Duwaraka Murugadas [1]
Stefanie Vieten [2]
Janina Nikolic [3]
Kaja J. Fietkiewicz [4]
Wolfgang G. Stock [5]

CREATIVITY AND ENTREPRENEURSHIP IN INFORMATIONAL METROPOLITAN REGIONS

Abstract

Due to the growing importance of metropolitan regions for the economy this work aims at analyzing what fosters economic prosperity. We propose the theory that creativity generates new ideas and enhances the entrepreneurship level in the city. In this research the focus lies on metropolitan regions, located around 30 Informational World Cities, which are prototypical cities of the knowledge society. Referring to Friedmann, we extended our focus to regions (surrounding the cities) and went beyond administrative boundaries for the purpose of economic integration and commuting flows to be included. The main task entails finding a possible correlation between creativity, entrepreneurship and economic prosperity. In order to do so, we had to determine adequate indicators describing these aspects. Regarding the economic prosperity we elaborated the GDP per capita. As for entrepreneurship, we focused on the self-employment rate and establishment of new firms. For the purpose of measuring the creativity we had to define it first, namely as constructiveness and innovative problem solving. This means creativity is not only to be found in the field of arts, but also in the fields of science, technology and research. Therefore, we chose the following four indicators to measure the level of creativeness: the Bohemian Index according to Florida which measures the amount of creative people within the city, the creative infrastructure, the scientific (publications) and the technological output (patents). To sum up, our research questions are: Can it be stated that in the informational metropolitan regions the more creative the city is, the more entrepreneurs it has? And, is there any correlation between creativity, economic prosperity, and entrepreneurship?

Keywords

Creativity, Economic prosperity, Entrepreneurship, Metropolitan regions, Informational World Cities

1. Introduction

Metropolitan regions have been gaining in importance for the economy. Thus, in this work we investigate if there is a correlation between indicators of creativity and entrepreneurship in informational metropolitan regions in order to ascertain what fosters economic prosperity. These regions are located around 31 potential Informational Cities designated by

[1] Heinrich-Heine-University, Germany, e-mail: Duwaraka.Murugadas@uni-duesseldorf.de
[2] Heinrich-Heine-University, Germany, e-mail: S.Vieten@uni-duesseldorf.de
[3] Heinrich-Heine-University, Germany, e-mail: Janina.Nikolic@uni-duesseldorf.de
[4] Heinrich-Heine-University, Germany, e-mail: Kaja.Fietkiewicz@uni-duesseldorf.de
[5] Heinrich-Heine-University, Germany, e-mail: stock@phil-fak.uni-duesseldorf.de

Mainka et al. (2013) (see appendix). Informational Cities are the prototypical cities of the knowledge society and the new centers of power, which have a "glocal" orientation since they can act out both—locally and globally (Stock, 2011; Mainka, Khveshchanka, Stock, 2011). Castells (1989) bespeaks Informational Cities as parts of knowledge societies. In such cities two kinds of spaces coexist: the "space of places" and the "space of flows," meaning the flows of information, capital and power. Informational Cities are important nodes of the space of flows (Castells, 2000) and if they are important glocal cities, they often are world cities as well. Furthermore, global cities serve as locations for the headquarters of global companies that require information and expert knowledge. And since there are a lot of different companies with various talents and expertise within one global city, the city itself becomes an information center (Sassen, 2001).

According to Friedmann (1995, p. 23), "world cities are large, urbanized regions that are defined by dense patterns of interactions rather than by political-administrative boundaries." Thus, for the purpose of this research, the focus was expanded from just the cities themselves to the metropolitan regions they lie in, because "metro-regions are based on agglomerations, which include the commuter belt around a city" (Eurostat, 2013) and so, "this approach corrects the distortions created by commuting" (Eurostat, 2013).

