



# **Creative and Knowledge Society**

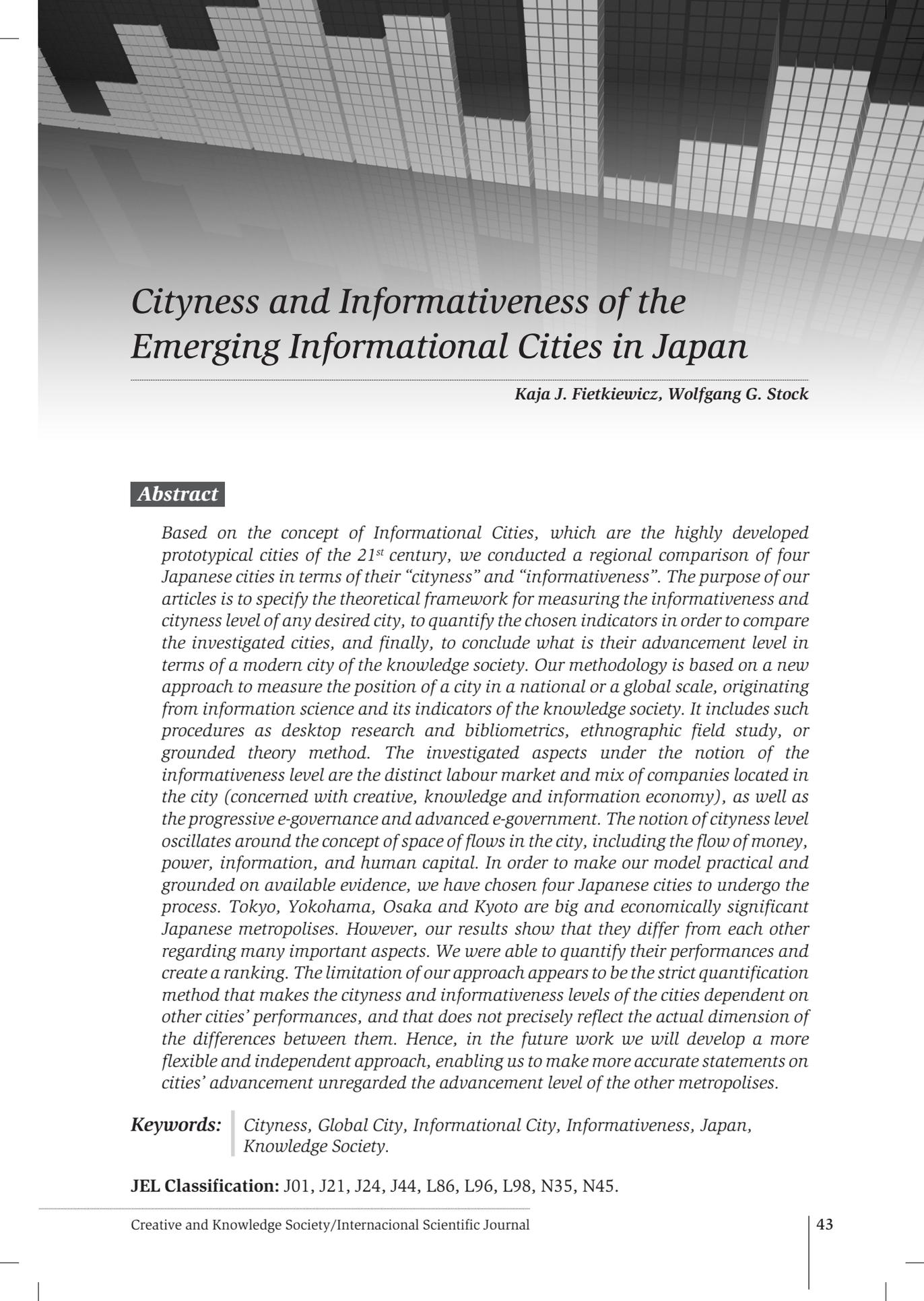
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# Cityness and Informativeness of the Emerging Informational Cities in Japan

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## Abstract

*Based on the concept of Informational Cities, which are the highly developed prototypical cities of the 21<sup>st</sup> century, we conducted a regional comparison of four Japanese cities in terms of their “cityness” and “informativeness”. The purpose of our articles is to specify the theoretical framework for measuring the informativeness and cityness level of any desired city, to quantify the chosen indicators in order to compare the investigated cities, and finally, to conclude what is their advancement level in terms of a modern city of the knowledge society. Our methodology is based on a new approach to measure the position of a city in a national or a global scale, originating from information science and its indicators of the knowledge society. It includes such procedures as desktop research and bibliometrics, ethnographic field study, or grounded theory method. The investigated aspects under the notion of the informativeness level are the distinct labour market and mix of companies located in the city (concerned with creative, knowledge and information economy), as well as the progressive e-governance and advanced e-government. The notion of cityness level oscillates around the concept of space of flows in the city, including the flow of money, power, information, and human capital. In order to make our model practical and grounded on available evidence, we have chosen four Japanese cities to undergo the process. Tokyo, Yokohama, Osaka and Kyoto are big and economically significant Japanese metropolises. However, our results show that they differ from each other regarding many important aspects. We were able to quantify their performances and create a ranking. The limitation of our approach appears to be the strict quantification method that makes the cityness and informativeness levels of the cities dependent on other cities’ performances, and that does not precisely reflect the actual dimension of the differences between them. Hence, in the future work we will develop a more flexible and independent approach, enabling us to make more accurate statements on cities’ advancement unregarded the advancement level of the other metropolises.*

