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# Measurement of Urban Competitiveness Based on Innovation Indicators in Six Metropolitan Cities in Korea [†]

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**Abstract :** In recent years, some experts have shown that urban competitiveness is more important than national competitiveness. They have also argued that innovation will make cities more competitive. The purpose of this paper is to create Korean urban competitiveness index, and to also highlight strategic aspects for enhancement of urban competitiveness of metropolitan cities based on innovation in Korea. First, we will present various factors and indicators of urban competitiveness based on three components for innovation: formation of cluster, human capital, creative economy. Available literature and statistical analyses will be used. Second, scores of urban competitiveness will be developed based on Analytic Hierarchy Process (AHP). Evaluation of scores with weights will be used for this purpose. The resulting weights are 0.3672 for the formation of cluster, 0.3318 for human capital, and 0.3010 for creative economy, respectively. Finally, we present urban competitiveness using the standardized T-score. The most competitive city based on innovation is Daejeon(1st), followed by Gwangju(2nd) and Daegu(3rd). Three least competitive cities are Incheon (6th), Busan(5th) and Ulsan(4th).

**Keyword :** Urban competitiveness, Innovation, Formation of Cluster, Human Capital, Creative Economy

## 1. INTRODUCTION

With an ever increasing rate of globalization in the world, some governments have begun to realize that national competitiveness is not just based on traditional national-level competition. Without fostering competitiveness between cities, ability to compete in the world may create difficulties for some nations. In recent years, enhancement of urban competitiveness has received more attention and is believed to be strongly related with the level of national competitiveness (OECD 2010).

In general, in order to develop competitive edge, cities need to find new and sustainable sources of growth. This is rather a difficult task these days. Many countries have experienced diminishing returns from labour inputs and investment in physical capital. Furthermore, some nations are faced with either stagnating or declining population growth. Urban competitiveness does come from innovation-induced productivity growth. Among OECD countries, innovation is an increasing indicator for growth. It is believed that urban cities and regions are key places in shaping important innovation trajectories and in mobilizing untapped potential for national growth (OECD 2010).

Over the years, papers have been presented on the concept of urban competitiveness, representing the aspect of economic development and growth (Storper 1997; Webster and Muller 2000). While urban competitiveness implies a level of economic growth, some suggest that urban competitiveness has to include non-economic characteristics to measure a long-term economic success (Jiang and Shen 2010; Kresl 2007).

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In recent years, cities in Korea began to participate in improving their capacity to adapt and create to new knowledge for their innovation need. In an attempt to understand more about the importance of urban competitiveness using innovation, we will develop Korean urban competitiveness index at national level, and to also provide strategic importance of urban competitiveness of metropolitan cities based on innovation in Korea.

This paper will present the following. First, we will present various factors and indicators of urban competitiveness based on innovation. Available literature and statistical analyses will be used. Second, scores of urban competitiveness will be developed based on Analytic Hierarchy Process (AHP). Evaluation of scores with weights will be used for this purpose. Finally, we will present urban competitiveness using the standardized T-score.

## 2. REVIEW OF LITERATURE

### 2.1 Definition of Urban Competitiveness and Innovation

In the literature, urban competitiveness refers to the interrelations among its causes (or determinant), the process of competence itself (rivalry among economic units) and its consequences (effects in the macro and micro evolution). The urban competitiveness is often identified as the productivity of a city, success in external market, and growth in local income and employment. The overall economic performance of the city is deemed important by Bruneckiene and others (2010). Therefore, they believe concepts of urban competitiveness and urban economic competitiveness are interchangeable. The concept of competitiveness was first used in the industrial and business sectors. Some equated the concept of urban competitiveness to competitive firms, mainly in its productivity and profit. Others highlighted the local conditions for cities to be competitive. Jiang and Shen (2010), Shen(2004) affirmed that competitiveness of firms and operational environments are important determinant of competitiveness of cities. A report from the OECD(2006) conceptualized the urban competitiveness in terms of two closely linked dimensions : 1) the development of the productivity of the business sector and 2) the development of human capital in the city. Landry(2000) asserted that urban vitality is new source of urban competitiveness. Various definitions of urban competitiveness are presented in Table 1.

