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# Urban Resilience Planning for Secondary Cities : Empirical Policy Guide for Developing Countries

중위도시를 위한 도시회복력 계획 연구

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Hong Saheum et al.



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# FINDINGS & SUGGESTIONS

주요 내용 및 정책제안



## 본 연구보고서의 주요 내용

- 1 급속한 도시화 과정 속에서 성장과 쇠퇴의 기로에 놓여있는 개발도상국 내 중위도시(Secondary Cities)의 지속가능한 발전 및 관련 정책에 관한 연구 수요가 증가
- 2 수위도시(Primary City) 위주의 급속한 도시화는 중위도시의 성장에 긍정적인 혹은 부정적인 충격(Impact)으로 작용한다고 볼 수 있으며 이를 도시회복력(Urban Resilience) 관점에서 분석하고 연구할 필요가 있음
- 3 급속한 성장과 도시화를 경험한 우리나라 중위도시들의 변화를 세 가지 - 사회경제, 재난대응, 환경 - 회복력 측면에서 분석하고 이를 토대로 개발도상국 중위도시들의 회복력 제고를 위한 구체적인 정책 대안을 제시

## 본 연구보고서의 정책제안

- 1 사회경제적 측면의 중위도시 회복력 제고를 위해서는 각 도시별로 자생적인 경제기반을 마련하는 것이 무엇보다 중요하며 이를 위해 산업단지 등의 물리적 산업기반 조성 및 정주여건 개선 등을 통해 기본적인 인구 및 시장 규모를 유지할 필요가 있음
- 2 재난대응 회복력 제고를 위해서는 기본적으로 재난예경시스템 및 정보전달시스템을 조기에 구축할 필요가 있으며 재해영향성 검토와 같이 도시계획 단계에서부터 방재 관련 요소들이 제도적으로 토지이용 및 개발 계획에 반영되도록 해야 함
- 3 환경 회복력 제고를 위해서는 도시화 초기 단계부터 세부적인 환경오염 물질 배출기준 설정 및 도시화 정도에 따른 배출기준 조정 등의 제도가 마련되어야 하며 오염물질 관리를 위해 유역단위 거버넌스와 같은 유연한 행정 조직의 구축도 요구

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# CHAPTER 1

## Introduction

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# Introduction

## 1. Introduction

### 1) Cities and Development

With the implementation of the United Nations' 2030 Agenda for Sustainable Development, there is a renewed interest in the development of cities. Sustainable development goal (SDG) 11 Sustainable Cities and Communities is directly related to urban issues, including the resilience of cities and disaster risk reduction. In addition to the launching of the SDGs, there have also been international efforts launched to address climate change, like the Paris Agreement created at COP 21 in 2015, and focusing on the development of urban areas, like the New Urban Agenda created at the Habitat III cities conference in 2016. Climate change has been identified as one of the major challenges in the 21st century that will have a global impact. Climate change is causing extreme weather events in higher frequency and intensity in many part of the world. To cope with the impacts these extreme events have on human settlements, the Sendai Framework for Disaster Risk Reduction 2015-2030 was created as a set of guidelines to decrease the risk posed by climate change.

Urbanization is driving the rapid growth of urban populations in much of the world. By 2050, two-thirds of the world's population is projected to be

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living in a city, with 90% of this growth set to take place in developing countries (Floater et al., 2014). Management of the urbanization transition presents a challenge for governments, because rapid urbanization requires massive investment in urban infrastructure as well as sufficient planning and effective financing mechanisms. Unplanned urban growth is a threat to sustainable development when the necessary infrastructure or policies are not in place to ensure equity in the benefits provided by the city. Unplanned or inadequately managed urban expansion can lead to urban sprawl, pollution, environmental degradation, as well as unsustainable production and consumption patterns.

Rapid urbanization is acting as a stress on cities which can make them more vulnerable to other shocks and stresses, which is why having resilience measures incorporated into the development plans for these cities is essential. Climate change is another example of a stress that is apply pressure to cities on a global scale, with some cities experiencing its effects more than others. Cities are complex series of interdependent systems and to become truly resilient to shock they must adopt a holistic approach encompassing economic, environmental, and social components.

## **2) Secondary Cities: New Frontiers of Development and Challenges**

While primate cities are often the focus of planning and policy secondary cities are garnering a renewed interest from governments and international organizations due to their importance to both the urbanization and SDG agendas. Secondary cities will have key roles as catalysts and secondary hubs for localized production, transportation, transformation, or transfer of goods, people, trade, information and services between sub-national metropolitan,

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national, regional, and global systems of cities (Choe & Roberts, 2011). Additionally, secondary cities are the fastest growing urban areas. The population of secondary cities, especially those in Africa, are expected to increase 2-3 folds over the next 15-25 years. Additionally, there are currently approximately 4,000 cities in the world with populations greater than 100,000 people and this number is expected to increase to 6,000 cities by 2050. 2,400 of these cities have a population of less than 750,000 and 60% of them are in developing regions or countries (Roberts, 2014, p. 43).

The projected rapid growth of secondary cities provides both challenges and opportunities for these cities. Secondary cities often lack the resources and capacity to manage their rapid urbanization. This has led to many secondary cities struggling to provide the necessary services; create jobs and retain jobs; being unable to diversify and revitalize their economies; difficulty retaining capital and attract investment; and it creates a backlog in demand for infrastructure and housing (Cities Alliance, 2014, p. 1). The lack of opportunity in secondary cities has contributed to increased migration towards primate cities, which generally have more economic opportunity than secondary cities. This results in population concentration and crowding in the primate cities while secondary cities are comparatively underdeveloped. Secondary cities, many of which are still developing, present the opportunity to incorporate resilience measures into their urban development planning, rather than addressing these issues after the city has finished developing. This allows the secondary cities to develop their resilience and become competitive in the new economic geography of cities.

Secondary cities developing resilience is important for the cities themselves as well as the regions where they are located. Without properly integrating resilience planning, the abilities of secondary cities to cope with stresses and

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stresses will be compromised, potentially putting the economic productivity, structures, and people's lives in the city at risk. Having resilience measures incorporated can help minimize potential losses, which is critical for secondary cities because of their relatively limited resources. Having robust resilience could also make the secondary city more attractive for businesses, thereby creating more economic opportunities and incentivizing people to either stay in the secondary city or migrate to these cities rather than the primate city.

While there are international efforts working towards addressing climate change and urban resilience, a lack of policy frameworks on a national level persists. Without national policy frameworks, the cities must develop their own policy approach to addressing resilience. Governments play a key role in ensuring that metropolitan areas are resilient to risks, guaranteeing the safety and welfare of the public, and maintain the public's trust.<sup>1)</sup> Cooperation between the national governments and the city governments will be vital to establishing resilience planning tailored to the unique needs of each city.

## 2. Objective

This paper aims to provide a practical policy guide and analytical policy framework to help integrate resilience in urban development policies in developing countries, especially for secondary cities, in context of realizing the 2030 Agenda for Sustainable Development, the Paris Agreement, the New Urban Agenda, and the Sendai Framework for Disaster Risk Reduction. The paper starts with a review of the existing concepts and works around urban

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1) <http://www.oecd.org/development/asia-forum/Documents/BackgroundNoteSession3.htm>

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resilience and provides a working definition of urban resilience, especially one that fits to the context of secondary cities and takes a holistic approach along the green growth theory. Learning from South Korea's development is used to develop recommendations. The unprecedented and rapid development of South Korea from an economic basket case to an OECD donor country within a generation provides valuable lessons for developing countries embarking on similar breakneck urbanization and development to lift its poor and realize the SDG and NDC goals.

Analyzing policies and plans to tackle resilience in secondary cities of South Korea during their rapid urbanization, the work attempts to provide recommendations for incorporating social, environmental, and economic aspects of resilience. Alongside, a secondary city of Cambodia is analyzed as a case study to provide practical lessons that could serve as building blocks for policy and planning of resilience in secondary cities in the emerging and developing countries.







## CHAPTER 2

# Concepts of Resilience and Secondary City

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## **Concepts of Resilience and Secondary City**

### **1. Resilience**

Resilience has become a prominent topic of discussion in many fields, including urban development, partially because it is closely related to sustainable development, which is the major focus of the international development community with the 2030 agenda. However, how resilience is defined remains fragmented between various organizations and experts. In the resilience community, discussion has focused on the fitness of the resilience paradigm as understood in social-ecological systems (SES) theory (Jerneck & Olsson, 2008; Nelson, 2009; Pelling & Manuel-Navarrete, 2011, p. 1). Resilience has become a prominent topic in academic and policy discourse, in part because resilience theory provides insight to complex socio-economic systems and their sustainable management (Meerow et al., 2016, p. 39). Although resilience is often discussed in reference to climate change, literature on resilience exists in many fields including natural disaster and risk management, international development, engineering, energy systems, economics, and planning (Meerow et al., 2016, p. 39).

In terms of an academic concept, the origins and meaning are somewhat ambiguous. This ambiguity allows resilience to be a boundary object or concept that is relevant to many fields and fosters multidisciplinary scientific collaboration (Star). The flexibility of the definition of resilience allows

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stakeholders to work around the concept without needing to agree upon an explicit definition (Brand & Jax, 2007). However, its ambiguity also makes it difficult to operationalize, or to develop generalizable indicators or metrics (Gunderson, 2000; Pizzo, 2015; Vale, 2014; Meerow et al., 2016, p. 39). However, despite the sizeable amount of literature on the concept of resilience, which spans many fields of study, there is an apparent lack of work which focuses on resilience's application to secondary cities.

Within the UN family of organizations there are more than one definition for resilience. The United Nation International Strategy for Disaster Reduction defines resilience as “the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management,” (UNISDR, 2012). However, the United Nations Development Programme (UNDP) finds this definition as well as other organizations' definitions to focus too narrowly on responding to shocks rather than preventing or preparing for them, and their stated goal is only to return communities to their original state. Therefore, the UNDP (2013) defines resilience as a “transformative process of strengthening the capacity of people, communities, and countries to anticipate, manage, recover, and transform from shocks,” which emphasizes building back better after a shock.

The UN established the Sendai Framework for Disaster Risk Reduction 2015-2030, which builds upon the Hyogo Framework for Action. The Sendai framework seeks to achieve the following between 2015-2030: The substantial reduction of disaster risk and losses of in lives, livelihoods, and health and in economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries.

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The World Bank (2013) defines resilience as “the ability of a system, community, or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and efficient manner.” The concept of resilience can be applied to any community as well as any kind of disturbance: natural, man-made, or a combination of the two. Resilience to disaster is viewed as a public good that ensures redundancy is built into urban systems and the adoption of a “when, not if” mentality regarding disturbances. Addressing the possibility of disturbances, both from known and unknown hazards, requires urban planners to build the long-term capacity of communities to deal with uncertain risks.

The World Bank breaks urban resilience down into four components, economic, institutional, infra-structural, and social. Economic resilience measures the economic diversity of a community, including overall employment, the number of businesses, and the ability to function after a shock or disturbance. Institutional resilience refers to the governmental and non-governmental systems that administer a community. Infrastructural resilience takes into consideration the vulnerability of built structures including property, buildings, transportation systems, sheltering capacity, healthcare facilities, critical infrastructure, and the availability of roads for evacuation routes or supply lines. Social resilience is the last component and is concerning the demographic profile of a community, which includes the sex, age, ethnicity, disability, socio-economic status, as well as the community’s social capital. This social capital includes a sense of community, the adaptability of the citizens, and a sense of attachment or belonging to a place.

The Asian Development Bank (2014) defines urban resilience as “the capacity of cities to function so that the people living and working in cities - particularly the poor and vulnerable - survive and thrive no matter what

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stresses or shocks they encounter.” The ADB (Asian Development Bank) focuses their resilience efforts on urban climate change resilience. A city is considered resilient to climate change if the city’s systems survive shocks and stresses, the people and organizations can accommodate these stresses into their day-to-day decisions, and the city’s institutional structures continue to support the capacity of the people and organizations to fulfill their full aims.

The ADB specifies second-tier cities as good areas for focusing resilience programs. They recognize residents of second-tier cities have different levels of access to services than primary cities. This is due to rapid growth in urban populations in these cities, growth in demand for services, inadequate planning, preexisting patterns of social marginalization. These second-tier cities will also be making significant decisions on planning, land-use, and major investment projects. It is during these planning stages that the ADB feels climate change and urban development can be effectively addressed.

The ADB has several principles that must be integrated into any actions taken to achieve resilience as well as a set of qualities that a city must possess to be considered resilient. The ADB’s guiding principles of urban resilience are: Combining hard and soft measures; engaging diverse perspectives through multi-stakeholder processes; enlist different geographic and governance scales, beyond city boundaries; addressing today’s problems while embedding a long-term vision; tapping into local expertise; building leadership and action planning; and focusing on vulnerable communities. The seven qualities that resilient cities possess as identified by the ADB are: reflective, robust, redundant, flexible, resourceful, inclusive, and integrated.

The Rockefeller Foundation in collaboration with has produced the City Resilience Index (CRI, 2015) as a measurement tool to gauge how resilient a city is. The CRI is based on evaluations of four dimensions, with three goals per

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dimension for a total of 12 goals, and 52 indicators. The four dimensions that are key to a city's resilience are health and well-being, economy and society, infrastructure and environment, and leadership and strategy. Cities can access the CRI to see their current performance in the four dimensions, as well as assess their trajectory towards resilience. In addition to the CRI, the Rockefeller Foundation is also involved with the 100 Resilient Cities Project. In the 100 Resilient Cities Project, urban resilience is defined as, "the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience."

### 1) Working Definition of Resilience

This paper proposes a more comprehensive definition of resilience, which includes economic and social resilience in addition to environmental or climate change resilience. Resilience is a characteristic of a city/community that minimizes the extent of damage or disruption to its economic, environmental, and social systems from shocks or hazards through preparation and planning combined with the adaptive capacity to recover (build back better) quickly if the magnitude of the shock exceeded the protection from the mitigation measures. Urban resilience is the capacity of a city to withstand a shock or disturbance or, if the shock is too great, to accommodate and recover quickly afterwards (at Asia dialogue). Urban resilience has multiple components and consists of climate change resilience, economic resilience, and social resilience. This resilience relies on effective governance, a clear plan of action in event of a disaster, and modularized, redundant infrastructure and systems.