**Keywords:** Cityness, Global City, Informational City, Informativeness, Japan, Knowledge Society.

**JEL Classification:** J01, J21, J24, J44, L86, L96, L98, N35, N45.

## ***Introduction***

Informational Cities (IC), Digital Cities, Knowledge Cities, Smart Cities – there are many new concepts of cities in the modern age. These cities are nodes in the worldwide network; they play a leading role in the world economy and try to reverse the negative environmental changes by introducing sustainable energy solutions. These cities have an advanced ICT as well as the knowledge and creativity-promoting infrastructure. If we want to model the significance of a metropolis, parameters for trade or industrial production will no longer be enough. Rather, we must work out their placement in the global space of flows. Here, too, we cannot stop at their administrative borders, as important companies may well shift their activities (or parts thereof) to the periphery of the city instead of remaining doggedly within the city limits. As the main indicator for the informational city, Peter Hall proposes access to information (both face-to-face and transmitted via ICT), accompanied by further values. The goal is to develop alternative procedures for measuring the state of the art of different kinds of information activity in the city. “The outcome should be a new urban hierarchy of centers and sub-centers, based on position within a set of global information flows” (Hall, 1997, p. 320).

Our approach is based upon concepts and methods of information science (Stock & Stock, 2013), which is an interdisciplinary science studying knowledge representation, information retrieval, and the environment of knowledge and information such as the information or knowledge society. This article is part of a comprehensive project on cities in the knowledge society. Besides our theoretical considerations on prototypical cities of the 21<sup>st</sup> century (Stock, 2011; Khveshchanka & Mainka, 2011; Mainka, Khveshchanka & Stock, 2011; Linde & Stock, 2011, pp. 87-92) empirical results are available concerning the characteristics of Informational Cities, e.g. on measuring Informational World Cities’ degree of cityness (Nowag, Perez & Stuckmann, 2011), on job polarization in Informational Cities (Dornstädter, Finkelmeyer & Shanmuganathan, 2011), about Singapore as a “prototype” of an Informational City (Khveshchanka, Mainka & Peters 2011), on digital libraries in selected Informational Cities (Mainka & Khveshchanka, 2012), on the role of physical and digital libraries in Informational World Cities (Mainka et al., 2013b) and upon the state of e-government in such cities (Mainka et al., 2013a; Mainka et al., 2014).

In the present case we investigate four Japanese cities relying on the work on the cities in the Information Age by Castells (2010), and the concept of indicators for an Informational City (Castells, 1989; Stock, 2011). We defined two main aspects we intended to measure. The first one is the cityness level, which refers to the World or Global City research (Friedmann & Wolf, 1982; Friedmann, 1986; Sassen, 2001) and includes the theory of space of flows introduced by Castells (1989; 2010). The second aspect is the informativeness level of the city, which is indicated by the cityness level itself, as well as such factors like the distinct labour market (knowledge economy, creative economy, and information economy) and the e-governance and e-government. With e-governance we mean the political willingness to create an Informational City, measured by the amount and effectiveness of political initiatives aiming at development of digital, smart, creative or knowledge infrastructure of the city. The term e-government refers to the governmental services offered via the Internet, preferably not only information dissemination oriented, but most importantly transactional and participatory services. Ensuing from these main categories, we investigated indicators contributing to the cityness and informativeness levels of the cities, and quantified them in order to estimate if the investigated metropolises may be labelled as (emerging) Informational Cities.

## **1. Japanese informational cities**

During the last decades many large Japanese cities have emerged as places of social, technological, institutional and economic networks. Japan has become one of the most urbanized countries in the world (Karan, 2009, p. 236). According to Karan (2009), there are six great metropolitan areas merging to an axis of the greatest urban concentration in Japan - Tokyo, Yokohama, Kyoto, Osaka, Nagoya and Kobe. This so-called “Japanese Megalopolis” dominates the services sector and the labour force sector, and is the emerging post-industrial informational and transactional area (Karan, 2009, p. 249). Tokyo, Yokohama, Osaka, and such cities like Kobe, Hiroshima, Fukuoka and Nagasaki are emerging as electronic hubs for telecommunications and telematics networks (Karan, 2009, p. 252). Hence, there is a transformation from an industrial (manufacturing-based) urban society into a society dominated by information, high-tech manufacturing, services, and leisure industries, which leads to further changes in the urban labour market and urban socioeconomic dynamics as well (Karan, 2009, p. 253). Knowledge and information are becoming a dominant aspect of the economies in many cities of the Megalopolis (Karan, 2009, p. 254); hence, they become the post-industrial “informational cities” (Hepworth, 1987; Karan, 2009).

