

## **When the Oryx takes off: Doha a new rising knowledge hub in the Gulf-Region?**

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## **Abstract**

With accelerating pace in the past years, Qatar has strategically pushed forward its economic diversification. According to Qatar's long-term development vision, the knowledge-economy is taking a key role within this economic diversification process and the transformation of its capital into a regional as well as global service-hub.

This paper aims at identifying emerging knowledge-based patterns that drive the Qatari space economy. We apply a research concept that brings together two different scientific angles: relational economic geography and physical urban development aspects. The results indicate first a subsidiary role for the Qatari knowledge intensive firms within the Gulf region; second their predominant connectivity patterns to Europe and South-East Asia; third as a distinct lack of urban amenities and qualities for knowledge workers.

Keywords: Knowledge economy, Doha, Qatar, Gulf, advanced producer services, high technology, urban hierarchy.

## Introduction

‘When the Oryx takes off’ stands for a widespread process where globalization has entailed a reorganization of spatial development processes on a global, European, national, and regional scale. The Oryx antelope is the iconic logo of Qatar Airways, which can be regarded as one epitome of Doha being a new rising hub in the Gulf region. One consequence of this global transformation is the emergence of a new spatial logic in which the structures of whole societies, economies, and national states are determinate by different kinds of flows, such as information, capital and power flows. New forms of hierarchical and network developments and functional differentiation between cities can be observed (Hales and Pena 2012; Sassen 2001; Friedmann 1986). As engines of wealth creation, cities have advanced to the position of global economy focal points. In this context, two competing interpretations of global trends in spatial development are identifiable. On one side of the debate is Thomas Friedman (Friedman 2005), who takes the position that the world has become increasingly flat. According to Friedman, geography no longer matters. In opposition to his is Richard Florida, who claims that “the world is spiky” (Florida 2005). According to his point of view, a diminishing number of cities must compete for the talent and global business elites that drive the world’s economy. And indeed, spikiness appears to have reignited the debate: developments in information and communications technology may have shrunk the world, but there appears little evidence that this is the end of geography or the “death of distance” (Cairncross 1997).

In order to understand the competitive nature of cities, especially those exposed to global competition, it is essential to understand the character of their networks. Manuel Castells published one of the most influential academic works in the recent past about this topic. According to Castells’ (Castells 1996) seminal work on space of flows, societies are centered around a variety of flows: “flows of capital, flows of information, flows of technology, flows of organizational interactions, flows of images, sounds and symbols.” They are the expression of the process dominating our economic, political and symbolic life. Thus, we propose the idea that there is a new spatial form characteristic of social practices that dominates and shapes the network society: The space of flows” (Castells 1996). Castells develops a new perception of spatial and urban development by identifying the space of flows as the underlying concept of spatial developments rather than the space of places, represented by world cities and other territorial spaces: The global city is not a place, but a process (Castells 1999). The rise of the networked economy, the space of flows, and the growing spikiness of the global urban hierarchy is fueled by advances in transport and telecommunication technologies in addition to the growing mobility of global business elites. In this context, the development of cities is increasingly dependent on their position in international flows of capital, knowledge, foreign direct investments, and commodities.

In recent years the global economy has found itself in a transitional phase, “with an accent shifting in the sense that knowledge is steadily gaining weight as a production factor” (van den Berg et al. 2005; Rollwagen and Voigt 2012). Today knowledge is considered a key driver for innovation, economic growth, and spatial development. Moreover, it has become an integral part to not only those companies engaged in producer services and advanced manufacturing, but also to “firms in traditional industries in order to stay ahead of international competitors, occupy markets niches, and maintain a competitive advantage” (Bathelt and Glückler 2011; Rollwagen and Voigt 2012). Although its rise has been noted since the 1960s, research still lacks a commonly accepted definition of what the knowledge economy exactly is. We use the definition by Lüthi (2011) who

describes the knowledge economy as the “part of the economy, in which highly specialized knowledge and skills are strategically combined from different parts of the value chain in order to create innovations and to sustain competitive advantage” (Lüthi 2011). In accordance with Thierstein et al. (2006) the knowledge economy is characterized by three important pillars: Advanced Producer Services (APS), High-Tech industries, and knowledge-creating institutions, such as universities and research establishments (Thierstein et al. 2006).

