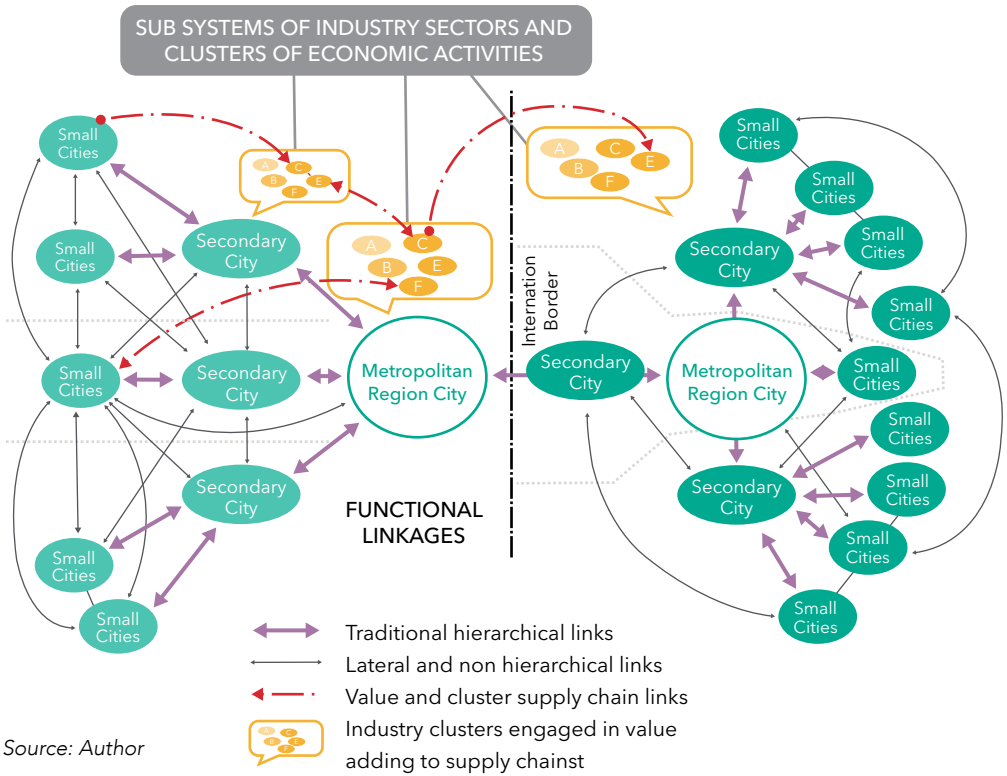
2. Clustered secondary cities, which develop on the periphery of metropolitan or urban regions and take the form of new towns, spill-over growth centres, and linear cities. These may also include migrant and refugee cities.

3. Corridor secondary cities developed along major transportation corridors.

These three forms of secondary cities play a vital role in the function and operation of a country's national system of cities. In some cases, their role and functions expand outside a geographic region or global level. Some have become specialised centres and hubs of business, logistics, and trade in the international system of cities. Secondary cities such as Siem Reap (Cambodia), Wolfsburg (Germany), and Gaziantep (Turkey) are, respectively, global centres of cultural tourism, the automotive industry, and carpet manufacturing.

The changes to global production systems in the last quarter century, however, have meant that many centres of economic activity, especially cities, rely increasingly on complex networks of inter-connected hard and soft infrastructure and services to support the operation and development of local economies. With the development of the internet, computer-aided technology, and the increased growth in traded services, a new system of global networks of intercity business, government, and social exchanges and connections are emerging, which are less hierarchal, but more virtually networked (see Figure 2.1). With more intense competition in production, trade, markets, and investment, firms' profit margins are being squeezed, and firms are looking at ways to become more competitive by engaging in collaborative joint ventures and partnerships.

FIGURE 2.1 Emerging systems of cities and connectivity.

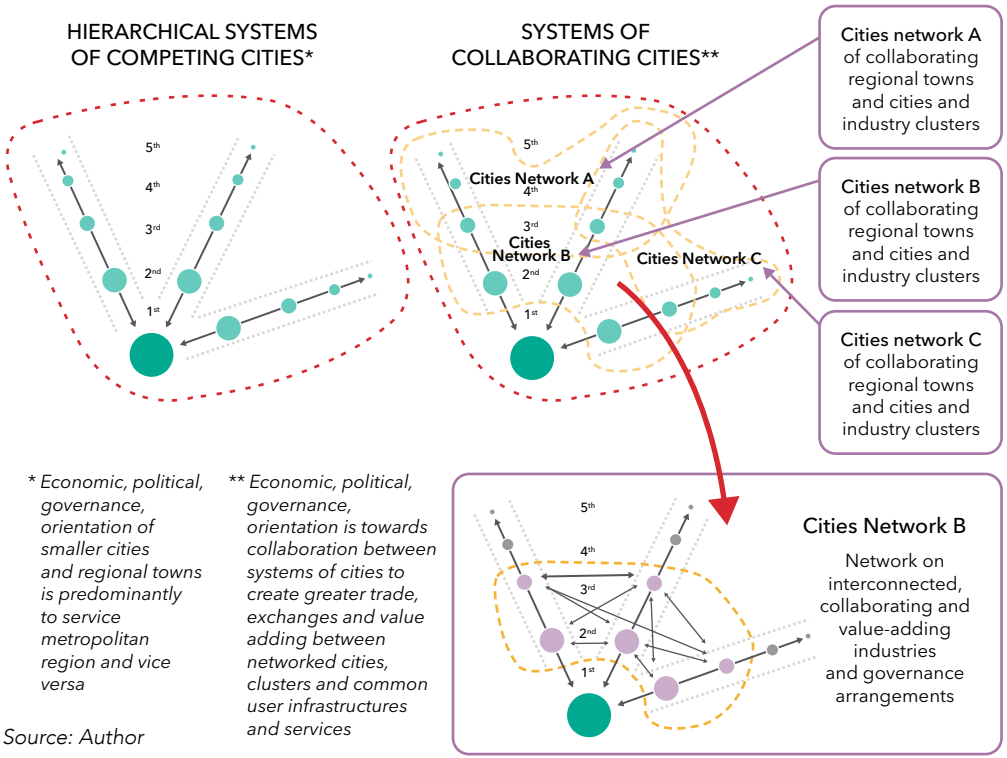


Source: Author

Collaboration between cities, especially industry clusters, helps to overcome scale issues for some economic activities and reduce common-user costs of infrastructure and services. It could also help sub-national systems of secondary cities to create sub-markets and value-adding opportunities to compete against the dominance of goods and services produced and supplied by metropolitan regions. In some instances, the combined populations and markets of collaborative networks of regional cities are larger than the largest metropolitan region. For example, the UK Core Cities Network (Core Cities, 2010) was established to compete against the market power and dominance of London.

Figure 2.2 shows two models used in supporting the development of systems of secondary cities. The traditional hierarchical model is shown on the left—the orientation of trade, investment, political systems, and transportation is towards the capital city. There are lateral connections between the systems of cities along the corridors, and the focus of value-adding and supply chains is oriented to the country's largest city. In European and some East Asian countries, such as Japan and Korea, the spatial concentration and range of cities are much more closely knit, and there are significant historical city-to-city links based on trade and manufacturing. Today, with the hollowing out of manufacturing, the orientation of economic activities is much stronger in the capital cities or large metropolitan regions. This is very apparent in the USA, showing significant widening of regional disparities within systems of cities (Florida, 2018).

FIGURE 2.2 Two models of developing systems of secondary cities.



** Economic, political, governance, orientation of smaller cities and regional towns is predominantly to service metropolitan region and vice versa*

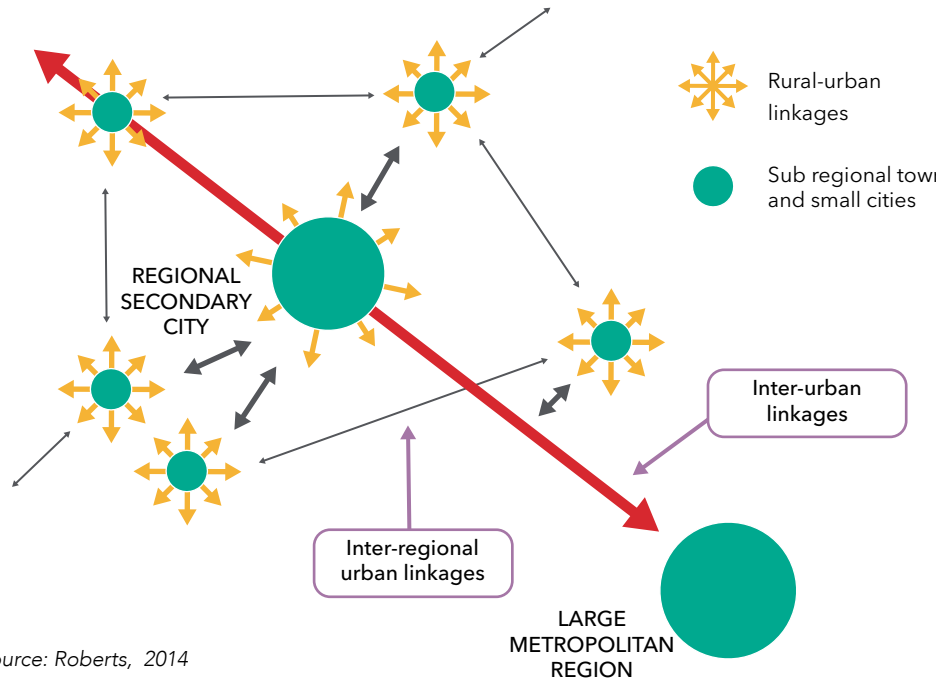
*** Economic, political, governance, orientation is towards collaboration between systems of cities to create greater trade, exchanges and value adding between networked cities, clusters and common user infrastructures and services*

Source: Author

2.1.1 REGIONAL SECONDARY CITIES

Many regional secondary cities are sub-national centres—state, provincial, or district. Others are sub-national single- or mixed industrial centres engaged in mining, manufacturing, processing, transportation and logistics, education, culture, religion, tourism, or defence. For some of these cities, local firms may be engaged in value-adding to large, global industry supply chains, such as steel, chemical, automobile, and aircraft manufacturing. Typically, the city's population will range from 100,000 to over 1.5 million. In developing economies, the population of regional secondary cities is likely to be less than that of the surrounding hinterland/rural population. In developed economies, a much higher proportion of the region's population will live in the city than in surrounding towns and rural areas.

FIGURE 2.3 Regional secondary cities.



Source: Roberts, 2014

The spatial features of regional secondary cities (Figure 2.3) are typically a sizable central business district or services centre, surrounded by smaller subregional cities and towns serving mostly rural regional populations. The population density (people per square kilometre) and size of regional secondary cities vary significantly. In sub-Saharan Africa, regional secondary cities tend to have low population density (>3000 ppkm^2) and low-rise building development incorporating large areas of peri-urban informal sector development. In more densely developed countries, the density may exceed 5000 ppkm^2, with more medium- and some high-rise development.

Monocentric secondary cities are primarily single hub cities, which are the centre of gravity for most political or economic activities of a distinct sub-national region. They are likely to be more than 200 km or 2-3 hours of driving distance apart and are a common feature of systems of cities in many former colonial countries of Africa, parts of Asia, Australia, and Latin America. Kandy (Sri Lanka), Cusco (Peru), and Arusha (Tanzania) are examples of monocentric regional secondary cities.

Polycentric systems of secondary cities occur where two or more secondary cities in sub-national regions mutually agree to collaborate and cooperate on the development of their economies. This often occurs where secondary cities are located near each other, such as in Europe, North America, and China, and they agree to some form of closer cooperation,

or where monocentric cities in a much wider geographic area agree to engage in trade and economic development opportunities. The UK Core Cities Network and South East Queensland Regional Council (see case studies) are good examples of the former.

Two types of approaches can be taken to the development of polycentric systems of secondary cities networks. The first is based on a collaborative-competitive approach, where subregional systems of secondary cities work as a partnership to compete with metropolitan regions (e.g., the UK Core Cities Network). The other is a collaborative model, where systems of secondary cities collaborate with metropolitan regions to create scale and access to new markets. The New Zealand Core Cities model is an example of this. There are hybrids and combinations of both models, for example, the Bratislava approach.

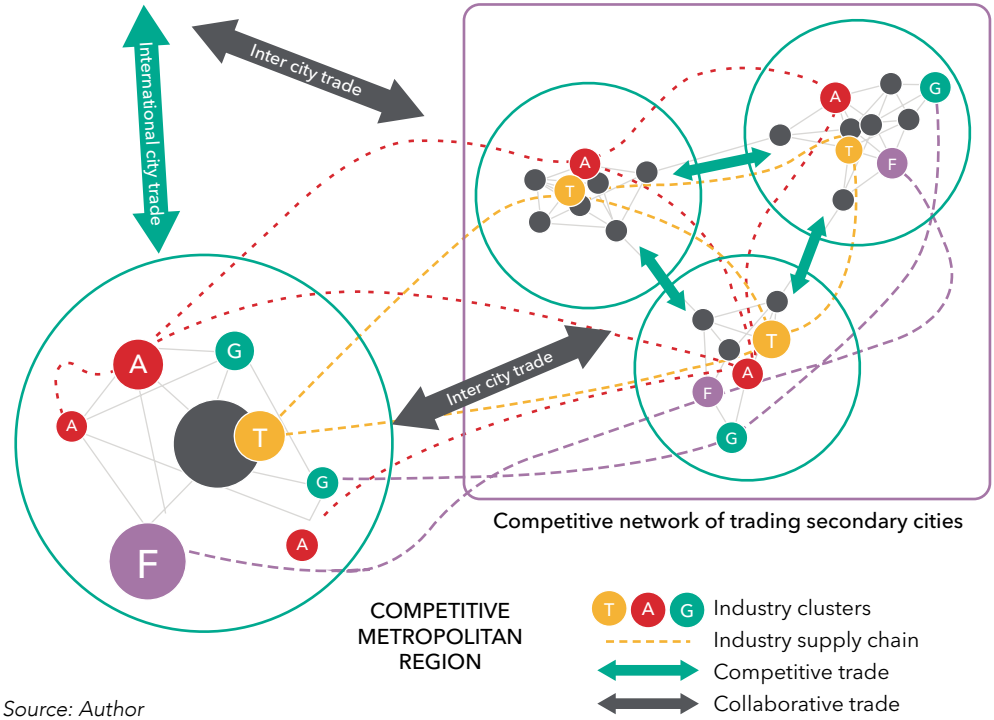
2.1.1.1 Polycentric Regional System of Secondary Cities (Collaborative-Competitive Model)

In many countries, metropolitan regions win a greater per capita share of wealth, investment, and development opportunities. Secondary cities can compete against metropolitan regions by collaborating to develop networks to facilitate the growth of trade between regional cities and international markets. The approach (Figure 2.4) involves business, institutions, and governments supporting strategic alliances; collaborative governance arrangements; and linking industry clusters' supply- and value-adding chains for identified industry sectors in order to compete with metropolitan regions to gain a greater share of national and international production, trade, and investment.

The philosophy behind the polycentric collaborative-competitive approach is that collective systems of secondary city businesses, institutions, and governments can willingly collaborate to create a larger internal market within a collective subregional system of secondary cities. The advantage of the approach is that it can help to reduce leakages and dependency on metropolitan regions for access to a wide range of public goods and services. It also offers opportunities for import substitution. The approach can help overcome economies-of-scale issues, and lower marginal costs that make local production and supply of goods and services uncompetitive. In some cases, the combined resources and production capacity of two or more secondary cities could exceed that of a large metropolitan region.

The secondary cities regional linkages model is based on firms associated with an industry sector or cluster, for example, the food industry, agreeing to collaborate on producing value-added food products. A group of firms in an industry cluster in City A may produce foods with high milk content based on the region's dairy or goat industry. City B may be a major producer of flour or cereal crops. Some of these processed foods are sent to a food cluster in City C, which in turn produces value-added foods that combine the ingredients from clusters in cities A, B, and C. The primary and value-added products are then traded between the secondary cities and the large metropolitan region and export markets.

FIGURE 2.4 Regional System of Secondary Cities Networks (Competitive Model).



Source: Author

By taking advantage of shared resources, knowledge, and back-loading freight capacity, the network of clusters and secondary cities will be able to produce value-added products and services, thereby creating both specialisation and collaborative advantage, rather than dependence upon a dominant metropolitan region for imports. Such opportunities are only open to certain industries and products from which the cities can achieve some form of collaborative advantage. That requires secondary cities to collaborate to build the infrastructure necessary to enable these opportunities to compete against metropolitan regions.

With technology-based production, 3D printing, and artificial intelligence, marginal costs of production are expected to fall dramatically, making many services and goods produced in secondary cities competitive with those sourced from large cities (Lim & Mack, 2017). The model is not dissimilar to large national industry cooperatives that pool resources to reduce transaction costs of production, distribution, and sales, but it is intended to enable secondary cities to gain a competitive advantage against large metropolitan regions.

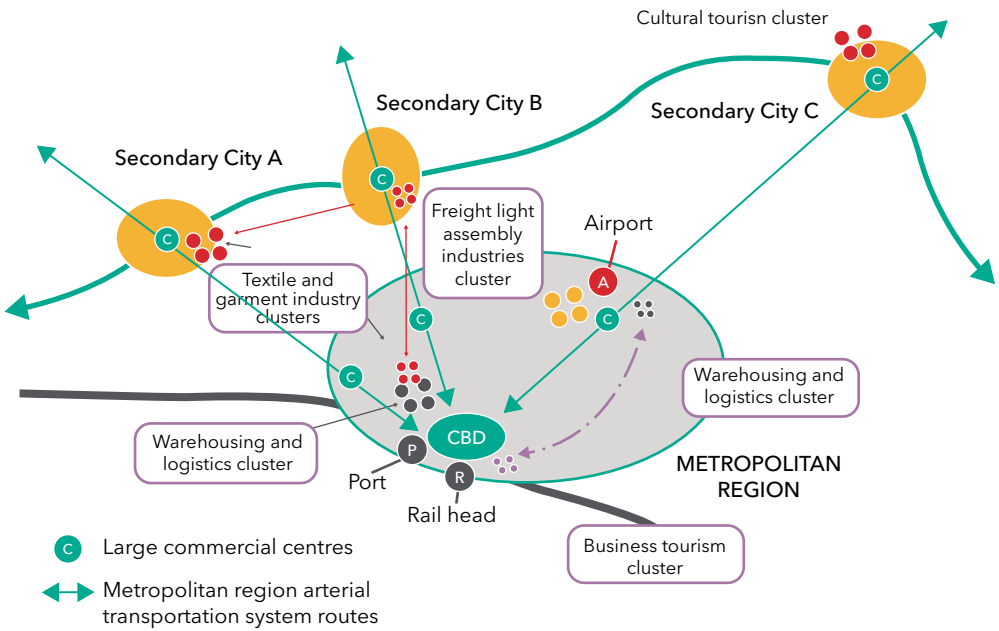
The UK Core Cities Group is a good example of a collaborative network involving secondary city regional linkages. Collaboration takes the form of smaller firms in similar-type industry clusters in two or more secondary cities becoming involved in cross-cluster partnerships, such as conducting R&D, new product development, value-adding, and co-marketing at trade shows. At a government level, an agreement was reached to develop improved flows of information between cities about markets, growth, and socioeconomic data. City-to-city trade and development agreements are equivalent to sub-national free-trade arrangements between cities and underpin the model.

2.1.1.2 Polycentric Regional System of Secondary Cities (Collaborative Approach)

In many countries, businesses located in secondary cities are too small to operate at scale, but they can significantly support national export development or import substitution products and services by collaborating with firms located in metropolitan regions to create value and overcome scale and barriers of entry to markets (Figure 2.5). If regional firms located in secondary cities can be networked with firms in a larger metropolitan region, the desired scale can be achieved. The approach involves mapping the supply chains from material or accessory sources of inputs to production, markets and other end-user demands, and developing infrastructure and enabling the environment to add value to regional supply-chain industries at scale. The New Zealand Core Cities network is a good example of this model: Auckland became the hub of the network, but the secondary cities have identified opportunities to add value to products in the tourism and education sectors.

The strategic intent of the approach is to develop a system of trading cities where firms, industry clusters, and local governments can facilitate greater connectivity to create new opportunities in order to attract investment and develop new value-added industries and jobs, all of which mutually support a more equitable national and local economic growth and development. Secondary cities must determine which industry clusters and infrastructure supply-chain networks in metropolitan regions they can collaborate with and which ones they want to compete with. The collaborative approach has relevance to the development of clustered towns and villages surrounding monocentric and corridor secondary cities and has worked well, for example, in Italy and Vietnam, as will be discussed in Chapter 3.

FIGURE 2.5 Clustered system of secondary cities.