In our research we investigated Tokyo, Osaka, Kyoto and Yokohama. These are the cities of the Japanese Megalopolis. Tokyo is already defined as a global and world city (Friedmann & Wolf, 1982; Sassen, 2001). There were also further evidences for Tokyo’s digital, smart, creative and knowledge infrastructure. Osaka was for a long time the centre of Japanese economy. It is still referred to as a global city (Sassen, 2001). It also improves its position in the city hierarchy by different projects, e.g. enhancing its knowledge or creative infrastructure. Kyoto is the former capital as well as former centre of Japanese economic development. It is interesting to investigate if it still keeps up in the modern global world. Yokohama is the second largest city in Japan, and it is interesting to examine if its size actually fosters globalization and transformation into an Informational City. Also, Yokohama’s location in the near proximity to Tokyo may either enhance or limit its potential for becoming an Informational City. We studied the level of informativeness and cityness level for these four cities in order to examine if they can be already considered as Informational Cities, or at least as emerging Informational Cities. Our choice of the cities is based on the references of global cities as well some other possible infrastructures of Informational Cities given in these Japanese metropolises.

## **2. Methods**

To investigate the Informational Cities’ infrastructures we had to define which data is interesting for us. However, we also had to use general methods of ethnographic or empirical studies, in order to gather and analyse the needed information.

### **2.1 Ethnographic field study**

The ethnography deals with research on people and can be translated as characterization of ethnic groups. The ethnographic field study aims at a deep and diversified analysis of specific fields and cultural scenes. It enabled us to personally experience the everyday life in the investigated cities and better understand the people living there. We completed the ethnographic field study in all investigated cities. During our stays (for each city 3-4 days), we conducted semi-standardized interviews and

collected self-made data (photos, videos and voice recordings). After the field study, we worked on further literature and the Internet research, which we partially based on the outcomes of our interviews and personal experience gained in the field.

## **2.2 Interviews**

Interviews contribute to the empirical social studies. Methods used during the empirical study are e.g. interviews, inquiries, observation, content analysis, or experiments. In our research we combined the qualitative and quantitative methods of the empirical social research. During the interviews we used a questionnaire, which consisted of closed questions (standardised technique) to quantify the outcomes and analyse them statistically. Additionally, the qualitative aspects were not neglected, i.e. during the interview, the interviewee was involved into an open discussion. During our research the amount of the interviews was rather low; hence, the outcomes are statistically insignificant and cannot lead to conclusions about the main unit. However, it is possible to identify some tendencies in the interviewees' answers, and to gain first impressions.

The interviews were conducted between 27 March and 03 April 2013 in Tokyo, Osaka and Kyoto. We did not have any interviews in Yokohama. However, this gap will be closed during the further research. All in all, we interviewed thirteen interviewees (including university professors, the German ambassador, and employees of international organisations) during eight interviews.

## **2.3 Grounded theory**

The framework of the Grounded Theory Method (GTM) was presented by Glaser and Strauss (1967). The basic notion of this method is to discover a theory from data (literature, statistics, or interviews), which are systematically obtained and analysed in social research. Even though GTM originates from medical sociology, it is currently used in many other fields, like education, psychology, business management, social work, as well as library and information science (Mansourian, 2006; Tan, 2010). Generation of a theory is a process that combines the operations of collecting data, analysing (coding) and constructing a theory. GTM is a constant shifting between acting (data collection) and reflexion (data analysis and theory generation).

Major part of our empirical procedure were interviews we conducted in particular cities, as well as personal impressions gained during our field research in those cities. We have chosen the GTM because of its great flexibility. Globalization, changes in the world economy and society are significant and partly unpredictable. The classical theories are not sufficient enough to explain these changes, as they do not suit current circumstances. Apart from that, worldwide research on different cities cannot be based on one rigid theory. The theory has to evolve in the process so that it is not divorced from the reality.

## **2.4 Desktop research**

We also integrate the quantitative data like official statistics or the amount of granted patents. These measures can be statistically evaluated and are as important as the outputs of the empirical approach. Mainly, we used official (ministerial) statistics, because they deliver a sufficient informational infrastructure. An official statistic is based on the

respondents' obligation to give information, truthfully and exhaustively, and therefore, one can trust in the validity and credibility of it.

In order to analyse and to compare the industrial groups or labour infrastructure in the cities, we had to analyse the Japanese industrial/occupational classifications, and define classes relevant to us. In Japan none of the common European or international classifications, like e.g. the Statistical Classification of Economic Activities in the European Community (NACE) or the North American Industry Classification System (NAICS) is being applied. In official statistics the industries are classified based on the Japan Standard Industry Classification (JSIC) (MIC, n/a) and the Japan Standard Occupational Classification (JSOC). Furthermore, we used professional databases like Web of Science or the Derwent World Patent Index hosted by STN International, in order to analyse the knowledge output of each city.