Since this work aims at analyzing the correlation of creativity and entrepreneurship, these concepts have to be defined first. As for creativity, it is not possible to find an explicit definition. According to Florida (2003, p. 40), "creativity is multifaceted and multidimensional." He identifies three different kinds of creativity: technological creativity or innovation, economic creativity or entrepreneurship, and artistic and cultural creativity, which are dependent and reinforce each other. One theory to explain regional development is "human capital," i.e. the importance of highly educated and productive people. The higher the number of talented people, the more further talent is attracted, which includes existing firms as well as the creation of new enterprises (Florida, 2005). Florida identifies the "creative capital" as a type of human capital and the key to economic growth. Creative people prefer places which are diverse, tolerant and open to new ideas (Florida, 2002), so his creativity-based theory consists of the "3 T's" of economic development: technology, talent and tolerance. As a result, Florida has used different indicators to verify this theory. Besides the Innovation Index, the Gay Index and several more indicators, the Bohemian Index reveals a region's level of aesthetic creativity and measures artistically creative people like authors, designers, musicians, composers, actors, directors, painters, sculptors, artist printmakers, photographers, dancers, artists, and performers. Moreover, he defined the Creative Class in a broader way with the main aspects of marketability and creative problem-solving. This includes occupational fields of scientists and engineers, artists and designers, as well as creative professionals, managers and technicians (Florida, 2003). Concerning the overlap of the Bohemian Index and the Creative Class as well as the difficulty of finding data comparable to Florida's values, another established term was used to capture the habitat of creative workers: "creative industries," also called "cultural industries" or "creative economy" (Hesmondhalgh, 2002; Howkins, 2001). The British Department for Culture, Media and Sport (DCMS) describes the creative industries as "those industries which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property" (DCMS, 2001, p. 4). In 2006, the DCMS recognized twelve creative sectors including advertising, architecture,

crafts, arts, design, fashion, film, video, photography, software, computer games, publishing, music, performing arts, television, and radio. Nevertheless, there still remain different though similar comprehensions of the term "creative industries." For example in the USA the creative industries are defined as industries composed of arts-related businesses that range from non-profit museums, symphonies, and theaters to for-profit film, architecture, and advertising companies. In other regions it is the "creative and cultural industries," not directly implying which sectors are included or if creative industries contain cultural industries per se.

Besides creativity, the second important concept is entrepreneurship. It can be defined as the process by which individuals follow opportunities without regarding resources they currently control (Stevenson, Jarillo, 1990). The most obvious process of entrepreneurship is a business coming into existence (Gartner, 1989). A possible coherence between both creativity and entrepreneurship might be the circumstance that researchers can be seen as academic entrepreneurs. Innovations, which researchers create and release in the form of publications and patents, are not only a type of creativity, but also a kind of entrepreneurship since "they 'sell' their products at conferences, journals" (Erdös, Varga, 2012, pp. 157-158). According to Etzkowitz (1983, p. 199), research groups can even be declared "quasi-firms."

1.1. Indicators

To quantify the aspects of creativity and entrepreneurship, several indicators were defined. Our index describing entrepreneurship consists of two indicators: the number of enterprise births (Lee, Florida, Acs, 2004) and the self-employment rate—two measures which are also to be found in the literature (Glaser, Kerr, 2009; Blanchflower, Oswald, 1998). It is stated that self-employment is the "simplest kind of entrepreneurship" (Blanchflower, Oswald, 1998, p.27). Apart from these indicators, a third one counting the number of small and medium enterprises (SME) was initially included. Since it was found that in most of the regions the ratio of SMEs amounted to more than 98%, it was decided that this indicator would not show significant differences between the various investigated regions and was thus removed from the Entrepreneurship Index. The Creativity Index is comprised of four indicators: the ratio of creative workers, the creative infrastructure (on city level, because data could not be found consistently on regional level), the scientific output and the technological output. In accordance to Florida's Bohemian Index and his Creative Class (2002), the ratio of creative workers was calculated by computing the percentage of employed people in the creative industries in relation to all employed people. What accounts for a creative city is not only "cultural production" but also "cultural consumption" (Hall, 2004, p. 257), which is why the creative infrastructure was included into the Creativity Index as well. Furthermore, the afore-mentioned three types of creativity (Florida, 2003) were incorporated into the compiled list of indicators. So, to cover the aspect of creativity not only in the sense of culture and arts, innovation as a form of creativity was taken into consideration as well by measuring the scientific output (published articles) and the technological output (number of international patents). Apart from the Entrepreneurship Index and the Creativity Index, two further general indicators were incorporated into the statistical analysis. One of these indicators is the GDP per capita to capture the economic