The concept of urban competitiveness is closely connected with innovation. Therefore, it is important to understand the importance of innovation with respect to urban competitiveness. Innovation is the creation of better or more effective products, processes, services, technologies, or ideas that are readily available to markets, governments, and society (OECD 2010).

Manual defines innovation as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (OECD and Eurostat 2005).

In general, all innovation must contain a degree of novelty. There are three types of novelty: an innovation can be new to the firm, new to the market or new to the world. The first concept covers the diffusion of an existing innovation to a firm. Innovation may have already been implemented by other firms, but it is new to the firm. Innovations are new to the market when the firm is the first to introduce the innovation on its market. An innovation is new to the world when the firm is the first to introduce the innovation for all markets and industries (OECD and Eurostat 2005).

Innovation is clearly a much broader notion than R&D. It is also influenced by a wide range of factors, some of which can be influenced by policy. Innovation can occur in any sector of the economy, including government services such as health or education (OECD and Eurostat 2005).

### 2.2 Factors of Urban Competitiveness

In understanding urban competitiveness, Kresl(1995) correctly emphasizes the need for care when using indicators to measure competitiveness and makes it clear that the focus at the urban level may differ significantly from the national level. Kresl cites five attributes, indicating a competitive urban economy. They include both qualitative and quantitative targets:
- The jobs created should be high-skill, high income jobs
- Production should evolve towards environmentally benign goods and services
- Production should be concentrated in goods and services with desirable characteristics, such as high income elasticity of demand
- The rate of economic growth should be appropriate to achieve full employment without generating the negative aspects of overstressed market
- The city should be able to enhance its position in the urban hierarchy (Kresl 1995, p.51)

Research of the region competitiveness conducted by

Table 1. Definitions of urban competitiveness

| Author | Definition |
|---|---|
| Storper (1997) | Competitiveness reflects the capability of an economy to attract and maintain firms with stable or rising shares in activity, while maintaining stable or increasing standards of living for those who participate in it. |
| OECD (Begg 1999) | The degree to which it can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its people over long term. |
| European Commission (1999) | Competitiveness is defined as the ability to produce goods and services which meet the test of international markets, while at the same time maintaining high and sustainable levels of income, or, more generally, the ability of city to generate, while being exposed to external competition, relatively high income and employment levels. |
| D. Webster and L. Muller (2000) | City competitiveness refers to the ability of a city region to produce and market a set of products (goods and services) that represent good value (not necessarily lowest price) in relation to comparable products of other city region. Non-tradable, e.g., local services, are part of the competitiveness equation. |
| Gordon and Cheshire (2001) | may be conceived of as involving attempts by agencies representing particular areas to enhance their locational advantage by manipulating some of the attributes which contribute to their area's value as a location for various activities. |
| Kostiainen (2002) | An ability to attract flows of information, technology, capital, culture, people and along organizations that are important to the region, and along with it, the ability to maintain and develop the quality of life and standards of living of local residents, as well as an ability to create an innovative operational environment in which companies can develop their competitiveness. |
| P. K. Kresl (2007) | Urban competitiveness refers to the degree to which a city or urban region, on comparison with other competing cities, is able to provide jobs, income, cultural or recreational amenities, degree of social cohesion, governance and urban environment to which is current and targeted new residents aspire. |
| J. Sinkiene (2009) | It is the ability of city population to maintain competitive position within a specific area(market) of competition among other cities of similar type and pursuing similar aims by conserving resources and improving wellbeing of city members by management of factors of external and internal environment. |

some (Brunekiene et al 2010; Snieska and Bruneckiene 2009; Bruneckiene and Cincikaite 2009) proved the importance of the identification of the main factors of competitiveness in improving the competitiveness of region and cities.