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The economic pillar of resilience refers to reducing or preventing direct and indirect economic losses. An abundance of monetary resources has been shown to reduce the potential impact of a given hazard. The scale of assessment determines what indicator is used to assess economic resilience, with mean income or personal savings being used on a household level and gross regional product (GRP) or size of employment for regional scale. The environmental pillar of resilience encompasses avoiding the degradation of the surrounding ecosystems as well as the city's ability to endure natural disasters. The social resilience pillar is concerning the community itself and the ability to maintain or reestablish services critical to the well-being of the citizens.

## 2) Shock and Stressor Approach to Assess Resilience Actions

Shocks are defined as external short-term deviations from long-term trends that could cause significant negative effects on people's state of well-being, level of assets, livelihoods, or safety or their ability to within future shocks. Stressors are on the other hand are long-term trends or pressures that could undermine the stability of a system and increases vulnerability within it (Zseleczky & Yosef, 2014). Since both shocks and stressors could operate in multiple scales and time periods, the impacts would subject to economic, environmental and social state of a primary or secondary city. Table below provide the taxonomy of indicative major shocks and stressors in cities and actions for resilience programming.

Resilience programming would require holistic approach as one or more of these shocks and stressors could impact a city simultaneously. Nevertheless, some of these shocks and stressor require special attention. When it comes to secondary cities in the developing world, urbanization is one such key



common stressor as it could be a primary economic growth driver not only to the secondary cities, but also to the primary cities that the secondary cities' economies are linked to. Managing secondary cities for resilience against rapid urbanization would ensure diversification of economic growth and regional development, that in turn would contribute to greater resilience in national economy and easing urbanization pressures in primary cities. This proximity and linkage of the secondary cities to primary cities could also prove to be both a source of resilience or vulnerability of secondary cities, and would need to be considered in the context of urbanization.

**Table 1-1 | Shocks and Stresses for assessment of resilience actions**

Categories of Resilience	Major shocks and stresses	Indicative actions for resilience programming
Economic	<p><b>Shock</b></p> <ul style="list-style-type: none"> <li>- Financial crises</li> <li>- High inflation</li> <li>- High price fluctuations</li> </ul> <p><b>Stressor</b></p> <ul style="list-style-type: none"> <li>- Lack of social safety net**</li> <li>- Rising economic inequality</li> <li>- Lack of economic opportunities</li> </ul> <p>** Unemployment benefits, welfare services, subsidized public transport, homeless shelters etc.</p>	<p><b>Assessment</b></p> <ul style="list-style-type: none"> <li>- Household surveys (with shock modules that shock and livelihood particulars)</li> <li>- Financial stress tests of regional government/ financial entities</li> <li>- Regional economic diversity assessment</li> </ul> <p><b>Preparedness</b></p> <ul style="list-style-type: none"> <li>- Establish economic emergency management plan and team</li> <li>- Reserve of essential commodities</li> <li>- Conservation plans in plausible supply shortage areas</li> <li>- Mandatory buffer resources in local govt. and businesses</li> </ul> <p><b>Prevention and mitigation</b></p> <ul style="list-style-type: none"> <li>- Strengthening of regional economy (diverse economy, greater domestic consumption, or less dependent on high risk sectors)</li> <li>- Price control mechanism for essential commodities</li> <li>- Conservation measures in supply shortage areas</li> <li>- Social safety net</li> </ul>

Categories of Resilience	Major shocks and stresses	Indicative actions for resilience programming
Environmental / Physical	<p><b>Shock</b></p> <ul style="list-style-type: none"> <li>- Climate change related natural disasters (e.g. heat wave, storm surge etc.)</li> <li>- Non climate change natural disasters (e.g. volcanic eruptions, flooding)</li> <li>- Man-made environmental disasters(e.g.oilspill)</li> </ul> <p><b>Stressor</b></p> <ul style="list-style-type: none"> <li>- Environmental degradation (e.g. soil degradation, worsening air pollution)</li> </ul>	<p><b>Assessment</b></p> <ul style="list-style-type: none"> <li>- Household surveys (with shock modules that shock and livelihood particulars)</li> <li>- Spatial and temporal</li> <li>- vulnerability and damage potential assessments</li> <li>- Identification of potential hazards / high risk areas</li> </ul> <p><b>Preparedness</b></p> <ul style="list-style-type: none"> <li>- Establish emergency response management system</li> <li>- Develop evacuation plan and conduct regular drill</li> <li>- Mandate sectoral mitigation measures, such as storm shutters</li> <li>- Establish monitoring systems (e.g. for air pollution, epidemics)</li> <li>- Develop epidemic management plan</li> </ul> <p><b>Prevention and mitigation</b></p> <ul style="list-style-type: none"> <li>- Enforce zoning and building standards</li> <li>- Climate proofing urban structures</li> <li>- Coastal defense structures</li> <li>- Seismic retrofit on structures</li> <li>- Use drought/flood resistant crops</li> <li>- Reduce interdependence, enhance design standards, and provide enhance protection of lifeline and critical infrastructure</li> <li>- Develop sustainable practices in land &amp; water use</li> <li>- Employ early warning systems</li> <li>- Emissions reduction policies/program(e.g. GHG, PM2.5)</li> <li>- Community education programs</li> </ul>
Social/ Demographic	<p><b>Shock</b></p> <ul style="list-style-type: none"> <li>- Sudden large-scale migration</li> <li>- An epidemic</li> <li>- Major crime and/or terrorist activity (damaging livelihood)</li> </ul> <p><b>Stressor</b></p> <ul style="list-style-type: none"> <li>- Urbanization</li> <li>- Ageing society (or society with younger population)</li> </ul>	<p><b>Assessment</b></p> <ul style="list-style-type: none"> <li>- Household surveys (with shock modules that shock and livelihood particulars)</li> <li>- Urbanization scenarios</li> </ul> <p><b>Preparedness</b></p> <ul style="list-style-type: none"> <li>- Holistic urban planning (to tackle urbanization)</li> <li>- Refugee management plan</li> <li>- Crime monitoring and information dissemination system</li> </ul>

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Categories of Resilience	Major shocks and stresses	Indicative actions for resilience programming
	<ul style="list-style-type: none"> <li>- Rising social non-inclusion (e.g. racism, classism)</li> </ul>	<b>Prevention and mitigation</b> <ul style="list-style-type: none"> <li>- Social safety nets</li> <li>- Ageing friendly emergency use systems (e.g. in buildings and transport)</li> <li>- Public awareness raising programs</li> <li>- Community crime prevention measures</li> </ul>

## 2. Secondary Cities

While each country has different methods of defining cities and towns within the hierarchy of urban areas or systems of cities, secondary city is a term commonly used to describe the second-tier level of hierarchical system of cities, between primary and metropolitan cities and small cities and towns.

They are defined in general by population size, but also according to density, functional roles, and historic status. For example, UN-Habitat defines a “secondary city” as an urban area generally having a population of between 100,000 and 500,000 (UN-Habitat, 1996), and a study on EU countries defines “small and medium-sized urban areas as urban areas with 5,000 to 50,000 inhabitants. Europe is an urban continent with 70% of the population is living in urban areas, but unlike other continents, the urban pattern of Europe is more polycentric with relatively small cities, and about 66% of Europe’s urban dwellers are residing in urban areas with less than 500,000 inhabitants.<sup>2)</sup>

Our working definition on secondary cities are largely in line with those of

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2) Challenges of Small and Medium-Sized Urban Areas, their economic growth potential and impact on territorial development in the European Union and Latvia, 2015, Social, Economic and Humanities Research Institute(HESPI) of Vidzeme University of Applied Sciences(HESPI) and European Urban Knowledge Network(EGTC)

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Cities Alliance (2014) and World Bank (2009, New Economic Geography of Cities), and highlights the importance of urban functionality and linkage to local, national and global networks of cities. Among concepts underpinning the definition of the term, the following four criteria interrelated - city's connectivity in urban hierarchical systems, functional and spatial typologies, and population size - are privileged as key criteria to classify secondary cities.

### 1) Typology of Secondary Cities (proposed by Cities Alliance 2014)

Following the typology of secondary cities proposed by Cities Alliance, a secondary city generally falls into one of three types:

#### ☐ Sub-national Secondary Cities:

This type of secondary cities is a subnational administrative capital, transport hub or large manufacturing or natural resource industry center, playing a vital role in the development of national and, in some cases, the global economy. Typically, these cities have populations of over 200,000. Many of them are growing rapidly as the result of industrialization and the development of export-processing zones, which provide the catalyst for their development.

#### ☐ Metropolitan Secondary City Clusters:

Secondary city cluster development is a phenomenon associated with the development of metropolitan regions and the new towns movement. These cities are integral to the functioning of the core city that provided the catalyst for them to grow and develop- a phenomenon associated with this is the transformation of the economic structure of the city core. Metropolitan clustered secondary cities development presents particular development problems for city managers as they have in general weak metropolitan

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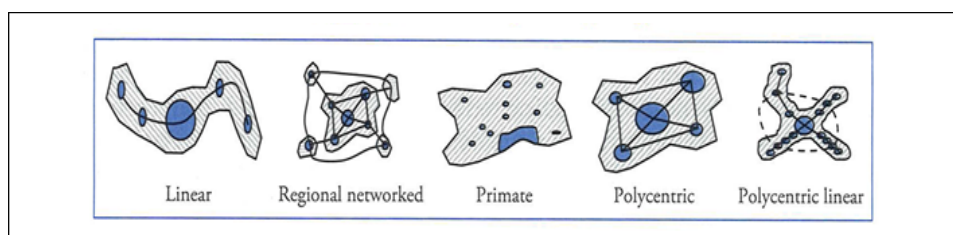
governance integration, and consequently lack of basic urban infrastructure which link the core city and satellite secondary cities.

□ Corridor (or Development axe) Secondary Cities:

The growing levels of trade and travel between cities is resulting in the emergence of a new type of secondary city developing along trade or economic growth corridors, often with the improvements to national transport infrastructure. National and international firms are seeking opportunities to develop new manufacturing and processing factors close to sources of raw materials and cheap labor.

Poly-centric national (and regional) spatial structure, supported by well-balanced urban hierarchy and network in a both vertical and horizontal way, will be an important guide lining goal which directs the current and future policy interventions aiming effective spatial and economic development of nations and secondary cities. The following groupings in the figure, representing city-region spatial pattern could be applied to different scales of cities and regions as well, while simplistic and theoretical.

**Figure 2-1 | Urban Regions: Typology**



Source : ADB, 2011, Competitive Cities in the 21st Century, Cluster-Based Local Economic Development, p. 19

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### 3. Challenges and Opportunities of Secondary Cities

Secondary cities have a distinct set of challenges and opportunities than primate cities. This stems from secondary cities generally having less resources, people, governance capacity, and on occasion their location. The resilience of secondary cities is partially dependent on the cities' ability to effectively address these challenges and take advantage of the opportunities.

#### 1) Economic aspect

Not all secondary cities can rely on an export-oriented model because they do not all have the necessary resources to do so or nor are they all able to integrate into the global economy. For secondary cities' economies to develop successfully, national governments must make changes to urban economies, financial planning, and management arrangements to strengthen the capacity of cities to finance and provide essential infrastructure and services. Local-economic development models that focus on developing the potential for exogenous and endogenous growth to boost the domestic consumer markets. As the national and global economies continue to evolve the model of an industrial city driving and export-oriented model will become a thing of the past.

The shift towards automation in manufacturing will lead to traditional labor-based jobs being lost in developing countries. The industries where these losses will be most prominent are pharmaceuticals, textiles, electronics, and machinery, as foreign firms move production back onshore, closer to their markets. The shift to technology-based manufacturing will threaten the growth model that has been the foundation of many countries' development

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for the last half century. This change in manufacturing will challenge countries and cities to develop strategic infrastructure, technology, and production systems to adapt to the changing markets. However, many secondary cities in developing countries lack the ability to provide basic infrastructure, technologies, and services for even current production systems.

Cities are facing increasing global competition for resources and investment to create jobs, absorb the growing number of migrants, increase trade, and improve city-friendly business status. International investors are seeking to invest in cities with well-documented and enforced regulations with investor-friendly, enabling environments. In these terms, secondary cities tend to lag far behind metro region cities. The role of urban governance is shifting from a focus on service delivery to strengthening location competitiveness by building competitive advantage in strategic infrastructure, human capital, livability, creativity, and innovation. Another initiative to bolster the competitiveness of cities is the development of industry clusters, which encourage the development of agglomeration economies, where transaction costs between firms can be reduced by having access to common services. Clusters also stimulate competition, encouraging innovation, creativity, and levels of specialization in different parts of industry supply chains.

Urbanization in secondary cities presents the difficult challenge of creating opportunities for investment and jobs. Facilitating local economic development in activities requires cities to create development opportunities and to revitalize decaying or environmentally damaged areas of cities. This is a challenge for many secondary cities in developing countries due to their distance from markets and their inadequate transport and communications services.

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## 2) Environmental & Disasters related aspect

Many developing countries governments do not manage urban and economic development well, resulting in the environment being polluted and destroyed, because they believe these issues can be addressed after a certain level of development or wealth is achieved. Environmental degradation resulting from development has a substantial negative impact on environmental services, public health and well-being, productivity and performance of the labor force, and deterioration of infrastructure and buildings resulting from intensive flooding and acid rain (Cities Alliance, 2014, p. 113).

The increased frequency and intensity of natural disasters has spurred governments to adopt climate change mitigation and adaptation measures. Cities, secondary cities especially, will face many challenges in addressing the impacts of climate change. Addressing climate change will require both mitigation and adaption strategies, which will both be critical to disaster management and planning in cities. Secondary cities are less likely to have plans in place to deal with disasters, which are often managed through the central government without enough input from the local government. Water storage and treatment is a primary concern in the event of a disaster.

## 3) Social aspect

The level of human and social-capital development in cities has a significant effect on characteristics like livability, safety, friendliness, and effectiveness. Cities with high levels of human-capital development tend to be the most livable and most competitive. The most important asset in the development of cities is a well-educated, diverse, and competent workforce to provide a wide range of urban services and production systems, which provide essential goods



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and services to urban areas and the wider community. The human-capital base in secondary cities is often weaker than that of metropolis cities, due in part to the migration towards primate cities. Migration depletes the skill base, making it more difficult for the secondary cities to compete for investment and development. Building a strong, diverse, and competent workforce, which is responsive to the changing demands of urban systems is a key challenge for cities to develop and grow sustainably.