The analysis of the online content complements our methodical strategy. In the present project case a major part of online content analysis aims at investigation of e-government development in the cities. To estimate the governmental activities in this context we analysed the municipal governments' websites, based on the five-stage model by Moon (Moon, 2002). Taking into consideration the critical revision of stage models by Coursey and Norris (2008) as well as our results of E-Government maturity of 31 Informational World Cities in our prior research (Mainka et al., 2013a), we decided to define the stages rather as five pillars, and equally important components of an E-Government. The five pillars include: information, communication, transaction, integration, and participation. Each one includes diverse aspects, which concern services provided by the government for different stakeholders. To enable a quantifiable result we weighted each aspect appropriate to its importance and complexity. The cities could obtain 100 points for each pillar and 500 points in total.

### **3. Results**

In this section we conduct the concrete definition and argumentation of investigated indicators regarding the cityness and informativeness level, as well as the actual investigation of the four cities in terms of these indicators.

#### **3.1 Cityness**

Friedmann and Wolf (1982) proposed the concept of the so-called World Cities. Afterwards, Sassen (2001) defined London, New York, and Tokyo as the leading Global Cities (Sorensen, 2003). The World Cities research by Friedmann (1986) concerns the placement of a city in the world economy. The increased integration of world commodities and financial markets, as well as growing interconnection through communication networks have some spatial as well as social impacts on the cities (Sorensen, 2003, pp. 519 f.). According to Friedmann (1986, p. 72), the selection criteria for the world city hierarchy are major financial centres, transnational corporations (TNCs), and regional headquarters, as well as a rapid growth of business service sector. Regardless these positive (economic) aspects, there may also occur some negative (social) consequences, as e.g. gentrification, which is a relocation of wealthy urban community in the city-centre, whereas of the less-wealthy and socially-weaker inhabitants in the city suburbs.

According to Castells (2010), the societal structural transformation leads to the emergence of new spatial forms and processes. The society is constructed around flows: of capital, of information, technology, organizational interaction, images, sounds, and symbols (Castells, 2010, p. 442). We can define the placement of a city in the world cities' hierarchy through its placement in this space of flows (Stock, 2011, p. 968). The measure for the economic significance of a city, i.e. the flow of capital is the turnover of nearby stock exchanges, and for the flow of power, the profit of companies having their headquarters in the city. We focus on companies from the Fortune-500 list, which is an annual ranking issued by the American Fortune magazine with the 500 most successful companies in the world (Nowag, Perez, & Stuckmann, 2011, p. 105). According to Nowag, Perez and Stuckmann (2011), Global Fortune 500 is an appropriate source because companies registered there have a leading role in the global economy and have the highest turnover in the world (indicating high level of money flow). Furthermore, the headquarters control and coordinate the company's branches in other cities; hence, they have a certain power (indicating high level of power flow).

The international flow of information can be measured in different ways, e.g. the information connectivity related to business (Stock, 2011, p. 968). The connectivity of business information is created, for example, through the connectivity between different branches and offices of the same company. This approach to measure the business information connectivity is provided by GaWC, the Globalization and World Cities Research Network, which publishes studies on connectivity between World Cities and the companies (Taylor, 2004). In our study we revert to the GaWC research. We also analyse further indicators, like barriers for information flows (censorship), information exchange through international meetings, incentives, conventions and events (MICE), or the amount of international non-profit organizations (NPO).

We investigated diverse indicators in order to measure the cityness-level. Regarding the population size, Tokyo has the most residents and is followed by Yokohama, Osaka and Kyoto. Even though the population size itself is not necessarily an attribute of a global city, it can be seen as a consequence of the city's attractiveness. An important and significant indicator for a city's attractiveness is definitely the amount of foreign inhabitants. In absolute numbers, the most foreigners live in Tokyo, whereas the highest percentage relative to the whole population is given in Osaka, followed by Tokyo, Kyoto and Yokohama. We also studied the phenomenon of gentrification as a negative consequence of modern city development. Indeed, in Tokyo and Osaka the most expensive rents were for apartments located in the city centre (for Tokyo over 70 % of the mean monthly nominal per capita income and for Osaka between 17 % and 35 %), whereas apartments in the suburbs were cheaper (9-19 % in Tokyo, 11-22 % in Osaka). In Yokohama the tendency was smaller, but recognizable; still, the apartment rents appear relatively high as the cheapest accounted to 17-24 % of the mean monthly nominal per capita income. In Kyoto the small central districts were one of the most expensive regions in the city, but there are also other non-central districts with the same apartment prices; hence, the gentrification is not recognizable.