A report from the OECD(2006) identified two sets of factors : urban specific and external ones. The former are localized assets, including the quality of urban/regional governance. External factors include the national and international economic and policy context.

Some others identified the factors of competitiveness with business performance and the local conditions for firms to be competitive(Porter 2000). Webster and Muller(2000) classified the factors of urban competitiveness into external and internal. The external factors include the factors, which represent the external (global and national) conditions for the city to be competitive. They could include national, and supranational policies, structure of national economy, level of innovation, national tax policy, integration process of the country, development

of human resources, tariffs, initiatives of macroeconomics and industry, other public policy conditions, level of accessibility, labor force skills etc. Sinkiene(2009) affirmed that among physical factors, urban infrastructure and geographical location of a city are seen as the most important one. Among institutional factors, the most important one is effectiveness of local government activity. In the area of human factors, factor of local labor skills and local city leader received the greatest importance. For economic factors, local high value added activities were indicated as having the greatest importance for city competitiveness (Brunekiene et al 2010).

## 3. METHOLOGY : FACTORS OF URBAN COMPETITIVENESS BASED ON INNOVATION

The measurement of urban competitiveness using innovation is based on three components: formation of cluster,

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human capital, and creative economy. They are further divided into nine distinct factors.

Science continues to be an essential ingredient of innovation. Modern innovations, from the transistor to the Internet search engine, have drawn on scientific knowledge. Most basic research is still done in the public sector, predominantly by research universities or by public research institutions. Data on science-patent linkages show that the role of science in innovation has steadily increased. Areas like pharmaceuticals and semiconductors rely heavily on scientific research, and they are becoming increasingly multi-disciplinary in nature(OECD 2010).

Universities and colleges still play one of the most important roles when it comes to innovation, both producing and attracting the human capital needed for innovation. These institutions act as essential bridges among players —businesses, governments and countries —in broader and more open systems of innovation. The mere presence of these institutions also contributes to local quality of life by attracting to highly skilled workers from around the globe. World-class institutions can be an anchor for clusters of innovative activity. It has been recognized that one of the most critical policy challenges is to recognize an essential role of universities as the innovation enterprise rather than simply view them as providers of essential public goods. For this challenge, it would require a greater focus of competition, excellence, entrepreneurial spirit and flexibility in universities (OECD 2010).

Formal education is the basis for forming the present and future human capital. As such, policy makers should ensure that educational systems help learners to adapt to changing nature of innovation from earlier ages of learning. This requires curricula and pedagogies that equip students with the capacity to learn and apply new skills throughout their lives. Emphasis needs to be placed on skills such as critical thinking, creativity, communication, user orientation and teamwork, in addition to domain-specific and linguistic skills (OECD 2010).

In order to develop successful formation of cluster like these discussed above, it will depend on competitiveness of firms, effectiveness of high quality labor market, enhancement of role of local universities, increase of a city's economy and infrastructure for innovation.

Human capital is the basic input for innovation. People generate the ideas and knowledge that power innovation. They apply this knowledge. The resulting technologies, products and services are applied in the workplace and people also act as consumers. Innovation requires a wide variety of skills, as well as the capacity to learn, adapt to or retrain radically new products and processes.

Vocational education and training also play an important role in innovation. Policies need to connect this training to the world of work. This may encourage employers and workers in curriculum development by actively engaging. Costs beyond the secondary level should be shared among government, employers and students. Vocational teaching and training should be improved and national assessments should be adopted to ensure quality and consistency. Using various sources of human capital, firms make incremental changes to production processes and adapt to new technologies, and lift the overall capacity to innovate(OECD 2010).