Community engagement networks and partnerships are important to knowledge development, business development, and good governance. Building networks takes time because it is a learning process involving the development of trust, information-sharing, and cooperation between communities, individuals, businesses, and public institutions.

Engagement in urban health and community well-being is important to making cities more livable and productive places. There have been several best-practice case studies which showed how substantial improvements in environmental health and community well-being can be accomplished by engaging communities with the design and development of projects for social and health-care services (Cities Alliance, 2014).





# CHAPTER 3

## Analysis of Urban Resilience in Korea Secondary Cities

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## **Analysis of Urban Resilience in Korea Secondary Cities**

### **1. Urbanization in Korea**

#### **1) Overview of Economic Growth and Urbanization in Korea**

The speed of urbanization is analogous to the rapid economic growth in Korea. Since the 1960s, Korea has experienced drastic economic growth through radical industrialization led by the central government. The GNP (Gross National Products) expanded from 2.3 billion U.S dollars in 1962 to about 1.015 trillion U.S. dollars in 2010; the GNI per capita also surged from 87 U.S. dollars to 20,562 dollars during the same time span.<sup>3)</sup> This rapid economic growth and industrialization in Korea has brought unprecedented change to the spatial or geographical distribution of population and economic activities.

The most remarkable feature of this change in spatial distribution of population is mostly based on the rapid increase of the migration from rural to urban areas. The size of rural population, which was 16.04 million people (64.2% of entire population) in 1960, decreased to 4.56 million people (9.4% of entire population) in 2010. At the same time, the urban population increased by 5 times from 8.95 million in 1960 to 44.02 million in 2010, resulting the more than 90% urbanization rate.<sup>4)</sup>

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3) Korea Economic Census (2010)

4) Korea Population Census Data

**Table 3-1 | Change in Population and Urbanization Rate**

(Unit: 1,000 people, %)

	1960	1970	1980	1990	2000	2010
Total Population	24,989	31,409	37,436	43,520	46,125	48,580
Urban Population	8,947	15,809	26,891	36,001	40,497	44,023
Rural Population	16,042	15,600	10,545	7,519	5,628	4,557
Urbanization Rate(%)	35.8	50.3	71.8	82.7	87.7	90.6

This rapid urbanization in Korea has caused a serious problem of inter-regional disparity between the excessive concentration in the capital(Seoul) region and the decline in other regions. Specifically, the population size of capital region, which was only about 20.8% of total population in 1960, increased to 49.1% of the total population. Due to the excessive concentration of population, the capital region is suffering from various negative externalities such as housing shortages, traffic congestion, environmental pollution, etc.<sup>5)</sup>

**Table 3-2 | Concentration of Population on Capital Region in Korea**

(Unit: 1,000 people, %)

	1960	1970	1980	1990	2000	2010
Total Population	24,989	31,409	37,436	43,520	46,125	48,580
Capital Region Population	5,194 (20.8)	8,894 (28.3)	13,298 (35.5)	18,586 (42.8)	21,346 (46.3)	23,836 (49.1)

Automatically, the concentration of population and economic activities in the capital region stimulated the outflow of rural population and other

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5) Korea Population Census Data

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resources, undermining the settlement bases and region economy in non-capital regions. Nevertheless, the large cities in non-metropolitan regions, which served as regional growth poles or centers during the rapid economic growth, have indicated the moderate level of population increase, while rural and small cities declined very rapidly. Moreover, with the population decrease and aging trends, the speed of decline in rural and small cities is expected to be accelerated even more.

Put simply, the urbanization in Korea is summarized in two aspects: the concentration of the capital region and the decline of rural and small cities. In the perspective of urban resilience, it can be said that the impact of drastic urbanization in Korea played a positive or negative role in the development process of various regions or cities.

## 2) Evolution of Urban and Regional Development Policies<sup>6)</sup>

The government policies related to urban and regional development have been devised and implemented to support economic growth and address the problems caused by this rapid growth. In this section, the evolution of the policies in response to the urbanization phase of Korea is addressed.

### □ 1960-70s: Urban development policies for economic growth (the era of growth pole)

In 1962, the First 5-year economic development plan was established to promote economic growth through industrialization. According to this growth-oriented plan, in 1970s, the first national territorial comprehensive

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6) The basic structure of this section was constructed with reference to “Regional Development, A Primer on Korean Planning and Policy (KRIHS, 2013)” & “The Korean Economy 1945-1995: Performance and Vision for the 21st Century (KDI, 1997).

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development plan was established to provide the guidelines for the physical or spatial development, including the infrastructure such as rail and highway system and urban and regional development strategy. In terms of spatial development, the concept of this plan was based on “Growth Pole Strategy (Perroux, 1950)” So the (government) investment was concentrated on a limited number of areas or sites called growth poles. At that time, it was strongly believed that the fruit of concentrated development would be expected to spillover to nearby areas. The infrastructure and physical facilities or space such as roads, seaport, water, electricity, and industrial complex were mainly provided for those growth poles. Specifically, in order to develop a corridor of light industries, the electric rail line was constructed between Seoul and Incheon in the capital region. Moreover, an industrial belt was built along the coastal area of Gyeongnam province to foster export industries.

#### □ 1980s: Perception of balanced national growth

As a result of the rapid economic growth, there were side effects of overconcentration and unbalanced development in Korea. The direction of development policies was changed from industrialization and economic growth to social stability and the reduction of inequality among people and regions. The central government began to realize the need of policies for balanced regional development. In this context, the second national territorial comprehensive development plan was launched. The major goals of this plan is to promote balanced regional development by controlling an excessive concentration in capital region and fostering region-specific industries in non-capital areas. First, in 1982, the capital region readjustment planning act was enacted to control for the concentration of industrial facilities such as factories, large office buildings, etc. However, unfortunately, in spite of policy



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efforts, the concentration trend in capital region remained unchanged. Simultaneously, in order to develop regional industries, the government expanded the investment of SOC such as industrial complex, highway systems, and water supply and sewage system, and implemented the policies of financial support and incentive provision for attracting large companies or enterprises into non-capital regions.

□ 1990s: Urban and regional policies for globalization

In 1990s, the urban and regional development policies were designed to build up the competitive capacity at the national level through industrial advancement corresponding with globalization. The government revised the National land use and management law to simplify the land-use system and to mitigate rigid land-use regulations, allowing companies to flexibly utilize the land spaces. However, this radical deregulation has led to indiscreet development in agricultural or mountain areas and now it has been pointed out as one of causes of extreme unplanned development around large metropolitan areas. Additionally, differentiated growth pole strategy, the government promoted a strategy to foster regional extended growth centers connecting local metropolitan cities, mid-small size cities, and industrial complex. To implement this strategy, the central government initiated the decentralization policies focusing on the cooperation of local governments and private sectors in regions.

□ 2000s: Era of clusters and innovation - Glocalization

It was recognized that expanding regional competitiveness through balanced regional development is the driving force of national capacity in globalized world. In this context, the regional clusters, which links companies,

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research institutes, and educational facilities in each region, were planned and constructed by central or local governments. This is because that the external effects of knowledge or technologies agglomeration within the clusters are expected to be a source for regional innovation. Specifically, considering region attributes, region-specific specialized sectors were selected and fostered through the clusters. In terms of governance, the decentralization and local empowerment were simultaneously promoted by constructing the administrative capital and transferring the central government authority.

□ 2010s - recent: Policies for resilient urban and regional development

The demand for social welfare has increased due to the continuous trend of low economic growth and the aftermath of 2008 global economic crisis. The focus of urban and regional policies has also shifted from “nation” to “every individual”, and “growth” to “quality of life”. In this context, the interest in the concept of urban and regional resilience to cope with the impact of mega events such as natural disasters or economic recessions has increased because those events caused by increasing uncertainty have frequently occurred. As a result, urban and regional policies have initiated the strategies to promote or secure the safety or sustainability of the region or individual, instead of growth-oriented policy tools such as large-scale physical development. Specifically, in order to enhance the urban resilient capacity for natural disaster related to climate change, the local governments have been obliged to conduct the disaster vulnerability analysis and reflect the results of this analysis in the city/county master plan and the city/county management plan. Additionally, the policies and strategies are implemented to regenerate depressed the residential and commercial sites in the cities.

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## 2. Korean Secondary Cities, who they are?

### 1) Overview of Korean Secondary Cities

As mentioned already, this study is about analyzing the urban resilience by assuming the rapid urbanization that Korea had experienced as an impact towards to secondary cities. Especially, as in Korea, rapid urbanization based in Seoul, the primary city, can have various influences on the secondary cities of the whole country including the periphery. For example, small-mid size cities adjacent to Seoul may have the positive effects of the rapid growth of Seoul. The growth of a residential satellite city through the development of large-scale housing complex are the representative examples.

On the other hand, old cities that used to be the base of non-capital region in the past, their function and status may have declined due to excessive concentration of population and industrial facilities in Seoul. Such a rapid urbanization based on the primary city can be act as various forms of impacts to the economic, social and environmental aspects of the secondary cities. The main goal of this chapter would be quantitatively measuring the resilience of secondary cities in Korea, which had taken a part while overcoming the sudden urbanization impact of the primary city, and to deriving political implication from the results.

### 2) Typologies of Korean Secondary Cities

In order to quantitatively analyze the resilience of the secondary cities in Korea, operational definition and screening processes should be preceded. As mentioned in Chapter II, secondary cities can be broadly defined and

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categorized in terms of a quantitative standard such as population size and functional characteristics of cities such as the economy and housing.

The important thing for selecting and analyzing the secondary cities is considering both quantitative standard and functional aspect. In this study, we used the population size of each city as a quantitative standard in order to target the advocate secondary cities. After work, the secondary cities were selected and classified considering their functional characteristics.

In this study, secondary cities were selected and classified according to the functional criteria of City Alliance(2014), which was mentioned in Chapter 2, based on the circumstance in Korea. As noted above, the population scale of the year 2000 was used as a quantitative indicator that is the basis for the selection of the secondary cities. The main purpose of this research is to study the growth of secondary cities diachronically from the 6, 70's to the recent years.

This study used the population size of the year 2000, which is the midpoint of the targeted period (1970 ~ 2010). Specifically, using the functional classification criteria of Cities Alliance (2014) for municipal cities (excluding metropolitan cities) due to the administrative districts classification with a population size of more than 50,000 in the year 2000.

In particular, the study of Byun (2015) was applied in order to distinguish between a secondary city of the metropolitan cluster type and the one in the corridor or regional type. According to Byun (2015), local small and medium cities with more than 50,000 populations, in 2013 administrative district's unit, were classified by quantitatively judging whether they are under the influence of local mega cities including metropolitan cities.

In this classification, local small and medium cities were classified into cities inside of the influence zone of mega cities and liberty type cities outside of the

influence zone of mega cities. Referred the classification, this study categorized the small and medium cities inside the influence zone of mega city in the ‘Metropolitan cluster secondary city’ and the other cities in the ‘corridor or regional secondary city’. A total of 76 secondary cities were selected, and the results are shown in the table below.

**Table 3-3 | Typologies of Korean Secondary Cities**

Types	Secondary Cities
Sub-national secondary cities (8 cities)	Gangneung, Cheongju, Cheonan, Jeonju, Mokpo, Pohang, Changwon, Gimhae
Metropolitan-cluster secondary cities (44 cities)	Suwon, Seongnam, Uijeongbu, Anyang, Bucheon, Gwangmyeong, Pyeongtaek, Dongducheon, Ansan, Goyang, Gwacheon, Guri, Namyangju, Siheung, Gunpo, Uiwang, Hanam, Yongin, Paju, Icheon, Anseong, Gimpo, Yangju, Yeosu, Hwaseong, Gwangju, Pocheon, Chuncheon, Chungju, Gongju, Asan, Nonsan, Iksan, Jeongeup, Namwon, Gimje, Naju, Gyeongju, Gimcheon, Gumi, Yeongcheon, Gyeongsan, Miryang, Yangsan
Corridor or regional secondary cities (24 cities)	Osan, Wonju, Donghae, Taebaek, Sokcho, Samcheok, Jecheon, Boryeong, Seosan, Dangjin, Gunsan, Yeosu, Suncheon, Gwangyang, Andong, Yeongju, Sangju, Mungyeong, Jinju, Tongyeong, Sacheon, Geoje, Jeju city, Seogwipo

The list and types of selected secondary cities through the classification standard and method, are shown in the table. Those characteristics of above classified secondary cities are as follows.

#### □ Type 1 Sub-national secondary city

Cities that take a central role in a specific industry field are observed throughout the country. In addition, based on various industrial structure, some cities provide educational, medical, and cultural services to neighbor regions. Also, there are cities that had experienced a functional decline because of the rapid growth of Seoul.

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#### □ Type 2 Metropolitan cluster secondary city

In cities around Seoul (primary city), there are a considerable number of cities experiencing joint growth in population and economic size due to the rapid development of Seoul. In many of these cities, they usually fulfil a residential function in the form of a bed town or production facilities are concentrated due to the development of a specific industrial complex. Some cities, used to have independent influences as secondary cities, eventually changed into 'metropolitan cluster secondary city' due to the development of mega city are also observed.

#### □ Type 3 Corridor or regional secondary city

Due to geographical and spatial characteristics, many cities have low accessibility to sub-national secondary cities including Seoul and metropolitan cities. Compared to other types of secondary cities, there are many cities where the status of cities is continuously falling compared to the past in terms of population size and function. On the other, for cities that are located in tourist areas such as Jeju Island, are showing vitality again.

### **3. Analysis of Urban Resilience in Korean Secondary Cities**

In this section, we will analyze the urban resilience quantitatively in three pillars - economy, (general)environment, and disaster - using the selected secondary cities and draw political implications in each sectors.

To conduct quantitative analysis, the method of Chapple and Lester (2010) was used. Chapple and Lester (2010) analyzed the resilience level of a city by comparing the relative resilience index values of each sectors represented by a

city. As shown in the table below, the relative levels of the resilience index between the two points are compared and classified into four types.