prosperity of the metropolitan region. In this way, we are able to answer the question whether creative people foster the economy. The second general indicator is the population in order to put the other indicators into perspective and get comparable results for each of the investigated regions.

1.2. Research questions

Based on the defined indicators the following research questions were formulated:

- Can it be stated that in the informational metropolitan regions the more creative the city is, the more entrepreneurs or economic prosperity (Florida et al., 2011) it has?
- Is there any correlation between creativity, economic prosperity, and entrepreneurship?
- Are there any distinctions between different continents or nations which can lead to the assumption of diverse cultural influence and development?
- Which type of creativity has the greater impact on economic prosperity, if any?

Answering all these questions is a challenge to meet and requires the right tools to obtain significant results like a variety of methods to collect and correlate the data. This approach is explained in the following.

2. Methods

During the investigation of the introduced research questions different methods were used. These encompass working with official statistics, informetrics (consisting of bibliometrics and patentometrics), online content, and statistical analysis.

2.1. Official Statistics

Official statistics, which are based on the respondents' obligation to give truthful and unmitigated information, were used to obtain profound statements about the investigated indicators. To enable an international comparison between regional currencies, the prices were adapted to US dollars. Furthermore, all statistical data was preferably collected from the year 2012 and from an extended period of time in case the data for 2012 was not available. In this respect, finding data for Dubai turned out to be a problem since hardly any data could be found. Due to that, it was decided to leave Dubai out as one of the originally 31 informational cities; hence, this research focused on metropolitan regions located around the remaining 30 informational cities.

2.2. Informetrics

As an indicator to study a region's technological output (patentometrics) and scientific output (bibliometrics), the number of its patents and publications from 2003 to 2012 was derived from respective databases. To determine the number of patent applications, a

search was performed in the Patentscope database of the World Intellectual Property Organization (WIPO). The database enables a patent search on city level (field: AAD), at the same time considering the priority date of an application (field: PD). Every city located in a region had to be included with disjunction, except for the regions of the United States where only principal cities could be regarded. By involving a country restriction (field: AADC) homonymous city names were avoided (e.g. London, UK and London, Ontario). To include different notations, a city's English name was linked to its national language's name, if necessary, and alternate spellings were utilized for the German umlauts. Furthermore, only the number of international patents (WO applications) was taken into consideration, which enabled a better comparability between the different regions.

The number of publications (scientific output) was ascertained using the interdisciplinary database Web of Science by Thomson Reuters, which allows searching for a city (field: CI) and a publication year (field: PY).

2.3. Online content analysis

Useful information can also be provided by conventional websites. Since not every data was available through official statistics, especially data describing the creative infrastructure (theaters, galleries etc.), and the number of start-up companies were retrieved from reliable websites.

2.4. Statistical analysis

Previous to the computation of any correlations, the indicators expressed by absolute numbers had to be made comparable, taking into consideration the size of the region, so that small regions were not disadvantaged compared to the greater ones. Therefore, such indicators were relativized by the population size of the respective area.

To determine possible correlations between the entrepreneurial and the creative indicators, the correlation coefficient by Pearson was applied to all of the statistical series comparing every indicator with all other indicators. As a result of the application of the Pearson coefficient for each two compared indicators, a value figure between -1 and 1 was obtained. Any figure between 0 and 1 shows a positive correlation between the indicators while a figure between 0 and -1 signifies a negative correlation. The greater the distance to 0, the stronger the correlation. These correlations were computed not only for the comparison of all metropolitan regions but also for metropolitan regions within a country or a continent, which are the United States of America, Europe and Asia. As it was not intended to compare the metropolitan regions within these areas on the level of the single indicators, they were agglomerated to two indexes: an Entrepreneurship and a Creativity Index. For comparison, the agglomeration approach was also conducted for all investigated metropolitan regions. Both, the Entrepreneurship Index as well as the Creativity Index, are composite, agglomerated indicators (Saisana, Saltelli, Tarantola, 2005). There is no “real counterpiece” of such indicators; they are pure constructs.