Innovation contributes to creation of new jobs by bringing diverse culture and tourism. OECD cross-country analysis finds that employment in less productive firms tends to decline, while more productive firms create additional jobs(OECD 2010). In the long run, innovation and employment creation go hand in hand, contributing to a more creative and high-employment economy. Creative economy is measured by such factors as attractiveness of a city for tourists, infrastructure for creative economy and products of creative sector(OECD 2010).
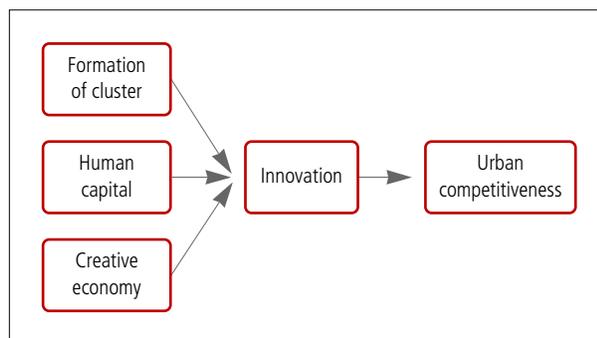


Fig. 1. Conceptual model

# 4. INDICATORS OF URBAN COMPETITIVENESS OF METROPOLITAN CITIES BASED ON INNOVATION IN KOREA

Formation of cluster component of a city is measured by factors of five groups: They are: competitiveness of firms, effectiveness of high quality labor market, enhancement of role of local universities, increase of a city's economy, and infrastructure for innovation. Each factor is measured by indi-

Table 2. System of factors and indicators for the measurement of urban competitiveness based on innovation in Korea

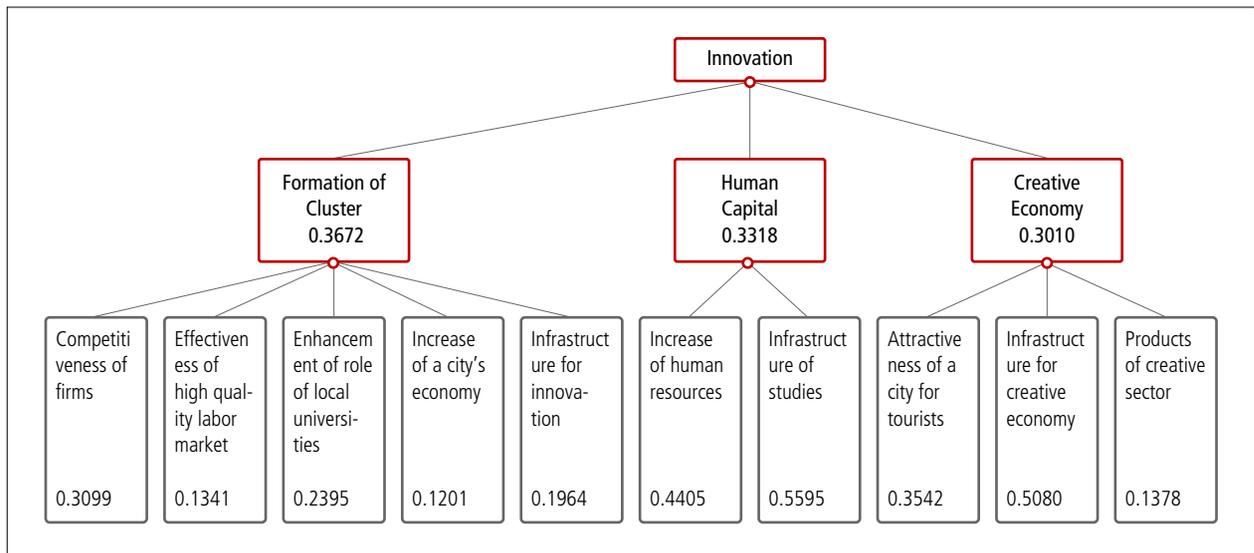| Components | Factors | Indicators of factors |
|---|---|---|
| Formation of Cluster | Competitiveness of firms | • Number of economic entities for science technology in operation per1000 inhabitants<br>• Number of employed persons in science technology service jobs per 1000 inhabitants |
| | Effectiveness of high quality labor market | • Employment ratio of those who graduated from university or college |
| | Enhancement of role of local universities | • Expenses for research and development in local university per capita |
| | Increase of a city's economy | • Increase ratio of GRDP(Gross Regional Domestic Product) in the city per capita |
| | Infrastructure for innovation | • Funds for equipment for science technology per capita |
| Human Capital | Increase of human resources | • Ratio of Increase of inhabitants<br>• Ratio of participants for lifelong education per 1000 inhabitants |
| | Infrastructure of studies | • Ratio of those who graduated from university or college per 1000 inhabitants<br>• Ratio of persons for research and development per 1000 inhabitants |
| Creative Economy | Attractiveness of a city for tourists | • Number of hotels per 1000 inhabitants<br>• Number of facilities for tourists per 1000 inhabitants<br>• Number of travel agencies per 1000 inhabitants |
| | Infrastructure for creative economy | • Number of facilities for public performance per 1000 inhabitants<br>• Number of facilities for exhibition per 1000 inhabitants<br>• Ratio of budget of cultural sector per 1000 inhabitants<br>• Number of members of art group per 1000 inhabitants |
| | Products of creative sector | • Products in business sector of publication, Image and broadcast |