**Table 3-4 | Analytic Framework for Urban Resilience**

Start/End Status	Below Average	Above Average
Below Average	Stagnant (4)	Transformative (2)
Above Average	Faltering (3)	Thriving (1)

For example, when the employment rate of each city is used to measure the economic resilience between the year 1990 and 2000, if a city shows a below average employment rate at both points then it can be said that the city shows stagnant performance in terms of economic resilience. In addition, the analysis can be performed by comparing not only a simple index value but also a rate of change such as a growth rate.

This research is basically for studying the changes of the secondary cities through the rapid urbanization process between the 1970s to the 1980s via resilience perspective. Unfortunately, it is impossible to obtain such time-series data used for empirical and quantitative analysis of the four resilience aspects presented above. In this case, the data were acquired and analyzed within the affordable time series range.

## 1) Socio-economic Resilience

### ☐ Population

Population is the most basic and widely used indicator of socio-economic performance of a city. Given the fact that the population moves in search of economic opportunities, the increase in the population of a city can represent the economic prosperity of the city. In addition, social conditions such as

settlement attributes and welfare benefits (education, culture and etc.) can also be the influx factor of specific cities. Furthermore, the only indicator that covers the entire development process of cities in Korea is indicators of population. Therefore, in this study, the population growth rate was used to analyze as it is considering affordable and quantitatively representing city resilience indicator.

Population data of population census, which is basically published every five years, are used. The resilience was analyzed through calculating the population growth rate between 1980 and 1990, between 1990 and 2000, and between 2000 and 2010.

**Table 3-5 | Results of Socio-economic Resilience Analysis using Population('80~'00)**

Types	Attributes
Thriving	<ul style="list-style-type: none"> <li>- Cheonan is the only type 1 secondary city, and Type 2 (93.8%) of the remaining 15 cities</li> <li>- Most of metropolitan cities near metropolitan areas including Seoul are continuously showing the population increase regardless of external impacts</li> <li>- Specifically, most of the secondary cities are located close to Seoul, which is considered to be the main reason for the residential function-oriented new cities built around Seoul from the late 1980s to the early 1990s</li> </ul>
Transformative	<ul style="list-style-type: none"> <li>- Gimhae was the only type 1 secondary city</li> <li>- Six cases (66.7%) in Type 2 secondary city, 2 cases (Osan and Wonju) in Type 3 secondary city</li> <li>- Like the Thriving type, it occupies a large number of cities adjacent to Seoul</li> <li>- In the case of some secondary cities in the southern part of Seoul, it was negatively influenced by the rapid growth of Seoul in 1980, but it was the region experiencing the increase of population due to the expansion of the metropolitan area in the 1990s</li> </ul>
Faltering	<ul style="list-style-type: none"> <li>- Includes Cheongju and Changwon as Type 1 secondary city</li> <li>- Type 2 is a total of four cities adjacent to Seoul, and Type 3 is only one in Gwangyang</li> <li>- The dramatic development of neighboring metropolises such as Seoul had a negative impact on traditional secondary cities</li> <li>- In the case of secondary cities in the metropolitan area, poor development and the lack of proper settlement conditions are considered to be the result</li> </ul>



Types	Attributes
Stagnant	<ul style="list-style-type: none"> <li>- A total of 44 cities with the highest number of secondary cities were found to belong to the Stagnant type as a result of resilience analysis in terms of population</li> <li>- Type 1 secondary city 9.1%, Type 2 secondary city 40.9%, Type 3 secondary city 47.7% so mostly composed with Type 2 and Type 3 secondary cities</li> <li>- Most middle-class cities that are not adjacent to Seoul or some metropolitan cities have experienced negative impacts on the population in terms of growth-oriented development</li> <li>- In particular, most of the Type 3 secondary cities that served as corridors or traditional regional bases without adjacent metropolises are mostly in the Stagnant Type. The Development method based on the population side implied a negative impact that was difficult to recover for the Type 3 secondary cities</li> </ul>

**Table 3-6 | Results of Socio-economic Resilience Analysis using Population('90~'10)**

Types	Attributes
Thriving	<ul style="list-style-type: none"> <li>- 2 Type 1 secondary cities are Cheonan and Gimhae, 2 Type 3 secondary cities are Osan and Wonju</li> <li>- Type 2 secondary cities occupy the majority with 15 (7.9%)</li> <li>- It is found that secondary cities adjacent to Seoul and metropolitan cities continue to grow with their impact on the population</li> <li>- In particular, Wonju has been partially influenced by the positive effects of corporate cities that began to be built in mid-2000 as a part of local distribution and development</li> </ul>
Transformative	<ul style="list-style-type: none"> <li>- Cheongju is the only Type 1 secondary city</li> <li>- 6 Type 2 secondary city (66.7%), 2 Type 3 secondary cities are Dangjin, and Geoje</li> <li>- Includes cities in Chungcheongnam region that are adjacent to metropolitan areas and cities in metropolitan area that are close to Seoul</li> <li>- The expansion of the metropolitan area due to the regulation of the metropolitan area and the construction of the administrative capital were interpreted as the result of this</li> </ul>
Faltering	<ul style="list-style-type: none"> <li>- Composed with Type 2 secondary cities located in metropolitan area</li> <li>- Seongnam and Anyang, where the first new city was constructed, are declining in terms of population with the backwardness of the city</li> <li>- In some secondary cities in the metropolitan area, the metropolitan area regulation and local distribution policy have been negatively affected</li> </ul>
Stagnant	<ul style="list-style-type: none"> <li>- Type 1 secondary city 11.9%, Type 2 secondary city 40.5%, Type 3 secondary city 47.6% so mostly composed with Type 2 and Type 3 secondary cities</li> <li>- The secondary cities located far away from the growth poles continue to show low resilience level</li> <li>- Some secondary cities dominated by equipment industries also show low level due to lagging in their industrial structure</li> </ul>

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As a result of the resilience analysis using the population index, it was revealed that most of the secondary cities continuing the population growth trend with high resilience in the rapid urbanization were Type 2 secondary cities adjacent to Seoul and other big cities. Especially, the secondary cities in Seoul metropolitan area showed a trend of population growth along with policies such as the construction of a metropolitan mainly for land development.

In addition, some areas in the metropolitan area overlapping with various regulations began to decline, while some secondary cities in Chungcheong province, which are adjacent to the metropolitan area, have recently recovered rapidly. On the other hand, the secondary cities that are not adjacent to the metropolitan cities are experiencing problems such as continuous population drainage. In other words, in terms of population resilience, it can be seen that Host-oriented development method was positively influenced on the secondary city adjacent to the base, and negative impact on the non-secondary city.

Regulation of the metropolitan area and other balanced development strategies, which had been pursued since then, have been observed to positively affect the resilience of the secondary cities in rural areas but they have not achieved remarkable results. On the other hand, some of the secondary cities in Chungcheong province, which are adjacent to the metropolitan area, have increased their resilience since the 2000s due to a side effect of the metropolitan area's external or physical expansion.

#### ☐ Employment

From the economic point of view, employment growth rate was used to analyze the resilience of secondary cities. Employment statistics in the county units serving as administrative districts of the secondary city have been provided since 1994 and the most recent statistics were published in 2014.

During that period, Korea suffered two economic shocks: the IMF foreign exchange crisis and the 2008 global financial crisis. Considering the response process of these two shocks, employment growth rate for 16 years from 1994 to 2000 and employment growth rate for 14 years from 2000 to 2014 were calculated and used for resilience analysis. In other words, a secondary city that has an employment growth rate above average in both periods can be said to be a secondary city with high resilience, which has overcome both shocks and is growing continuously.

**Table 3-7 | Results of Socio-economic Resilience Analysis using Employment**

Types	Attributes
Thriving	<ul style="list-style-type: none"> <li>- Type 1 secondary city includes Cheonan city and Gimhae city</li> <li>- Type 2 secondary cities accounted for the majority (63.6%), and Type 3 was included only Dangjin city</li> <li>- Continuous increase in employment was observed in the secondary cities where the first new city was built. It can be seen that the employment creation caused by large-scale population inflows persisted and sustained external shocks</li> <li>- Secondary cities where companies and large industrial complexes are located show high resilience</li> </ul>
Transformative	<ul style="list-style-type: none"> <li>- Type 1 secondary cities Including Cheongju city and Jeonju city</li> <li>- Type 2 8 cities (42.1%), Type 3 9 cities (47.4%)</li> <li>- Secondary cities in the metropolitan area where large-scale land development has occurred since 2000 and some secondary cities in Chungcheong Province affected by the external or physical expansion of the metropolitan area were observed</li> <li>- Secondary cities such as Cheongju, Jeonju, Naju, and Wonju are said to have a positive effect on the resilience of the employment because of the construction of administrative capitals and enterprises, innovative cities and the public institutions, which were promoted simultaneously by the motto of balanced development</li> <li>- Additionally, some secondary cities seem to have contributed to the resilience of traditional centers of regional industry</li> <li>- In case of Jeju and Seogwipo, the creation of employment responded to the increase of domestic and foreign tourists</li> </ul>

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Types	Attributes
Faltering	<ul style="list-style-type: none"><li>- Including only mass production as Type 3 and the rest are Type 2 secondary cities</li><li>- In the case of secondary cities in the Seoul metropolitan area, the decrease in employment is attributed to political effects such as the regulation of metropolitan areas and the relocation of factories</li></ul>
Stagnant	<ul style="list-style-type: none"><li>- In total 40 cities, the highest number of secondary cities belonged to Stagnant type as a result of resilience analysis in terms of employment</li><li>- Portion: Type 1 secondary cities 10.0%, Type 2 secondary cities 60.0% and Type 3 secondary cities 30.0%</li><li>- Cities that occupy major industrial sectors with a specific structure of industry or lagging industries such as simple manufacturing industries have shown a stagnant level of employment resilience</li><li>- The majority of type 2 or type 3 secondary cities which do not have a specific industry base, continue to experience low levels of employment resilience performance by internal or external shocks</li></ul>

The secondary cities that have experienced two economic crises and showed a relatively good level of employment resilience have the following characteristics. In the case of the secondary cities which had a rapid population inflow through large-scale residential land development projects such as the 1st new city, the resilience of employment was high due to the diverse regional economic demands. In addition, cities with large industrial bases such as national industrial complexes, and secondary cities with diverse industrial structures adjacent to big cities, showed high resilience as well. On the other hand, low-level resilience of secondary cities with no specific industry base was also observed. The metropolitan area regulations found that the resilience of employment in some of the secondary cities adjacent to the metropolitan area was shifted positively, and the results of the relocation of companies, innovative cities and public institutions built with balanced development policies were also observed in some secondary cities in suburban area.

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## □ Concluding Remarks

In the process of rapid urbanization in Korea, the economic resilience performance of secondary cities has been determined by the distance from Seoul and some major cities. Specifically, the population and employment of Type 2 secondary cities in Seoul and other major cities are experiencing continuous growth without being significantly affected by internal and external shocks.

Especially the large-scale housing development around Seoul which is summarized as the construction of the first new city, has resulted in an immense influx of population from Seoul and the provinces. The resulting economic demands also served as an energy for economic growth and employment. On the other hand, the strong locational regulation on the metropolitan area as a part of the balanced development showed a limited positive impact only on the economic resilience of some secondary cities adjacent to the metropolitan area. This may be interpreted as the development of the region itself, but in some cases it is interpreted as the external expansion of the metropolitan area.

In terms of employment, it is observed that the relationship with Seoul and primary cities affects the status of the industrial base of the secondary city on the resilience level. Especially, in the case of some secondary cities that have been renovated by relocation of corporate cities and public institutions, the resilience of their employment has increased recently due to the relocation.

The urbanization strategy of Korea, represented by its growth-based development method, has had a different impact on the economic resilience level of each secondary region depending on the physical and economic relations between the base and the secondary city. In other words, it is a very positive factor for the secondary city adjacent to the base, whereas the base

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development for the secondary city is the negative effect. This suggests that an efficient development policy in terms of growth of the entire country can serve as a negative impact on demographic outflows and employment in some intermediate or lower spatial units such as secondary cities.

## 2) Disaster-related Resilience

### ☐ Human Life and Property Damage

Statistical yearbook of natural disaster is organized and distributed annually to the damages by natural disaster. In this study, not only the concept of resilience is represented, but also the analysis is performed by selecting damage as an index based on the occurrence of disasters in each city where data can be easily acquirable and comparable.

The damage caused by disasters that are currently counted in Korea can be classified into damage of human life and property. In this study, the data were analyzed by collecting the damage of human life and property separately. The damage of human life is counted as a person and includes both death and injury. In case of the damage of property is counted as KRW. One of the important issue when compare the damages in the regional level is to determine the comparison unit. In particular, the damage of property can be comparable to three types: total damage, population damage (per person), and area damage density(damage per unit area). These three comparison units are analyzed in this study, and then the damage scale per person, which is deemed to be most appropriate was selected.

Resilience is basically related to the capacity and vulnerability of a city. For that reason, it is more reliable to look at the average situation of the city based on the long-term data rather than the fragmentary comparison at two points,

because the disaster is exerted by the city's capacity by natural environment, geological, and geographical conditions. Basically, this study is considered the comparison of 2000 and 2010 and 10-year average was calculated for 5 years (1996~2004) back and forth from 2000 in order to calculate the disaster damage by city in 2000. In addition, the average value of 10 years from 2005 to 2014 was used to evaluate the resilience of the city accurately.