To agglomerate the different indicators within one index, the found data for each of them (and not the relativized values) was turned into a percentage. 100% were designated to the highest value within each indicator. All other values were calculated as the percentage of the previously determined highest value. Subsequently, the average of all indicators' percentages had to be computed for each region to obtain its index value. To calculate the Entrepreneur Index, for example, the average of the appertaining indicators self-employment rate and enterprise births was computed.

3. Results

The correlation of the described indicators resulted in the values listed in table 1. The highest value is 0.541, which represents the coherence between the population and the ratio of creative workers. In contrast, the most negative correlation exists between the population and the scientific output (-0.509). Remarkable results are the correlation of creative facilities and the scientific output (0.529) as well as a mediocre negative coherence between the GDP per capita and both the self-employment rate (-0.378) and the ratio of creative workers (-0.374).

As mentioned in the introduction, creativity is measured in different ways depending on the region's definition standards. Hence, it is difficult to compare the values of creativity homogeneously. Furthermore, it was not possible to find all information for every city. For instance, the number of enterprise births could not be found for Hong Kong. Therefore, to find a better way to compare entrepreneurship and creativity, and to obtain more significant results, it was more reasonable to create agglomerated indexes as well as to distinguish between the different continents the metropolitan regions are located in (table 2). This way, continentally and nationwide differing trends could be examined.

Total	*GDP per capita in Dollar*	*Population*	*Self-employ-ment rate*	*Enterprise births per 1,000 inhabitants*	*Ratio of creative workers*	*Creative facilities per 1,000 inhabitants*	*Scientific output per 1,000 inhabitants*	*Technological output per 1,000 inhabitants*
GDP per capita in Dollar	1							
Population	-0,270	1						
Self-employment rate	**-0,378(*)**	0,094	1					
Enterprise births per 1,000 inhabitants	0,114	**-0,373***	0,049	1				
Ratio of creative workers	**-0,374**	**0,541**	0,119	**-0,364**	1			
Creative facilities per 1,000 inhabitants	0,071	**-0,475****	-0,041	0,297	-0,100	1		
Scientific output per 1,000 inhabitants	**0,398***	**-0,509****	-0,166	0,108	-0,128	**0,529****	1	
Technological output per 1,000 inhabitants	**0,479****	-0,124	-0,282	-0,098	-0,033	0,241	**0,438****	1

Table 1. *Correlations of the investigated informational metropolitan regions (Multiple sources; own calculation); significance level of 10% (*), 5% *, 1% ***

	GDP per capita in Dollar	*Population*	*Entrepreneurship*	*Creativity*
Total				
GDP per capita in Dollar	1			
Population	-0.270	1		
Entrepreneurship	-0.106	-0.242	1	
Creativity	**0.304**	-0.242	-0.041	1
Asia				
GDP per capita in Dollar	1			
Population	-0.086	1		
Entrepreneurship	**0.775**	-0.109	1	
Creativity	**0.311**	**0.525**	0.365	1
Europe				
GDP per capita in Dollar	1			
Population	0.297	1		
Entrepreneurship	**-0,416**	-0,105	1	
Creativity	0,040	**-0,387**	-0,219	1
USA				
GDP per capita in Dollar	1			
Population	**-0.398**	1		
Entrepreneurship	**-0,330**	**0,745**	1	
Creativity	**0,910***	**-0,482**	**-0,465**	1

Table 2. *Agglomerated correlations of the investigated informational metropolitan regions by region (Multiple sources; own calculation); significance level of 5% **