Fig. 2. System and weights of components, factors and indicators

cators consisting of the number of economic entities in operation per 1000 inhabitants; the number of employed persons in science technology service jobs per 1000 inhabitants; employment ratio of those who graduated from university or college; expenses for research and development in local university per capita; increase ratio of GRDP in the city per capi-

ta; and funds for equipment for science technology per capita.

Human capital component is described by increase of human sources, infrastructure of studies which have ratio of Increase of inhabitants per 1000 inhabitants, ratio of participants for lifelong education, ratio of those who were graduated from university or college per 1000 inhabitants, and ratio of persons for research and development per 1000 inhabitants as indicators.

Creative economy component includes the following; having attractiveness of a city for tourists, infrastructure for creative economy, products of creative sector as factors can be indicated by number of hotels per 1000 inhabitants, number of facilities for tourists per 1000 inhabitants, number of travel agencies per 1000 inhabitants, number of facilities for public performance per 1000 inhabitants, number of facilities for exhibition per 1000 inhabitants, ratio of budget of cultural sector per 1000 inhabitants, number of members of art group per 1000 inhabitants, and products in business sector of publication, image and broadcast.

## 5. ANALYSIS OF SIX METROPOLITAN CITIES IN KOREA

### 5.1 Overview of Cities and Weights

There are six metropolitan cities in Korea. Busan is the second biggest city next to the capital city, Seoul. Over the years, however, Busan has been losing population. Incheon is located in the capital region. Population in Incheon has been increasing with the highest growth rate. Daegu is also decreasing in population. Daejeon is very similar in population, rate of population growth and GRDP per capita to Gwangju. Ulsan, though small in population, has the highest in GRDP per capita because Ulsan is connected with a heavy engineering sector.

As discussed previously, there are three components of urban competitiveness: is formation of cluster, human capital, and creative economy. A method of Analytic Hierarchy Process (AHP) was used to produce relevant weights for various components and factors for this paper[1]. The resulting weights are 0.3672 for the formation of cluster, 0.3318 for human capital, and 0.3010 for creative economy, respectively.

Formation of cluster has six indicators and their resulting

Table 3. Population and GRDP of six cities in Korea

| Cities | Number of Inhabitants (person) | Increase Ratio of Inhbitants (2005-2010) (%) | GRDP per Capita (won) |
|---|---|---|---|
| Busan | 3,393,191 | -3.9 | 17,544,260 |
| Incheon | 2,632,035 | 4.3 | 21,601,890 |
| Daegu | 2,431,774 | -1.0 | 14,652,640 |
| Daejeon | 1,490,158 | 3.5 | 17,724,750 |
| Gwangju | 1,466,143 | 3.6 | 17,147,090 |
| Ulsan | 1,071,673 | 2.5 | 55,202,990 |

Source: http://kosis.kr/region/region_02List.jsp

weights are: number of economic entities in operation per 1000 inhabitants (0.1503); number of employed persons in science technology service jobs per 1000 inhabitants (0.1596); employment ratio of those who graduated from university or college(0.1341); expenses for research and development in local university per capita(0.2395); increase ratio of GRDP in the city per capita(0.1201); and funds for equipment for science technology per capita(0.1964). As discussed previously, the role of local university is most important for formation of cluster in innovation.