**Table 3-8 | Results of Disaster-related Resilience Analysis using Damage of Human Life**

Types	Attributes
Thriving	<ul style="list-style-type: none"> <li>- Among the 37 cities, 13.5%(5) of the Type 1 secondary cities, 59.5%(22) of the Type 2 secondary cities and 27.0%(10) of the Type 3 secondary cities</li> <li>- Approximately 56%(5) of the Type 1 of the total 9 cities, 50%(22) of the Type 2 of the total 44 cities and 41.7% of the Type 3 are the thriving type</li> <li>- It appears evenly in all types but types 1 and 2 are included more relatively</li> </ul>
Transformative	<ul style="list-style-type: none"> <li>- Among the 12 cities, 16.7%(2) of the Type 1 secondary cities, 16.7%(2) of the Type 2 secondary cities and 66.7%(8) of the Type 3 secondary cities</li> <li>- Approximately 22.2% of the Type 1, 4.5% of the Type 2 and 33.3% of the Type 3 are the transformative type</li> <li>- Type 3 cities are included more relatively in the transformative performance type. Among the cities on the eastern coast of Gangwon Province where have been a lot of damages in past, there are many places that the damages of people is reduced due to the improvement ability of alertness and rescue ability</li> </ul>
Faltering	<ul style="list-style-type: none"> <li>- Among the 18 cities, Type 1 secondary city does not appear, Type 2 secondary city has 72.2% and Type 3 secondary city has 27.8%</li> <li>- 0% of the Type 1, 29.5% of the Type 2 and 20.8% of the Type 3 are the faltering type</li> <li>- Central cities in the national level have no negative disaster resilience influenced in the aspects of human loss</li> </ul>
Stagnant	<ul style="list-style-type: none"> <li>- Among the total of 10 cities, Type 1 secondary cities are 20%(2), Type 2 secondary cities are 70%(7), and Type 3 secondary cities are 10%(1)</li> <li>- Among 22.2% of Type 1 secondary cities, 15.9% of Type 2 secondary cities and 4.2% of Type 3 secondary cities are applied</li> <li>- Cities with low resilience and resilience related to human casualties are mostly type 2 secondary cities such as Jeonju, Changwon, and Type 2 middle-class cities experiencing rapid population growth and development around the Seoul metropolitan area</li> </ul>

The average loss from the disaster-related damage tends to be higher than the median because the damage gap between big and small cities is relatively large. This tendency was reflected in most of the cities of the thriving type that showed average annual loss of life below average in both view points.

The number of death due to disasters tended to decrease in the whole country. In addition, the secondary cities, which are the target of this study, the declining tendency was remarkable and the annual decrease from 1.55 in 2000 to 0.15 in 2010 was notable. This has been done because of the improvement in alertness, information transmission ability, response and rescue ability in case of disasters in Korea.

The stagnant performance type, which has low resilience based on life-sustaining damage at both point of time, appeared in a large city of type 1 and a secondary city of type 2 that experienced rapid growth. Moreover, the faltering performance of disaster resilience in the 2010s was higher than the 2000s. The cities of type 2 experienced rapid population growth and development in the metropolitan area as well. In other words, the total damage of human life in Korea has been reduced due to disaster alert capability, information transmission capability by mass media, and response capability. But these areas also have been experienced increase in people exposed to the danger because of the rapid growth in population.

**Table 3-9 | Results of Disaster-related Resilience Analysis using Property Damage**

Types	Attributes
Thriving	<ul style="list-style-type: none"> <li>- Of the 41 cities, 6 secondary cities (14.6%) were in type 1, 28 (68.3%) secondary cities were type 2, and 6 secondary cities (14.9%) were type 3</li> <li>- This was 66.7% of 9 secondary cities in type 1, 63.6% of 44 secondary cities in type 2, and 29.2% of 24 secondary cities in type 3</li> <li>- Many cities are located inland</li> <li>- It serves as the center of the region, and is located near the metropolitan cluster, and has a large number of secondary cities of type 1 and type 2</li> </ul>



Types	Attributes
	<ul style="list-style-type: none"> <li>with a certain level of disaster prevention budget</li> <li>- The proportion of the type 3 secondary cities, which have difficulty in securing disaster prevention budget due to the relative unpopularity and the weak financial base, are low</li> </ul>
Transformative	<ul style="list-style-type: none"> <li>- Among the 9 cities, 2 secondary cities(22.2%) of type 1, 1 secondary city(11.1%) of type 2, and 6 secondary cities(66.7%) of type 3 are shown</li> <li>- This corresponds to 22.2% of type 1, 11.1% of type 2, and 25.0% of type 3</li> <li>- In some coastal areas where damage has been occurred in 2000 (point 1), there are cities that have reduced the damage level by installing structures such as breakwaters, banks and coastal disaster prevention facilities</li> <li>- Geoje experienced property damage as Typhoon Maemi in 2003, but since then it has implemented a policy to move residents to safe areas to contribute to improving disaster resilience</li> </ul>
Faltering	<ul style="list-style-type: none"> <li>- Type 1 cities did not appear in 13 cities. Type 2 cities accounted for 8 cities (61.5%) and type 3 cities accounted for 5 (38.5%)</li> <li>- This corresponds to 18.2% of type 2 cities and 20.8% of type 3 cities</li> <li>- Among the small cities outside of Seoul, there are cities where disaster resilience is rapidly deteriorating as a result of repeated water disasters. In this area with the river, flood damage is heavy</li> <li>- There are many coastal cities where disaster prevention facilities are not properly equipped</li> </ul>
Stagnant	<ul style="list-style-type: none"> <li>- Among 14 cities, 1 secondary city (7.1%) of type 1, 7 secondary cities (50.0%) of type 2, and 6 secondary cities (42.9%) of type 3 are shown</li> <li>- 11.1% of type 1 cities, 15.9% of type 2 cities, and 25.0% of type 3 cities</li> <li>- Continued damage to property in many coastal cities in the East Sea and the South Sea</li> </ul>

A number of coastal area cities are emerging where disaster resilience is consistently stagnant or deteriorated (performance) when the annual average property damage per capita is used as an index. However, cities that have experienced a lot of damage at point 1 have continually invested in breakwater, dykes, and coastal disaster prevention facilities have been shown to be less vulnerable to disaster recovery.

The city with high thriving resilience is a city where the population, economy, and functions of the city are somewhat active and stable with financial base. This result implies that securing resources for disaster greatly affects disaster resilience.

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## □ Concluding Remarks

Disaster resilience is closely related to the occurrence of disasters. In Korea, coastal areas have relatively low resilience because natural disasters such as typhoons, floods damages account for 80 ~ 90% of total damages. However, even if the physical and municipal vulnerability to disasters is high, cities that have actively installed disaster prevention facilities such as breakwaters and dykes, shelter policies for solving safety problems after the point 1 (2000s), The disaster resilience was significantly improved.

Considering human injury as an indicator, Korea's resilience overall showed a rise, which seems to have affected the transmission of information through various routes such as forecasts of disasters, alarms, radio, TV, and text messages. Especially, cities located in the coastal area among the type 3 secondary cities conducted activities to raise the response capacity of the residents by voluntarily preparing the residents to explain the action tips to the residents.

Disaster resilience is highly related to the financial level of the city, and cities with a high level of resilience continue to have relatively stable local economic levels. However, some cities in the metropolitan area of Type 2, which have undergone rapid development and growth, are cities where disaster resilience deteriorates due to indiscreet development of dangerous areas such as riverside.

## 3) Environmental Resilience

For the analysis of environmental resilience, analysis was conducted using representative indicators of water and atmosphere, which were the most important environmental issues in Korea's urbanization process.

## □ Sewer Penetration Rate

Due to rapid urbanization and industrialization, "water pollution" have been recognized as a representative problem in Korea's urban environment. In this analysis, the resilience analysis in terms of "water" environment was carried out using the sewerage penetration rate indicator directly related to the water pollution. The sewerage penetration rate refers to the ratio of the sewage treatment population in the sewage treatment area treated through professional sewage treatment facilities in the total population. In other words, improvements in the sewerage penetration rate means the ability to minimize the environmental impact of urban pollution. In the case of the secondary city, due to the expansion of the development area, proper sewage treatment cannot be performed and it has been recognized as a serious urban environmental problem. This analysis compared the secondary city's sewerage penetration rate indicator of 1996, 2002, 2008, and 2014 for the four years and conducted analysis.

**Table 3-10 | Results of Environmental Resilience Analysis using Sewer Penetration Rate('96~'02)**

Types	Attributes
Thriving	<ul style="list-style-type: none"> <li>- Type 1 secondary city 16.7%, Type 2 secondary city 58.3%, Type 3 secondary city 25.0%</li> <li>- The location of the thriving is showed centered on the city functionally connected with the metropolitan city</li> <li>- Appeared in the secondary city near the metropolitan area</li> </ul>
Transformative	<ul style="list-style-type: none"> <li>- Type 1 secondary city 7.1%, Type 2 secondary city 64.3%, Type 3 secondary city 28.6%</li> <li>- Cities linked to metropolitan cities and secondary cities near the metropolitan area</li> </ul>
Faltering	- Type 1 secondary city 75.0%, Type 3 secondary city 25.0%
Stagnant	- Type 2 secondary city 63.6%, Type 3 secondary city 36.4%

**Table 3-11 | Results of Environmental Resilience Analysis using Sewer Penetration Rate('02~'08)**

Types	Attributes
Thriving	- Type 1 secondary city 15.4%, Type 2 secondary city 56.4%, Type 3 secondary city 28.2% - Appeared around the metropolitan area and secondary cities nearby metropolis
Transformative	- Type 1 secondary city 33.3%, Type 2 secondary city 33.3%, Type 3 secondary city 33.3%
Faltering	- Type 2 secondary city 50%, Type 3 secondary city 50%
Stagnant	- Type 1 secondary city 4.8%, Type 2 secondary city 66.7%, Type 3 secondary city 28.6%

**Table 3-12 | Results of Environmental Resilience Analysis using Sewer Penetration Rate('08~'14)**

Types	Attributes
Thriving	- Type 1 secondary city 18.2%, Type 2 secondary city 54.5%, Type 3 secondary city 27.3% - Appeared around the secondary city nearby metropolitan area
Transformative	- Type 2 secondary city 100%
Faltering	- Type 1 secondary city 16.7%, Type 2 secondary city 33.3%, Type 3 secondary city 50%
Stagnant	- Type 1 secondary city 3.8%, Type 2 secondary city 61.5%, Type 3 secondary city 34.6% - It occupies a large proportion in the secondary city which have mixed rural area

The sewerage penetration rate is increased from 61.3% in 1996 to 85.9% in 2014. Compared with a water supply rate, which is increased from 75.4% in 1996 to 94.2% in 2014 in the same period, the spread of infrastructure is relatively low. Type 1 secondary city is currently in the thriving position, past the transformative stage. This means that most of the secondary cities in the key point area are maintained above average sewage penetration rate.

The resilience of sewerage penetration rate in Type 2 cities shows improvement mainly in the cities in the metropolitan area. This means

infrastructure installation and environmental responsiveness have been created in the secondary city, which is developed in accordance with the development pressure centered in the metropolitan area. In secondary cities connected with metropolitan cities outside the metropolitan area, it was found that the installation of infrastructure and environmental responsiveness could not be improved beyond the average. In the Type 3 secondary cities, the cities with thriving and stagnant positions have not changed for about 20 years from 1996 to 2014, this implies that there is no change between the secondary city which have the environmental investment and capacity to cope with waste water and the city that is not.

#### □ Air Pollutant Emission

"Air Pollutant Emission Statistics" was used to analyze the environmental resilience in terms of the atmospheric environment. Among the atmospheric pollutants classified as gas, which are largely responsible for air pollution, analysis was conducted using the emission data of gas, which is a big issue at the beginning of industrialization - such as CO, SO<sub>x</sub>, NO<sub>x</sub>, etc. - by secondary city as an indicator. The data for the year 2000, 2005, 2010, and 2013 were compared with each other in consideration of the time available for data acquisition.

**Table 3-13** | Results of Environmental Resilience Analysis using Air Pollutant Emission('00~'05)

Types	Attributes
Thriving	- Type 1 secondary city 3.8%, Type 2 secondary city 63.5%, Type 3 secondary city 32.7%
Transformative	- There is no secondary city belonging to the type
Faltering	- Type 2 secondary city 100%
Stagnant	- Type 1 secondary city 27.3%, Type 2 secondary city 40.9%, Type 3 secondary city 31.8%

**Table 3-14 | Results of Environmental Resilience Analysis using Air Pollutant Emission('05~'10)**

Types	Attributes
Thriving	- Type 1 secondary city 4.1%, Type 2 secondary city 67.3%, Type 3 secondary city 28.6%
Transformative	- Type 2 secondary city 100%
Faltering	- Type 3 secondary city 100%
Stagnant	- Type 1 secondary city 26.1%, Type 2 secondary city 43.5%, Type 3 secondary city 30.4%

**Table 3-15 | Results of Environmental Resilience Analysis using Air Pollutant Emission('10~'13)**

Types	Attributes
Thriving	- Type 1 secondary city 4.0%, Type 2 secondary city 68.0%, Type 3 secondary city 28.0%
Transformative	- Type 1 secondary city 20%, Type 2 secondary city 60%, Type 3 secondary city 20%
Faltering	- There is no secondary city belonging to the type
Stagnant	- Type 1 secondary city 23.8%, Type 2 secondary city 33.3%, Type 3 secondary city 42.9%

From 2000 to 2013, emissions of air pollutants in the secondary cities appear in a polarized form. Most of the type 1 secondary cities remain in the stagnant position while the type 2 middle cities are maintaining the thriving position. It is observed that the type 3 secondary cities developed with large scale petrochemical industry remain stagnant position and some secondary cities in coastal areas are changing from thriving in 2000 to stagnant in 2013.

#### □ Concluding Remarks

In case of sewerage penetration rate, this was increased from 61.3% in 1996 to 85.9% in 2014, and the secondary cities changed to the thriving stage

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through a transformative stage similar to the water supply rate indicator. In addition, type 2 secondary cities have been improved mainly in the secondary cities located in the metropolitan area. Type 3 secondary cities are clearly distinguished from stagnant cases and thriving cases, and the sewerage penetration rate in these secondary cities are as low as 70%. These results are attributed to the fact that investment and responsiveness about treating wastewater vary depending on each secondary city. In particular, in case of the secondary city which has improved in the past, but has recently deteriorated, it is considered that the proper response to changes in development conditions in the region is delayed or the problems of poor local finance and location of disgusting facilities are occurring.

In the case of air pollutant emissions, there is a clear difference between the Type 1 and Type 2 secondary cities. This suggests that the characteristics of the Type 1 secondary city where relatively large scale city or settle into equipment industry on a large scale are appearing clearly. Type 3 secondary city, which is shown to be stagnant, also shows similar industrial structural characteristics. This indicates that the industrial structural characteristics of each city can be pointed out as an important factor in determining the environmental resilience of the atmosphere. Furthermore, the implication of the industrial policy for economic prosperity can be a negative impact on the environment.