Regarding the capital and power flows we looked at the stock exchange turnovers as well as the revenues of the international firms with headquarters located in the cities. There are stock exchanges in Tokyo and Osaka, and the first one has by far the highest turnover in Japan (and - although declining over the last years - one of the highest in the world). Regarding the headquarters of the firms listed in the Global Fortune 500, the most headquarters (and the highest revenues) are in Tokyo. There were headquarters of 56

listed companies in year 2005, and 45 in year 2013. The second most headquarters are located in Osaka (8 in 2013). Both Yokohama and Kyoto have only one headquarter, whereas the revenues of the company with headquarter located in Yokohama are higher. In order to analyse the information flow, we looked at the total number of international conferences and meetings (MICE) held in each city. In this regard, the most MICE were hosted in Tokyo (55 in 2011), followed by Yokohama (32) and Kyoto (28). The fewest MICE considering the four cities were held in Osaka (13). Another important factor is the number of NPOs located in the cities. Here, the ranking of the cities is very similar, as the most international organisations are located in Tokyo. Second most organizations are in Kyoto, whereas Yokohama and Osaka are behind.

In terms of short distances (hence, easy and/or fast access to the city), we measured the distance between the city centre and the nearest airport(s). The shortest distance and travelling time is given between Osaka and its nearest airports (in average 32 km). Second shortest distances are between Tokyo and its airports (approx. 47 km), followed by Yokohama (59 km) and Kyoto (69 km). The flow of people was measured by the number of passengers attending international flights, as well as the total number of international flights. In this regard, the most international flights and passengers attending these were from/to Narita airport (Tokyo and Yokohama). In 2012 there were 148,265 international flights, with total 29,719,560 passengers. Far behind was the Kansai airport, in Osaka and Kyoto area. There were 68,733 international flights in 2012, with total 11,253,210 passengers. The most flight connections to the World Cities (defined by Friedmann) were from the Narita airport (Tokyo and Yokohama) as well. Far behind were Haneda and Kansai airport. Another important factor of people flow is the number of visitors. In this manner, Tokyo was on the top. Far behind were Osaka, Kyoto and Yokohama. The attractiveness of the city can be also measured by the number of foreign students willing to study in the city. Even though the most universities are in Tokyo and Kyoto, the most foreign students (relatively to the total amount of students) are in Tokyo, followed by Osaka Prefecture, Kyoto Prefecture, and Kanagawa Prefecture.

In terms of openness and tolerance in the city, we considered such factors as number of religious entities represented in each city. The most are located in Tokyo (4,267) and Kyoto (2,416), even though the second one has the smallest population of the investigated cities. Behind were Osaka (2,084) and Yokohama (1,101).

A city that can be definitely called a Global City is Tokyo. It succeeded in almost all aspects of our analysis. It is a big metropolis, with flows of power and capital (one of the biggest in the world), as well as the flow of information (due to many connections between companies, high amount of MICE and NPOs). Nonetheless, the other cities succeeded in some aspects as well, which indicates they are also global cities or, at least, on their way to become one. Osaka can also be regarded as a Global City. Even though the flow of information is not as good as in other cities (less MICE and NPOs), there is still a bigger flow of power and capital than in Yokohama or Kyoto.

Yokohama and Kyoto are behind Tokyo and Osaka. However, Yokohama could be seen as an emerging Global City, as some aspects of cityness are already present. This port-city aims at strengthening its flow of power and capital by attracting big companies. Yokohama manages to host a lot of MICE, which ensures its good flow of information and people. Kyoto is a totally different type of city. Even though in some regards it accomplishes few global properties, it is not its main objective to become a global city. On the one hand, it is a historical city with a great amount of Japanese heritage, which is

supposed to attract many visitors. On the other hand, it is a Knowledge City with many universities and research institutions. These infrastructures and goals may have some common aspects with the global dimension of a city, like e.g. many visitors, MICE and NPOs or foreign students. However, it should not be regarded as a Global City, but at most as an emerging Global City, when some serious steps are taken.

### **3.2 Informativeness**

In terms of the cities' informativeness we analysed further factors like the labour market and mix of companies (with focus on knowledge and information economy), the knowledge output as well as the e-government and the e-governance in the city. We analysed the labour market situation in the cities, i.e. the labour force (employees) in diverse fields as well as the mix of companies located in the city. We focused on three main fields: information economy ("infonomics"), knowledge economy, and creative economy. The main drivers of the Knowledge Economy are the globalization, technological advance (ICT revolution), and knowledge (based on the World Wide Web), which created ubiquitously networked economies and societies (Asian Development Bank, 2007, p. 1; OECD, 2001, p. 100). Another important factor is the changed consumer demand and rising living standards in advanced economies, where consumers are richer, more sophisticated and, therefore, increasingly interested in an intellectual content as well as technologically advanced products (Brinkley et al. 2009, p. 9; Levy, 2011, p. 6). Not only do the knowledge and information drive the economic growth and development, but also the creativity. It contributes to the entrepreneurship, fosters innovation, and enhances productivity. There are different types of creativity, like e.g. artistic and cultural creativity, scientific creativity, and economic creativity (Florida, 2003; UN, 2008, p. 9). Florida (2003) argues that the Information or Knowledge Economy is powered not by information or knowledge itself, but by the human creativity. He defines it as the ability to create meaningful new forms. All in all, creativity involves the generation of new ideas or recombination of known elements into something new, providing a valuable solution to a problem (Sefertzi, 2000, p. 2).