As can be seen in table 2, there are considerable differences between the correlations of the different continents and countries, and all metropolitan regions in total. However, it has to be considered that these values are not representative of the whole continent or country itself, but only for the investigated informational metropolitan regions located there. In this work, the focus lies on the correlation between creativity and entrepreneurship. Whereas the consideration of all regions in total did not reveal special findings, there are expressive results regarding the continental or nationwide correlation values. In the US regions, the GDP per capita and creativity correlate highly positive (0.910). In contrast, a relation of this kind cannot be found for the European regions (0.04). Taking a glance at the whole table, it can be seen that for each country or continent the significant correlation values differ enormously. The most remarkable difference can be observed between the correlation of the GDP per capita and entrepreneurship in Asia and Europe. In Asia, there is a high correlation of 0.775, while there is a mediocre negative correlation of -0.416 for European Informational World Cities.

These numerical results allow assumptions about the significance of the dependence of creativity and entrepreneurship as well as of the other investigated indicators which are discussed in the following paragraph.

4. Discussion

The focus of this research lay on the impact of creativity on the entrepreneurship in informational metropolitan regions. After analyzing the elaborated results, we can state that there do exist coherences between entrepreneurship and creativity to a varying degree depending on the investigated region and the agglomeration. The correlation of the agglomerated indicators (table 2) shows that in total there is a slightly positive correlation between creativity and the GDP per capita, which represents the region's economic prosperity. A glance at table 1 reveals that this is mainly due to the positive correlations of the scientific and technological output, whereas the creative facilities only have a noticeably weak correlation with the GDP per capita; the amount of creative workers even correlates not inconsiderably negative with the economic prosperity.

This finding inevitably leads to a discussion about Florida's thesis that creativity and economic growth interrelate. He states that in the American society the people "now live in an 'information' or 'knowledge' economy. This economy is powered not by information or by knowledge, but by human creativity" (Florida, 2003, p. 39). As the correlation of the agglomerated indicators shows (table 2), this is unmistakably true for the USA: creativity and the GDP per capita correlate positively with a remarkable correlation value of 0.910. This assertion originally made for the USA does not necessarily hold for the other investigated regions, though. While in Asia there still is a slightly positive correlation to be found (0.311), there is no considerable correlation for Europe (0.04).

The most striking correlation value for all investigated metropolitan regions (table 1) is the correlation between the creative facilities per 1,000 inhabitants and the scientific output per 1,000 inhabitants. This value can only be of fortuitous nature, though, since no immediate causal relation between these indicators could be found. A possible explanation might be that both indicators are in the same way influenced by another third indicator and, therefore, correlate. The slightly positive correlation between the scientific output per 1,000 inhabitants and the GDP per capita (0.398) for all investigated regions possibly arises from the fact that the more prosperous a region is, the more higher education institutions it can afford; and at the same time it might imply that the scientific output, and thus the work of higher education institutions, fosters the economic prosperity of a region.

Regarding creativity, the scientific and technological output have the highest influence on the GDP per capita, which explains the strength of the USA in this area with an average of 20.8 publications and 3.7 patents per 1,000 inhabitants. Although Asia has a huge ratio of creative workers, the correlation is even highly negative (-0.796), which underlines that the output or production of a creative city is more important than just the number of employed people in the creative sector, because Asia has the least scientific and technological output. With reference to the GDP and entrepreneurship, differences arise between Asia and the USA or Europe. While the GDP in Asian regions is growing with the increase of entrepreneurship (0.775), in western regions a lower amount of large enterprises tendentially suggests economic prosperity and one seems to be less willing to take risks. Furthermore, the indicator enterprise births per 1,000 inhabitants is obviously more expressive in the context of GDP per capita than the self-employment rate as Europe, for example, has the highest average self-employment rate (12.9%) but nevertheless a negative