Source: Author

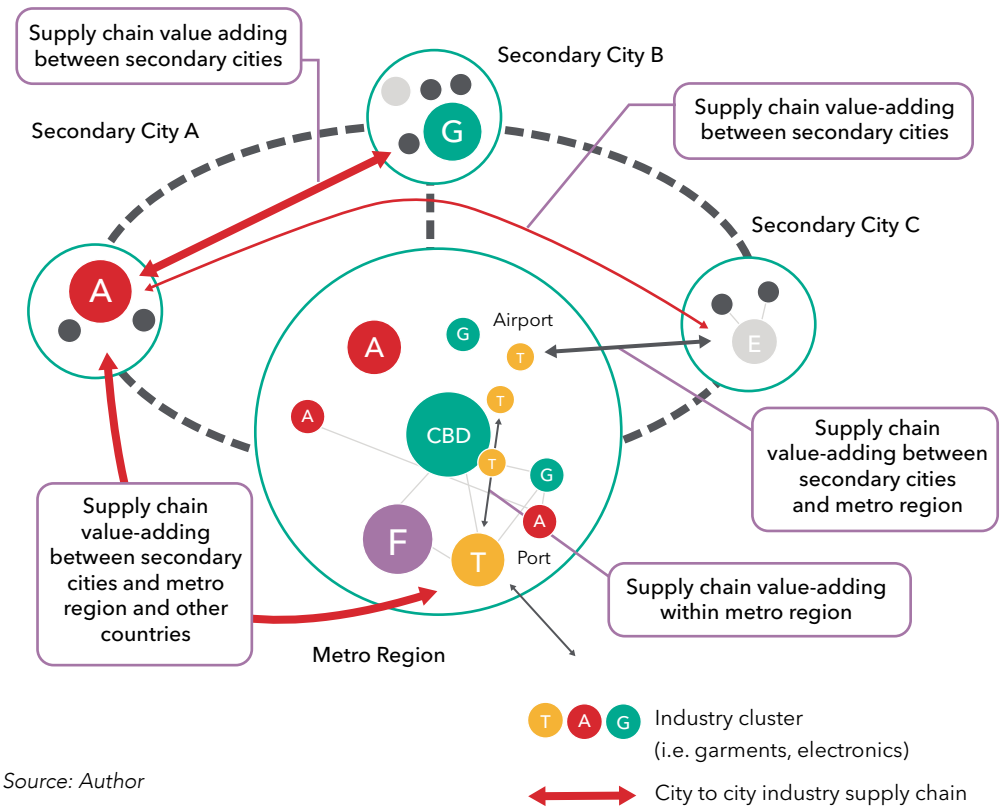
2.1.2 CLUSTERED SECONDARY CITIES

Clustered secondary cities tend to be located on radial and lateral connector roads which surround the metropolitan centre. In Asia, clustered cities have become a favoured location for large industrial estates and economical processing zones, forming an economic base through co-location of similar types of industries. Many clustered secondary cities in developing economies, especially in sub-Saharan Africa, have developed into sizeable informal housing settlement areas with poor connecting infrastructure and arterial and public transport services to existing built-up areas of metropolitan regions. Many have elevated levels of informal settlement and employment. In developed economies, they have become cities for refugees, with poorer quality housing and undesirable social issues.

Extensive investment in hard and soft infrastructure networks is necessary to foster connectivity and flows of materials, trade, investment, and exchanges within the systems of cities and the metropolitan area boundaries. Physical networks such as roads and information and communications technology (ICT) systems are crucial to the flow of goods and materials between networks of cities. However, soft connectivity infrastructure networks, such as collaboration on marketing along tourist routes or sharing data and

knowledge about environmental, economic, and governance information and about planning and development are becoming increasingly important to fostering local economic development.

FIGURE 2.6 Secondary city-metropolitan region linkages.



Source: Author

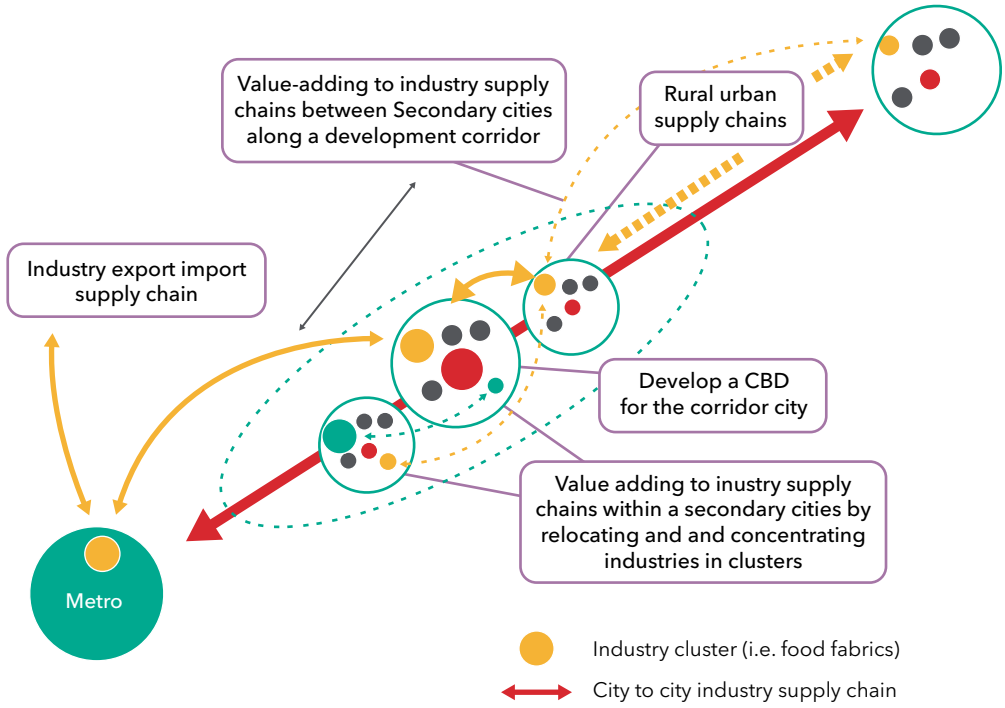
One of the most important elements of developing clustered secondary cities is enhancing the efficiency of city-wide logistics facilities and networks, inter and intra-city movement and transport systems, and transport-oriented development (TOD). Increasingly these cities are being driven by the need for land for development, technical skills and community services, basic infrastructure, and housing. The failure to deliver on these services is overloading the capacity of existing networks, especially in rapidly urbanising metropolitan regions. The lack of capacity or the overloading of existing capacity results in rising externality costs, mainly as the result of congestion, pollution and its effects on public health, and loss of productivity.

China has taken the concept of clustered cities to another level, with the development of supra-regional systems of city clusters. These clusters are designed to improve connectivity between large, medium, and small cities to form a supra-regional city designed to take advantage of agglomeration shortening industry supply chains. The intent is to develop regions like Beijing-Tianjin-Hebei, the national capital region, and the Pearl River Delta and Shanghai regions into a hieratical network of interconnected cities operating as a cluster. The pattern emerging in China is one of the polycentric city clusters.

2.1.3 CORRIDOR SECONDARY CITIES

Corridor secondary cities comprise multiple, small expanded towns that have joined up along an inland or coastal transportation route to become a linear or strip city. Some of these are many kilometres long and a few kilometres wide. The linear-strip urban development along the south coast of Spain, Turkey, and Sri Lanka are examples of these types of cities. Strip industrial and commercial development along highways has become a contiguous strip of urban development with no central business core or district. Linear coastal tourism and recreational strip development are characterised with nodes of hotels in locations with high scenic value. Linear secondary cities are dominated by commercial trade and service industries along the transportation corridor.

FIGURE 2.7 Key infrastructure to support corridor systems of secondary cities.



Source: Author

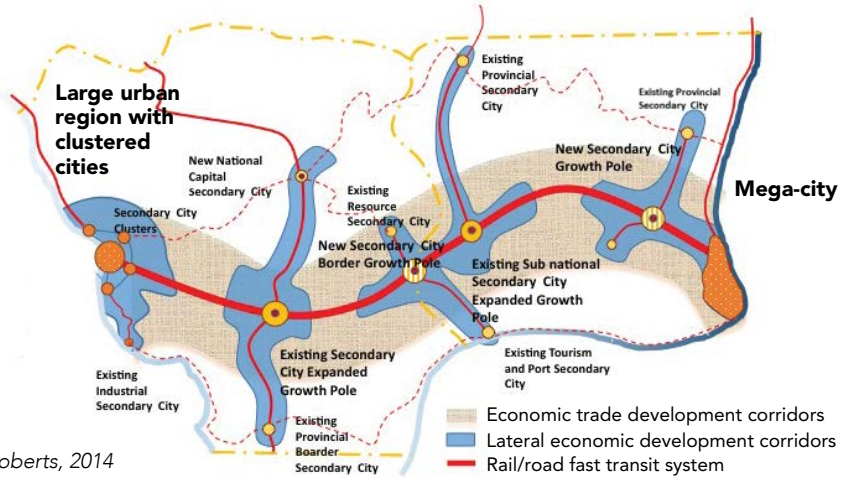
There are two types of corridor systems in secondary city networks: national and international economic and trade development corridors. The first is much easier to support and develop, as this type is usually contained within the boundaries of a country, although it may include cross-border cities at a national or sub-national level. Many of the investments needed to develop cities are directed to alleviate congestion and freeing up the capacity of the corridor city to function more efficiently.

A feature of national corridor development is that many lateral links feed into the arterial corridor, from smaller feeder roads to hinterland areas. These give rise to multiple nodes and congestion points. There is a tendency for governments to develop bypass roads to separate local from through traffic. The problem in many developing countries experiencing rapid urbanisation is that residential and commercial development along bypasses is not policed, and the problem is transferred. Bypasses reduce the opportunity for trade with passing-through traffic and are seen as a simple solution to congestion problems. Bypasses can have a profound, adverse effect on local economies, however, and can cause the relocation of micro-businesses and petty traders from local communities to locations along the bypasses.

International economic- and trade development corridors may cross multiple countries and connect many primary and secondary cities. The promotion of economic development corridors between countries has become an important focus of attention in recent years, especially with the One Belt One Road or Belt and Road Initiative (BRI) being promoted by China in the Asian Region (Jinchen, 2016; Lee, 2016). Some economic development corridors are confined to connecting cities within countries. Increasingly, the focus has been on the development of multi-country economic development corridors. These are much more difficult to develop, however, as significant international negotiations are required on cross-border trade arrangements (Kunaka & Carruthers, 2014). This has been a significant issue with the development of the West African Economic Trade Corridor between Cameroon and Côte d'Ivoire. Similar issues have been encountered with the development of the Johannesburg-Maputo Development Corridor connecting South Africa and Mozambique (Campbell et al., 2009) and the Southern Mercosur Economic Development Corridor between Brazil, Chile, and Argentina (Paiva & Gazel, 2003).

The World Bank *Trade and Transport Corridor Management Toolkit* (Kunaka & Carruthers, 2014) provides very useful guidance on the development and management of economic development corridors, especially for development agencies and governments in assessing, designing, implementing, and evaluating the impact of trade and transport corridor projects. It provides useful information on how "corridors affect the space economy of countries; they are best developed with clear estimates of what the spatial impacts are going to be" (Kunaka & Carruthers, 2014: xiii p). Second, it notes that "a corridor is a system made up of several components, including infrastructure (roads, railways, ports), transport and logistics services and regulations (typically influenced by policy choices of and financing from the public sector)" (Ibid: xiv p). The *Toolkit* notes that it is important for policy-makers to appreciate the linkages between these components, "particularly as the overall performance of a corridor is determined by the weakest component" (Ibid: xiv p). The *Toolkit* deals with corridor management and the motivations of the various parties and highlights that it is vitally important that the parties involved with the economic development corridors have the commitment and agreement to purpose, resources and outcomes needed to support its development.

FIGURE 2.8 International Economic (Trade) Development corridors.



Source: Roberts, 2014

Investment in soft and hard infrastructure can help Bangladesh foster equitable economic growth within its cities.

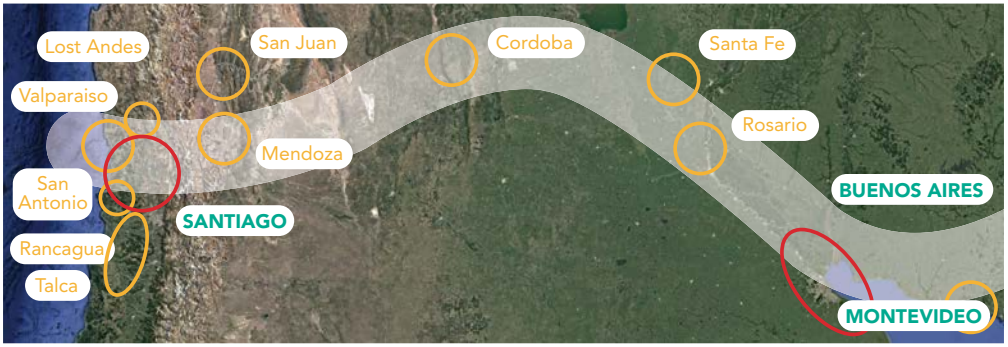
Location: Bangladesh
Photo Credit: @Cities Alliance, 2014

2.2 Systems of Secondary Cities

2.2.1 ECONOMIC DEVELOPMENT AND TRADE CORRIDOR SECONDARY CITIES

Free trade agreements and economic unions, such as NAFTA and the EU, and city-to-city trade partnerships are leading to the development of economic development and trade corridors along transportation routes, where secondary cities play a crucial role in supporting business networks and inputs/outputs of supply chains within and between countries. These trade corridors may include several secondary cities and large metropolitan regions. Secondary cities located in the corridor are encouraged to develop as specialised production, value-adding, export, distribution of goods and services, and logistics hubs. The Interstate 5 corridor from Tijuana to Vancouver is an example of a well-established economic development and trade corridor with three large and many secondary cities. The Mercosur Economic Development Corridor between Chile and Argentina, extending to southeast Brazil is an example of an emerging corridor (Figure 2.9).

FIGURE 2.9 Southern Mercosur Economic Development Corridor Chile-Argentina.



Source: Author - Map data: Google Data SIO, NOAA, U.S. Navy, NGA, GEBCO Landsat / Copernicus, 2019

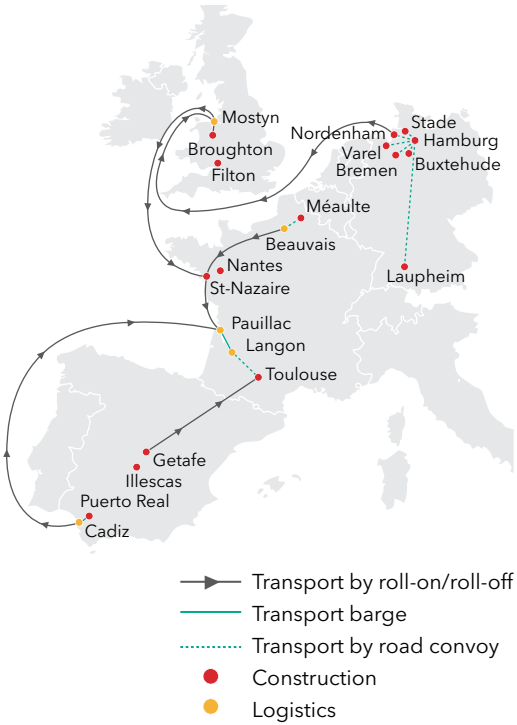
2.2.2 GLOBAL SUPPLY CHAIN SYSTEMS OF SECONDARY CITIES

A feature of globalisation is the development of networks of cities that are vertically and horizontally integrated into global assembly supply chains. Some of the inputs are physical, comprising industry parks, factories, and infrastructure. Others are services, including finance, design, and ICT. These supply chain networks develop over time and are where many competitive businesses with specialisations are contracted globally into the production systems of a manufacturing industry, such as aircraft, with Airbus or Boeing. The main urban centres engaged in the supply chain are connected so that there is seamless delivery of infrastructure, parts, and services into the production of aircraft (Figure 2.10).

2.2.3 SECONDARY CITIES NETWORKS

There is increasing interest in the development of collaborative networks by secondary cities. By collaborating, instead of competing individually, businesses in similar industries can work to create a collaborative advantage to fill large orders, share risks, and compete on more favourable terms with large corporations. The Core Cities networks in New Zealand and the UK are examples where regional city representatives meet regularly to discuss ways cities can collaborate and share resources to help reduce externality costs associated with common-user infrastructure and services, collaborative marketing of industries, and support for policy development. Some secondary cities are working collaboratively to ensure that secondary cities get a more equitable share of national resources and stronger support for devolution (Core Cities, 2016).

FIGURE 2.10 Cities connected to the supply chain of the Airbus A 380.



Source: Author

2.2.4 CROSS BORDER CITY GROWTH PARTNERSHIPS

Cross-border cooperation among secondary cities has become a focus of development in several countries, especially in Europe and Asia. A key example is the cross-border cooperative arrangement of the Johor Bahru (Malaysia), Bintan/Batam (Indonesia), and Singapore growth triangle (Yuan, 2011). The intent of the initiative by the three countries' governments was to strengthen their regional economic links and the competitive advantages of each location and to optimise the complementarity between the three adjacent urban centres. The growth triangle does not involve a formal treaty arrangement. Growth triangles are expected to become a significant force of the 21st-century economy in Asia, Europe, and North America, allowing metropolises and secondary cities that cross international and state borders to capitalise on the linking of cultures, language, and currencies. The commonality of language and culture are crucial elements of cross-border growth triangles and regional city growth partnerships.

2.3 Development Challenges for Secondary Cities

The challenges facing the development of secondary cities have been researched and documented over three decades (ESPON, 2012; Roberts, 2014; Rondinelli, 1983; Roberts and Hohmann, 2015). These include lack of infrastructure and services, weak governance and enabling environments, land management issues, loss of skills, and difficulty in attracting investment and jobs. Many solutions to address these matters have been tried with varying levels of success, but disparities between metropolitan regions and systems of secondary cities on fiscal transfers, levels of investment, and infrastructure spending per capita continue to widen. Even in developed countries like the United Kingdom, 24 times more is spent on infrastructure per resident in London than for cities in North East England (Arnett, 2014).

As we move deeper into the information age, many new challenges are emerging that will affect the development prospects and operation of secondary cities, especially in developing economies. The future development of urban economies will be driven by advanced and personal services, rather than manufacturing. Local economic development is increasingly being driven by information services and affected by events in global and regional economies. Governance systems will become more transparent, accountable, participatory, inclusive, and responsive to change as the result of broader applications of social media, growth in open knowledge and information platforms, freedom of information laws, and blockchain technology (Ølnes et al., 2017).

Globally, manufacturing employment as a percentage of the total labour force is declining. Manufacturing employment, as a percentage of total employment, will continue to fall as technology and capital-intensive production replace labour in agriculture, manufacturing, and services jobs. As a result, the future of work will change significantly over future decades with some countries predicting that over 40 per cent of jobs will be lost to robotics and artificial intelligence (Manyika et al., 2017).

Technology will change the nature of production, distribution, consumer demands, and markets. Retail and business services are already changing as a result of the Internet. The Internet of things (IoT) is a system of interrelated computing devices (computers, smartphones), mechanical and digital machines and objects that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. It has broad applications toward improving efficiency in the delivery of government services.

Disruptive change, technology and the IoT are expected to have a profound impact on the planning, management, and development of cities (Rathore et al., 2016). Infrastructure will become smarter, more efficient, and cost less to run as a result of IoT. Its impact on developing economies is already significant (Gong et al., 2016; Rathore et al., 2016). Few governments in the developing economies of the world, however, are equipped to meet the challenges of rapid change and IoT—especially those in sub-Saharan Africa and parts of Asia and the Pacific. Some countries, like Rwanda and Kenya, are preparing to meet these challenges, but most others are not prepared for the shocks of the information age and its impact on the systems of secondary city development and management, or its implications on economic development policy.

The impact of the information age has already brought a switch in the nature and location of production. More multi-national corporations are nearshoring (relocating) industries much closer to markets, customers, and efficient logistics systems. A study published by the McKinsey Group (Andersson et al., 2018) found that 63 per cent of survey respondents believe it is likely that fabric production will move to nearshoring to support regional supply chains by 2025. China is moving towards endogenous growth models to create industries and jobs, many of which are in secondary towns and cities. The implication of these changes indicates that countries seeking to use urbanisation and industrialisation as a way to reduce poverty and attract foreign direct investment (FDI) is a model that is being overtaken by the advances of the information economy.

> Building strategic infrastructure and enhancing connectivity will be crucial to boosting the competitiveness, development, and prosperity of systems of secondary cities.

The information age is proving a significant challenge for secondary cities in developing economies, especially those in sub-Saharan Africa and Asia. Emerging economies can no longer rely on industrialisation—taking advantage of low-cost unskilled labour to produce goods and services for export—as the pathway to growth. With poor access to national and global infrastructure services and networks, a lack of capital and skills, and the use of low-level technologies, many secondary cities are not in the position to engage effectively in the information age. Unless governments give priority to investment in developing ICT systems and networks, and to soft infrastructure support, such as education and training of SME and micro-business networking, a digital divide will emerge that will preclude many cities from having access to the essential goods and services necessary to engage in a growing digital economy.

The prospects for the development of secondary cities are promising—provided steps are taken by all levels of government, in partnership with the private sector to improve their functions, infrastructure enabling environments, and accessibility to supply chain systems and networks. There are many examples of secondary cities grasping the opportunities of the information age to help support sustainable economic growth and development in developed and developing countries. The issue for all secondary cities is how they can address scale issues, access to skills and resources, knowledge, and information as the Fourth Industrial Revolution (4IR) unfolds. Many secondary cities, e.g., Wellington (New Zealand), Wolfsburg (Germany), and Sleman (Indonesia), have realised that connectivity, networking, and collaboration are crucial to overcoming locational and size constraints, and they have significantly outperformed many larger metro-city economies.

3| CONNECTIVITY AND NETWORKS WITHIN SYSTEMS OF SECONDARY CITIES

3.1 Connectedness, Performance, and Economic Development

Increasing efforts are being made by governments to enhance the competitiveness and performance of cities. Unfortunately, much of this effort tends to focus on large cities—not secondary cities (Roberts, 2014). Large cities are where the proportion of national GDP tends to be highest, but urbanisation issues, poverty, and development problems are not necessarily as acute as in secondary cities, which have faster growth rates. While improving the elements of performance of large cities through investment in significant infrastructure projects to relieve congestion, the development of economic enterprise zones, and improved governance, helps large cities to become more competitive, often the flow-on benefits to regional areas, towns, and cities are poor. Enhancing the elements of performance of metropolitan regions requires the government to give more attention to the networks and supply chains that feed them—especially to secondary cities, which provide the vital hubs and links to resources and materials in regional areas.

Most government efforts to support improved performance of cities in developing economies occur through international development assistance or national grant/loans for physical infrastructure and institutional capacity building. The Jawaharlal Nehru National Urban Renewal Mission program covering 63 cities in India (GoI, 2007) is an example of an infrastructure-driven boost to primary and secondary development. The development of secondary-city growth poles and economic enterprise zones has been used widely in many countries, many of which have failed to live up to expectations (Kilroy et al., 2015).