We precisely analysed the markets of the individual cities and compared their establishments and employees ratios. The most establishments in all of the investigated cities are active in wholesale and retail trade (24 % for Tokyo and Yokohama, 27 % for Osaka and Kyoto) as well as real estate and goods rental (8 % for Kyoto, 9 % for Tokyo and Osaka, and 10 % for Yokohama). The biggest ratio of companies in ICT sector is located in Tokyo (4 %), followed by Osaka (3 %), Yokohama (2 %), and Kyoto (1 %). In the scope of the Knowledge Economy Tokyo with 22 % was again on the top followed by Yokohama and Osaka with 19 % each, and Kyoto with 15 %. Taking into account the labour force distribution, the most workers are employed in the wholesale sector (20 % - 24 %), followed by manufacturing (10 % - 14 %) and medical care (7 % - 11 %). The labour force in ICT sector was the biggest in Tokyo (10 %), followed by Osaka (6 %). Yokohama and Kyoto are behind with 4 % and 2 % respectively. In the Knowledge Economy unchanged Tokyo was on the top with 30 %. Surprisingly, Osaka did not score as well as expected from the establishments ratio and took the last place with 23 %. Yokohama accounted for 25 % and Kyoto 24 %. The structure of the labour market and the mix of companies located in the city can depend on many factors. The most internationally operating firms most probably favour cities having a higher level of cityness. Professionals and skilled job-seekers will most probably choose cities also attractive to live in (and not only work). Hence, the last important factor we investigated is the political initiatives to create

Informational Cities or at least to enhance some important aspects of an IC and thus, make the city more attractive to companies and professionals.

Regarding the Knowledge Economy, there is one further factor enabling us to compare the four cities, namely the knowledge output – i.e. the amount of published patents or the amount of scientific publications. The innovativeness is an important part of the Knowledge Economy and should be therefore included into our findings. We analysed the amount of patents for each city between 2000 and 2012. Tokyo has had, by far, the most publications over the years. In total, 39,433 patents have been published since 2000. Kyoto took the second place regarding the amount of patents with total 10,376 ones since 2000. Osaka followed Kyoto with most patents, at the amount of 2,054 since 2000, and Yokohama has the fewest patents, namely 1,191. According to Web of Science, the most scientific publications in 2012 came from Tokyo (24,882), followed by Kyoto (7,805), Osaka (4,930), and Yokohama (4,656) (Pyka, 2013). Hence, Tokyo has the biggest output referring to the knowledge and innovativeness sector. The other cities are far behind. As for Kyoto, in spite of its smaller size and resources, it still manages to maintain its big knowledge cluster. Osaka and Yokohama, compared to Tokyo and Kyoto, did not perform very well.

In many growing informational cities, there have been or are political programs to build necessary infrastructures and to coordinate the way toward them. As our society is increasingly mobile, it demands a spatial and temporal unrestricted access to information and transactions. Therefore, in many areas of the world municipalities are adopting E-Government in order to improve their public service delivery and provide a “one-stop” government access to citizens (Holzer, Manoharan, & Van Ryzin, 2010, p. 104). The highly developed ICT tools and applications boost the emerging explosion and utilization of e-commerce and e-business models in a private sector and consequently force the public sector to revise its bureaucratic organizational models (Ndou, 2004, p. 2). The Internet encourages reinvention of local governments, i.e. its transformation from the traditional bureaucratic paradigm to the E-Government paradigm (Ho, 2002, p. 434). The first one is characterized by functional rationality, departmentalization, hierarchical control, rule-based management, standardization, and operational cost-efficiency. The later one, the e-government paradigm, is based on competitive, knowledge-based economy and is characterized by flexibility, coordinated network building, vertical and horizontal integration, innovative entrepreneurship, organizational learning, external collaboration and customer service (Ho, 2002; Ndou, 2004; Holzer, Manoharan, & Van Ryzin, 2010, p. 104).