# 4

CHAPTER

## Korean Perspectives of Urban Resilience Planning and Policy Implications for Secondary Cities in Developing Countries

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## CHAPTER 4

# Korean Perspectives of Urban Resilience Planning and Policy Implications for Secondary Cities in Developing Countries

## 1. Korean Perspectives of Urban Resilience Related Planning

This section aims to provide policy implications for enhancing the resilience of developing countries based on the findings from the analysis of secondary cities in Korea as mentioned previously.

Firstly, this study is about to draw up a list of major policies used in the growing, developing, and recovering process of secondary cities in Korea during its rapid urbanization process by pillar and discuss the pros & cons of such policy efforts.

Especially by making a close review of analysis results in the previous chapter, we are to discuss how such major policies have contributed to enhancing the resilience of secondary cities in Korea by each pillar or if we've failed in achieving good results in improving the resilience compared to the government's efforts involved due to very invalid policies. Based on this, we are to provide specific policy plans for enhancing the resilience of secondary cities in developing countries.

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## 1) Korean Policies related Socio-economic Resilience

### □ Related Policies

The policies on the economic resilience of secondary cities in Korea can be understood within the framework of the central government-led national land planning. In Korea, its regional planning was led mostly by the central government and established and implemented top down. Specifically, if the directions for spatial policies according to the development stages by period in terms of national land planning were established by the central government, then the policies on the development of regions, i.e. secondary cities were established and implemented accordingly. Based on this, we are to summarize the policies on development of secondary cities in Korea within the framework of comprehensive national territorial plan (CNTP) ranging from the 1st to the 4th and discuss the pros & cons.

**Table 4-1 | Socio-economic Resilience related Policies in Korean Secondary Cities**

Policies	Content
1 <sup>st</sup> Comprehensive National Territorial Plan (1972-1981)	<b>Background:</b> <ul style="list-style-type: none"><li>- To make growth poles with Seoul-Busan as the center, starting from capital area including Seoul, aiming at creating the infrastructure for rapid economic growth</li></ul> <b>Content:</b> <ul style="list-style-type: none"><li>- Planned the size of population for classifying and typing the secondary cities and promoted development policies in connection with big cities that are growth poles</li><li>- Founded the secondary cities like satellite cities and promoted development policies, as alternatives to solving the problems appearing in big cities like concentration of population and industrial facilities and environmental issues</li></ul>

Policies	Content
2 <sup>nd</sup> Comprehensive National Territorial Plan (1982-1991)	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- To disperse the population to the provinces and improve the living environment, in order to solve such problems as rapid urbanization and concentration of population and industrial facilities to metropolitan areas</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- Improved the complementary functions of the secondary cities according to the growth characteristics and development levels of adjacent metropolitan cities</li> <li>- Improved settlement conditions by expanding transportation and communication facilities in order to play a key role in dispersing the population to the provinces</li> </ul>
3 <sup>rd</sup> Comprehensive National Territorial Plan (1992-1999)	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- To promote decentralized national land development actively by recognizing the serious problems from the spatial concentration into the capital region and launching the autonomous local government system</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- To keep the capital area from playing a prominent role and improve the competitiveness of secondary cities</li> <li>- To establish collaborative governance between central government and local government</li> </ul>
4 <sup>th</sup> Comprehensive National Territorial Plan (2000-2020)	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- To promote balanced national development for realizing the 21<sup>st</sup> century integrated land development and establish the foundation for becoming the hub of Northeast Asia</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- Expanded the dispersion of the central government's powers to the provinces (central authority transfer)</li> <li>- Made cities with specialized functions based on specialization industry by secondary cities</li> <li>- Established the foundation for self-sustained growth of secondary cities, metropolitanized by redeveloping the underdeveloped areas, and provided differentiated service and living environment</li> </ul>
4 <sup>th</sup> Revised Comprehensive National Territorial Plan (2006-2020)	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- Same as above</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- Induced development into cities with specialized functions by considering the characteristics and potential of secondary cities and improved settlement conditions through environment improvement</li> <li>- Connected metropolitan city-sub secondary cities (farming and fishing village) functionally and established integrated settlement systems</li> <li>- Established the institutional framework for renewal of the underdeveloped central areas within the secondary cities for economic revitalization</li> </ul>

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In Korea, the government did not have specific directions or systems established for the policies on development and restoration of secondary cities early in economic development. Especially the central government led the growth-centered development strategies centering on some growth poles, which led to tangible results of rapid economic growth and urbanization. In such rapid development process, however, various side effects were caused: overpopulated metropolitan area, environmental problems, and depopulation of secondary cities in the provinces. In other words, the Korean policies on the development of secondary cities were made to solve such problems and have been promoted until now.

#### □ Discussion

As mentioned earlier, the central government-led national land development centering on growth poles has indeed brought about such good results of rapid economic growth and urbanization at the national level. Due to unbalanced development strategies, however, the secondary cities lacking their own industrial foundation and being less connective with adjacent metropolitan cities sometimes suffered from a rapid decline, as can be observed in analysis results of economic resilience in the previous chapter. Especially some Type 2 secondary cities that benefited from the ripple effect from the growth poles due to excessive policy support of the growth poles only experienced a positive ripple effect of win-win growth, whereas Type 3 secondary cities that were different from Type 2 have shown a continuously stagnant performance in economic aspects.

After recognizing such unbalanced development of national territory, the Korean government implemented various policies on balanced national development. In the first place, the government regulated the capital area into

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which population and functions were excessively concentrated, expecting that the population and industries having difficulty in entering the capital area could be dispersed to the provinces. As a result, however, the capital area has grown qualitatively and quantitatively in terms of population and economy compared to the other areas up until now and economic entities having failed in entering the capital area due to regulations moved to Chungcheong regions adjacent to the metropolitan area, which rather caused side effects: urban sprawl of capital area. Such policy failures stemming from the underestimation of the capital area's strongly positive externalities in economy and settlement aspects have raised serious questions about the effectiveness of the policies in every national economic crisis situation and now policy functions have withdrawn a lot.

On the other hand, Korea has promoted a balanced development very positively by using such strategies as construction of administrative city, transfer of public institutions to the provinces, innovation city, and enterprise city. It is yet difficult to determine whether such policies are a success or failure, but in some cities, high employment resilience was found in the 2008 global financial crisis restoration process despite the absence of differentiated industrial foundation like in Jeonju and Naju to which public institutions were transferred and innovation city, etc. were constructed.

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### <Case Study> Innovation City

Innovation city, as defined in the law is as follows. Innovation city is a “future-oriented city that is developed according to the law requiring the city to have innovative conditions so that enterprise, university, research institute, and public institution can cooperate closely by accepting the public institutions transferred and settlement environment including a high standard of housing, education, and culture.”

The basic directions for constructing innovation city can be classified into four types of city: innovation city that creates innovation by linking university and industry, specialized city that is characterized by having regional themes, ecofriendly green city that anyone hopes to live in, and education and culture city where learning and creative exchanges are available.

As of now, Korea is transferring the public institutions, by enacting the Special Law on Innovation City on Jan. 2007 and constructing ten innovation cities. With the transfer of public institutions, workers and their families moved to the provinces naturally and innovation city was promoted to achieve balanced development through regional development, but its success or failure is still under discussion.

Transfer of families and employment of local students by the public institutions transferred are appearing in fact, but it is difficult to assert that valid regional development was achieved. In fact, the results of such positive dispersion policies are observed in some innovation cities, as mentioned in above case analysis of employment resilience.

## 2) Korean Policies related Disaster Resilience

### ☐ Related Policies

To improve disaster resilience, Korea has introduced and implemented various disaster management policies. Disaster management policies can be divided largely into structural approach and non-structural approach. Structural approach is an engineering solution and means an activity to reduce disaster damages largely by installing structures or improving physical environment, whereas nonstructural approach is an activity to reduce damages by using human behavior or system without engineering solution.

As Korea suffers relatively a lot from storm and flood damage, disaster



management policies are largely centered on installation of flood defences and flood forecast and warning system for responding to a flood and the installation of other various structures including coastal disaster prevention facilities and water distribution system constituted the majority of disaster management policies from the beginning that such policies were applied until now. Despite such various structural policies, however, there was an increasing interest and emphasis on non-structural measures in recent 2000s with the continuously increasing disaster damages. The typical nonstructural measures include danger zone management based on regulations of land use, disaster impact assessment, insurance, education, and promotion. The representative policies used in Korea are as follows. The table below summarizes the background of introduction by policy and main contents.

**Table 4-2 | Disaster Resilience related Policies in Korean Secondary Cities**

Policies	Content
Establishment of Disaster forecast & alert system	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- To collect and analyze information on disaster risk. Forecast and warning that are based on such analysis results of information on disaster risk are the basic information for disaster preparedness and response</li> <li>- To collect and analyze information on location, cause, and situation of the areas where disaster occurrence symptoms were captured in various ways and let the residents know so that they can evacuate and maintain facilities properly</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- Developed forecast and warning methods of wave height and tidal wave</li> <li>- Expanded and developed flood forecast and warning systems in major rivers</li> <li>- Developed weather observation techniques and abilities in case of meteorological disasters including typhoon</li> <li>- Established the systems to deliver information automatically to automated voice notification system and text messages as well as forecast and warning systems</li> </ul>

Policies	Content
Installation of dam, bank, tide embankment, and other structures	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- Efforts to prevent disasters by installing structures such as dam, bank, and sea dike were made continuously, with the increasing damages caused by continuous development in vulnerable areas including coast and riverside</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- Installed flood defences (dam, detention pond, ponds near the river sides, flood control reservoir, etc)</li> <li>- Installed offshore disaster prevention facilities (embankment, revetment, seawall, etc)</li> </ul>
Installation and maintenance of sewage and drainage	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- In Korea, the outflow discharge increased and the low-lying grounds vulnerable to waterlogging (zones where rainfalls are convergent, basement, etc.) were developed, with the rapid urbanization, which caused overload of the existing water distribution systems and thus frequent flooding</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- Installed and managed sewerage pipes</li> <li>- Installed and managed retarding basin and rain water pump station</li> <li>- Korea has enforced urban and construction laws requiring installation of sewerage pipes as critical infrastructure with the urban development</li> </ul>
Introduction of disaster impact assessment system	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- Due to increasing size of disaster risk despite the application of various structural disaster management policies, our development method and urbanization were recognized as compelling evidence causing the occurrence of disaster</li> <li>- As alternative to problem solving, Disaster Impact Assessment System requiring companies to predict and analyze the possible disaster impact factors due to development and establish and implement reduction measures as main contents was introduced</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- A policy to prevent increasing disasters due to development projects in advance by analyzing how various plans and developments influenced the disasters through prediction and analysis of disaster-causing factors and preparing countermeasures</li> <li>- Korea has implemented "Preliminary Disaster Inspection and Consultation" System and mandated disaster impact review procedures early in the urban planning stages</li> </ul>

Policies	Content
Management of danger area	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- A policy proposed under the awareness that installing structures only have limitations in reducing disaster damages. Suppressing development in this area while identifying and managing danger zones because there are multiple danger zones with a high disaster occurrence possibility can be a fundamental measure</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- Identified danger zones and made drawings on danger zones (disaster map)</li> <li>- Designated as flood hazard zone, natural disaster (flood risk, soil loss hazard, isolation danger, risk of collapse, tsunami hazard, etc.) risk district, disaster prevention district, and areas prone to floods</li> <li>- The regions that are designated as danger zones are supported so that they can use various disaster management measures by priority</li> <li>- Underdeveloped danger areas are induced to suppress development</li> <li>- In case of continuous damages in the already developed danger areas, movement policy, etc. are used as alternatives</li> </ul>
Introduction of Storm and Flood Insurance	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- Disaster Insurance is an insurance system to compensate the damages from natural disasters and was already introduced in the U.S. in 1968</li> <li>- We have Storm and Flood Insurance covering damages from storm and flood only and it was expanded nation-wide in 2008</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- As a policy insurance supervised by the Ministry of Public Administration and Security and managed by commercial insurance company, a portion of insurance premium that must be born by insurance policy holder is supported by the central and local government</li> <li>- Currently in Korea, property damages including houses and vinyl greenhouses resulting from wind and flood damages including typhoon, heavy rain, flood, strong wind, and heavy snow are only subject to compensation</li> </ul>

## □ Discussion

Korea could not identify and manage danger areas well from the early urban development stages because of rapid urbanization process and development and grown-oriented policies and thus largely concentrated on installing simple disaster prevention facilities as disaster management policy. With the

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continuously increasing disaster damages despite the installation of disaster prevention structures, as mentioned earlier, the need to suppress development in danger areas based on land use as well as identification and management of danger zones was raised as fundamental measures.

Accordingly, the Korean government established a system to manage various danger areas. Danger area management policy includes identification of danger area, drawing disaster map, designation of danger area, limited development in danger zone, establishment of disaster mitigation plan in case of unavoidable development in danger area, and preparedness for risk management including movement in continuously damaged area among already-developed danger areas.

Managing danger area is the most effective if such management is performed from the previous stages of development, but in Korea, fundamental suppression of development in danger areas was not made because the system was introduced after urban development was already done. Residents often objected to designating as danger area including disaster prevention district due to fear of falling land price and expanding negative cognition of the area where they live and thus such areas were not designated a lot in fact. However, in the areas that have recently been designated as danger area, disaster prevention budgets were input by priority and projects were enforced so that disaster prevention facilities could improve environment and reduce risk simultaneously, which received a favorable evaluation. Accordingly, the representative case is presented below as natural disaster risk district improvement project in Samcheok city.

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#### <Case Study> Natural Disaster Risk District Improvement Project in Samcheok city

Korea has made every effort to manage danger areas by selecting various danger areas including disaster prevention district and natural disaster danger district and investing resources to such areas, but local residents were reluctant to designate the areas where they live as danger area because they had fear of falling land price and spreading negative cognition despite the presence of vulnerability to disasters.

However, with the continuously increasing disaster risks and changing resident's perception, natural disaster risk district improvement projects have been actively carried out recently. The representative example is natural disaster risk district improvement project in Samcheok, Gangwon-do.