3.1.1 CONNECTIVITY IS CRUCIAL TO MAKING SECONDARY CITIES MORE PROSPEROUS

The building of infrastructure to improve the collaboration, performance, and prosperity of secondary towns and cities is insufficient to boost local economic development. Many other hard and soft infrastructure factors need to be addressed to make local economies more collaborative. A crucial missing element, which is continuously overlooked by researchers and policy-makers, is the importance of hard and soft infrastructure associated with connectivity between systems of cities. If cities are not well connected by hard and soft infrastructure (i.e., roads, rail, air services and political, social, and business networks), the flows of materials, people, trade, goods, services, and information are slowed down, and the prospects for sustainable local economic development are minimal. Very few national and regional economic development plans mention the need to develop both hard and soft connections between systems of cities to boost local economic development and address the impact of poor connectivity on regional disparities.

The importance of connectivity and network infrastructure to support the local economic development of secondary cities has not been researched extensively. Most investigations on connectivity tend to focus on the role of hard or physical infrastructure connections, networks, and flows. The skills and competencies of the people who oversee these systems are critical to ensuring that they operate efficiently and effectively. Personal or corporate knowledge on how to use the infrastructure, services, and technology that connect business and people within systems of cities has an impact on performance, productivity, and prosperity. Historically, the scale and quality of physical infrastructure, for example, roads, utilities and logistics systems, supported the flow of materials, goods, services, energy, and merchandise trade between geographic locations, and dictated the rate, growth, and development of cities. Today, the output and development of cities is driven increasingly by a range of services delivered in a variety of ways.

> "When we think of cities now, we typically envision businesses, systems, and people operating among one another with almost no connection or collaboration. Now, imagine what will happen once cities become more connected and smarter? Once local companies realize the value they could create together through interconnectivity, the possibilities are virtually endless."
>
> (Newman, 2016). Smart Cities May Turn Competition into Collaboration.

The relationship between connectedness and economic performance of systems of secondary cities is poorly understood. Several studies show the importance of connectivity in supporting the development of systems of cities (Ammann & Sanogo, 2017; Bank, 2009), especially global cities, but few studies are specific to the performance of secondary cities. In a study of 16 states in Europe, Parkinson et al. (2012: 31p) acknowledge that "one or more second tier cities recorded higher annual growth in total GDP between 2000 and 2007 than their capitals especially in Germany, France, Norway, and Spain. But it also happened in three former socialist states. And states in Eastern Europe experienced some of the fastest growth rates, as their economies integrated into the European economy, with second tier as well as capital cities contributing."

Other studies of second-tier cities in Europe (ESPON, 2016; Meijers, 2016) note connectivity as one of the key drivers of improved economic performance, but note also that many other driving factors, such as innovation, governance, size, and level of human capital development affect economic performance.

What is emerging from European studies is that soft infrastructure connectivity in public and private sector services to support the flows of knowledge, innovative ideas, information, and data in second-tier cities has a significant impact on economic performance and growth, especially in advanced service-sector employment (Parkinson et al., 2012). The extent to which any one of these factors affects the economic performance and growth prospects of systems of secondary cities is difficult to quantify. Once secondary cities have well-developed transport, communications, and logistics systems and services, investment in the development of softer connectivity assets and systems, including regional knowledge, information and business networks, communities of interest, and inter-regional collaborative governance, becomes important to improving economic performance.

Public-community based partnerships for maintenance of public marketplaces constitute a type of soft infrastructure that help develop better trade systems.

Location: Uganda
Photo Credit: @Cities Alliance, 2019

3.1.2 NETWORKS

Many types of linkages connect nodes and hubs through networks. Collectively, they bring together global and national systems of cities and regions. Without these connections, few current-day cities could function or develop. Connectivity (Buck et al., 2005) plays a crucial role in supporting the economic development, functioning, and elements of performance of cities and regions (Behrens et al., 2014). Many studies and reports have been published on city elements of performance and their link to economic development (Kilroy et al., 2015; World Economic Forum, 2014). However, the role of connectivity in supporting the elements of performance and economic development of cities, especially secondary cities, is not well researched and understood. This relationship is a significant and crucial factor in the growth and development of secondary cities.

Most firms understand the need for quick and reliable access to the nodes, hubs, and networks that deliver or receive goods and services from many locations around the world. The world is connected by 3200 airports and 60,000 routes. Port cities handle 80 per cent of global merchandise trade, and 40 ports control 60 per cent of world container traffic (United Nations Conference on Trade and Development, 2017). The efficiency and effectiveness of these are crucial to business development, elements of performance, and reputation for goods, people, and the services they deliver and receive. Running a modern business requires good access to supply chains, transportation systems ports, activity nodes and networks, internet services, analytical skills, and information technologies. Connectivity is difficult to quantify and measure, as is knowing how to connect to industry supply chains, markets, enabling systems, etc. Dispatch companies like DHL have developed a connectedness index to measure the efficiencies in freight transport logistics between cities in order to reduce the time-cost of deliveries.

Other factors of connectivity such as business, information and data sharing, or visitor exchanges have been included in connectivity indexes; however, data in developing countries are often poor, not easily collected, or not available. These soft connectivity factors are becoming increasingly important to business, trade, and the economic development of cities. Most connectivity indexes focus only on metropolitan and megacity connectedness, and tend to measure indicators of physical movements of goods and e-services. By comparison, there is little research on indicators to measure the connectivity of systems of secondary cities. The following section seeks to fill that gap by presenting a theoretical basis and framework to analyse the hard and soft connectivity factors and network infrastructure connecting secondary cities. By measuring and ranking indicators of flows and exchanges in hard and soft infrastructure networks connecting systems of secondary cities, weaknesses and opportunities can be identified to strengthen these so that a more competitive and collaborative system of secondary cities can be developed.

3.2 Connectivity within a System of Cities

Connectivity is defined as "the state or quality of being connective or connected" (Merriam-Webster, 2018). Connectivity can be applied widely to many kinds of systems and to the way the different elements or components of a system interact. Connectivity has both physical (hard) and (soft) metaphysical attributes. These attributes can be measured in terms of exchanges and flow between hubs and nodes using infrastructure and enabling environment networks. Physical connectivity is relatively easy to observe and measure. Metaphysical connectivity, on the other hand, is much more difficult to describe and measure.

3.2.1 HARD AND SOFT CONNECTIVITY BETWEEN CITIES

The most noticeable features of physical connectivity are infrastructure that supports accessibility and use of transportation, postal, and telecommunication services within and between cities and the waterway systems that provide navigational routes between cities. Physical assets provide the basis of trade, tourism, cultural, social, and other exchanges. Physical proximity, rivalry, and economic geography often play crucial roles in the way cities are connected and the alliances that occur between them. The internationalisation of business, free trade agreements, modern telecommunications, and the Internet have changed the ways cities connect, as well as the ways businesses and people connect within cities. As a result, the economic growth and development of cities are being shaped by physical connectivity. Never have cities been more dependent on connectivity to support their growth and development.

Much of the literature and debate on the connectivity of cities tends to focus on the need to improve connectivity and accessibility to physical infrastructure networks and services. Many city economic development plans stress the need for improved hard infrastructure, such as roads, airports, and ports (Farole, 2012). Subsequently, the focus on physical connectivity has tended to be on transport and communications planning. Connectivity, in the context of cities, is not limited to the quantity and capacity of physical infrastructure, utilities, transport, and logistics facilities to support the movement of materials, goods, services, and people. Factors such as quality, density, choice, flexibility, and location also influence how well cities are connected, and the way they function and develop. The level and quality of hard infrastructure connectivity in European cities are high because this infrastructure is extensive, dense, and heavily utilised, adding to production, elements of performance, and efficiencies in the ways goods and services are produced and distributed. The same cannot be said of sub-Saharan countries, for example.

The 2014 World Economic Forum Report (2014: 6p) describes soft connectivity as follows: "the city's social capital is as important as hard connectivity in the 21st century's knowledge economy – while soft and hard connectivity is mutually reinforcing, soft connectivity is also about supporting an open society in the city, which spurs ideas, entrepreneurship, innovation, and growth."

Many elements of soft connectivity—like information, reputation, knowledge, social capital, and creativity—are often latent or intangible features which develop or become known by reputation over time. Social capital is built up over many years and becomes deeply embedded in the makeup of the political economy (Woolcock, 1998). It is known to be a key driver of regional innovation and creativity (Westlund et al., 2013) and also of the development of industrial clusters and connectedness in cities and businesses, such as in Italy's Emilia Romagna region (Botturi et al., 2015). Social capital created within migrant diasporas has been critical in providing the links to markets, finance, technology, and expertise behind the development of microenterprises in systems of cities in countries like China, Vietnam, India, Indonesia, Morocco, Bangladesh, and many Latin American countries.

The ways different factors of soft connectivity capital are applied and combined, and the way they flow and interact with each other are what adds extra value to the many things that cities, businesses, and individuals produce, use, or exchange (Berglund et al., 2002). Soft connectivity capital and flows are extremely important in the age of artificial intelligence and IoT to maintain and develop functioning, dynamic, and viable secondary cities. However, soft connectivity can be extremely fragile and short-lived: social media, for example, can quickly and adversely impact the perceptions of a city.

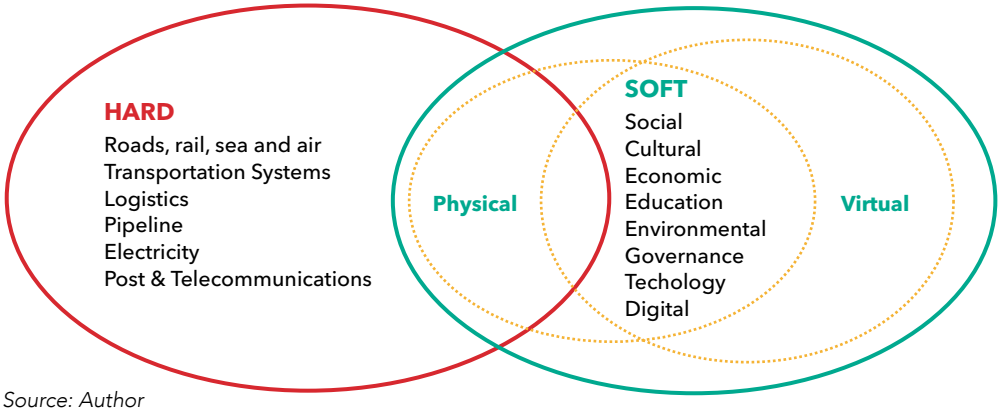
3.2.2 BALANCING HARD AND SOFT INFRASTRUCTURE

Improvements in physical accessibility through improved transport infrastructure systems are no guarantee of an increase in local and regional population numbers, nor of enhanced economic performance (ESPON, 2016). Physical connectivity is essential, but so is the soft infrastructure of social and digital networks. The propensity to separate connectivity into hard and soft elements, while useful, overlooks the importance of the relationship between the two. They are not mutually exclusive. The size and scale of hard and soft infrastructure should be determined in relation to future demand, technology, risk, and other anticipated changes. In seeking to enhance connectivity as a strategy to support the economic development of secondary (or larger) cities, it is important that policy-makers understand the need for integration and dependency between hard and soft connectivity elements and how governments can facilitate their development.

Figure 3.1 shows a conceptual framework of the interrelationship between hard and soft connectivity and network infrastructure needed to support the development of systems of secondary cities. Hard connectivity, as noted, consists mainly of physical connections. These are the transportation, telecommunication, and services networks which connect human settlements. The size of a population and the function and location of urban centres have a significant influence on the scope, scale, and types of connections between human settlements. However, many other political, economic, social, and cultural factors shape features of hard connections. Many of these factors comprise elements of soft connectivity.

Soft connectivity has virtual and physical features. Virtual features take various forms—transfers or transactions of intangible capital, ideas, information, data, and knowledge exchanges between governments, business, and individuals. The connection is not physical but is made through the use of technology. Historically, written or other forms of documentation were used, but increasingly the platform has become digital. Online learning, blogging and social media are significantly expanding the access, range, and depth of information, knowledge, and experiences that are crucial to human capital, social, and local economic development. The nature and mix of transfers and exchanges occur through different modes of connection and network infrastructure.

FIGURE 3.1 Framework of the interrelationship between hard and soft connectivity and network infrastructure.



Source: Author

The second feature of soft connectivity is physical, and space/place-based. It is linked closely to and, in many cases, is dependent upon the first feature. It is in the spatial domain/place where virtual and physical connectivity meet, interface, and interact. The meeting places are part of the physical exchange space where people and organisations meet for different reasons to share, exchange, argue and debate ideas and concepts, and learn from each other. Such spaces and places are crucial to fostering innovation, creativity, transformation, exchange, and agreement to support human capital, social, and economic development. Conferences, exhibitions, seminars, teaching and learning activities, and job exchanges are some ways in which this happens. Others include trade missions, cultural and work exchanges, and mentoring.

Labour markets are an important element of soft connectivity within systems of secondary cities. In developing countries, many secondary cities have become the first stage of urban-rural migration in providing new opportunities for access to employment, health, education, and trade services. High regional fertility rates and other push factors have resulted in many secondary cities absorbing population and growing much faster than metropolitan regions. Urbanisation has led to a rapid expansion of labour markets, with a high proportion of migrants and residents working in retail, transport, construction, urban utilities, and domestic services sectors.

Many of the basic skills and competencies of the labour force are developed either from tacit knowledge or by learning on the job, as most people are not in a position to access higher education. Basic social, learning, and business skill sets are passed onto family members, friends, and cultural groups which enable many permanent and temporary residents of secondary cities in developing countries to start small- and micro-scale business enterprises. For some, this experience equips them or their children to migrate to metropolitan regions and overseas in search of higher paying work.

Unfortunately, many secondary cities in developing economies have not been able to increase skills levels in the labour force or to foster public and private engagement to provide the necessary development to attract private investment and create decent jobs. Subsequently, unemployment and underemployment tend to be high, as does the level of informal sector employment. Secondary cities also end up importing high levels of skilled labour, capital, and business services which can lead to significant structural problems in their economies. The exceptions are secondary cities that have created large industrial areas and attracted FDI in industries in food processing, garment, textile, and parts and accessories manufacturing, where the demand for labour is high. Lower costs for labour, housing, and living expenses have helped to offset the high transaction costs for the transportation of goods and materials to and from ports.

In post-industrialised economies, a situation has arisen where many secondary cities and regional centres have become net exporters of skilled labour. Populations are ageing, infrastructure and the housing stock are not well maintained, and community and social services have become run down. Many cities have developed resilience strategies to lift the skills base and diversify and restructure into more service-based economies driven by tourism, trade, education, and health services. Others, especially in older industrial parts of Europe, Japan, UK, USA, Canada, and Australia have not, and are in decline. In some

case, for environmental and economic reasons, strategies to support managed decline may be necessary for many of these cities; however, this does not mean abandoning support for resilience initiatives. Every effort should be made to revitalise post-industrial cities, provided they have good prospects for sustainable futures.

The challenge for cities, especially secondary cities, which do not have the depth and range of capital as larger cities, is how to create the enabling infrastructure and places/spaces to focus the efforts of governments, institutions, firms, and individuals to maximise opportunities, and extra yields and the value of connectivity exchanges. Many cities spread their efforts on connectivity too widely, resulting in diminished returns. On the other hand, cities that are too narrowly connected could miss opportunities to create new industries and employment opportunities. The key is a balanced broadening and targeting of connectivity development to support local economic development in secondary cities through public policy and other interventions.

Improving the level and quality of hard and soft connectivity and network infrastructure, especially among secondary towns and cities, is crucial to more equitable, efficient, and effective access and flows of goods, services, and other exchanges needed to foster the development of trade, investment, information, knowledge sharing, and visitations between systems of cities (ASEAN, 2016). The emphasis given in development policy to the need for hard infrastructure is widely recognised. An Asian Development Bank (ADB) study forecasts that the needs for hard infrastructure in developing Asia and the Pacific will exceed US$22.6 trillion through to 2030, or US$1.5 trillion per year, if the region is to maintain growth momentum (Asian Development Bank, 2017). Much of this will be needed in cities. Currently, the region invests annually an estimated US$881 billion in hard infrastructure. Little is known about the level of investment required in soft infrastructure.

The need for focus and balance on the way cities are connected raises an important question for governments and public policymakers. What aspects of connectivity should governments focus upon developing, and how can they get the right mix of hard and soft? A useful way to start is through the development of connectivity indexes, which attempt to measure the attributes of connectivity and network infrastructure that influence regional and local economic development. The mix that will return stronger yields in terms of economic and social development will become more apparent through observation and experimentation. Efforts by cities and regions to concentrate the depth and focus of spatial networks to create competitive advantage will result in positive outcomes in supporting local economic development.

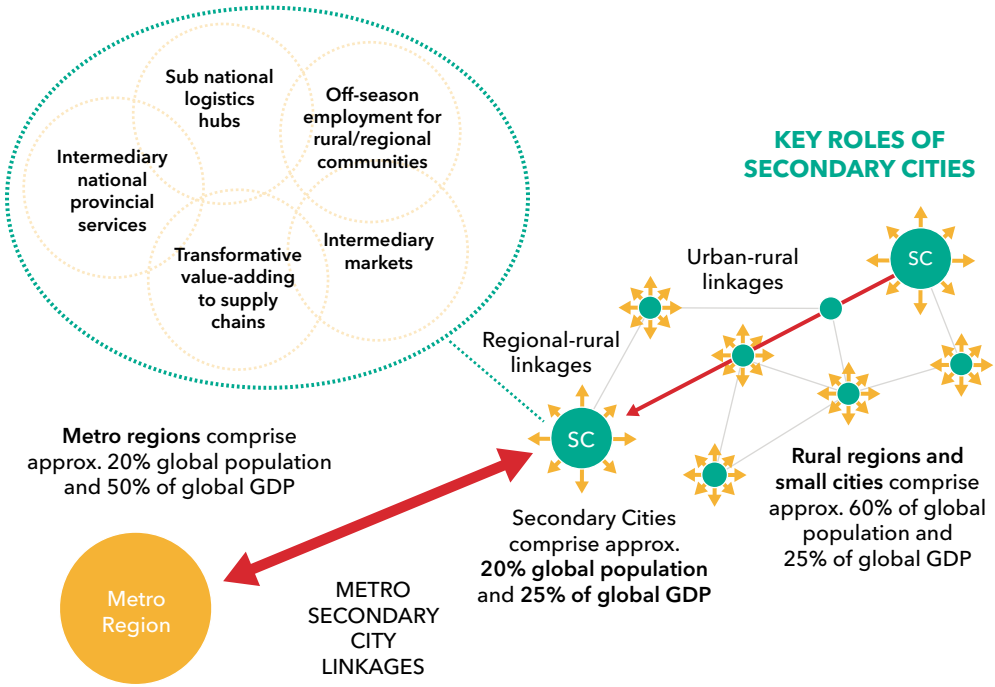
3.2.3 THE SECONDARY CITY TRIAD OF LINKAGES AND NETWORKS

A triad of key hard and soft external connectivity factors or linkages have been identified, which must be considered carefully in the planning of economic development of secondary cities. These are urban-rural, secondary city to secondary city, and metropolitan region linkages (Figure 3.2). In addition, there are many other intra-city connectivity factors, or linkages, that secondary cities must ensure are in place and operate efficiently and effectively to enable local economies to grow. Most secondary cities play an important role

as regional market, transport, freight and passenger, and logistics hubs or centres. These facilities can add value to production and end-user demand for goods and services. They are vital to the flow of materials, goods, and services between rural areas and metropolitan regions. Poor logistics facilities and transfer systems within systems of secondary cities can affect the timeliness, quality, and capacity to collect, sort, and dispatch a wide range of goods and services within industry supply chain systems.

Urban-rural linkages are a crucial part of production value-adding to consumption supply chains. These supply chains provide most of the materials, food, and cash crops that manufacturing and processing require to make value-added products. For cities and nations to maximise their value-adding development opportunities, it is crucial that producers in rural and regional areas have quality access to industry supply chains. Secondary and smaller intermediary cities provide the nodes to connect supply chains that offer opportunities for secondary cities to first-stage value-adding to products and services to be able to engage in the expansion of trade, investment and other exchanges beyond their local area or jurisdictions. Secondary city hubs and nodes provide the pivotal connection point where urban-rural linkages interface and converge, developing and strengthening the hard and soft infrastructure to enable urban-rural linkages to function more efficiently to feed into industry supply chains. It is at this point in the supply chain and production cycle that transaction costs are highest, particularly if it is limited or there is no competition on the use of public monopoly infrastructure goods and services.

FIGURE 3.2 The Connectivity Triad.



Source: Author

Secondary City to Secondary City linkages and Networks play a crucial role in many value-adding industry processes, especially for industries associated with first/second stage value-adding, such as processing food, materials and accessory parts and goods. Supply chains have the role of ensuring inputs into production processes and transport outputs to a range of end-user demands. These can be additional value-adding, markets, exports, and development of capital stock. The efficiency of supply chains operating among secondary cities affects the overall production and productivity of national economies and metropolitan and rural regions. If these are constrained by poor hard and soft infrastructure, such as poor interregional roads, weak enforcement of regulations, or labour skills shortages, the system of conveying goods and services along supply chains will slow and give rise to high transaction costs.

The weakness in city-to-city or intercity linkages is a significant factor in the failure to develop national networks of competitive trading secondary cities, which could collaborate and compete collectively with large metropolitan regions. Instead, much of the focus of economic development in secondary cities is on trade with metropolitan regions because they have bigger markets. In many countries, the collective size and market of three or four secondary cities are much larger than those of metropolitan regions. Nevertheless, it is the metropolitan regions that get the benefit of trade, investment, and jobs—not secondary cities

As noted above, most secondary cities give the greatest attention to the development of their local economies by focusing on links with metropolitan regions. This makes sense where the travel time among secondary cities and metropolitan regions is less than a couple of hours. Where secondary cities are dispersed or spread widely within supply chain systems, the development of regional trading networks of secondary and intermediary cities may be possible. In centrally planned economies, however, there is often no choice but to rely on the central government to provide the resources needed to support local economic development. Opportunities for the development of networks of secondary trading cities are probably strongest in more decentralised and federated economies. However, secondary cities must collaborate on developing the infrastructure that strengthens the connectivity and linkages between them.