We investigated the political willingness of the national and local governments by analysing their latter initiatives and programs aiming at developing and/or reinforcing diverse infrastructures. Hereby we focused on goals relevant to our research, i.e. knowledge, digital, creative or smart infrastructure. The majority of political programs were unsurprisingly initiated by the national government. This is not an unusual phenomenon and it indicates a strong centralisation of political power. Tokyo’s government offers a big variety of projects. It mainly tries to attract even more international investors and companies. Nevertheless, it is also interested in other areas of development, like i.e. Creative Economy. Finally, it conducts a smart city project, trying to diversify energy sources and to guarantee a sustainable and undisturbed (e.g. by natural disaster) energy utilization. Osaka focuses rather on the revitalization of its former economic and commercial importance. The plans involve the development of large complexes or districts containing a variety of facilities for international businesses, research centres and places where creative people can meet and interact. Yokohama also

provides special facilities and incentives to attract foreign businesses, but its main focus lies on smart city solutions, which are already appreciated at the international level. Kyoto is far behind in matters of big projects aiming at discussed infrastructures. One reason can be the historical value of Kyoto and some constraints regarding urban development (like changes of the city’s appearance). However, it should not prevent from creative programs or smart city solutions. In matters of capital and power flows, Kyoto is also behind the other investigated cities. Nevertheless, it has an excellent R&D, knowledge centre and a relatively strong IT market.

Japan scores very well at the international level as for e-government readiness and e-participation. However, the local results are less satisfactory. The investigated five pillars of e-government include the information dissemination, communication, transaction, integration and participation. The most important aspects belonging to these pillars can be seen in figure 1. In result, Tokyo scored 304.15 points (out of 500) and Osaka 261.76 points. Apparently, the shift from a bureaucratic paradigm is not yet completed. There is a big amount of information available on the websites, also regarding carrying through administrative transactions. But, all in all, many of them have to be conducted personally and not online. The integration between departments is advanced and leads to portals offering information from diverse sources (“one-stop” government). The participation options are rather limited, possibly because of a small demand in this regard. Yokohama’s e-Government is international-oriented (due to the exact translation of the city’s website into English) and focuses on supporting foreign investors. Probably because of this main priority, other factors as transactions and participation are not as developed as in Tokyo or Osaka. It scored only 129.69 points. In Kyoto, the focus lies on supplying the citizens or visitors with news, alerts with upcoming events or living information. This portal design is highly information-oriented and lacks transaction services. It scored only 112.94 points, and its performance is comparable to Yokohama.

**Figure 1** *The five pillars of e-government. Adapted from Mainka et al. (2013a).*

Information dissemination	Communication	Transaction	Integration	Participation
<ul style="list-style-type: none"> <li>• information types</li> <li>• user types</li> <li>• contact information</li> <li>• current affairs</li> <li>• emergency number</li> <li>• city map</li> <li>• accessibility (e.g. mGovernment)</li> <li>• transportation</li> </ul>	<ul style="list-style-type: none"> <li>• social media services</li> <li>• fixing appointments online</li> <li>• email response</li> <li>• feedback</li> </ul>	<ul style="list-style-type: none"> <li>• online forms for filling-in</li> <li>• online payment of taxes, penalties etc.</li> <li>• library services</li> <li>• personalized portal for residents</li> </ul>	<ul style="list-style-type: none"> <li>• vertical (possibility to obtain information and services from other agencies, departments or offices from just one portal)</li> <li>• horizontal (common database, intranet and standardized software for all departments)</li> </ul>	<ul style="list-style-type: none"> <li>• giving feedback about political matters</li> <li>• filing a complaint</li> <li>• participating in a opinion survey</li> <li>• online elections</li> </ul>

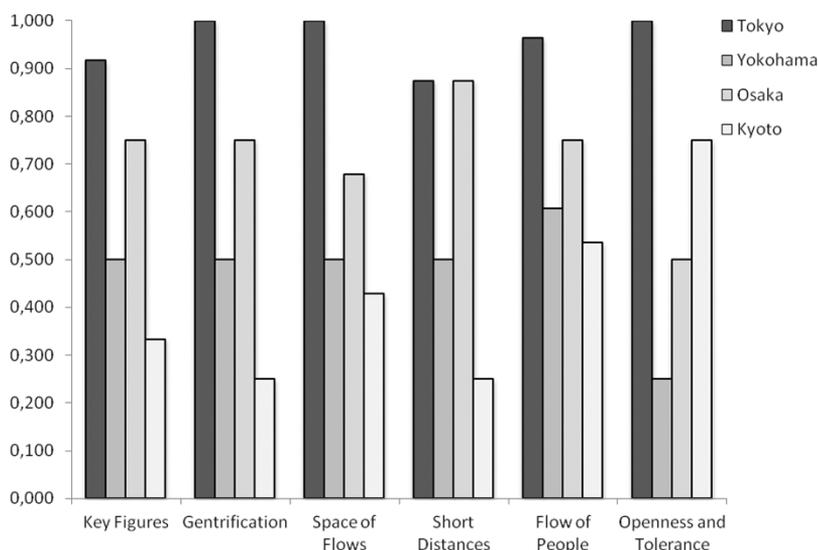
## Conclusion

In this regional comparison of Tokyo, Osaka, Kyoto and Yokohama, we analysed many different indicators of two categories constituting the concept of an IC: the degree of *cityness*, and the degree of informativeness (in terms of the labour market and mix of companies, E-Governance, and E-Government). The main goal was to investigate if the

cities may be regarded as (emerging) ICs. In order to compare the metropolises we quantified all investigated indicators. For each indicator (like e.g. distance from the city centre to the airport) we created a rank-list of the cities and valued each with points between 0 and 1 (0; 0.25; 0.5; 0.75; 1), where 1 means the best city (i.e. best performance or simply the presence of an important aspect) and 0 means the worst performance (i.e. 0.25 for the worst performance compared to other investigated cities or 0 points in case of non-existence of an important aspect). If there were no data available for all the cities or the data was incomplete, we did not assign any points. For each group of indicators and for all indicators we calculated the mean value of a category.