Samcheok city (type 3) is one of the areas showing a low disaster resilience, as observed in the analysis of disaster resilience of secondary cities in this study. Samcheok is located in the eastern coast of Korea and vulnerable to coastal disaster. When it underwent many damages continuously in the 2000s and the 2010s, it was selected as natural disaster danger risk district from 2012 on and has implemented various prevention measures. The city is trying to improve disaster resilience in the area by installing disaster prevention rivers and ecological detention ponds as well as underground retaining facilities and preventing disasters in order to reduce disasters while improving environment as well.

In addition, Storm and Flood Insurance, which began to be introduced nationally from 2008 on after 2006 demonstration project is an insurance covering damages from storm and flood and effective for reducing financial burdens on the disaster recovery. However, our storm and flood insurance subscription rate is relatively lower than advanced countries and not activated in urban areas. In most rural areas, subscribers are paid premium in case of damages of vinyl green house and country houses. Moreover, there is a need to improve the specific grounds and procedures for insurance premium calculation and so the insurance system needs to be complemented continuously. Nevertheless, as it is a policy insurance funded by the government, it is considerably effective for supporting vulnerable residents in secondary cities and rural areas with a lower restoration ability in case of disaster occurrence than urban areas.

### 3) Korean Policies related Environmental Resilience

#### (1) Hydrological Environment Management Policies

##### ☐ Related Policies

**Table 4-3 | Environmental Resilience related Policies for Hydrological Environment in Korean Secondary Cities**

Policies	Content
Pure Water Supply Plan (1989-1996) <sup>7)</sup>	<b>Background:</b> - Comprehensive water management policies began to be established when running water contamination emerged as a social problem in early 1989 <b>Content:</b> - Installation and improvement of sewage treatment equipment, installation of dams for water supply and multi-regional water supply, and improvement of old pipe
Establishment of Four Major Rivers Water Management Plan (2002) and Four Major Rivers Water System Law	<b>Background:</b> - 4 major rivers water quality unimproved and drinking water source pollution <b>Content:</b> - Held debate forum and public hearing over 420 times with local residents, civic groups, experts and autonomous bodies from 1998 to 2002, established plans based on public management of upper/lower regions, and introduced total maximum daily loads(TMDL), buffer zone system, water usage charge system, community support program for water conservation zone and land purchasing system
The 1st Basic Plan on Hydrological Environment Management (2006-2015)	<b>Background:</b> - To switch policy directions from the physio-chemical pollutants management-oriented policies (including BOD) to ecologically healthy rivers and safe water environment-oriented ones <b>Content:</b> - Improved over 85% of the rivers in the whole country to good water or higher level, included comprehensive countermeasures on nonpoint pollution source management, segmentalized environmental standards (grade 5-> grade 7), strengthened risk management (adding such items as COD, T-P, and TOC), and established the foundation for water demand management (improvement of old pipe, water saving, etc.)

7) Ministry of Environment (2017)'s White Paper of Environment, Ministry of Environment (1995)'s White Paper of Environment

Policies	Content
Unification of sewage related works to the Ministry of Environment and mandatory review of feasibility of a plan (1994) <sup>8)</sup>	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- To unify the sewage related works to the Ministry of Environment although it was dualized into the Ministry of Construction and Transportation and the Ministry of Environment</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- Established 20-year master plan on sewerage rehabilitation (mayor, head of gun) and mandated the review of feasibility of a plan every five years, regulated the scope of management of public sewerage system, had specialized agencies carry out technology inspection/diagnosis, and found the grounds to force polluters to bear the responsibility for the pollution</li> </ul>
Enforcement of Integrated Sewerage Act (2007) <sup>9)</sup>	<p><b>Background:</b></p> <ul style="list-style-type: none"> <li>- To reinforce the need for systematic management of separated sewage and waste water, to reinforce the need for integrated management with the increasing percent of population with sewer system</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>- Distinguished public sewerage system (installation and management by local governments) from individual sewage facility and established the foundation for expanding the reuse of reclaimed water, introduced specialized company's exclusive construction system of individual sewage and drainage facility, and reinforced local governments' responsibilities for sewage treatment equipment effluent standards</li> </ul>

## □ Discussion

In 1989, comprehensive water management countermeasures started with Pure Water Supply Plan (1989-96). Various countermeasures were implemented: drinking water source management for securing the water quality of original water source, installation of sewage treatment equipment for removing pollution sources, and water supply dams, but the water quality of water supply sources in four major rivers was not improved greatly. To solve this problem, Four Major Rivers Water Management Plan was established.<sup>10)</sup>

8) Ministry of Environment (1994)'s White Paper of Environment

9) Ministry of Environment (2008)'s White Paper of Environment

10) Ministry of Environment (2017)'s White Paper of Environment

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However, there was no big change in water quality at major points in four major rivers in 2005, when compared to that in 1997 and it could not reach the target water quality standards, which was evaluated as not showing a big difference from that in 1985.<sup>11)</sup>

The government established Hydrological Environment Management Policy (2006-2015) by evaluating the comprehensive countermeasures on four major rivers water management and improved water environment in the whole country and provided policy measures for comprehensive water management by river basin. It recognized the limitations of pollution control measures focusing on expansion of environmental infrastructure and converted to comprehensive policy structure considering socioeconomic conditions.

With respect to water supply and management policy, secondary cities were divided into two types before policies were applied to them. Secondary cities in upper regions were regulated by total pollution load and development activity restriction policies and those in lower regions were supplied with water source after they paid their water use charge. However, it was discussed that water quality improvement was inadequate despite the presence of payment of water use charge and upper region business by means of water system management fund for about 15 years since 2002 and such movements as refusal to pay water use charge have been observed recently. In upper regions, they are strongly demanding the release from the water supply source management zone because the development activity is limited.

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11) Achievement of target water quality of Ministry of Environment (2005)'s Comprehensive Measures on Water Quality Management for the Four Major Rivers of Korea and countermeasures



### <Case Study> Management System for Total Quota of Water Pollution

Cities adjacent to river basin enforced the Total Pollution Load Management System at the municipal level of government to reduce water pollution. Total Pollution Load Management System is the one designed to calculate total amount of emission and set up and manage a goal. It is the system that can accomplish water quality control and regional development simultaneously within the scope of total amount and solve conflicts between upper and lower regions, thus creating unity between river basins.

The system was introduced by Han River Water System Law in 1999 and applied to multiple secondary cities. Currently, it is enforced by 121 local governments except coastal and insular areas.

About 20 years have passed until it was enforced overall in 2010 after its introduction in 1999, but in local governments that introduced the system already and began to manage, the discharge load was reduced to 60.4% despite the increasing pollution load including regional development (Ministry of Environment, 2015).<sup>12)</sup>

In some local governments, industrial complex development support center including urban development projects and tourist destination were not approved due to excessive pollution load allocated. It caused a new conflict with the central government that funded sewage treatment equipment, system of sewage, and waste water treatment projects from the treasury.

## (2) Atmospheric Environment Management Policies

### ☐ Related Policies

**Table 4-4 | Environmental Resilience Policies for Atmospheric Environment in Korean Secondary Cities**

Policies	Content
Effluent Limitation Guideline and Discharging Enterprise Management (1991 up to now)	<p><b>Background:</b></p> <ul style="list-style-type: none"><li>- To control air pollutants and set the standards by considering the current emission levels and processing techniques and the social and economic conditions and manage by place of business</li></ul> <p><b>Content:</b></p> <ul style="list-style-type: none"><li>- Operated the permit and report system to install and change the air pollutants discharge facilities; Environmental Office supervised and inspected the place of business</li></ul>

12) Ministry of Environment (2015)'s introductory data on Water Quality and Pollutant Loads

Policies	Content
Designation and Management of Air Quality Regulated Area (1997) <sup>13)</sup>	<b>Background:</b> - Evaluated as the region that required air quality improvement urgently as the region having concerns about exceeding the air pollution standards <b>Content:</b> - Established practical plans to achieve environmental quality standards on such materials as ozone and nitrogen dioxide and evaluated implementation performance every year
1 <sup>st</sup> Basic Plan on the Metropolitan Area Air Quality Management (2005-2014) <sup>14)</sup>	<b>Background:</b> - Serious level of air pollution in capital area (compared to non-capital areas and major advanced countries), damaged to health due to air pollution (increase of infant mortality rate, increase of premature death due to fine dust) <b>Content:</b> - Established legal grounds such as Special Measures on Air Quality Improvement in Seoul (2002) and Special Act on Seoul Metropolitan Air Quality Improvement (2003) and set up government-wide comprehensive plans by forming the joint task force composed of relevant authorities, civic organizations, and industrial circles, vehicle exhaust gas reduction, total pollutant management for big business establishments, ecofriendly energy and urban management, etc.

## □ Discussion

Korea has managed air pollutant emission/discharge in stages since its enactment of Clean Air Conservation Act in 1991, but air pollution level was not improved easily in the capital area densely populated and fine dust and air pollution caused another health effects. Accordingly, it switched to implementing comprehensive countermeasures. As major policy means, it introduced tighter effluent quality standards on new vehicles, distribution of low-pollution car, mounting emissions reduction device into superannuated car, etc. However, air pollution was still at the serious level and the failure of policies such as decreased percentage of eco-friendly car, old diesel car, clean

13) Ministry of Environment (1997)'s White Paper of Environment

14) Ministry of Environment (2005)'s Basic Plan on the Metropolitan Area Air Quality Management

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diesel vehicle issues, and increased fine dust emissions (especially at power generation sector) is being constantly pointed out.

**<Case Study> Air Quality Management Plan for the Capital Region**

Basic Plan on the Metropolitan Area Air Quality Management is a policy drawn through social consultation as comprehensive plan for improving air pollution established and executed every ten years.

This plan targeted most of secondary cities within the capital area and the emissions itself dropped as a result of such a policy, thus showing significant improvements.

As policy goals, emission levels and concentration are determined by pollutant and as policy means, accompanied by un-structural measures such as tighter effluent quality standard and total pollution load at business establishments and structural measures such as distribution of low-pollution car, mounting of reduction device, mandatory oil mist, and scattered dust vacuum removal vehicle.

The emissions itself showed significant improvements after ten years of policy implementation, but the response to the appearance of new pollutants, increased levels of public health requirement, and transboundary air pollution materials is yet insufficient.

## **2. Policy Implications for Urban Resilience of Secondary Cities in Developing Countries**

### **1) Policy Implications for Socio-economic Resilience**

#### **(1) According to the Development Stages**

##### ☐ **Initial Stage**

It is necessary to develop growth poles spatially balanced. In Korea, however, such growth poles are excessively concentrated on Seoul and south-eastern part and such marginalized secondary cities are observed not to

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have narrowed the development gaps until now. In addition, each secondary city is required to have industrial foundation, at least, for linking with big cities and reaching a self-sustained development. Especially if the already-developed industry is out-dated like agricultural farming, it is necessary to have the foundation for developing up to an ordinary level through industrial restructuring.

#### ☐ Rapid Development Stage

There is a need to provide an institutional strategy not to marginalize secondary cities in the growing or developing process by not only connecting the growth poles where rapid growth occurs with the secondary cities but also linking economic functions. Specifically, it is also necessary to have the institutional foundation not to marginalize any regions from such a growth by designating “Joint Growth Sphere” centering on growth poles at the central government level.

#### ☐ Mature Stage

In areas showing mature growth, the preparedness for uncertainty like sudden slump in major industries is required. In particular, there is a need to disperse the economic impact to the provinces by diversifying industrial structure and in preparation for this, it is necessary to introduce “Economic Vulnerability Diagnosis System” at the city level.

### (2) According to the Types of Secondary Cities

#### ☐ Type 1 Sub-national Secondary Cities

The policies on economic resilience improvement for Type 1 secondary cities

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can be performed differently according to the level of each city's industrial base. In case of Type 1 secondary cities having a particular industrial sector that represents the area of interest, it is necessary to establish a system to diagnose the vulnerability of industrial structure in preparation for sudden shock. At the same time, it is necessary to make policy efforts to disperse the external shock to the applicable industry by diversifying the industrial structure. In addition, it is important to keep the population to a certain level or higher for the sustainability of regional economy. In other words, there is a need to improve the settlement conditions by carrying out a regenerative strategy in the urban residential areas becoming deteriorated and through this, maintain the size of population.

#### □ Type 2 Metropolitan Cluster Secondary Cities

In case of Type 2 secondary city, it is necessary to establish a policy to expand traffic and housing infrastructure to strengthen the functional connections between each city and adjacent bigger city. Through this, the role as a rear city to complement the deficient functions of big cities constantly should be reinforced. In particular, it is necessary to maintain and develop the power for autonomous development through sophisticated industrial sectors including enterprise service business and logistics industry that can support the key industries of big cities.

#### □ Type 3 Corridor or Regional Secondary Cities

The efforts to establish the industrial foundation basically is required. It is necessary to make an enduring economic structure based on quantitative growth to a certain level or higher. To this end, there is a need to construct the

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physical industrial base like industrial complex and establish basic settlement conditions through underdeveloped residential district improvement support project in order to attract population and industry very actively. At the central government level, it is necessary to consider rather aggressive policy means like Korea's enterprise and innovative city construction or transfer of public institutions to the provinces.

## 2) Policy Implications for Disaster-related Resilience

### (1) According to the Development Stages

#### ☐ Initial Stage

If such above-mentioned disaster prevention policies are combined with urban development stages, in the first place, it is necessary to establish disaster forecast and warning system and information delivery system and also a system to operate disaster system in the initial stages. In addition, to reduce human damages, rescue and emergency functions ought to be strengthened and disaster response methods ought to be trained to residents. Such structures as dam, bank, and tide embankment representing the fastest disaster management effects ought to be installed at the same time. Moreover, it is necessary to establish the institutional foundation for managing danger areas to urban planning and development stages from the initial rapid development stages.

#### ☐ Rapid Development Stage

In the expanding stages that cities are expanding rapidly and much more developments are made than the initial stages, disaster prevention policies

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ought to be combined with urban planning and development projects and in this process, it is necessary to introduce such policies as limitation of danger area development based on land use, danger area management, and disaster impact review. In addition, it is necessary to reinforce the system to have disaster prevention and drainage facilities as infrastructure in conjunction with development projects.