Human capital inlcudes four indicators and their weights are: ratio of Increase of inhabitants per 1000 inhabitants (0.2672), ratio of participants for lifelong education(0.1733), ratio of those who were graduated from university or college per 1000 inhabitants(0.2734), and ratio of persons for research and development per 1000 inhabitants(0.2861).

Creative economy includes eight indicators and their weights are: number of hotels per 1000 inhabitants(0.1367), number of facilities for tourists per 1000 inhabitants(0.1234), number of travel agencies per 1000 inhabitants(0.0941), number of facilities for public performance per 1000 inhabitants(0.1249), number of facilities for exhibition per 1000 inhabitants(0.1251), ratio of budget of cultural sector per 1000 inhabitants(0.1296), number of members of art group per 1000 inhabitants(0.1284), and products in business sector of publication, image and broadcast(0.1378).

### 5.2 Interpretation of the Analysis

This section discusses results from our analysis that reveals

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[1] 4 professors work for Chungnam national university and 6 researcher work for national research institute in the field of regional development. They were asked that how many one indicator is more important than the other. If they think two indicators have same importance, they should choose 1. There are six level score like 3, 2, 1, 1/2, 1/3. This oral interview was progressed by face to face. They were given explanation about this paper's purpose and methodology.

the competitive position of six Korean cities in 2010. The most competitive city based on innovation is Daejeon(1st), followed by Gwangju(2nd) and Daegu(3rd). Three least competitive cities are Incheon (6th), Busan(5th) and Ulsan(4th).

Table 4. Ranking of six cities in Korea

| Cities | Ranking | T-Score with weight |
|--------|---------|---------------------|
| Busan | 5 | 56.6 |
| Incheon | 6 | 53.0 |
| Daegu | 3 | 59.2 |
| Daejeon | 1 | 63.8 |
| Gwangju | 2 | 62.6 |
| Ulsan | 4 | 56.8 |

Further analysis reveals that Daejeon is the best in all components except creative economy. Strengths of Daejeon are in the areas of expenses for research and development in local university per capita and ratio of persons for research and development per 1000 inhabitants. A weakness of Daejeon is shown for ratio of budget of cultural sector per 1000 inhabitants.

Gwangju is the best city in the component of creative economy. Strength of Gwangju are illustrated in the indicators such as number of facilities for public performance per 1000 inhabitants, products in business sector of publication, image and broadcast, and the number of economic entities in operation per 1000 inhabitants. A weakness of Gwangju is ratio of persons for research and development per 1000 inhabitants.

Although Daegu is experiencing a decline in population and GRDP, Daegu is seen to increase its innovation component. Strengths of Daegu are shown in the indicators such as ratio of participants for lifelong education, funds for equipment for science technology per capita, and the number of employed persons in science technology service jobs per1000 inhabitants.

Ulsan is the most productive city among six cities and already has the base of a heavy engineering industrial sector. A strength of Ulsan is in the area of an increase ratio of GRDP in the city per capita. But urban competitiveness based on innovation is not too strong. Some weaknesses of Ulsan are shown in the indicators such as expenses for research and development in local university per capita, ratio of persons for research and development per 1000 inhabitants, funds for equipment for science technology per capita, and number of facilities for exhibition per 1000 inhabitants.

Total population in Busan is decreasing. But the strength of Busan is in the indicator of ratio of those who graduated from university or college per 1000 inhabitants. However, our analysis finds some weaknesses of Busan in the indicators such as employment ratio of those who graduated from university or college, number of facilities for public performance per 1000 inhabitants, and ratio of budget of cultural sector per 1000 inhabitants.