Metropolitan region linkages are the third element of the triad. Governments recognise that improvements to transport and communications among secondary cities and large metropolitan regions will boost trade, investment, and exchange opportunities. The emphasis that is given to improvements in hard infrastructure connectivity often overlooks the importance that should be given to the development of soft infrastructure links to supporting industry supply chains. Improvements to hard infrastructure significantly increase the capacity for movement and volume of goods, but have not necessarily led to a reciprocal growth in services, especially in value-added business services.

Secondary cities offer opportunities to develop (and decentralise) business services to support the development of metropolitan regions, partly because labour and some transaction costs are lower. For secondary cities to do so, there is a need to identify niches in industry supply chains where these can add value to companies and businesses that may be located away from metropolitan regions. Outsourcing business from metropolitan regions to secondary cities tends to be limited to lower value-added services, but there

are significant opportunities for to develop higher value-added services in the future, for example in industries associated with 3D printing and advanced business services. Some secondary cities in India have been very successful in creating new opportunities for advanced business services, supporting the growth of secondary cities as part of metropolitan region supply chains.

Factors that affect connectivity between systems of cities include the following:

- Ease of access to hubs, nodes, and connectors that provide seamless access to infrastructure networks that support the flow or exchange of information, physical, or spatial movement of many types of goods and services
- Economic, governance, ideological, social, legal, and other non-physical types of access to public and private goods and services in other locations
- Freedom of movement and speech
- General levels of and attitude towards literacy, education, language, knowledge, skills, and immigration, and openness to change and ideas
- Quality, scope, scale, flexibility, and capacity of infrastructure and networks responding to change
- Threats or fears of unknown consequences of opening local economies
  to competition, change, foreign investment, and international exchanges, and unfettered FDI
- Community beliefs and attitudes.

Table 3.1 lists examples of some hard and soft elements and attributes of flows along with exchanges that can be a measure for these.

TABLE 3.1 Hard and soft elements of connectivity.

	ELEMENTS OF HARD CONNECTIVITY	ELEMENTS OF SOFT CONNECTIVITY
Physical	• Road, rail, sea and air infrastructure platforms and network • Postal and freight and passenger services • Utilities (pipelines, electricity and ICT) • Origin-destinations movements	• Internet • Other ICT data • Information systems • E-utility services • E- monitoring
Economic and Trade	• Trade flows • Business documents exchanges • Passenger flows • Business exchange • Tourists • Telecommuting (physical)	• E-finance • E-health • E-services • Marketing and promotion • E-trade and manufacturing • Telecommuting
Social and Cultural	• Education • Visiting friends and relatives • Sports and cultural • Conventions, workshops, and seminars • Cultural exchanges and events	• E-learning and conferencing • Social and public media • E-library and media • Community networks • Diaspora

	ELEMENTS OF HARD CONNECTIVITY	ELEMENTS OF SOFT CONNECTIVITY
Governance	• Government to government meetings • Cooperative services delivery • Collaborative services delivery • Resource sharing (staff and assets) • Vertical and horizontal fiscal exchange	• Political allegiance • E-governance • E-services • Partnerships • Alliance (Sister cities)
Environmental	• Environmental flows (water, air) • Animal and bird migration	• Environmental partnerships • E-environmental services
Intrinsic	• Physical identity • The sense of place and belonging • Customary/traditional ownership	• Experience, image, reputation • Security and safety • Historical legacies

Source: Author

3.2.4 TOWARDS AN INDEX TO ANALYSE CONNECTIVITY AND NETWORKS FOR SECONDARY CITIES

The various indexes described above provide useful insights into different elements of connectedness in relation to movements and transfers between countries and the world's major cities. In developing economies, however, such data may not be available, and simpler sets of indicators may need to be used to gain a picture of how well systems of cities are connected. In some cases, this may involve using a focus group to access the regularity of meetings between regional levels of government departments or estimates of the number of buses and passengers travelling between cities. For this publication, an experimental, analytical framework was developed to measure levels of connectivity between cities.

FIGURE 3.3 Index framework to evaluate the scope and scale of connectivity between cities.

	SCALE OF NETWORKS			
Scope of connectivity	Hard and Soft Indicators	Intra Regional (City/rural urban)	National (Inter-regional City)	Global (Inter-city)
	Physical (including ITC)			
	Economic			
	Social/cultural			
	Environmental			
	Governance			
	Information/Knowledge			

Types of Secondary Cities

REGIONAL	CLUSTERED	CORRIDOR

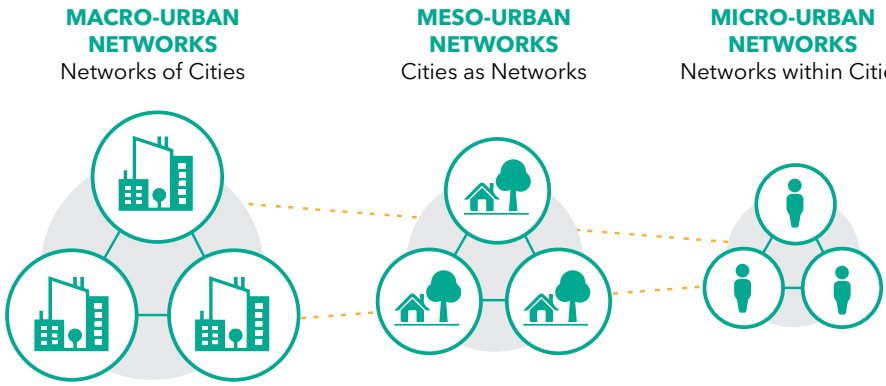
Source: Author

Figure 3.3 shows a basic framework used to evaluate the scope and scale of connectivity and networking that supports the development of secondary cities. *Scope* covers the extent of the area or subject matter that something deals with or to which it is relevant, or there is an opportunity or possibility to do or deal with something. It can be used to examine different elements of connectivity. *Scale* relates to the size, range, or level of coverage. It can be used to examine the spatial elements of networking. By using qualitative and quantitative nominal-scale methods of analysis (flights per day/capita, volume and value of trade per capita), it is possible to develop a basic index that provides perspectives and insights into the nature, qualities, and dimensions of connectedness and the infrastructure networks that support the development of secondary cities. The framework could also be used to evaluate these characteristics for metropolitan regions, small regional towns, and cities. Annexe describes a framework which can be used to develop a connectivity index for systems of secondary cities.

3.3 Examples of Secondary City Systems

Secondary cities are part of a much larger system of cities (Berry, 1964) connected to complex multi-level urban networks, which function at different levels, scales, and intensities. Neal (2013) classifies urban networks into three levels (Figure 3.4). *Macro urban networks* are the connections between cities. They comprise a myriad of physical, economic, cultural, and social connections which relate to activities and flows occurring at different scales and intensities. Within macro urban networks sit systems of secondary cities. These form a distinct sub-system within the systems of cities.

FIGURE 3.4 Nested levels of urban networks.



Source: Adapted from Neal, 2013.

Meso-urban networks comprise the rich mixture of connections between people engaged in business and public activities in different parts and places within cities. These networks extend beyond the city into peri-urban regions and hinterlands.

Micro urban networks occur between people in communities. These are developed and shaped by culture, communities of interest, politics, and personal factors. These nested levels of networks are no longer bound by geography, culture, or language. However, each level provides a useful basis for a spatial way in which networks operate and how governments can play a role through policy, information, budgets, and other mechanisms to support the operations, development, interfaces, and engagements between different levels of networks present in human settlements.

Networks play a critical role in the development of cities and regions (Boix, 2003). Networks can be physical or virtual and may include combinations of both. A network may be as small as three connections. Large networks like Facebook and Twitter involve millions of connections. In the context of cities, networks are the connecting physical or metaphysical platforms or mediums which provide the means of movement, exchanges, flows, transmissions, and other transactions of many things (physical or metaphysical) between spaces, places, people. They vary in size, coverage, distance, density, accessibility, and complexity.

Movements that occur within networks are measured in many ways: types, flows, volume, space, density, time, and other attributes. Some networks provide opportunities for alternative choices in route, direction, and time. Routes may be direct or circuitous, depending on factors such as geography or law. Flows in networks can be stable, alternating, rippling, erratic, or chaotic. Networks, at times, can become unstable or hard to manage, measure, and model. This is especially so when it comes to managing networks upon which the operations, functions, and activities of cities and regions rely.

Physical networks, in the context of systems of cities and regions, are vital to well-functioning cities; they include the mesh of transport, energy, and other utility infrastructure that services a wide range of land-use activities. There is an extensive field of knowledge on the operations, development, and modelling of physical networks that service cities. The modelling and monitoring of urban systems to ensure that flows within physical networks are not overloaded are part of traffic, electricity, and flood management in many cities. The mapping of physical networks is crucial in navigating in and around cities. For example, one of the most famous network maps in the world is the London metro system.

Metaphysical networks in cities are mostly invisible transactions and flows of e-finance, intelligence, news feeds, and multi-media. These are soft infrastructure networks. They are crucial to supporting local economic development. Increasingly they must be capable of being connected to global networks and sub-networks in other countries and cities (Malecki, 2002). Metaphysical networks predominately service the need for digital information and data flows. Metaphysical networks are also social and complex. They manifest themselves as associations, family connections and other links between people, places, shared beliefs, values, and interests.

There is growing interest in the role and development of soft networks between cities to support economic development. However, as one author put it, "there is a need to move away from a one-sided financial/investment-oriented approach of city networking, towards one that emphasises qualitative partnerships that involve documentation and peer-to-peer transfer of knowledge on urban governance and management between cities in a country or region" (Srinivas, 2015).

The development of networks to support the exchange, sharing, and accumulation of social, cultural, corporate, and technology capital are important and add to the intrinsic capital stock of cities—especially accumulative human capital and knowledge. Networks allow the creation and flow of intrinsic knowledge and capital which are essential in the creation of smart cities (GMSA, 2016; McClellan et al., 2017). Without the presence of these networks, cities of today would have difficulty functioning.

The effect of technology and ICT change is that city networks are becoming less hierarchical in form and structure, more dispersed and, in some cases, localised. The emergence in cities of local area networks and grids for energy, water, and information is becoming more common. Local area networks and grids reduce the dependence and risk associated with reliance on large national networks, especially national electricity grids, which are prone to failure. A downside of an increasingly networked society is that many big system networks are currently controlled by the government or large corporations, creating concerns about security, privacy, and accessibility if these become privatised and closed systems.

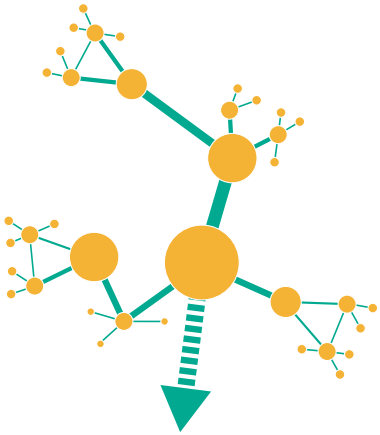
A critical factor in secondary city development is the creation of opportunities to build local physical and metaphysical networks that can connect and be integrated, without having a dependence upon large metropolitan regions for the provision of higher-level services and other needs. Access to the IoT will help break that dependence and is already creating opportunities for regional towns and cities to gain access to virtual communities of interest and to specialised services, products, and markets, which connect like-minded and even competing interests globally.

3.3.1 TYPES OF SECONDARY CITY SYSTEMS

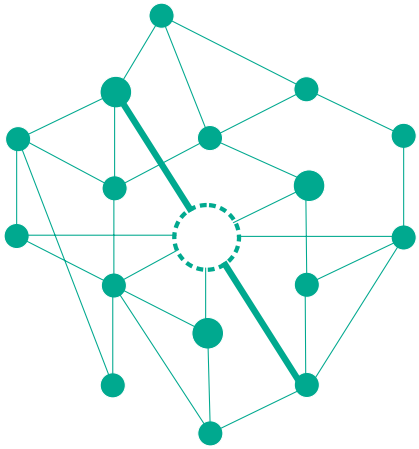
Changes in global trade and the IoT have given rise to very complex networks of hubs and nodes within systems of cities. Networks have spatial, physical, and virtual elements: they are made up of many connections, which allow many different things to interact with each other in time, space, and place. There is a high degree of interaction between all three elements. A rail network, for instance, requires both physical infrastructure, signalling, and time tables to operate. How well a network functions, however, depends on many other factors, such as use, scale, capacity, technology, and the skills and competencies of the people who build and operate it. Physical networks comprise a system of interconnected people or things; their purpose is to support the movement and the exchange of physical things. Railways, roads, telecommunications, and river and canal networks have the primary purpose of servicing the needs of human settlements. Non-physical networks relate to the exchange of data and information and are developed by personal interests and professional or social contacts—although these networks have become much wider and deeper with the IoT.

Networks related to the spatial development of systems of cities can be identified as regular, random, scale-free, and hierarchical (Figure 3.5). *Regular networks* are 'regular' because each node has the same number of links. This is the pattern associated with rural development in many countries prior to historical industrialisation. *Random networks* are generated by starting with a disconnected (independent) set of nodes that become linked up in relation to the proximity and scale of nodes in the network. For example, clusters of villages become more interconnected to an urban centre as the result of a new food processing industry being developed in a town or small city. This is the pattern of human settlement development that often occurs with the initial stages of industrialisation or regional tourism development.

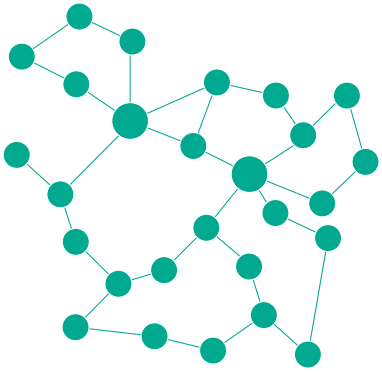
FIGURE 3.5 Regular, random, scale-free, and hierarchical networks.



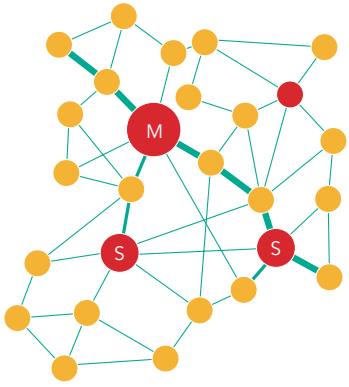
Hierarchical Networks comprise a series of secondary hubs and nodes which function mainly through a centralised hub. Hierarchical networks of cities are evident in many African, South American and some Asian systems of cities.



Regular Networks are not homogeneous. The pattern can be a regular grid or other patterns where the links and separation of hubs and nodes tends to be uniform. These uniform spread of nodes tend to happen around a major hub within a country. This type of networks are features of densely populated decentralised countries.



Random Networks are nearly homogenous. Most nodes have approximately the same numbers of links. The road system, for pre-industrialised countries with low levels of urbanisation, fits this type of network model. Many of these are transforming into hierarchal or scale-free networks as a result of urbanisation.



Scale-Free Networks are not homogeneous. Most nodes have two or three strong links but a few highly-connected nodes, so-called hubs, have a large number of links. This network pattern is reminiscent of North American, Brazil and some Asian countries.

Source: Author

Scale-free networks are networks that emerge with the presence of hubs, or with a few nodes that are highly connected to other nodes in the network. This pattern of systems of cities settlement is associated with advanced levels of industrialisation, i.e., Europe, USA, and China. Hierarchical networks are those associated with the development of strong clusters of hubs and nodes of economic activities in geographic regions connected through a major global hub. The development of the Jingjinji (Beijing-Tianjin-Hebei) supra region in China is an example of this form of the hierarchical network system of cities. There are, however, many variations and mixes of all the above networks.

The most significant differences between regular, random, and scale-free networks are observed in urban hubs. Fixed regular networks are the physical and governance infrastructure systems and structures that connect many parts of cities and regions. Examples of governance network infrastructure are legal procedures, protocols, and rules that shape the actions of government and how citizens should behave. Without them, urban and regional systems would not function.

> The scale-free network model assumes that systems of cities will grow more uniformly as populations rise. The model has strongly influenced spatial planning for the balanced and equitable development of urban systems.

Developments in the field of mathematics, scale-free and random networks (Barthélemy, 2003) offer new insights into the creation of networks which could be applied to shaping the development, growth, and functions of primary and secondary cities. In the development of scale-free networks (Barabási & Albert, 1999), the degree of the largest hub rises as a nonlinear relationship with the size of the network. In random networks (Erdős & Rényi, 1961), the degree of importance of the most significant nodes rises faster or slower than other hubs in an extensive network. These occur where a hub city within a regional system of cities network is able to gain some form of competitive advantage. An example of this is the rise of Palo Alto (Silicon Valley) (Saxenian, 1996), which developed as a global IT centre) within the San Francisco Bay area. In the pre-internet age, scale-free networks dominated, but in the IoT, random networks are emerging. It is crucial however that "optimal network [of connections which] minimises both the total length and the diameter ties in between the scale-free and spatial networks" (Barthélemy, 2003: 915p).

The scale-free network model assumes that systems of cities will grow more uniformly as populations rise. The model has strongly influenced spatial planning for the balanced and equitable development of urban systems. It has also strongly influenced central government policies and decisions on the spatial location of major public investment to support new industries in poor or depressed regions to create jobs. It is also associated with political favouritism, with decisions made without proper consideration of access to skilled labour, access to supply chains, and transaction costs.

The scale-free network model has driven the development of cities in countries like Argentina, Thailand, and Ghana, where primary cities have dominated the development of the national economy and systems of cities. Unfortunately, the trickle-down effect in the development of systems of cities in scale-free networks has not been uniform and has contributed significantly to the disparities in sub-national, regional development, elements of performance, and diversity in the development of secondary and tertiary systems of cities.

The random network model provides a better explanation of what happens to the growth of networks and urban patterns. The random model recognises that economics and other factors are far more influential in shaping the growth and development of cities than is population growth. Cities develop as the result of a unique combination of factors that attract the investment, capital, and labour needed to support their development. The progressive accumulation of wealth and other intrinsic factors result in the creation of competitive advantage. The level of connectivity and network development gives some cities a competitive advantage over others. In most cases, these cities networks tend to become broader and more specialised over time, so cities become known by what they produce or offer through reputation. Focusing on the development of random networks offers diverse opportunities for the development of secondary cities.

> While the size and the growth of random and scale-free networks are still important to the development of cities, it is the random networks that create the point of difference between the elements of the performance of cities.

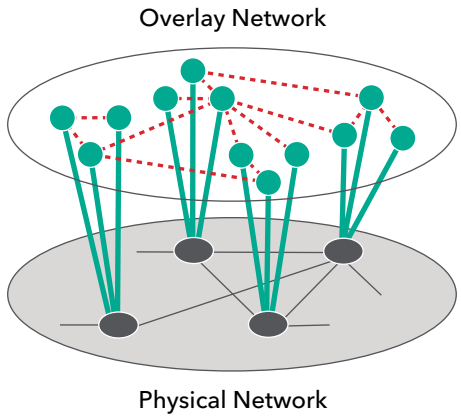
A hierarchical network divides the network into discrete layers relative to scale and proximity. Each layer, or tier, in the hierarchy, provides specific functions that define its role within a national or global network of cities. Population size and economic output are central to the explanation of the way cities fit within a world system of economic power or influence. While the size and the growth of random and scale-free networks are still important to the development of cities, it is the random networks that create the point of difference between the elements of the performance of cities. Random networks tend to form and build around clusters and communities of interest, especially associated with creativity, innovation, and knowledge sharing, which are becoming increasingly important to the development of cities. Weakness in the development of random networks is curtailing the development of many secondary cities. Secondary cities that have become smarter in developing random networks, for example, Gaziantep in Turkey, which is developing global leadership in carpets (Kilroy et al., 2015), shows how significant the development of random networks are to the development of secondary cities.

3.3.2 PEER-TO-PEER SYSTEMS OF SECONDARY CITIES

The diverse types of connections and networks described above have a crucial role in supporting the functions, operations and development of systems secondary cities. However,

new types of networks are emerging that are a hybrid of the networks described above. The difference is that these are increasingly virtual and they rely on the Internet to support their operations and development. These are peer-to-peer (P2P) networks (Andrews & Manning, 2016) linked to the sharing economy. Such networks are about major changes and developments in transport, travel, retail, business, education, and health services sectors in all economies.

FIGURE 3.6 Two elements of peer-to-peer networks.



Source: Moltchanov, 2013

In its simplest form, a P2P network is created when two or more computer devices are connected and share resources without going through a separate server computer. There are two elements of the network (Figure 3.6): there is the *overlay network*, which includes the Internet Protocol or IP addresses that are assigned to computers, as well as the flow of digital information that translates into many different forms of exchange (i.e., text, data, information, pictures, and words); and there is the *physical network*, which is the hard and soft infrastructure needed to make the Internet run (Moltchanov, 2013). A P2P network allows multiple connections between internet-linked devices supporting teleconferencing, mass education, and management of emergencies, among other things. Peer-to-peer networks are not constrained by hierarchy and scale, but by the capacity of the network infrastructure that drives them. That constraint is being overcome in many developing economies, however, with the rollout of 4G and 5G systems, low orbit satellites, and other devices which will permit Internet access in almost any place on earth.

Peer-to-peer networks have the capacity to remove the significant disadvantages (such as scale and accessibility) affecting the competitiveness and cost of doing business within systems of secondary cities. The advantage of P2P networks is that data and information can be compiled and sent instantaneously to almost any communications device. The importance of P2P networks in supporting economic transactions and many other activities is increasing rapidly and is constrained by the capacity of communications infrastructure.