correlation between GDP per capita and entrepreneurship (-0.416). The GDP per capita and the population can only be minimally associated with each other, where the type of cohesion is different for the European regions (0.297) than for the US regions (0.398). For the investigated European metropolitan regions it is the case that a higher population implies a higher degree of prosperity, while in the investigated US regions, a smaller population comes along with a higher GDP per capita. A linkage between the population and entrepreneurship can only be detected for the analyzed metropolitan regions of the USA, but in this particular case a rather conspicuous one. Since the USA is the weakest of the regions in terms of entrepreneurship and only there the population and entrepreneurship correlate positively, and additionally fairly high (0.745), it seems that from a certain degree of existent entrepreneurship in a metropolitan region onwards, the size of the population does not play a major role anymore. Concerning the correlation of the population and creativity, there are differences to be noticed between the Asian and the western regions. The greater the population in the Asian regions, the higher the degree of creativity, especially the percentage of people employed in the creative industries. As the Asian regions have a larger population on average (16.8 million inhabitants), the impression that creativity in these regions is generated through quantity instead of scientific and technological output (in contrast to the western regions) can be confirmed. Positive correlations between entrepreneurship and creativity can also only be spotted in the Asian regions.

5. Conclusion

Overall, it cannot be stated that in the informational metropolitan regions creativity always generates more entrepreneurship or prosperity, but most certainly there are correlations between these aspects, although to different degrees. It was found that the influence of creativity on economic prosperity is mainly caused by a certain type of creativity, which is the technological creativity and innovation, while creative workers and creative facilities only play a minor role in this respect. Moreover, the investigated metropolitan regions of the USA and Asia seem to be greatly different in respect of entrepreneurship and creativity, while the European regions do not show such high extremes but have correlations that are rather tendentially prone to those of the USA than those of the Asian regions. Hence, it can be stated that the initially posed research questions cannot be answered for all investigated metropolitan regions in total. Future investigations could work out the differences and the specific reasons therefore. Besides promotion programs for entrepreneurs or creative workers, also the hard and soft location factors of metropolitan regions should be considered, as they attract more human capital.

During the search for and the analysis of the official statistics several obstacles arose in so far as that the international comparison had been complicated by the absence of a coherent, transnational standard for statistics of all administrative levels. On the one hand, data for the same indicators were partly findable by different terms and on the other hand, some terms, especially within the creative sector, denote distinct entities. With regard to the alleged informativeness of these world cities, there still is potential for improvement to guarantee an optimal data acquisition. Additionally, a useful step would be the extension of statistics for metropolitan regions because they are the engines of economic prosperity and this growing importance should be describable in facts and figures.

In conclusion, it can be said that creativity in general has a more distinct positive correlation with the economic prosperity of a metropolitan region than entrepreneurship. At the same time, creativity and entrepreneurship correlate with each other both positively as well as negatively—depending on the country or continent one lives in: positively in informational regions in Asia, slightly negatively in Europe and very negatively in the USA.