In terms of the Global City we measured the level of cityness of each city. All in all, we analysed five groups of indicators. The mean average of the results for each group is showed in Figure 2. As we can see, Tokyo succeeded in all categories. Osaka stayed behind Tokyo, and was overtaken only by Kyoto in terms of “tolerance and openness”. In other aspects, Yokohama was the 3<sup>rd</sup> best city. The mean average of all groups leads to a conclusion that Tokyo has the highest level of cityness (average value of 0.963 points from 1) and is the best example for a Global City among the investigated Japanese cities. Osaka stayed behind Tokyo, with a quite good result of 0.725 points. Hence, it can also be considered as a Global City. Yokohama (0.525) and Kyoto (0.45) did not perform that well, as the flows of power and money are not as strong as in the top two cities. However, it is important to keep in mind that the results are relative to the performance of other cities, and that e.g. Kyoto’s rather unsatisfactory score results from the much better results of Tokyo, Osaka and Yokohama.

**Figure 2** *The mean values of investigated indicators in terms of the cityness level for Tokyo, Yokohama, Osaka and Kyoto.*

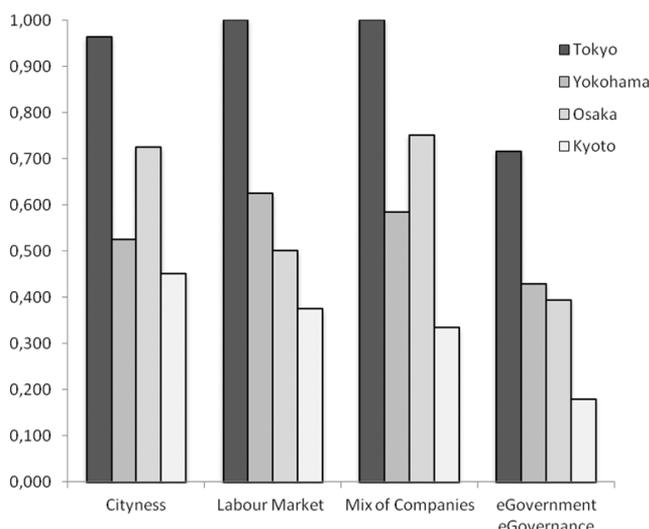


Cityness level is only one indicator for an informational city. In order to examine which of the four cities are (emerging) informational cities we had to take further factors into account. Figure 3 presents the mean values for categories investigated in this case study, which indicate city’s level of informativeness. These categories are: cityness, labour market, mix of companies, e-government and e-governance. The resulting

ranking is similar to the ranking regarding the single aspects of cityness. Considering all investigated categories, Osaka did not perform very well. Osaka's result (0.592 points) is closer to Yokohama's (0.540 points) than Tokyo's result (0.919 points). Kyoto's performance was the last one of the investigated cities – only 0.334 points.

In this case study only a part of indicators contributing to the city's informativeness was analysed. Further aspects as the knowledge city, digital city, creative city or smart city infrastructure would most probably influence the results. Nonetheless, the investigated categories are very important components of an informational city and consist of a great variety of significant indicators. Therefore, we can formulate an initial conclusion that Tokyo may be considered as an informational city (because of its high level of cityness indicating an advanced space of flows), whereas Osaka and Yokohama at least as emerging informational cities. Kyoto needs to improve some aspects in terms of its cityness level as well as the political initiatives establishing or strengthening the infrastructures of an informational city.

**Figure 3** *The mean values of investigated categories in terms of the cities' informativeness level.*



We investigated the cityness and informativeness level of four Japanese cities applying concepts and methods of the information science. Our aim was to specify the theoretical framework for measuring the informativeness and cityness level of a city, and to determine if the four investigated metropolises might be considered as the (emerging) Informational Cities. Our further research aims are: the investigation of additional indicators (e.g., infrastructure of the knowledge, digital, creative, or smart city), possible impacts on the high informativeness level (like e.g. political, religious or legal underpinnings) as well as its positive outcomes (like enhanced entrepreneurship). Furthermore, a successful application of our new model on further cities (in Japan and over the world) is targeted. Finally, we will adjust our strict quantification method in order to more precisely reflect the differences between the cities (hence, change the rigid rating with 0.25 intervals), as well as to make the scores more independent from other cities performances.

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