As a result of the development of P2P networks, many other networks within systems of cities are emerging (Table 3.2). Such networks will make access to public and personalised goods, services, information, and communications in systems of secondary cities easier and cheaper. The advantage of these new networks is that secondary cities will become much less dependent on hierarchical networks to access markets for the purchase, sale, despatch, and delivery of a wide range of goods services, data, and information. Transaction costs for time, travel, and intermediary supply chains will all fall dramatically, allowing systems of secondary cities to be more collaborative and enjoy more equitable access to goods and services.

TABLE 3.2 Types of peer-to-peer networks supporting the development of systems of cities.

• Personal Area Network (PAN)	• Storage-Area Network (SAN)
• Local Area Network (LAN)	• System-Area Network (also known as SAN)
• Wireless Local Area Network (WLAN)	• Passive Optical Local Area Network (POLAN)
• Wide Area Network (WAN)	• Enterprise Private Network (EPN)
• Campus Area Network (CAN)	• Virtual Private Network (VPN)
• Metropolitan Area Network (MAN)	

Source: Bourgeois, 2016

The above networks have developed with the growth of the Internet and with new technologies in digital production, materials, and IT systems which have substantially reduced marginal costs of production and access to information of many products. Peer-to-peer networks will create opportunities for governments, business, and organisations within systems of secondary cities to collaborate to create virtual economies of scale and critical mass. These opportunities can be achieved through the development of virtual industry clusters, where the physical elements of production/assembly/distribution are dispersed, but the core elements connecting them will be networks of business, organisations, and communities of interest (WEF, 2017).

The development of P2P networks has the potential to create many new opportunities for the development of systems of secondary cities in all countries. However, the development of internet infrastructure is expensive, especially in developing countries which are landlocked or dispersed across oceans. Many developing countries (e.g., Indonesia, Rwanda) are hurrying to develop the infrastructure to roll out internet services to regional areas; however, speed, bandwidth, and volume use have an impact on the quality and price of services. One of the most significant constraints to the development of P2P global networks is the "internet pipe"—the point where national internet systems join the Global Internet. Many of these pipe connections have low bandwidth capacity and, if volume flows are small, unit data transfer costs can be high. Pipe capacity and costs are a significant factor in the growing problems of the digital divide, and they have a flow-on effect onto many sectors of the economies of developing regions and cities, including education, business, trade, information services, and government services.

3.3.3 WHY ARE PEER-TO-PEER NETWORKS VITAL TO THE DEVELOPMENT OF SECONDARY CITIES?

The contribution of the Internet to national and regional economies is growing rapidly. Measured by the combined value of ICT production and integrated digital inputs, China's digital economy was estimated to have contributed to 30 per cent of GDP in 2016, up from 15.2 per cent of GDP in 2008 (Lau, 2017). However, when measured by the value-added effect of ICT industries in the sector, China's digital sector amounted to 5 per cent of GDP in 2012. In countries like Japan, Korea, and Ireland, it was 8 per cent (International Monetary Fund, 2018). The Internet and P2P networks are infrastructures for the building of 21st-century economies, and data and information are the fuels that drive them.

In the developing regions in Africa, Asia, and Latin America, relatively sparse infrastructure is in place to allow citizens to access the Internet. In secondary cities, download speeds, even on mobile networks, are less than 3 Mbs. Moreover, even when there are connections available, many people in those regions cannot afford either the devices required or the account access (IMF 2018).

Peer-to-peer networking is developing, but mainly in social networks, not in business, government, and education. The development of infrastructure to support internet capacity, spread, and P2P networking offers significant opportunities to strengthen connectedness between regional systems of secondary cities to boost exchanges and the flow of trade, investment, and visitors between regions. It is vital that this is recognised in national urban- and regional development policies and infrastructure programmes. Of more critical importance, however, is the development of a system of secondary cities P2P networks for business, trade, education, community services, and government.

Light rail construction in Addis Abeba.

Location: Addis Abeba, Ethiopia
Photo Credit: @Cities Alliance, 2014

4| CASE STUDIES: SYSTEMS OF SECONDARY CITIES

Case studies are a useful way to show how some countries and secondary cities are taking a more collaborative and networked approach to local economic development. The following chapter presents case studies from developed and developing economies which describe good practice examples of initiatives to enhance connectivity, networks, and development initiatives for different types of secondary cites.

4.1 Regional Networks of Secondary Cities

The development of regional networks of secondary cities engaged in collaborative competition is an emerging phenomenon. The reason regional secondary cities are examining ways to collaborate is the recognition that many local businesses find it difficult to compete or gain access to markets because they are not able to achieve the same economies of scale as large industry clusters located in metropolitan regions close to major transport facilities and services. Many secondary cities are located inland or in land-locked countries, which adds significantly to transaction costs for many businesses.

The model for the development of systems of secondary cities has tended to have a strong focus on enhanced governance, economic, social, and historical connectivity to support the development of capital cities or large metropolitan regions. This has built on a strong social capital base of family and firm specialisation and value-added production activities along primary supply chain routes, except in Europe and some more densely settled countries. This metropolitan-centric form of development has reduced the possibilities of developing sub-national systems of trading secondary cities.

Several countries have come to realise the need for change in the model of regional cities' economies in order to overcome the problems of isolation, being land-locked, high transaction costs, and the dominance of and dependence on metropolitan region markets and supply chains. As a result, some countries have been encouraging a more collaborative model of regional economic development to reduce business transaction costs and achieve economies of scale. The following case studies provide insights into

approaches that regional and local governments have taken to improve soft connectivity and networked infrastructure in order to create a competitive advantage to support the development of secondary cities.

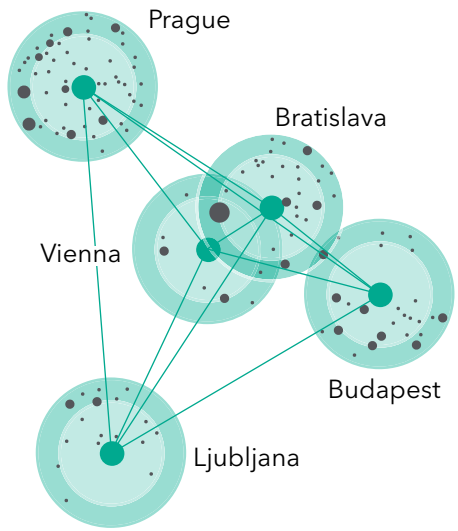
4.1.1 BRATISLAVA, BUDAPEST, LJUBLJANA, PRAGUE, AND VIENNA: A DANUBE REGION POLYCENTRAL CITY NETWORK

An example of a polycentral network of a system of cities can be found in the Danube region, where the central European capitals of Bratislava, Budapest, Ljubljana, Prague, and Vienna (BBLPV) have formed a distinct interrelationship and collaborative governance (Kramar & Kadi, 2013) (Figure 4.1). Strictly speaking, three of these are metropolitan regions, but are small by international standards. Based on a shared history and collaborative culture, these five cities have built a spatial triangle of economic flows between them. Proactively fostered by collaborative territorial cooperation, several inter-municipal planning initiatives have been established to capitalise upon these flows through the harmonisation of municipal spatial planning practices towards a joint, regional spatial-development strategy across several national borders. The main reason for territorial cooperation was to find a balanced way to work together and, at the same time, compete and identify the potentials and challenges for such cooperation/competition (EPSON, 2017).

The idea to create a collaborative advantage model of economic cooperation and development in order to strive towards a common regional economic corridor between the cities was based on the significant role and nodal point of each of the five cities within their respective national system of cities. Data used in reviewing the locations of 100 FIRE (finance, insurance, real estate) firms in 315 global cities indicate the shared role of Vienna and Prague in the Danube region. Of importance to the operation of the soft connectivity and network infrastructure is the function of Vienna. It is the catalyst for the network, hosting more high-ranking company locations than its surrounding partner cities in the region. Prague leads the number of hosted FIRE company relations within the region (ESPON & Vienna University of Technology, 2012).

The emerging role of this network of cities is also recognised by the European Union and its financing institutions,

FIGURE 4.1 Bratislava, Budapest, Ljubljana, Prague, and Vienna: a polycentral city network.



Source: Adapted from EPSON, 2017

such as the European Investment Bank (EIB), shifting both attention and financing in support of this network. All cities are benefitting from a stronger orientation to the Trans-European Transport Networks (TEN-T), Trans-European Networks for Energy (TEN-E), and Trans-European Telecommunications Networks (eTEN) linking investment priorities to key connective infrastructure in cities, which allows better access to the single European market.

The BBLPV polycentric network is developing slowly. There is recognition that it will take time to develop more advanced networks of cooperation between stakeholders that result in more significant economic cooperation and development between the cities. Polycentricism is showing promise at the micro (intra-regional) level, with the development of networks between the core cities and their surroundings being financially supported by existing 'Convergence' or 'Regional Competitiveness and Employment' objective programme. However, learning gained from the initiative show that programmes need to be better aligned to support the integration of municipal systems—not spatially aligned by national administrative borders within the EU countries involved. There is a need for a better city-to-city integration of clusters and collaborative business development across borders that aims at fostering all kinds of city networks. There are opportunities also for the development of bilateral relations between cities supported by the interregional co-operation programme.

4.1.2 A NETWORK OF NEW ZEALAND REGIONAL SECONDARY CITIES

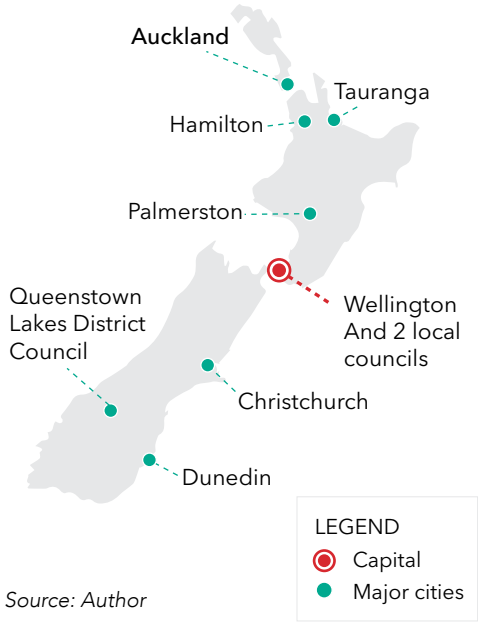
The New Zealand Core Cities Network was developed as a project designed to create a collaborative governance arrangement between central and local governments to realise the development potential of the country's cities. It drew upon the UK model, but the approach to its development is less formalised and operates more as a networked organisation collaborative partnership. It began with the nation's six largest cities agreeing to collaborate on a range of initiatives to support their development and influence the national urban policy agenda for cities. It grew out of a concern that New Zealand cities needed to collaborate to become more competitive to support business and engage in trade, investment, and tourism development. It has subsequently been expanded to ten cities (Figure 4.2).

There was realisation also by New Zealand local governments that geographic location, the small size of its cities, and the fragmented ways each were competing for trade and investment opportunities were not maximising the use of urban and regional resources and the development potential of the country. Collaboration between city governments and the national government was a way to reduce business transaction and externality costs, to share marketing intelligence, and to pool resources to create critical mass and scale in order to gain a competitive advantage for trade and investment.

The initial partnership focused on four areas: development of collaborative networks internationally; policy and research answers to determine the role of city networks in New Zealand; city competitiveness and city place in the national economy; and research options that would produce a database to assess regional economies (GoNZ, 2012). There was recognition by the councils involved that New Zealand cities are small and

remote, and that collaboration in areas of trade, information sharing, tourism, and economic development helps to reduce externality costs through shared services. The collaborative arrangement has enabled the cities to overcome economies of scale and entry barriers to new and emerging markets.

FIGURE 4.2 New Zealand network of regional secondary cities.



Source: Author

The *NZ Core Cities Research Summary* (LGNZ, 2012) is a summary of the six competitive advantage and distinctiveness reports completed for Auckland, Tauranga, Hamilton, Wellington, Christchurch, and Dunedin, the first significant output of the initiative. Analysis of the reports and summary led the network to progress two key projects considered to add the most value to its membership. The first of these was a collaborative project across the network that produced a set of guidelines for councils on the development of business-friendly policies (LGNZ, 2014). The policies set out good practices and principles for creating soft infrastructure and networking to support the development of cities. The second was the development and progression of the China engagement project, a practical programme of facilitated workshops run quarterly by LGNZ. The outcome was the formation of a new network of international relations teams from each of the core cities. The value over the two years was the establishment of new relationships, information sharing, and a joint strategic approach to future engagement with China. This project laid a foundation for a conversation with the Chinese Peoples Association for Friendship with Foreign Countries (CPAFFC) about establishing a new sub-national mechanism of exchange between China and New Zealand.

The first New Zealand China Mayoral Forum was launched in 2014 in the presence of President of China, Xi Jinping. A second was held in Xiamen 2015, and a third is planned for 2020 (LGNZ, 2017). The mayoral forums provide collaborative sub-national engagement to enhance and develop further political and trade relations between Chinese and New Zealand cities for the future. These forums provide opportunities for cities in both countries to discuss and explore trade and investment opportunities. The initial focus was on education, tourism and primary industries, reciprocal trade between cities, skills and technology transfer, and improved access and integration into supply chain value-added production systems. The result has been a steady increase in the city-to-city trade between New Zealand and China.

The New Zealand Core Cities Network began as a catalytic project for six local governments to collaborate to support local business and economic development, increase elements of performance, gain easier access to world markets, and develop mutual trade and

investment opportunities between cities within and outside the country. It was an ambitious and complex project led by LGNZ and carried out with some risk. As an entity, the New Zealand Core Cities Network no longer exists, but it provided the driver to create the soft infrastructure and networks to link cities in a more collaborative arrangement to support local economic development. The metamorphosis of the formal arrangement of Mayoral Council meetings has ensured more significant levels in the exchange of data and information, collaborative marketing, and innovation in local government reform and working arrangements with business in support of local economic development.

The New Zealand Core Cities Network is a good model, which indicates that collaborative governance arrangements to support the development of soft connectivity and networks must be adaptive, flexible, and responsive to change, creating and developing innovative ideas. It has proved that simple adaptive structures of collaborative governance between cities can result in many innovative and creative opportunities to foster connectivity and can work together on win/win solutions of mutual benefit to the cities engaged and to their country. This is particularly important, as both central and local governments around the world grapple with an increasingly complex policy setting.

The Core City concept of collaborative governance in New Zealand and the UK, The Netherlands, and Finland provide good practice examples of how secondary cities can work together to build political capital that gives them stronger competitive advantage, rather than seeking to compete individually. It is a model that highlights the key role local government can play in the achievement of national economic outcomes. This can be applied to the development of political and financial connectivity and networking infrastructure in middle income and developing economies.

4.1.3 RWANDA NETWORKED CITIES

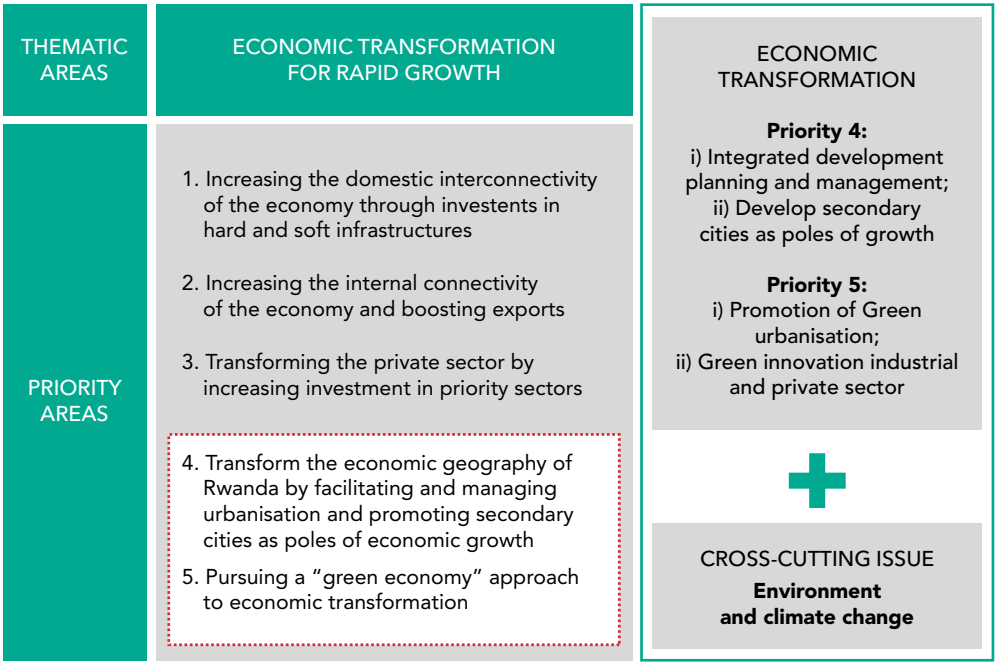
Rwanda is a small land-locked country of 26,338 km^2, located more than 1000 km from the nearest ocean port, with a population approaching 12.5 million. Rwanda is a country of few natural resources, with an economy based on agriculture. Around a third of the population live in urban areas, of which more than 1.3 million live in Kigali, the capital city. Rwanda is ranked 170th out of 190 countries in terms of GDP per capita, estimated at US$765.20 in 2017. Its economy is among the fastest growing in Africa at over 6 per cent, annually.

Rwanda suffered massive devastation as the result of genocide and civil war in the early 1990s. The Rwanda Vision 2020 (GoR, 2000), launched in 2000, set out an ambitious medium-term goal of transforming the country from an agrarian to a knowledge-based economy. Vision 2020 provides a roadmap for Rwanda that supports urbanisation; promotes regional economic integration and cooperation; actively encourages science and technology, education, and ICT skills; and addresses the fact that the country is land-locked. Rwanda has developed several progressive initiatives, such as flagship programmes to support private-sector development in the Skills, Employability and Entrepreneurship Programme (SEEP) and has prioritized ICT as an enabler of its socio-economic development through the five-year (2013-17) national strategy on ICT development called ‘Smart Rwanda’ (Nimusima et al., 2018). It has also taken the lead in Africa in the rollout of a broadband network (Box 5-1). These initiatives are moving the country towards the achievements of Vision 2020—which are strongly related to improved connectivity between cities.

Rwanda is embarking on an ambitious task of developing a network of six green secondary cities. Two key priorities are integrated development planning and management, and the development of secondary cities as growth poles. It has a priority also to focus on green urbanisation and innovation (Figure 4.3). In May 2016, the Government of Rwanda, in partnership with the Global Green Growth Institute (GGGI), launched the National Roadmap for Green Secondary City Development in Rwanda (GGGI, 2015). The National Roadmap will support Rwanda's Green Growth and Climate Resilient Strategy and serve as an implementation tool for the country's Economic Development and Poverty Reduction Strategy (EDPRS2). A key element of the green cities agenda is focused on connectivity around five priority areas of economic transformation for rapid growth.

The significance of the Rwandan green cities initiative is that it uses both hard and soft elements of connectivity between cities to support the development of regions throughout the country. The focus on education and ICT seeks to address significant factors that contribute to inequity in the development of the systems of cities. Rwanda is the only country in sub-Saharan Africa to do this.

FIGURE 4.3 Priority areas for economic transition - Rwanda.



Source: Jeong, 2014

> Rwanda has taken the lead in Africa to roll out a broadband network to support the development of secondary cities as part of a programme to support regional economic development through a model green city programme. The initiative is supported by the World Bank with the aim to network six secondary cities and towns, to provide a basis for information and knowledge sharing, e-education and health services, and green industry development in regional towns and cities.
>
> (Jeong, 2014)

4.1.4 COLOMBIA COFFEE TRIANGLE: A HISTORY OF COLLABORATIVE CITY DEVELOPMENT

Colombia, located in the northern part of South America, has extraordinary biodiversity, allowing the country to have urban and rural developments with unique characteristics. For more than 50 years, coffee has been the main agricultural product of Colombia.

The Colombian Coffee Triangle Region (Spanish: Eje Cafetero), is a part of the Colombian Paisa region, in the rural area of Colombia famous for growing and producing most of Colombia's coffee. Located in the Central West section of the Andean region, the three departments (local government regions) Caldas, Risaralda, and Quindío host a population of over 2.5 million (Figure 4.4). Three secondary cities, of between 300,000 and 500,000 people each, are in this main growing area: Manizales, in the Department of Caldas, Armenia in Quindío, and Pereira in Risaralda, are home to over 50 per cent of the triangle's population. The triangle is also engaged in tourism, automotive production, agribusiness, cosmetics, and ICT (Cuesta et al., 2010).

From an administrative perspective, the cities have significant autonomy, as they are the capitals of their respective departments or states. During the 20th century, this autonomy, and their traditional, monolithically structured economy based on coffee cultivation and rivalry, characterised the relationship between the cities (Duque Escobar, 2017)

However, after a devastating earthquake hit the region in January 1999 and coffee prices fell internationally, these Colombian secondary cities faced significant economic hardship and were forced to re-invent themselves.

As a result of the national government's promotion of prosperity agreements between 2010 and 2014, a new urban cooperation was formed between Armenia, Pereira, and Manizales. The three cities realised that coffee growing could no longer be the only source of economic prosperity and that specialisation and positive interdependencies would benefit all cities. To support this integration, the national government provided funding to improve the road infrastructure connecting the three cities and promoted the development of a regional airport.

As a result, even though cities in the triangle maintain their uniqueness, each has a focus on diversifying its economy from coffee by providing supportive products and services needed by the urban areas that previously were seen only as competitors. The partnership between the cities has led to significant improvements in the three cities' economies (Table 4.1).

FIGURE 4.4 Map of the urban centres in the main coffee growing area of Colombia.

Source: Shadowxfox, 2015

TABLE 4.1 Growth in Coffee Triangle businesses in Pereira, Manizales, and Armenia (2015-2017).

	2015-16		2016-17	
	New Businesses	Per cent Increase	New Businesses	Per cent Increase
Pereira por Risaralda	553	1.88	1003	3.24
Manizales por Caldas	36	0.24	630	4.08
Armenia por Quindío	1341	8.45	1992	10.37

Source: La Republica, with info from Cámara de Comercio de Manizales por Caldas-CCM, 2018

Today, Manizales has an education focus and offers the largest and most diverse tertiary education services of all three cities. Pereira, the urban centre most affected by the earthquake, decided to focus reconstruction efforts on providing industrial zones and vibrant retail activity. Armenia, although the smallest of the three cities, took advantage of its unique location and climate to promote tourism.