6. Bibliography

1. Blanchflower, D. G., Oswald, A. J. (1998). What makes an entrepreneur? In Journal of Labor Economics, 16(1), 26-60.
2. Castells, M. (1989). The Informational City: Information Technology, Economic Restructuring, and the Urban Regional Process. Oxford, UK: Blackwell.
3. Castells, M. (2000). European cities, the informational society, and the global economy. In L. Deben, W. F. Heinemeyer and D. van der Vaart (eds.), Understanding Amsterdam: Essays on Economic Vitality, City Life and Urban Form (pp. 1-18). Amsterdam, NL: Spinhuis.
4. DCMS (2001). Creative Industries Mapping Document 2001 (2nd ed.). London, UK: Department of Culture, Media and Sport.
5. DCMS (2006). Creative Industries Statistical Estimates Statistical Bulletin. London, UK: Department of Culture, Media and Sport.
6. Erdös, K., Varga A. (2012). The academic entrepreneur: myth or reality for increased regional growth in Europe? In M. Van Geenhuizen, P. Nijkamp (eds.), Creative Knowledge Cities: Myths, Visions and Realities (pp. 157-181). Cheltenham, UK: Edgar Elgar.
7. Etzkowitz, H. (1983). Entrepreneurial scientists and entrepreneurial universities in academic science. Minerva, 21(2-3), 198-233.
8. Eurostat. (2013). Metropolitan Regions. Retrieved 23.07.2014 from http://epp.eurostat.ec. europa.eu/portal/page/portal/region_cities/metropolitan_regions.
9. Florida, R. (2002). The Rise of the Creative Class. New York, NY: Basic Books.
10. Florida, R. (2003). Entrepreneurship, creativity and regional development. In D. Hart (ed.), The Emergence of Entrepreneurship Policy: Governance, Start-Ups, and Growth in the U.S. Knowledge Economy (pp. 39-53). New York, NY: Cambridge University Press.
11. Florida, R. (2005). Cities and the Creative Class. New York, NY: Routledge.
12. Florida, R. et al. (2011). Creativity and Prosperity: The Global Creativity Index. Toronto, ON: Martin Prosperity Institute.
13. Friedmann, J. (1995). Where we stand: A decade of world city research. In P. Knox, P. Taylor (eds.), World Cities in a World-System (pp. 21-47). Cambridge, UK, New York, NY: Cambridge University Press.
14. Gartner, W.B. (1989). Who is an entrepreneur? is the wrong question. In American Journal of Small Business, 12(4), 11-32.
15. Glaser, E. L., Kerr, W. R. (2009). Local industrial conditions and entrepreneurship: How much of the spatial distribution can we explain? Journal of Economics & Management Strategy, 18(3), 623-663.
16. Hall, P. (2004). Creativity, culture, knowledge and the city. Built Environment, 30(3), 256-258.
17. Hesmondhalgh, D. (2002). The Cultural Industries. London, UK: Sage.
18. Howkins, J. (2001). The Creative Economy: How People Make Money From Ideas. London, UK: Penguin Books.
19. Lee, S. Y., Florida, R., Acs, Z. J. (2004). Creativity and entrepreneurship: A regional analysis of new firm formation. Regional Studies, 38(8), 879-891.
20. Mainka, A., Khveshchanka, S., Stock, W. G. (2011). Dimensions of informational city research. In Digital Cities 7 – Real World Experiences. International Workshop at C&T 2011, 30 June 2011. Brisbane, Australia.
21. Mainka, A., Hartmann, S., Orszullok, L., Peters, I., Stallmann, A., Stock, W. G. (2013). Public libraries in the knowledge society: Core services of libraries in informational world cities. Libri, 63(4), 295-319.
22. Saisana, M., Saltelli, A., Tarantola, S. (2005). Uncertainty and sensitivity analysis techniques as tools for the quality assessment of composite indicators. Journal of the Royal Statistical Society: Series A (Statistics in Society), 168(2), 307-323.
23. Sassen, S. (2001). The Global City. Princeton, NJ: Princeton University Press.

24. Stevenson, H.H., Jarillo, J.C. (1990). A paradigm of entrepreneurship: Entrepreneurial Management. Strategic Management Journal, 11, 17-27.
25. Stock, W. G. (2011). Informational cities: Analysis and construction of cities in the knowledge society. Journal of the American Society for Information Science and Technology, 62(5), 963-986.

Appendix

The Informational World Cities according to Mainka et al. (2013):

Amsterdam (The Netherlands); Barcelona (Spain); Beijing (China); Berlin (Germany); Boston (U.S.A.); Chicago (U.S.A.); Dubai (U.A.E.); Frankfurt (Germany); Helsinki (Finland); Hong Kong (China, SAR); Kuala Lumpur (Malaysia); London (United Kingdom); Los Angeles (U.S.A.); Melbourne (Australia); Milan (Italy); Montreal (Canada); Munich (Germany); New York City (U.S.A.); Paris (France); San Francisco (U.S.A.); Sao Paulo (Brazil); Seoul (Korea); Shanghai (China); Shenzhen (China); Singapore; Stockholm (Sweden); Sydney (Australia); Tokyo (Japan); Toronto (Canada); Vancouver (Canada); Vienna (Austria).

Acknowledgement

We would like to thank Elmar Lins for conducting the significance test.