Incheon is the least competitiveness city based on innovation. Some weakness of Incheon are the indicators such as ratio of those who were graduated from university or college per 1000 inhabitants, number of facilities for public performance per 1000 inhabitants, number of members of art group per 1000 inhabitants, products in business sector of publication, image and broadcast, and number of economic entities for science technology in operation per 1000 inhabitants. Since Incheon is located in the capital region the indicator of employment ratio of those who graduated from university or college is viewed as strength.

Table 5. Ranking based on formation of cluster

| Cities | Ranking | T-Score with weight |
|--------|---------|---------------------|
| Busan | 5 | 18.5 |
| Incheon | 6 | 16.8 |
| Daegu | 2 | 20.0 |
| Daejeon | 1 | 20.9 |
| Gwangju | 2 | 20.0 |
| Ulsan | 4 | 19.2 |

Table 6. Ranking based on human capital

| Cities | Ranking | T-Score with weight |
|--------|---------|---------------------|
| Busan | 4 | 15.9 |
| Incheon | 5 | 15.5 |
| Daegu | 3 | 16.3 |
| Daejeon | 1 | 18.7 |
| Gwangju | 2 | 16.6 |
| Ulsan | 6 | 14.6 |

Table 7. Ranking based on creative economy

| Cities | Ranking | T-Score with weight |
|--------|---------|---------------------|
| Busan | 5 | 18.5 |
| Incheon | 6 | 16.8 |
| Daegu | 2 | 20.0 |
| Daejeon | 1 | 20.9 |
| Gwangju | 2 | 20.0 |
| Ulsan | 4 | 19.2 |

Table 8. Strength and weakness of six cities in Korea

| Cities | Strengths | Weakness |
|---|---|---|
| Busan | • Ratio of those who graduated from university or college per 1000 inhabitants | • Employment ratio of those who graduated from university or college<br>• Number of facilities for public performance per 1000 inhabitants<br>• Ratio of budget of cultural sector per 1000 inhabitants |
| Incheon | • Employment ratio of those who graduated from university or college | • Ratio of those who graduated from university or college per 1000 inhabitants<br>• Number of facilities for public performance per 1000 inhabitants<br>• Number of members of art group per 1000 inhabitants<br>• Products in business sector of publication, image and broadcast.<br>• Number of economic entities for science technology in operation per 1000 inhabitants |
| Daegu | • Ratio of participants for lifelong education<br>• Funds for equipment for science technology per capita the number of employed persons in science technology service jobs per1000 inhabitants | • Increase ratio of GRDP in the city per capita |
| Daejeon | • Expenses for research and development in local university per capita<br>• Ratio of persons for research and development per 1000 inhabitants | • Ratio of budget of cultural sector per 1000 inhabitants |
| Gwangju | • Number of facilities for public performance per 1000 inhabitants<br>• Products in business sector of publication, image and broadcast<br>• Number of economic entities in operation per 1000 inhabitants | • Ratio of persons for research and development per 1000 inhabitants |
| Ulsan | • Increase ratio of GRDP in the city per capita | • Expenses for research and development in local university per capita<br>• Ratio of persons for research and development per 1000 inhabitants<br>• Funds for equipment for science technology per capita.<br>• Number of facilities for exhibition per 1000 inhabitants |

## 6. CONCLUSION

Under an intense rate of globalization, national boundaries are indeed getting less and less visible. As such, the world is getting flat and Cities need innovation to have urban competitiveness and economic advantages. In a competitive world market, Korea is still regarded as a very small country. Therefore, it is important to recognize that not only innovation at national level but at the level of urban centers are important to raise her competitiveness in the world market.

Results based on weighted factors for six Metropolitan cities in Korea reveal that each has some strengths and weaknesses in various components and factors. Clearly, Daejeon leads in almost all factors, while other cities show strengths in different areas. Given the nature of urban competitiveness in the world economy, it may be necessary for national policies to provide various means to improve each city's competitive edge. All cities are not created equal but will be competing equally in a rapidly globalizing world market.