Full integration of these urban centres has not yet been achieved, and work remains to be done. There is a lack of both inter-urban public transport services to facilitate workforce movement between these urban centres and more plans for better rural integration. However, the path of cooperation is politically, socially, and economically accepted in the Triangle. Investment and support from the national government were fundamental to the success of this cooperation, and all parties—local and national—recognise this collaborative approach as the best way for small cities to prosper together, while promoting sustainable development.

4.1.5 UK CORE CITIES GROUP

The UK Core Cities Group (2015) is a collaborative advocacy group representing ten of the United Kingdom's largest regional cities outside Greater London. The Group covers wide-ranging secondary city interests, encompassing transport and connectivity, innovation and business support, skills and employment, sustainable communities, culture and creative industries, climate change, finance, industry, and governance. It is politically led by the elected leaders and mayors, and each city has responsibility for a portfolio area that reflects national interests at the secondary city level. Members of the Group aim to work as collaborative partners with central government to support the development of cities and their economies.

The UK Core Cities Group typically undertakes activities such as the following:

- Developing strategies
- Conducting policy research
- Addressing information barriers
- Developing and disseminating best practices
- Enhancing links to the education sector
- Influencing the central government policy setting

The Group has been highly successful in leading collaboration on important issues affecting the development of cities. Each city has a lead role in developing key public policy issues, for example, Birmingham on industrial strategy, Manchester on Brexit/international development, and Glasgow on smart cities. The collaborative efforts of the Group have enabled the ten cities to leverage considerable political and competitive advantage in securing development funds and access to negotiations on Brexit, which will affect some of the cities significantly and require structural adjustment funding and collaboration on data sharing and knowledge exchange.

4.2 Clustered Secondary Cities

There has been a growing tendency for metropolitan regions to develop a polycentric development pattern, where the older core area of a city becomes 'full', and the growing population spills over political boundaries or green belts into urban growth centres in neighbouring local government areas, which eventually grow into middle-size and large secondary cities, creating clusters of cities. Some of the growth of clustered secondary cities is planned, such as the satellite cities or new towns around London and Paris. However, in rapidly developing economies, it is spreading, uncontrolled, for more than 100 km from the core city centre. Megacities such as Jakarta and Manila have grown into huge super regions, with populations of more than 20 million and a fused system of secondary cluster cities encompassing a built-up area of more than 4000 km^2.

The cohesiveness of metropolitan areas with a ringed-cluster of secondary cities has often resulted in dysfunctional regional governance, high peripheral-to-centre commuting and congestion, metropolitan and regional disparities, and uneven patterns of development and poverty in clustered secondary cities. However, some metropolitan regions have developed new models to improve hard and soft infrastructure connectivity and networks to substantially enhance governance, elements of performance, and the functional capacity of clustered secondary cities within the region.

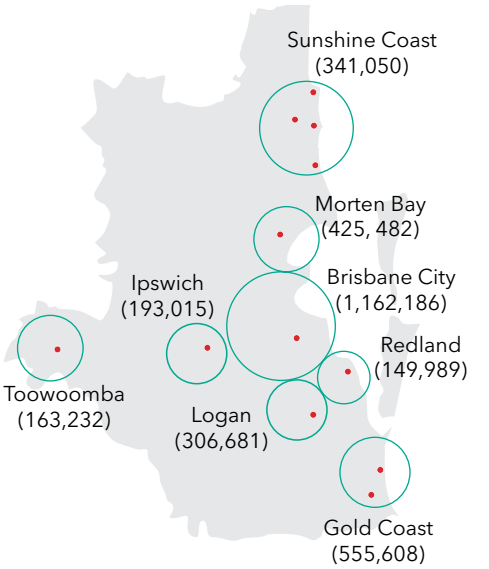
There is growing recognition that industry clusters in secondary cities that are part of larger metropolitan regions face significant development problems, caused by a lack of coordination, parochialism, and a lack of willingness to collaborate. Governance fragmentation is inhibiting the development of metropolitan regions. Some countries and regions have attempted to resolve these governance issues through the establishment of regional organisations of councils (Bay Area Council, 2018; Marshall et al., 2003). The following provides insights into the way one metropolitan region in Australia with a cluster of secondary cities has significantly improved the planning, infrastructure, and soft connectivity and networks to develop strong political, human, and economic capital to create competitive advantage.

4.2.1 SOUTH EAST QUEENSLAND REGIONAL ORGANIZATION OF MAYORS, AUSTRALIA

The Council of Mayors for the South East Queensland (SEQ) Region of Queensland, Australia was established in 2005 as an independent political organisation to represent the interests of one of the nation's fastest-growing regions (SEQ Council of Mayors, 2018). The Council of Mayors is a registered propriety company, with a board of 11 mayors representing the councils of SEQ. Brisbane and the Gold Coast are the two largest local governments in Australia. Brisbane is the capital city of Queensland and the largest city in the region (Figure 4.5). It is surrounded by a cluster of eight inter-regional networked cities to the north, south, and west, covering a geographic area of 22,420 km^2 and with a population of 3.5 million (2016), 14 per cent of the Australian population.

The Council acts as a regional collaborative governance body that is engaged in advocacy, regional planning, infrastructure and economic development, marketing, and promotion. The Council's mission has three primary outcomes: Advocate for a better-resourced SEQ region, with world-standard infrastructure to support economic development; influence other levels of government to ensure that their policy and legislative positions support SEQ regional growth, and collaborate in effective and innovative cooperative programmes across and within the SEQ region.

FIGURE 4.5 South East Queensland Council of Mayors, Australia.



Source: Author

The Council has been very successful in accomplishing elements of its mission, such as securing resources for the SEQ region nationally to build infrastructure, collaborating on regional waterways management, and the developing one of Australia's best public and private transportation systems. The Council is developing many elements of soft connectivity, including an agreement with a large US ICT services company to work collaboratively on becoming one of the world's first 'smart regions' (Cisco, 2015), based on improved hard and soft connectivity and networking infrastructure between Brisbane and the region's clustered cities. The outcomes of this initiative are interesting, as their focus is on the community, business, and government.

The community outcomes are focused on reduced commuter frustration and increased commuter comfort, empowering commuters to choose alternatives that achieve these outcomes. This is an excellent example of local governments seeking to use soft connectivity to address behavioural issues which affect regional productivity and performance. The business outcomes are expected to result in fewer employees being impacted by public transport delays and both easier commutes and transportation of goods on the road because of more commuters taking public transport. The government outcomes are expected to result in improvements in commuter route planning and decision-making; increased reliability of the public transport network; and increased patronage and load optimisation, resulting from the new technologies and improved services (Cisco, 2015:12). Recently, the Council of Mayors agreed to collaborative planning and funding of a $42 billion, ten-year programme of integrated regional transportation infrastructure to avoid gridlock.

The Council of Mayors is a cluster model of collaborative governance that has a strong focus on the development of soft and hard connectivity and network infrastructure to support

the long-term development of SEQ. Other initiatives that support the development of soft infrastructure include information sharing, joint planning, environmental partnerships, and research and social development (SEQ Council of Mayors, 2018). South East Queensland has become a region that, in practical terms, functions as a polycentric metropolitan region, under a non-legislative collaborative governance model.

4.3 Corridor Secondary Cities

The concept of corridor secondary cities development is a phenomenon that has been given much greater prominence by the BRI concept (Jinchen, 2016; Lee, 2016) being promoted strongly by China. Corridor development connecting large and smaller size cities along trade routes is not a recent phenomenon. As Neal (2010) notes, "The ancient network of trade routes known as the Silk Road played a key role in the development of cities as commercial centres" throughout Asia, Africa and Europe (see also Frankopan, 2015). Today's trade corridors include those passing along the west and east coasts of the USA, the intercontinental corridors that crisscross Europe (EC, 2014), and the developing West Africa corridor (US Agency for International Development -USAID, 2015).

The diagnostics of corridor development have tended to focus on physical measurements of the connecting and networked flows of goods, vehicles, materials, and utility services using a range of metrics. The analysis provides handy information about what happens to the dynamics and development of small towns and cities along corridors as the physical flows of people, goods, and accessories increase as they become more connected. However, it explains little about what causes information, trade, and traffic to flow between cities, especially when the structure of their economies and the goods and services they produce and sell are similar.

The answer to this question lies in setting up soft connectivity and networks that facilitate similar types of firms and industries within a regional system of cities to collaborate and combine resources. This then creates critical mass to collectively conduct research, innovate, pool capital, share risks, and focus on producing more specialised (or value added to) local products and services that would not be possible to do if firms were to compete independently as rivals. This also applies to regional and clustered systems of secondary cities. Soft connectivity and networking in economic development corridors are important in creating social capital, trading agreements, marketing intelligence, knowledge, and local financial markets. These are all crucial elements of soft connectivity infrastructure that stimulate and develop exchanges and trade between business enterprises within the corridors. Initially these smaller towns and cities compete for much the same businesses and provide much the same service; however, as the merging and lateral expansion of corridor secondary cities occur, opportunities for collaboration, specialisation, and innovative industries begin to occur.

Elements of soft connectivity between countries and large cities have been measured using the DHL and ASEF indexes. However, there is little evidence of the development of

an index of connectivity between towns and cities at the sub-national level. The annexe provides an example of an experiment to develop an index of connectivity between towns and cities along the Mekong River Central Economic Development Corridor in Cambodia and Lao PDR, which has been identified as one of the ADB-funded Greater Mekong Subregion Economic Corridors development projects (Asian Development Bank, 2015).

4.4 Virtual Flows among Secondary Cities

The internet is changing the model of economic development for secondary cities. Many cities play a crucial role in the services and networks of supply chains supporting large-scale manufacturing industries associated with automobiles, aircraft, shipbuilding, textiles, chemicals and pharmaceuticals, spacecraft, and defence equipment. Other secondary cities are becoming more involved with collaborative networks to leverage political advantage and gain greater access to public and private capital to support urban renewal, new industry development, research, and innovations. The building of connectivity and network infrastructure is all part of the emerging sharing economy (Economist, 2013; Hamari et al., 2015), where firms and governments work collaboratively to create opportunities to become more connected, with opportunities created in open markets and trading systems.

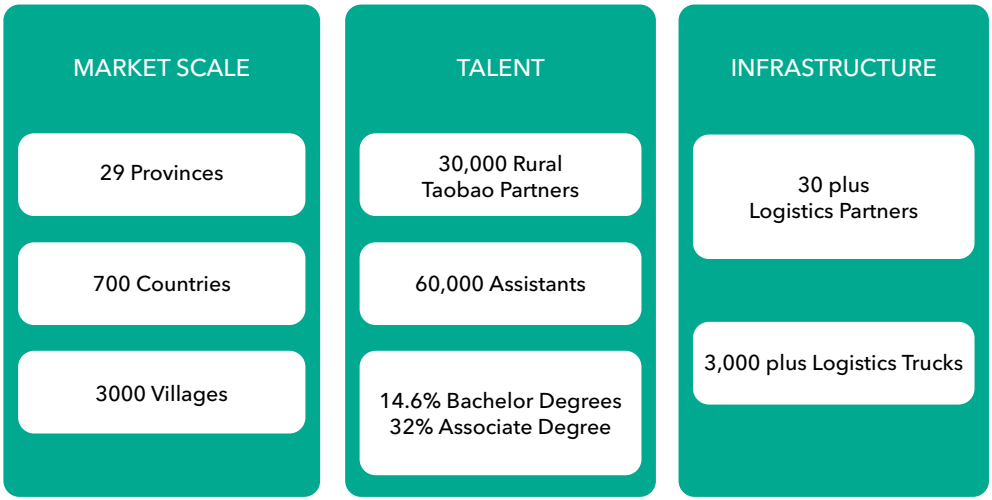
The following case study of the Taobao networked cities provides an example of the way Chinese cities in different regions and counties are working on collaborative models of engagement using networks and partnerships to create competitive advantage and expand opportunities for local economic growth and development. Taobao is providing a new model for the application of combining the IoT, with applications of soft connectivity and network infrastructure to enable small towns and secondary cities to become more integrated vertically into supply chains and gain market access that was previously hindered by accessibility and economies of scope and scale.

4.4.1 TAOBAO CHINESE SYSTEM OF CITIES: PRIVATE SECTOR AS THE FIRST INITIATOR OF VIRTUAL INTEGRATION

In 2003, Alibaba Group Holding Limited in China, through its subsidiaries, developed e-commerce with a vision to link villages to secondary and major cities, and then to export markets. Most secondary cities in China continue to be dominated by agricultural activities, small- to medium size trading, light manufacturing, and subcontracting as part of domestic and global supply chains. Alibaba developed a virtual integrator labelled as Taobao Rural. This virtual platform integrates market information, production capacity, logistics, financing and payment, trading, exchange of innovation/practices, and future services. Taobao's aim was that with CNY 10 billion investment, it could facilitate e-trading, investment, and innovation in more than 29 provinces, 700 counties, and 30,000 villages/towns with 1000 service centres in towns and 100,000 service centre stations in China. By the end of 2016, Taobao had achieved service coverage of more than 500 counties and 22,000 villages.

Today, China leverages this platform to implement its BRI (Mayer, 2017), linking cities not only within China but also along the Silk Road routes from Asia to Europe, the Middle East, and Africa. The government of China encourages its cities to invest in and accelerate the effective implementation of this virtual integration platform.

FIGURE 4.6 Taobao: Leading E-Commerce Market in China.



Source: Chen, 2017

The operational structure of the Taobao system is that it places its service station centres (i.e., entrepreneurial logistics centres) in towns and cities near productive villages (Figure 4.6). Many of these cities are classified as secondary cities. The efficiency of the logistics system (Cainiao Network) is achieved through specialisation and well-networked local partners (Luo, 2016). Within the Taobao system, rural areas are the production centres, whereas secondary cities focus on supporting services, logistics management, capability development, and innovation sharing. The service stations help farmers and manufacturers to access and exchange market information, latest innovation, financing and payments, and selected public services that require electronic transactions. For example, one service station provides online education, video conversations for families and return-home training, together with a unique service for left-behind children.

A group of service stations will be managed by a service centre located in a county, or a secondary or tertiary level city. The role of these service centres is to manage the daily operations of the system at the county level, control logistical movement, ensure capacity building for service stations at village/town level, and respond to requests for innovation from farmers and local manufacturers. Taobao Alibaba Headquarter supervises the service centres in Hangzhou, China. All of the transactions are processed and analysed in their

office, using big data analytics, which allows for best practices and opportunities extracted from the big data to be shared with the service station centres. The Alibaba Group believes that to be successful, it needs to combine both online platforms and supportive hard infrastructure, such as road, ships, trucks, and other modes to connect cities.

> A recent trend in city administrations in China has been for larger cities to develop their systems, like Taobao's, to serve urban supply chains and innovation, including the collaborative work of several cities within the supply chain.

While the early version of the Taobao system, managed solely by private sector Alibaba Group, did not involve local governments as partners, it later began to collaborate closely with many city administrations. It has an agreement with local governments to build warehouses for farmers and manufacturing products. The Taobao model invests extensively in data technology and management, payment systems, and exchanges, including marketing, and innovation and international trade platforms. It maps the connectivity and physical infrastructure of cities and towns, such as roads, restaurants, hospitals, and bridges, as part of the partnership with the local government. The map is used by its logistics fleets to navigate and courier packages, from food and raw materials to merchandise, within and between villages/towns, cities and counties and, in some cases, across borders to South Korea and the USA.

A recent trend in city administrations in China has been for larger cities to develop their systems, like Taobao's, to serve urban supply chains and innovation, including the collaborative work of several cities within the supply chain. Fuzhou city, for example, combines smart city technologies with the Taobao model (Wei, 2018). In several other cities, the Taobao model provides joint location activities with local government programmes or shared infrastructure such as warehousing or workshops and service stations. The role of local government is to provide the infrastructure of service stations in each village/town, including staff salaries to operate the stations, and to allow the Taobao system to leverage village entrepreneurship and innovation centres to disseminate new, innovative, and modern practices.

As Alibaba Taobao delivers meaningful results and brings prosperity, many cities in China have changed their strategic course from being just an enabler of the virtual integration platform to building and operating the platform by themselves to serve better their citizens and earn new own-source revenues from the user-fees-like the city of Fuzhou (Fuzhou Internet of Things Open Lab, 2017). Following the success of the Taobao system in China, local governments in India and South Korea have adopted the model, with minor modifications, to empower their secondary cities and rural development in remote areas.

Learning from its success, Alibaba Taobao plans to expand its coverage to connect cities at a global level. A new initiative called the electronic World Trade Platform (e-WTP) was launched in 2017. Alibaba, together with the federal government of Malaysia, is now preparing the global ecosystem for the initiative. A pilot project in Malaysia (Jaipragas, 2017) is underway, connecting Malaysian cities as a countrywide supply chain to address the country's declining economy and rising unemployment among its youth and new graduates. For this, Alibaba will tap Malaysia's super-corridor capacity with a hub in Kuala Lumpur. The hub, which is already operating, will function as a centralised customs clearance, warehousing, and fulfilment facility for Malaysia and the region in order to deliver faster clearance for imports and exports.

Taobao is developing a new model for connecting towns and cities into a broader network of trading partners and service systems using the IoT. The Internet provides the hard infrastructure to facilitate connectivity and the exchange of data and information, which can be transformed into new knowledge sharing of ideas, creativity, and innovation at any level of human settlement. However, it is the soft connectivity and infrastructure networks that provide access to small firms and to new markets and opportunities that have changed the scale and scope of opportunities for small towns and secondary cities to grow and develop. A key learning outcome of the Taobao initiative is that it has had to build soft connectivity and network infrastructure in parallel with the roll-out of hard ICT infrastructure and the IoT. To do this, Alibaba Taobao had to work closely with local governments and local business to develop the village nodes and secondary and primary city hubs to grow and develop the network. The Taobao connection and networking of towns and cities provide valuable learning and good practices for other countries to follow.

4.4.2 OTHER EXAMPLES OF SYSTEMS OF CITIES

Other diverse types of networked cities exist. Some are becoming increasingly internationally connected through value chains (A380 Airbus (Steff, 2006), city-to-city free trade agreements (Chicago-Mexico City Trade Partnership) (Liu & Donahue, 2013), and regional growth triangles, such as the Johor-Singapore-Riau Regional Growth Triangle Partnerships (Yuan, 2011). The Taobao study has many different elements including physical (IoT), economic (web infrastructure), social (social media), and governance (collaborative marketing and supply chain management), and providing greater knowledge on access to data and information on markets, innovation, and new products. Without substantial investment in soft connectivity infrastructure networks, Taobao might not have happened.

Taobao provides an example of a promising practice in engaging with private sector partnerships and networks, especially for developing economies like Rwanda, which are rolling out ICT in the expectation that business development will follow. Taobao demonstrates the crucial role of soft connectivity and network infrastructure in building the development of towns and cities engaged in supply-chain production and distribution between markets and individual producers and consumers. The development of soft networked cities engaged in value-adding requires new forms of partnerships, which are built upon soft connectivity, and network infrastructure. Without it, the building of hard infrastructure will not be enough to encourage cities and economies to flourish and develop (Lee, 2016).

5| INVESTING IN PUBLIC GOODS AND SERVICES TO FOSTER EQUITABLE ECONOMIC GROWTH

Connectivity is crucial to the development of systems of cities and regions. Cities with poor connections to knowledge, skilled labour, fast ICT systems, and markets may grow rapidly through rapid urbanisation, but they are likely to struggle to capture investment, create strong employment, increase public and private wealth, and grow sustainably. Many sub-Saharan African secondary cities will continue to struggle to attract investment and create quality jobs unless they can improve connectivity between their systems of cities. Much of the policy focus on local economic development in secondary cities in sub-Saharan African remains on building hard-infrastructure networks. The region must begin to focus on the development of soft connectivity infrastructure networks to prepare for the changes 4IR will bring. Countries such as Rwanda and Kenya have realised this and have begun to build soft infrastructure networks to support their long-term development. Significant efforts are needed to improve connectivity in sub-Saharan Africa secondary cities.

In post-industrialised secondary cities of Europe and North and South America, the challenges are equally hard. Many have realised that they need to face up to the disruptive effect of change and become better connected. The lessons gained from the revitalisation of secondary cities like Danville, Virginia, USA (Willingham, 2006), Dundee, Scotland (Harris, 2017), and Newcastle, Australia (Goodyear, 2015), is that enhancing connectivity by building hard and soft infrastructure networks is crucial to urban resilience. Secondary cities need to be aware of and be prepared and able to respond to these changes if they are to transform, grow, and develop their local economies, regardless of their state of development. The prospects for the future of secondary cities are good, provided they build networks that deliver essential public services and goods that enable business, institutions, and governments to be responsive to change, to innovate, and grow.

Implementing changes in policy, attitudes, and practices on economic development for secondary cities is difficult. There is a prevailing paradigm that secondary cities look to national and metropolitan governments to secure public resources, services, and goods to fund investment to develop infrastructure networks to support local economic development. A shift in ideology is needed where secondary towns and cities look to each other and collaborate to create an alternative market for the trade in goods and services they produce and purchase. What is needed in national economic policy is a system of

decentralised, regional trading secondary cities that operate collaboratively, where expedient, to compete with large cities or work collaboratively with industry clusters in large metropolitan regions to develop national export industries. The future development of secondary cities can no longer rely on each city independently trying to create some form of competitive advantage, but on ways they can work together with or against metropolitan regions to achieve collaborative advantage (Johnsen & Ennals, 2012). The focus on building infrastructure, networks, and clusters within systems of secondary cities will be crucial to achieving this.

> The future development of secondary cities relies on collaborative advantage through the development of intercity networks and partnerships.