#### ☐ Mature Stage

In mature stages of secondary cities, it is considered to be of help for supporting the restoration of local residents if disaster insurance is introduced with the works of inspecting and managing the capacity of previously constructed structures. In addition, disaster forecast and warning systems introduced in initial development stages should be more sophisticated so distribute information via various channels such as mass media, automated voice notification system, and text messaging service. If there are some areas that were developed unavoidably despite the presence of efforts to limit development in danger areas with the spreading urban development, such areas must be identified and the disaster prevention measures suitable for the areas should be established and managed. In addition, if disaster prevention facilities are installed or the level of danger in the area of interest is considerably high, such measures as movement can be applied.

### (2) According to the Types of Secondary Cities

#### ☐ Type 1 Sub-national Secondary Cities

Type 1 secondary cities are the cities that play a central role economically and administratively and development and population increase more rapidly

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than other secondary cities. In such cities, establishment of disaster forecast and warning system, securing emergency personnel, and installation of disaster prevention facilities must be basically performed and there is a need to focus more on managing danger areas in connection with urban planning and securing sewage and drainage facilities of proper capacity compared to other areas.

□ Type 2 Metropolitan Cluster Secondary Cities:

Type 2 secondary cities go through rapid growth in conjunction with primary cities and sometimes residential functions or other major industrial functions are concentrated. In these cities, like Type 1 secondary cities, establishment of disaster forecast and warning system, securing rescue and emergency personnel, and installation of disaster prevention facilities must be basically performed and by considering the pressure on development, such policies as risk control in connection with urban planning, introduction of disaster impact assessment system on development projects, and securing sewage and drainage facility of proper capacity need to be emphasized and implemented.

□ Type 3 Corridor or Regional Secondary Cities:

Type 3 secondary cities are basically with relatively low development pressure, and the designation and management of hazardous areas should be fundamentally implemented. However, an insurance system for disaster alert system, securing rescue workers, installing disaster prevention facilities.



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### 3) Policy Implications for Environmental Resilience

#### (1) Water : According to the Development Stages

##### ☐ Initial Stage

In the initial development stages showing rapid change, it is necessary to expand water supply and sewage systems with increasing urbanization. In the past, investment in equipment leaving a margin in order to enhance resilience beyond just remaining the effective level with the increasing population and industrial development was thought to be adequate. Specifically, integrated water management should be made: environmental treatment facility at the river basin level rather than source of pollution, preliminary regulation of land use, and mutual governance between upper and lower regions.

##### ☐ Rapid Development Stage

Such policies as conversion to total amount management of pollutants, expansion of management method burdened by polluter, and water demand management and rainwater availability expansion can be introduced. Especially in case of polluter's burdening method that the actor who caused pollution burdens the cost for managing pollution, such policies as mentioned above can be very useful policy means in that the government clarifies the responsible burden signals by the private sector for their irresponsible behavior toward the environment.

##### ☐ Mature Stage

In matured development stages, such policies as water demand management and rainwater availability expansion can be used. It is judged that it would be

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possible to manage recoverable water if we can set up water price appropriately and introduce rainwater availability method in initial stages where urban development stages are nearly complete.

## (2) Water : According to the Types of Secondary Cities

### ☐ Type 1 Sub-national Secondary Cities

It is necessary to invest in water supply and drainage infrastructure to sustain the increasing development demand and establish a protection policy on the existing water reservoir basin. Especially, securing facilities that are sufficient and complementary based on predictions in order not to become an environmental capacity that cannot cover the demand of new development is required. Moreover, such policies as protection of the existing water reservoir basin and withholding of development for securing sustainable water resources ought to be applied simultaneously in the post-development stages.

### ☐ Type 2 Metropolitan Cluster Secondary Cities

There is a need to discuss according to the linking characteristics of each secondary city. In bed town cities to which population are concentrated, policies to secure water circulation like Low Impact Development (LID) as well as expansion of water supply and drainage facility are required simultaneously. Moreover, in residential area development-typed cities where population are concentrated, Low Impact Development (LID) for managing water circulation as well as expanding facilities ought to be introduced because the increasing impermeable layer might affect the surrounding areas due to the development of the area of interest. In secondary cities showing a big percentage of industrial functions, expansion of wastewater discharging facility, management

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policies on expanding point pollution source and non-point pollution source management facilities and increasing pollutants are considered to be necessary.

#### ☐ Type 3 Corridor or Regional Secondary Cities

It is necessary to inspect and maintain underdeveloped environmental infrastructure and expand facilities and the policies that can act as an eco-friendly city in harmony with natural environment are required. Especially Low Impact Development (LID) in association with the regeneration of old cities ought to be introduced. In the old cities that acted as growth poles in the past, it is likely that they did not require investment in policies because of the presence of the existing facilities, but as times go by, there might occur a problem due to deteriorated facilities in the old downtown. As such deteriorated facilities are likely to lead to vulnerability to meteorological disasters, inspection and maintenance of environmental infrastructure and expansion and management of facilities are required before they become obsolete.

### (3) Air : According to the Development Stages

#### ☐ Initial & Rapid Development Stage

In initial development stages showing rapid change, it is necessary to set up environmental standards on air pollutants and introduce policies on tighter effluent standards by stages. Korea also upgraded the effluent standards according to the socioeconomic situations and technical standards 5 times for 20 years.

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#### ☐ Mature Stage

Comprehensive measures by sphere connecting metropolitan with secondary cities are necessary. Especially type 2 secondary cities have functional characteristics connected with the metropolitan cities and thus joint response to the improvement of air pollution is required. Korea has established and executed management plans on spheres centering on Seoul metropolitan city, based on the Basic Plan on the Metropolitan Area Air Quality Management. However, there were some limitations in improving the air pollution itself by focusing only on discharge amount itself. In other words, it is thought that behavior, cause, and health impact of air pollutants and preliminary response to new air pollutants ought to be included.

#### (4) Air : According to the Types of Secondary Cities

##### ☐ Type 1 Sub-national Secondary & Type 3 Corridor or Regional Secondary Cities

Such policies as emissions reduction and improvement techniques application and monitoring ought to be introduced. Especially in new development areas and secondary cities in the past growth poles, it is important to reduce the air pollution itself. In case of Type 3, it is necessary to establish countermeasures not to discharge pollutants from the obsolete facilities.

##### ☐ Type 2 Metropolitan Cluster Secondary Cities

Air pollution management plan by sphere ought to be applied. In other words, it is necessary to have comprehensive countermeasures by sphere in association with big cities connected functionally with Type 2 secondary cities in the surroundings, and small cities. Specifically, introducing such policies as

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improvement of public transportation system between connected cities, joint control of air pollution discharge amount, and limited traffic within the obsolete diesel car sphere is required.





# CHAPTER 5

## Conclusion

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# **Conclusion**

## **1. Summary of Study**

Rapid urbanization is acting as a stress on secondary cities which can make them more vulnerable to other shocks and stresses, which is why having resilience measures incorporated into the development plans for these cities is essential. The objective of this study is to provide a practical policy guidelines and analytical policy framework for resilience planning in secondary cities of developing countries.

Specifically, Chapter 1 provides the background of this study. In this chapter, we discussed the crisis and opportunity that secondary cities face in the process of rapid urbanization. Also, in this context, we address how urban resilience planning is important in the secondary development. Chapter 2 reviews the previous concepts of “Secondary city” and “Urban resilience” and presents the operational and working definitions of both concepts for use in this study. In Chapter 3, the process of rapid urbanization in Korea is briefly introduced and the Korean secondary cities are selected and categorized for empirical analysis. Then, we empirically analyze the resilience of Korean secondary cities in terms of socioeconomic, disaster, and environment perspectives. Finally, in Chapter 4, the policies related to urban resilience were discussed based on the results of analysis and we proposed policy measures to improve resilience of secondary cities in developing countries.

The table 5-1 below shows urban resilience policies according to development stage and table 5-2 presents policies according to types of secondary cities.

**Table 5-1 | Environmental Resilience Policies for Atmospheric Environment in Korean Secondary Cities**

Development Stage	Socioeconomic	Disaster	Environment
Initial	<ul style="list-style-type: none"> <li>- Develop growth poles spatially balanced</li> <li>- Have industrial foundation</li> </ul>	<ul style="list-style-type: none"> <li>- Establish disaster forecast and warning system and information delivery system</li> <li>- Establish the institutional foundation for managing danger areas</li> </ul>	<p>&lt;Water&gt;</p> <ul style="list-style-type: none"> <li>- Expand water supply and sewage systems with increasing urbanization</li> <li>- Integrated water management should be made</li> </ul>
			<p>&lt;Air&gt;</p> <ul style="list-style-type: none"> <li>- Set up environmental standards on air pollutants and introduce policies on tighter effluent standards by stages</li> </ul>
Rapid Development	<ul style="list-style-type: none"> <li>- Have the institutional foundation not to marginalize any regions from such a growth by designating "Joint Growth Sphere"</li> </ul>	<ul style="list-style-type: none"> <li>- Combine disaster prevention policies with urban planning and development projects</li> <li>- Introduce such policies as limitation of danger area development based on land use, danger area management, and disaster impact review</li> <li>- Reinforce the system to have disaster prevention and drainage facilities</li> </ul>	<p>&lt;Water&gt;</p> <ul style="list-style-type: none"> <li>- Conversion to total amount management of pollutants</li> <li>- Expansion of management method burdened by polluter</li> </ul>
			<p>&lt;Air&gt;</p> <ul style="list-style-type: none"> <li>- Set up environmental standards on air pollutants and introduce policies on tighter effluent standards by stages</li> </ul>
Mature	<ul style="list-style-type: none"> <li>- Disperse the economic impact by diversifying industrial structure</li> <li>- Introduce "Economic Vulnerability Diagnosis System"</li> </ul>	<ul style="list-style-type: none"> <li>- Introduce disaster insurance</li> </ul>	<p>&lt;Water&gt;</p> <ul style="list-style-type: none"> <li>- Expand water demand management and rainwater availability</li> </ul>
			<p>&lt;Air&gt;</p> <ul style="list-style-type: none"> <li>- Comprehensive measures by sphere connecting metropolitan with secondary cities are necessary</li> </ul>

**Table 5-2 | Urban Resilience Policies according to types of secondary cities**

Types	Socioeconomic	Disaster	Environment
Sub-national	<ul style="list-style-type: none"> <li>- Establish a system to diagnose the vulnerability of industrial structure in preparation for sudden shock</li> <li>- Disperse the external shock to the applicable industry by diversifying the industrial structure</li> <li>- Improve the settlement conditions to maintain the size of population</li> </ul>	<ul style="list-style-type: none"> <li>- Establish disaster forecast and warning system, securing emergency personnel</li> <li>- Install disaster prevention facilities</li> </ul>	<p>&lt;Water&gt;</p> <ul style="list-style-type: none"> <li>- Invest in water supply and drainage infrastructure to sustain the increasing development demand</li> <li>- Establish a protection policy on the existing water reservoir basin</li> </ul> <p>&lt;Air&gt;</p> <ul style="list-style-type: none"> <li>- Introduce policies as emissions reduction and improvement techniques application and monitoring</li> </ul>
Metropolitan Cluster	<ul style="list-style-type: none"> <li>- Expand traffic and housing infrastructure to strengthen the functional connections between each city and adjacent bigger city</li> </ul>	<ul style="list-style-type: none"> <li>- Establish disaster forecast and warning system, securing emergency personnel</li> <li>- Install disaster prevention facilities</li> <li>- Introduce disaster impact assessment system on development projects</li> </ul>	<p>&lt;Water&gt;</p> <ul style="list-style-type: none"> <li>- Policies to secure water circulation like Low Impact Development (LID) as well as expansion of water supply and drainage facility are required</li> </ul> <p>&lt;Air&gt;</p> <ul style="list-style-type: none"> <li>- Air pollution management plan by sphere ought to be applied</li> <li>- Introduce policies such as improvement of public transportation system between connected cities</li> </ul>
Corridor / Regional	<ul style="list-style-type: none"> <li>- Establish the industrial foundation (physical industrial base like industrial complex and establish basic settlement conditions)</li> </ul>	<ul style="list-style-type: none"> <li>- Implement designation and management of hazardous areas</li> </ul>	<p>&lt;Water&gt;</p> <ul style="list-style-type: none"> <li>- Inspect and maintain underdeveloped environmental infrastructure</li> <li>- Policies that can act as an ecofriendly city in harmony with natural environment are required</li> </ul> <p>&lt;Air&gt;</p> <ul style="list-style-type: none"> <li>- Introduce policies as emissions reduction and improvement techniques application and monitoring</li> </ul>

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## 2. Limitations and Further Research Directions

This study has several limitations that may hinder the validity of this research. First, this study attempted to investigate the resilient performance of Korean secondary cities in the past. However, due to the data availability, some indicators only reflect the recent change of secondary cities in Korea. As a result, the connection between the empirical analysis and the policy task suggestions is somewhat lacking in depth of analysis. Nevertheless, considering the fact that the current situations or conditions of the secondary cities in Korea were the result of the rapid urbanization in the past, the policy implications of the results are still meaningful.

Second, since the concept of urban resilience has been a topic of interest in recent years, it is somewhat difficult to say that the urban policies in Korea discussed in this study were also established and implemented with direct consideration of “Resilience”. Therefore, this study is not simply to introduce urban policies in Korea but also to discuss the strengths and weakness of each policy from the perspective of resilience and to propose policies suitable for the secondary cities in development countries.

Third, the policies suggested in this study are basically based on the situation in Korea. Of course, it is a similar condition that the secondary cities in developing countries w in the process of very rapid urbanization as the Korean secondary cities in the past. However, it cannot be overlooked that the characteristics of the metropolitan cities in each country are very different. Hence, the polices proposed in this study should be applied in consideration of individual characteristics of each country and secondary city.

Finally, it is disclosed that this study partially investigates the urban resilience due to the data availability. Given that resilience has emerged as a

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key policy concept in recent years, it is expected to see various data and results of policies related to urban resilience in the near future. At that time, by utilizing more relevant information, it will be possible to suggest more effective and abundant policies for improving urban resilience.



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**Chapter 1** Introduction

**Chapter 2** Concepts of Resilience and Secondary City

**Chapter 3** Analysis of Urban Resilience in Korea Secondary Cities

**Chapter 4** Korean Perspectives of Urban Resilience Planning and Policy  
Implications for Secondary Cities in Developing Countries

**Chapter 5** Conclusion



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