## REFERENCES

Bailey, N., Docherty, I., and Turok, I.(2002) "Dimensions of City Competitiveness : Edinburgh and Glasgow in a UK context," In Begg, I. (ed), *Urban competitiveness : Policies for dynamic cities* (Bristol : Policy Press), 135-60.

Begg, I. (1999) "Cities and Competitiveness," *Urban Studies*

36(5):795-809.

Bruneckiene, J., Guzavicious, A., and Cincikaite, R.(2010) "Measurement of Urban Competitiveness in Lithuania," *Inzinerine Ekonomika–Engineering Economics* 21(5) :493-508, available online at http://internet.ktu.lt/lt/ mokslas/zurnalai/inzeko/70/1392-2758-2010-21-5- 493.pdf. accessed June 19 2012.

Bruneckiene, J., and Cincikaite, R.(2009) "Salies regionu konkurencingumo vertinimas regionu konkurencingumo indeksu: tikslumo didinimo aspektas," *Ekonomika ir vadyba–Economics & Management* (14):700-8.

European Commission (1999) *Sixth Periodic Report on the Social and Economic Situation and Development of Regions of the European Union* (Office for Official Publications of the European Communities: Luxemburg), 242.

Gordon, I., and Cheshire, P.(2001) "Locational advantage and lessons for territorial competition in Europe," in : Johansson and Karlsson, Charlie and Stough, Roger, (eds.) *Theories of endogenous regional growth. Advances in spatial science* (Berlin Springer).

Jiang, Y., and Shen, J.(2010) "Measuring the urban Competitiveness of Chinese Cities in 2000," *Cities* 27(5):307-14.

Kostiainen,J.(2002) "Learning and the 'Ba' in the Development Network of an Urban Region," *European Planning Studies* 10(5):613-31.

Kresl, P.(1995) "The Determinats of Urban Competitiveness," in Kresl P., and Gappert G.(eds.), *North American Cities and the Global Economy*, Urban Affairs Annual Review 44 (London: Sage Publications).

Kresl, P.K.(2007) *Planning Cities for the Future : The Successes and Failures of Urban Economic Strategies in Europe* (Northampton, MA : Edward Elgar Publishing), 171.

Landry, C.(2000) *Urban Vitality : A New Sources of Urban Competitiveness*, Prince Claus Fund Journal/ARCHIS issue 'Urban Vitality / Urban Heroes', December 2000.

OECD(2006) *Competitive Cities in the Global Economy*, OECD Publication. 450.

OECD Committee for Scientific and Technological Policy, OECD Committee on Statistics and Eurostat Working party on Science, Technology and Innovation Statstics (2005) *Oslo Manual : Guidelines for Collecting and Interpreting Innovation Data* (3rd ed.)(Paris : OECD Publishing and Eurostat).

OECD (2010) *Ministerial report on the OECD Innovation Strategy*, available online at http://www.oecd.org/data oecd/51/28/45326349.pdf

Porter, M.E.(2000) "Location, Competition and Economic Development : Local Clusters in a Global Economy," *Economic Development Quarterly* 14 (1):15-34.

Snieska, V., and Bruneckiene, J. (2009). Measurement of Lithuanian Regions by Regional Competitiveness Index. *Inzinerine Ekonomika–Engineering Economics* (1): 45-57.

Sinkiene, J.(2009) "Competitiveness Factors of Cities in Lithuania," *Viesoji politika ir administravimas* 29:47-53.

Shen, J.(2004) "Urban competitiveness and Urban Governance in the Globalizing World," *Asian Geographer* 23(172):19-36.

Storper, M.(1997) *The regional world: territorial develop– ment in a global economy* (New York: Guilford Press).

Turok, I.(2004) "Cities, Regions and Competitiveness," *Regional Studies* 38:1069-83.

Webster, D., and Muller, L.(2000) *Urban Competitiveness Assessment in Developing Country Urban Regions : the Road Forward*, Paper prepared for Urban Group. INFUD. July 17 2000 (Washington D.C : The World Bank), 47.