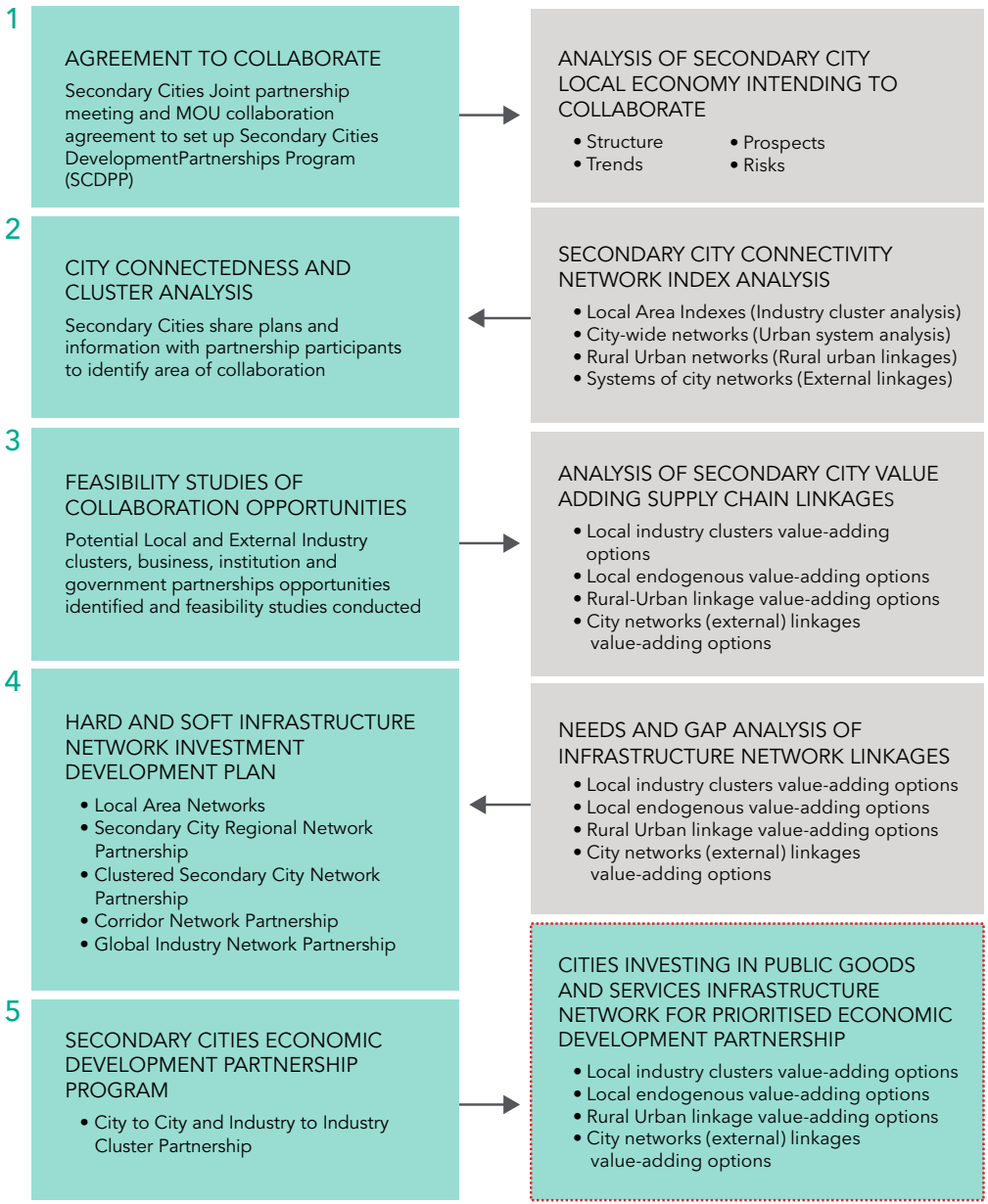
In this concluding chapter, some insights are provided on how secondary cities can build strategic infrastructure networks to grow and develop local economies. This requires secondary cities (and their associated hinterland local governments) to work with central and state/provincial governments, other secondary cities, businesses, institutions, and communities to decide what public services and goods cities need to invest in to gain a collaborative advantage in order to help develop local economies. This must be done collaboratively, consultatively, and transparently in order to build the infrastructure networks that connect national systems of cities more closely, and with the right policies to encourage more significant trade, investment, and exchange between them.

5.1 Steps in Building Collaborative Advantage for Secondary Cities

The emerging model of economic development is based on the concept of the sharing economy (PriceWaterhouseCoopers, 2015). A model of collaborative advantage is replacing older models of competitive and comparative advantage in both regional economic and business development. In the drive for firms to become more competitive, opportunities to reduce business cost margins are limited, except through innovation, investment in new technology, and low labour costs of production. Business and governments are attracted to collaboration arrangements and other partnerships to reduce externality costs and to gain better access to knowledge, public infrastructure, and resources. The growing importance of industry clusters and networks has been identified as a way firms in secondary cities can create collaborative advantage and secure a greater share of national investment in new industries and jobs (Turiera & Cros, 2013).

For secondary cities to be successful in growing and developing local economies, investing in the right strategic infrastructure and enabling environments, and becoming better connected to supply chains, markets, support services, it is essential they have a framework and governance arrangements to guide the process. This is a valuable lesson gained from the network partnerships for economic development described in some of the case studies in Chapter 4.

FIGURE 5.1 Framework for Development of Secondary Cites Partnership Programme



Source: Author

Figure 5.1 outlines a framework that can be used to guide the process to build the strategic infrastructure to enhance connectivity for secondary cities. Elements of this framework are drawn from the New Zealand and UK Core Cities initiatives. There are six basic steps in the framework and three analytical processes.

Step 1: Agreement to Collaborate: This initial step involves three or more secondary cities agreeing to collaborate as a network to support local economic development and trade between them. For this to happen, there must be agreement on specific types of activities which the cities can mutually support to generate competitive advantage and mutual benefit from the development of partnership arrangements. The partnership might involve specific industries, clusters, or provision of public goods and services. This initial process takes time. Considerable effort is necessary to win the confidence of businesses and public agencies in order to collaborate. In secondary cities, interests are often parochial, territorial, and myopic—especially if power, position, or market share is threatened.

Collaboration and co-operation (Brandenburger & Nalebuff, 1996) is a new model of business and local economic development; however, it takes time for business to understand its advantages. Unless the benefits of collaboration and a willingness to work towards co-investment in public goods and services are clear, secondary cities should not seek to rush into agreements to develop collaborative industry structures and systems to support local economic development. Experience in building industry clusters shows that it takes many years to educate, win trust, and gain confidence among stakeholders within local communities that collaborative approaches will benefit local economic development.

Step 2: City Connectedness and Cluster Analysis: Before secondary cities can begin to develop infrastructure networks to enhance connectivity and foster trade between cities, there must be a thorough audit of the state, capacity, and performance of the local economy and the network infrastructure that supports its operations and developments. Secondary cities engaged in development need to prepare city development strategies, as these have a crucial role in identifying the potential of co-investing in infrastructure to support industry and cluster network partnerships that add value to local business and public services. The analysis conducted to prepare city development strategies should not only identify structure, trends, risk, and prospects, but the current strength of connectivity in city networks and connectivity between cities.

This involves the preparation of connectivity indexes for the following:

- Local area indexes (industry cluster analysis)
- Citywide networks (urban systems analysis)
- Rural-urban networks (rural-urban linkages)
- Systems of city networks (external linkages)

The Annexe provides an example of the method that can be used to prepare connectivity indexes, as described in Chapter 3.

The information gathered to prepare secondary city economic development strategies (CEDS) is then shared by the partners, so that opportunities to start linking development activities between industry clusters and public service providers can be identified. These opportunities provide the platform for further discussion and research on development potential, network infrastructure, and capital goods and services investment needs. Much of the discussion will focus on the strategic infrastructure needed to enable business activities and markets in the respective cities to develop, and what key investment is needed in public goods and services to develop the infrastructure networks to enable the free flow of exchanges to occur.

If cross-border secondary cities and national governments are involved, the process becomes more complex. However, this should not dissuade secondary cities that have similar cultural, religious, legal, and language systems from agreeing to engage in secondary city regional- or economic development corridor partnerships. There are good prospects for this to occur in Asia and sub-Saharan Africa.

Step 3: Feasibility Studies of inter-City Local and External Industry Cluster Partnerships: The sharing of information on respective secondary city local economies will enable businesses, governments, and institutions to identify opportunities to collaborate, innovate, or share information. This is the concept behind smart cities, where information is shared so that individuals, entrepreneurs, and industry groups can identify and assess the feasibility of developing and launching new or adapted products into local and external markets. Experts and research can facilitate these connections. This process may involve cities working collaboratively with firms, industry groups, and clusters to develop their private sector partnership, e.g., food processing, tourism, and agricultural machinery, among others.

The importance of intra-city and urban-rural linkage partnership should not be overlooked. Local area networks and production outputs can be significantly enhanced to expand their contribution to a broader industry-secondary city partnership, at the regional, corridor, metropolitan, and global levels. This is one of the principles behind the development of the European Cluster Collaboration partnership initiative (European Commission, 2018). A valuable example of facilitating opportunities for connecting and collaborating is the NZ Innovation Council. Through the Council, New Zealand innovators' websites post opportunities for businesses and public institutions in the country's largest cities to connect, collaborate, and form partnerships that support intercity industry cluster development.

Feasibility studies should be undertaken of industry and public services for which there is agreement on the potential for collaboration and development. Priorities should be determined on what partnerships should be developed. Ideally, an industry or an associate public services partnership, if not both, should be developed, preferably one that is not too complicated. This would help create confidence in the building of city-to-city government and business partnerships. The first partnerships will always be a learning experience; therefore, an action-learning (learning by doing) management approach should be adopted as a good practice technique used to promote the development of industry cluster partnerships (OECD, 2004).

Step 4: Hard and Soft Infrastructure Network Investment Development Plans: A crucial step in creating partnerships for building networks within systems of secondary cities is to identify types, arrangements, and priorities for their establishment. Studies and research are needed to investigate the nature, scale, reach, and technology for building the hard and soft infrastructure to support many different types of networks for systems of secondary cities for the following:

- Local area networks
- Secondary city regional network partnerships
- Clustered secondary city network partnerships
- Corridor network partnerships
- Global industry network partnerships

Connectivity indexes (See Chapter 3) are a useful tool to produce sets of indicators showing the relative strengths, weaknesses, risks, and gaps in soft and hard infrastructure network elements supporting industry supply chains and other types of exchange between cities. Assessing collaborative government arrangements can also help identify what public investments are needed to strengthen and develop enabling environments and common-user infrastructure and services. In some cases, collaboration can help to reduce transaction and operational costs of services, such as e-services and compliance and enforcement of regulations, where costs are shared between cities.

Step 5: Secondary City Partnerships Programme: The Bratislava, Budapest, Ljubljana, Prague, and Vienna, a polycentral city network in the Danube region, is a good example of a way that secondary cities and metropolitan regions can develop into a fully-fledged network of government and industry collaboration. At a smaller scale, the North Carolina Research Triangle offers a model for regional collaboration on education and research. The Singapore, Johore Bahru, Bitan/Batam Triangle offers another model of partnership.

There is no single model that best suits city-to-city collaboration and network development; however, some form of agreement that provides for collaborative governance and resource sharing for the development of public goods and services in order to develop strategic infrastructure networks is essential for raising capital and allocating resources in city budgets involved in a secondary-cities partnership programme. In some cases, the partnership can be strengthened by state/province/district and national governments being party to industry partnerships. Such an arrangement can help provide a guarantee for capital and other resources to develop strategic infrastructure for supporting intercity partnership arrangements.

For city partnerships to work, there must be agreement on governance and resources, guarantees to invest in capital, and (public and private) goods and services to build and maintain the networks within and between cities. Some capital investment will require co-partnering on finance and risk sharing. Other investments will be the responsibility of individual governments.

Step 6: City Investment in Public Goods and Services Infrastructure Networks: This final step is the subject of Section 5.2

5.2 Investing in Public Goods and Service Infrastructure Networks

For secondary cities, especially those in developing economies, to be able to gain a more equitable share of economic growth and investment a fundamental shift is required in national government spatial-development policy. In most countries, secondary cities are not gaining an equitable share of public and private investment or wealth. The consequences of this situation are that GDP and incomes per capita, especially in sub-Saharan Africa, can be as little as half that of large metropolitan regions, and the difference is considerably worse in rural regions and small towns. Unless more significant opportunities and efforts are made to support the development of secondary cities, most countries will be unable to maximise their development potential. Without greater focus and more decentralised investment in public services and goods to support secondary cities, the gap between them and metropolitan regions is likely to widen.

A fundamental shift in urban and regional development policy is needed for secondary cities to be given opportunities to grow and develop. Secondary cities will perform better if they have greater political and financial autonomy to collaborate and make decisions about what is best for their development. Secondary cities tend to perform better in more decentralised states, where there is less reliance on the central government to provide the public capital and resources to support their development. The report on second-tier cities in Europe found these perform better where "national government policies support them, give them significant powers and resources and where investment is more deconcentrated. National governments should decentralise responsibilities and resources to cities and deconcentrate public investment more" (ESPON, 2012: 62p.).

However, there is also a need for a second significant shift in economic and trade development policy. This involves secondary cities engaging with each other and collaborating on a wide range of activities to create a system of trading cities. Currently, secondary cities are trapped by the pulling power of the markets and forces of metropolitan regions and megacity economies. Secondary cities, collectively, have a larger population than metropolitan and megacities (25 per cent compared to 20 per cent). They can, therefore, have significantly more market influence if they operate more collaboratively.

> Unless more significant opportunities and efforts are made to support the development of secondary cities, most countries will be unable to maximise their development potential. Without greater focus and more decentralised investment in public services and goods to support secondary cities, the gap between them and metropolitan regions is likely to widen.

The hierarchical systems of transport, trade, and communications have served the development of cities for more than 2000 years, but 4IR and IoT will completely change the dynamics in the location patterns of production, trade, consumption, and markets. This will affect both developed and developing economies, but in diverse ways. Size will no longer be the advantage it has been in shaping the competitiveness of cities: functionality, speciality, and ease of connectivity will increasingly provide that advantage.

The challenge to make secondary cities more relevant and central in national urban and economic development policy is complicated. The focus on cities has a strong bias toward the development and challenges of managing megacities and metropolitan regions. Yet without a well-functioning system of cities and regional economies, neither the rural nor the metropolitan economies will reach their full development potential. It is the failures of the infrastructure networks and systems which connect cities and regions that are adding substantially to supply chain and externality costs of production systems. If infrastructure networks that connect systems of cities can be improved so that secondary cities, which form the hubs and nodes of rural-urban supply chains, are more efficient, the sustainable development of cities will positively be affected.

The need for improved connectivity infrastructure networks raises the question of which public services and goods should secondary cities develop and provide to ensure that industry supply chains and logistics facilities can perform more efficiently. Substantial investment in public services and goods is necessary at multiple levels in order to form local area networks to improve international transportation, logistics, and telecommunications services significantly. Secondary cities, alone, cannot be expected to address all these levels, but they can work together to address problems and issues that are preventing improvements in connectivity between them and the forward and backward linkages in supply chains.

Table 5.1 lists some key public services and goods that metropolitan and secondary cities can focus on improving in order to enhance connectivity and the development of networks. Addressing just a few of the items listed could result in significant multiplier effects and create greater opportunities to support the development of secondary cities.

TABLE 5.1 Public goods and services to enhance connectivity among secondary cities.

NETWORKS	PUBLIC GOODS	SERVICES
LOCAL AREA		
Physical Economic Social Environmental Governance Intrinsic	• Secured and protected services corridors • Co-located urban services • Local area network services • Local, pedestrian, and cycle-way roads • Collocated community social, education, and recreational facilities • Localised (ward) single-point information and services centres	• Public-community based partnerships for asset management and maintenance of public infrastructure • Acquisition of public land for community facilities • E-libraries • E-maintenance and repair reporting • Just-in-time emergency, disaster, and security response service
CITY		
Physical Economic Social Environmental Governance Intrinsic	• One window ('One Stop Shop') services for accessing public information and services • Development of specialised and integrated employment zones and collocated logistics and public transport facilities • Disaster and flood management works to protect vital economic infrastructure and human life	• Application of smart city concepts and practices • One-government information and services • Development of community colleges focusing on enhancement of technical skills • Collaborative governance to develop integrated planning, budgeting, construction and maintenance.

NETWORKS	PUBLIC GOODS	SERVICES
URBAN-RURAL		
Physical **Economic** **Social** **Environmental** **Governance** **Intrinsic**	• Shared integrated regional information systems for information services, data sharing, and emergency management • Shared use, maintenance, and funding of common user public resources and infrastructure • 4/5-G internet services to all regions • Integrated subregional logistics freight handling and passenger service hubs • Regionally significant natural, cultural and architectural assets for tourism, scientific and recreational use	• Regional common user ('Uber'-type) services for ride sharing, public transport, goods and services delivery • Collaborative governance involving revenue collection, research, marketing and resources sharing for a range of public services • Regional e-markets for sale and exchange of localised information, goods and services
CITY-TO-CITY		
Regional **Physical** **Economic** **Social** **Environmental** **Governance** **Intrinsic**	• Co-investment in key infrastructure services to improve efficiency and speed of physical connections • Facilities for centres of excellence for collaborative trade, education, innovation and creative industries development for secondary city partnerships • Inter-region significant natural, cultural and architectural assets for tourism, scientific and recreational use	• Collaborative initiatives to develop new secondary city network partnerships for trade, culture and economic development • Development of resource sharing and specialised knowledge centres to support networked cities • Collaborative research and development on managing cities, logistics systems • Joint trade missions and exchanges • Regional air services

NETWORKS	PUBLIC GOODS	SERVICES
METROPOLITAN		
Physical Economic Social Environmental Governance Intrinsic	• Development of national facilities, but with physical networks and infrastructure that permit virtual (visual, digital and audio access from other cities and regions of the country (national libraries, museums, statistical and GIS data, etc.)	• Integrated systems for information sharing which support the development and efficient operations of national systems of cities • High-level telecommunications, medical research, and governance services for conferencing, business, operations and production activities in regions
CLUSTERED CITIES		
Physical Economic Social Environmental Governance Intrinsic	• Development of efficient, integrated and intelligent regional transport, logistics, ITC, and Water, Sanitation and Hygiene (WASH) services • Strategic location and development of extra-metropolitan regional services	• Metropolitan regional core and clusters secondary-cities collaborative governance arrangements • Equitable cost sharing and outlays recovery of services provided by core city and secondary cities and vice versa
CORRIDOR		
Physical Economic Social Environmental Governance Intrinsic	• Development of efficient, integrated, and intelligent regional transport, smart logistics, ITC and WASH services • The strategic location of corridor emergency management response centres • City by-passes for heavily congested towns and cities located along the corridor • Fast train corridors and infrastructure • Good 24-hour logistics facilities at borders to avoid delays	• Corridor collaborative partnerships between local governments for planning, economic, and trade development and provision and maintenance of corridor services. • Corridor traffic and transport information services for road users • Fast train services between larger cities and towns • Virtual cross-border services and inspection services

NETWORKS	PUBLIC GOODS	SERVICES
GLOBAL AND VIRTUAL		
Physical **Economic** **Social** **Environmental** **Governance** **Intrinsic**	• 24-hour international port/ airport/train/bus terminal and transfer facilities • 24-hour international business services • International hotels, trade, and conferencing facilities • Security of nationally and internationally significant assets and landmarks	• Transport facilities working at international best practice standards • 24-hour services for visitors and growing non-business hour services. • 'Night mayors' or executives to run the city at night • International language signage and information services

Source: Author

5.3 A New Agenda for Developing Collaborative Systems of Secondary Cities

This book set out to fill a knowledge gap on ways to improve connectivity between systems of secondary cities to help support inclusive, equitable, and sustainable economic growth and development. It has addressed important questions about the nature and importance of connectivity in the performance and prosperity of local economies.

The findings of the research show the importance of networks in the development of systems of secondary cities. They point to the need for secondary cities to invest strategically in public goods and services to develop not only the enabling environment of a city and its rural linkages, but also the linkages between systems of cities, especially secondary cities. Enhanced connectivity between national and regional systems of cities opens new prospects for growth and development of secondary cities, primarily through embracing ICT. Increasing the breadth and depth of connectivity among secondary cities can make a significant contribution to more equitable growth in national systems of cities, especially smaller regional cities and towns, and cities in land-locked countries.

The case studies provide some tangible evidence that enhancing connectivity between systems of secondary cities (metropolitan regions and their hinterlands) and building different types of networks is crucial to raising the overall performance of national and sub-national regional economies. However, this requires national governments, when developing urban and regional economic policies, actions, and budgets, to allocate a more equitable proportion of public funds within the fiscal transfer systems to the infrastructure networks outside metropolitan areas.

Secondary cities will continue to be disadvantaged and fail to gain a more equitable share of national development and investment if they continue to compete independently against each other. Systems of secondary cities must adopt better ways to utilise resources more efficiently (DeSantis & Stough, 1999), reduce costs, and obtain economies of scale for business to compete nationally and internationally. They can do this by collaborating. Collaboration between firms and cities is not done to win a higher market share—its purpose is to grow the market, and in so doing, make more efficient use of public and private goods and services to develop and grow local economies. Collaboration is a pillar to building smart, prosperous, and sustainable modern urban economies.

As nations become more urbanised and incomes rise, national and local economies become more service orientated, and the need for ways to expand soft infrastructure connectivity becomes more important (Lee, 2016). Factors such as internet speed, quality, and accessibility; access to knowledge; advanced technology, health, and education services; and social networking for either business, pleasure, or both become increasingly important in shaping the dynamics and development of local urban economies. The strength of and access to enabling environments that support soft connectivity and infrastructure networks are increasingly important to the functions, operations, performance, and development of cities. They will become even more critical in the future.

The rapid development of the information age demands investment in soft connectivity in ICT technologies and network infrastructure and, at the same time, is opening new opportunities for collaboration. The challenge is identifying the balance needed in both public and private sectors between soft and hard connectivity services and infrastructure required to support the sustainable growth, development, and operation of cities.

Finally, if secondary cities are to become more prosperous and develop sustainably, a change in the model of national and regional physical and economic development is required. This calls for a new agenda for the development of networked secondary cities. Secondary cities in many developing economies can no longer rely on population growth, low skilled migration, metropolitan regions, and limited export markets to develop and grow their economies. In post-industrial economies, secondary cities must develop the resilience that enables existing infrastructure networks to be revitalised and skills developed to enable them to participate in the rapidly expanding digital economy.

Regardless of their locality, secondary cities must become more collaborative and competitive to attract investment, create decent jobs, encourage trade and new value-adding advanced technology manufacturing and business services opportunities, and create new sub-national and international market development opportunities. This calls for governments to make policy changes that encourage some re-orientation of supply chains to a less hierarchal system of city development and trade, to support collaborative network systems of trading cities at the sub-national level, and to ensure more balanced investment in both hard and soft infrastructure in areas outside metropolitan regions.

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ANNEXE | CONNECTIVITY INDEX ANALYSIS AND CASE STUDY

Measuring the attributes of connectivity and scale networks for secondary cities is difficult, especially in developing economies. There are no standard metrics available for measuring connectivity between cities. Factors such as scale or level of population/development/economy, import-export/trade and visitor flow between cities, immigration flows, business transactions, and megabyte exchange are all measures of connectedness which can be described, quantified, or both. However, the collection of less tangible measures of connectivity and network data is difficult to obtain, even in advanced economies. Much of the spatial data on information flow by categories is privately held and not readily compiled and formatted into composite data sets. Few cities collect information on trade flows, for example, between cities, yet the volume, nature, and velocity of trade between cities have a significant impact on economic activities, growth and development.

A.1 Connectivity Index - Framework Development

Section 3.2.4 (Figure 3.3) showed a conceptual framework for measuring the scope and scale of hard and soft connectivity between cities This basic framework can be developed to collect indicators to produce an index to analyse connectivity and networks for secondary cities. The advantage of the framework is that it can be made relatively simple, and it can use quantitative and qualitative data gathering and computational analytical techniques, depending on the level of sophistication desired. Figure A.1 elaborates on Figure 3.3, with indicators developed under each category. A measure of flow or connections is made of traffic flow, level of service, and passenger flow, among others. These are given a quantitative or qualitative scale valve in a range of 0 to 3, 5, 7, and so on, using a scale system (Duncan & Stenbeck, 1987; Spector, 1992). In developed economies, data is more readily available, and the use of quantitative methods can be applied. In developing economies, data is often not available, so that qualitative methods, using Delphi and expert group scoring, may be required.

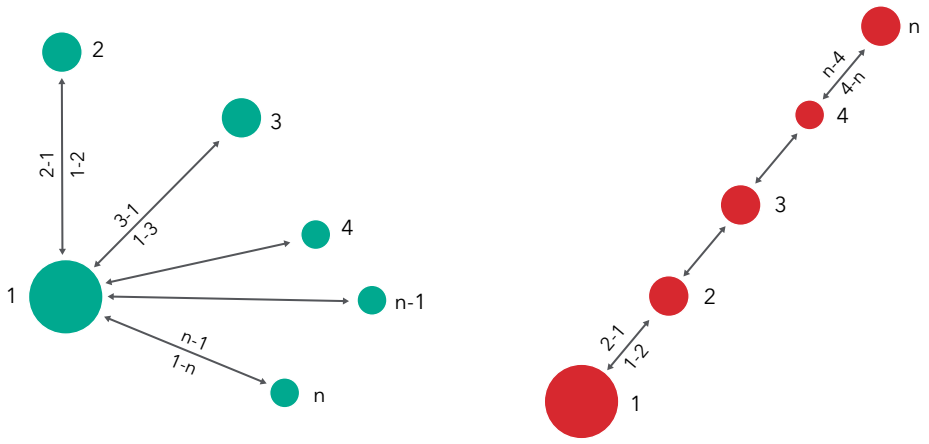
TABLE A.1 Framework for an experimental index to evaluate the scope and scale of hard and soft connectivity.

	SCALE OF NETWORKS					
Scope of Connectivity	Hard and soft Indicators	City Network 1-2	City Network 2-3	City Network 3-4	City Network (n – 1)-n	Median Network (C_1...*Cn*)
	Physical Assets (a_1 … a_n)					
	Economic (b_1 … b_n)					
	Social/cultural (c_1 … c_n)					
	Environmental (d_1 … d_n)					
	Governance (e_1 … e_n)					
	Information/Knowledge (f_1 … f_n)					
	Index Score Median (a_1-*fn*)					

Source: Author

Figure A.1 shows two types of simple linear network analysis that could be used to develop an index of connectivity. The left side of the diagram shows a simple two-way assessment of connectedness between Cities 1 through n. The right side is an example of a corridor connection for Cities 1 to 2, 2 to 4, and 4 to n. The problem with matrix network analysis is that it can become extremely complex as more cities become involved. Thus, keeping the number of indicators between 15 and 20 is often enough to indicate the strength of connections and flows between cities in a region, corridor, or metropolitan cluster of cities. The critical factor in the analysis is to identify which indicators are crucial to lifting connectivity and the development of networks to support city trade development.

FIGURE A.1 Simple network analysis for regional and corridor system of secondary cities (numbered 1 to n).



Regional network analysis

Corridor network analysis

Source: Author

A.2 Case Study: Connectivity Index of Mekong Economic Development Corridor Towns and Cities

As part of the Fourth Greater Mekong Subregion Corridor Towns Development Project (Asian Development Bank, 2016) preparation and design, one of the authors who led the regional economics team for the project developed an experimental index of connectivity to measure the breadth of connectedness between cities along 1500 km of the corridor in Cambodia and Lao PDR. Thirteen towns and cities, which lie in the Economic Development Corridor (CMEDC) between Vientiane and Sihanoukville, were included in the study. The index was developed to provide an indicator of the relative strength of hard and soft levels of connectedness between the cities, to identify possibilities to include projects and programmes that would strengthen the networks and connectivity of towns and cities along the Mekong River. The index was made up of a set of 21 qualitative/quantitative indicator measures (Table A.2) using a 5-point Likert scale.

The use of a gravity model to scale some measures of connectivity, using a log scale, helps to overcome issues of scale and connectedness. In some cases, towns/cities of comparable size and of short distances apart can have a similar level index of connectivity to larger cities that are farther apart.

Figure A.2 shows the index measures of connectivity between the 13 towns and cities along the corridor. Data was collected for the indicators shown in Table A.2 from primary or secondary sources where possible, or by using an expert panel to provide an informed assessment where data was not available. The left side of each bar shows the current

overall index score of connectivity between cities along the corridor. The scores on the right show a measure of improvements needed to meet the connectivity index score set for a target date of 2025. An expert panel set the target level for improvement score. The measure between the target and current score is a measure of the two-way connectivity or connectedness gap.

TABLE A.2 Connectivity Index of Indicators for CMEDC.

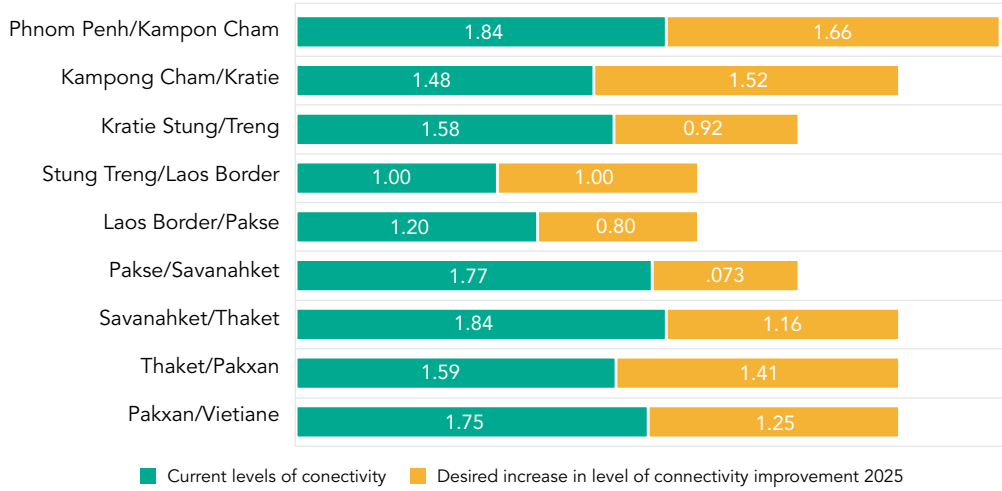
INDICATOR	DESCRIPTION OF INDICATOR
Distance	Using Google Maps estimates: Distance between cities less than 50 Km = 5; Distance < 75 = 4; Distance < 150 = 3; Distance < 225 = 2; Distance > 225 = 1
Travel time	Using Google Maps estimates: Time between cities less than 30 mins = 5; Time between cities less than 60 mins = 4; Time between cities less than 90 mins = 3; Time between cities less than 180 mins = 2; Time between cities > 120 mins = 1
Average speed Kmh	Using Google Maps estimates: Capacity 2800 vph 2 ways aver > 80 Kmh/hour = 5; Capacity 1900 vph 2 ways aver 70 Kmh/hour = 4; Capacity 1400 vph 2 ways aver 60 Kmh/hour = 3; Capacity 900 vph 2 ways aver 50 Kmh/hour = 2; Capacity 600 vph 2 ways aver > 40 Kmh/hour = 1
Road condition	Sealed dual-lane freeway = 5; sealed two-lane wide, good condition = 4; sealed two-lane, moderate condition = 3; sealed two-lane, poor condition = 2; sealed/unsealed two lanes = 1
No trucks (peak flow/hour)	> 1000 passengers/hour (2X) = 5; > 500 passengers/hour (2X) = 4; > 250 passengers/hour (2X) = 3; > 250 passengers/hour (2X) = 2; < 250 passengers/hour (2X) = 1
Estimate freight flows/day	>100 trucks/hour (2X) = 5; >75 trucks/hour (2X) = 4; > 50 trucks/hour (2X) = 3; >25 trucks/hour (2X) = 2; < 25 trucks/hour (2X) = 1
No buses (peak flow/hour)	> 20 buses/hour = 5; > 15 buses/hour = 4; > 10 buses/hour = 3; > 5 buses/hour = 2; < 5 buses/hour = 1
Intercity passengers flow per day	> 100 buses/hour (2X) = 5; > 75 buses/hour (2X) = 4; > 50 buses/hour (2X) = 3; > 25 buses/hour (2X) = 2; < 25 buses/hour (2X) = 1

Indicator	DESCRIPTION OF INDICATOR
Domestics Visitors/ capita/annum	> 4 visitors/capita/annum = 5; > 3 visitors/capita/annum) = 4; > 2 visitors/capita/annum = 3; > 1 visitors/capita/annum = 2; < 1 visitors/capita/annum = 1
International Tourists/capita/ annum	> 4 visitors/capita/annum = 5; > 3 visitors/capita/annum) = 4; > 2 visitors/capita/annum = 3; > 1 visitors/capita/annum = 2; < 1 visitors/capita/annum = 1
No Cars/pickups (peak flow/ hour)	> 500 two ways = 5; > 400 two ways = 4; > 300 two ways = 3; > 200 two ways = 2; > 100 two ways = 1
Momentum (Vehicles X aver speed of vehicles)	Log of vehicles x velocity > 5 = 5; > 4 = 4; > 3 = 3; > 2 = 2; > 1= 1
Level of air services connection	International = 5; National = 4; Region to capital city = 3; Local small aircraft = 2; Emergency helicopter services = 1
No meetings between Chambers of Commerce	6-12 meetings/year = 5; 3-6 meetings/year = 4; 1-3 meetings/year = 3; 1 meeting/year = 2; 1 or 2 occasional meetings/last 5 years = 1
No meetings per year between tourist agency officials	Once/month, multiple region agencies = 5; Once/3 months, multiple agencies = 4; Once/3-6 months, multiple agencies = 3; Once/3-6 months, single agency = 2; Once/year or less = 1
No meetings per year between government officials	Once/month, multiple agencies = 5; Once/month, single agency = 4; Once/3-6 months, multiple agencies = 3; Once/3-6 months, single agency = 2; Once/year or less = 1
Meeting of mayors	Using Chamber of Commerce interviews on level of two-way trade between cities: Very high = 5; High = 4; Moderate = 3; Low = 2; Very low/negligible = 1

Indicator	DESCRIPTION OF INDICATOR
Trade dependency between cities	Using interviews with meetings and visits to market stall owners on level of two-way trade between cities: Very high = 5; High = 4; Moderate = 3; Low = 2; Very low/negligible = 2
Regional joint trade missions/shows	Joint Participation in international trade mission/show = 5; Joint participation in national trade mission/show = 4; Joint participation in provincial trade mission/show = 3; Joint regional show = 2; Discussion on participation in trade mission/show = 1
Average Internet download speed between cities	> 20 Mbs = 5; > 10 Mbs = 4; = > 5 Mbs = 3; > 3 Mbs = 2; < 2 Mbs = 1
Information exchange between Cities	Very high level of information sharing between city governments = 5 (e sharing of data); Moderate level of information sharing between province and city governments = 4; Moderate level of information sharing between province and low level for city governments = 3; Low level of information sharing between province and city governments = 2; Little information sharing between province and city governments = 1

Source: Author

FIGURE A.2 Connectivity between Towns Central Mekong Economic Development Corridor



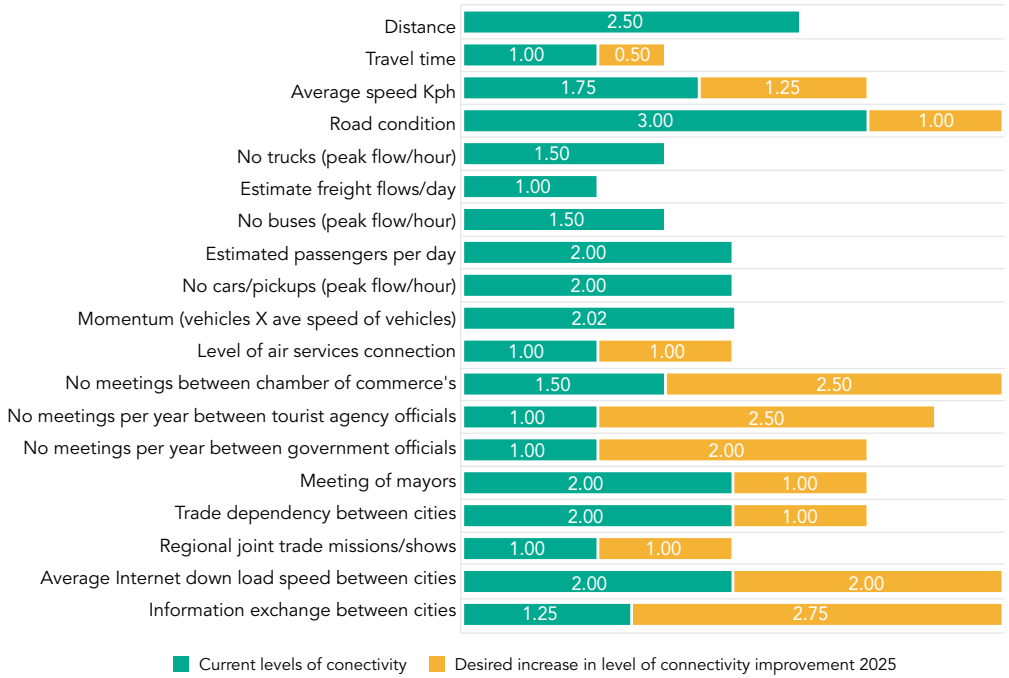
Source: Author

A.3 Priority Areas for Improvements

Figure A.3 shows priority areas of improvement in connectivity along the Mekong Economic Development Corridor for each indicator derived from the gap analysis. The targets for connectivity were set by an expert panel. There are five significant gaps in connectivity along the corridor: information exchange between cities, Internet speeds, the frequency of meetings by the government, tourism, and chamber of commerce organisations. Momentum is a measure of speed/mass ratio, with mass being the number of vehicles per hour multiplied by average speed. Momentum is affected by speed, which is slow due to congestion, the condition of roads, and insufficient capacity on the national highway roads network.

There are differences in indicator gaps between individual cities. Cities like Phnom Penh in Cambodia have better road connections and services than more remote cities like Kratie. The same applies to Lao PDR. These differences need to be considered when formulating external development policies in respect to cities along the corridor. In some cases, indicators such as the number of rail services will not improve because these are not available. Indicators related to increasing the flow of passengers, goods, and services will also be dependent on the growth of population in markets. The analysis, however, provided a useful focus for prioritising investment in enhancing connectivity along the corridor to open new opportunities for trans-corridor investments and increased trade and visitor travel between cities located along the corridor.

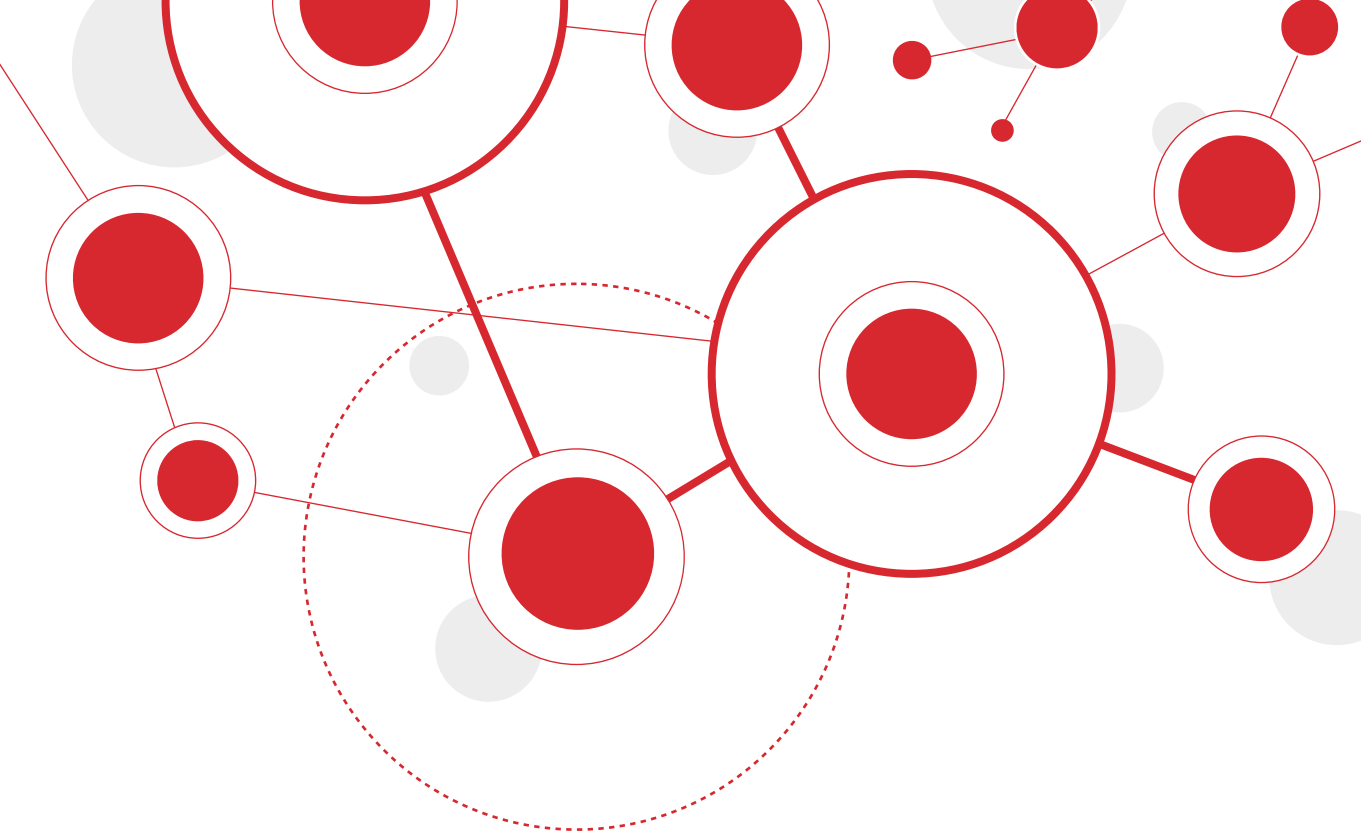
FIGURE A.3 Priority areas of improvement in connectivity along the CMEDC in Cambodia.



Source: Author

The analysis of connectivity factors confirms the need for policies and strategies to support the development of enabling environment capacity to improve the flow of goods and services between cities within the corridor. Investment in high-speed Internet services is crucial to supporting the development and growth of service industries and towns and cities along the corridor. With an average download speed of less than 5 MB per second, Lao PDR had rates far below those of neighbouring countries such as Vietnam and Thailand. These countries have recognised the importance of high-quality Internet services along economic development corridors in order to develop manufacturing and service industry jobs in regional towns and cities.

The connectivity index is a first attempt at developing a measure for levels of connectivity and dependency between cities. The tool is very much developmental, and in the context of Cambodia and Lao PDR, is limited by lack of reliable data. Information on traffic counts, passenger flows, volumes and freight movement, and Internet traffic, is difficult to obtain. In many cases, the team had to use proxy values based on expert assessment. Despite the shortfalls, the connectivity index provides a useful platform to measure gaps in performance needed to improve diverse types of links between towns and cities, their hinterlands, and their internal logistics systems.



About the Book

Connecting Systems of Secondary Cities seeks to pave a new way of thinking on approaches to the development of systems of secondary cities. It challenges much of the traditional thinking on the subject, and it calls for change in the way governments approach national, regional, and local development policy and planning to support more equitable regional economic development. It argues the need for a systemic and less structured hierarchical approach to the way governments support the development of systems of cities. If systems of cities are to be more resilient, prosper, and develop more equitably, a new kind of 'strategic architecture' must be introduced to support their development and link their economies in order to create more opportunities for the development of new markets.

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