Following Polanyi’s seminal classification, knowledge itself can be distinguished into codified or explicit knowledge on the one hand, and tacit knowledge on the other (Polanyi 1966). As opposed to tacit knowledge, explicit knowledge is codifiable, articulable, and storable – verbally, visually, and symbolically. New information and communication technologies increasingly offer the opportunity to codify and commodify knowledge and make it tradable across time and long distances, which means that codified knowledge is becoming more and more de-territorialized. This enables companies to outsource activities and inputs globally and to benefit from relational proximity and international knowledge spill overs. Contrastingly, tacit knowledge is highly contextualized and not effectively transferable between individuals via certain media. With his well-known phrase ‘we know more than we can tell’ (Polanyi 1966), Polanyi illustrates the fundamental idea of the distinction between explicit and tacit knowledge (Gertler 2003). Tacit knowledge in combination with personal experience is considered an essential prerequisite in creative processes and innovation, and therefore as a foundation of the knowledge economy (Schamp 2003).

Thus a key driver behind the development of spatial hierarchies is the functional logic of the knowledge economy. Firms that are engaged in innovation processes need constantly to create new knowledge and to manage these knowledge resources in an appropriate organizational structure. Knowledge creation requires both tacit and explicit knowledge since tacit insights are needed to interpret explicit knowledge meaningfully (Lambrechts 2008). Most corporations in the knowledge economy develop their location networks as part of their overall business strategy. Thereby, they can split their activities into units and localize them in the most favourable places in terms of local knowledge resources and industrial culture (Dicken 2007). Boschma (2005) argues that the importance of geographical proximity cannot be assessed in isolation, but should always be examined in relation to other dimensions of proximity, relational proximity in particular (Boschma 2005). Thus an empirical analysis of the relative importance of knowledge intensive firms acknowledges that local clustering and global sourcing are compatible and mutually reinforcing business strategies (Lüthi et al. 2013).

The objective of this paper lies in the exploration of the emerging knowledge-based pattern in the case of an emerging city in the Global South. The significance of cities on the Arabian Peninsula in global knowledge economy networks has grown rapidly (Schein 2009). In contrast to cities like Dubai or Abu Dhabi (Blum and Neitzke 2009), Qatar’s capital Doha had attracted little global attention in international research in spite of its rapid urban growth in recent years. The combination of still remaining wealth of fossil fuels, a progressive governance and a fortunate geopolitical location have led to a unique form of urbanism in Qatar. Wiedmann et al. (2014) highlight that the new strategy of developing Doha into a service and knowledge hub as well as a cultural hub for the entire Gulf region replaced the previous local understanding of cities. This change was accompanied by a reinterpretation of governance in a more entrepreneurial sense instead of the former conception of being a ‘rentier state’ based on fossil fuels (Wiedmann et al. 2012).

In this paper we hypothesize that emerging knowledge economies have become visible in the case of Doha by forming strongly established firm networks on a regional and global scale in spite of the fact that economic diversification strategies have only been initiated since 1995, when a new ruler introduced a new economic development vision. We test this hypothesis by applying a comprehensive research concept that analyses the intra-firm and extra-firm linkages of knowledge intensive firms – Advanced Producer Services (APS) and High-Tech sectors. We then map the physical and non-physical functional connectivity of the knowledge economy firms in the case of Doha on different spatial scales, which will produce three main findings: First, the relative significance of the knowledge economy within the long-term development strategy of Qatar will be discussed; second, the spatial patterns of intra- and extra-firm networks on a supra-regional, European, and global scale will be analysed; third, we will briefly shed some light on the inter-relationship between the relational proximity – the connectivity analysis – and the physical proximity in terms of office location patterns of the knowledge economy within the built environment. The next section introduces our research methodology that brings together the locational behaviour of multi-branch, multi-location firms with a value chain approach and it looks at the extent to which this hierarchy is associated with the networking activities of advanced producer services and high-tech firms.

### **Methodology**

To understand the structure of the current patterns of knowledge-based companies in Doha it is necessary to investigate their functional logic and the networks in which the firms interact. This paper analyses the networks of multi-branch firms and measures the flows of information between business partners and their locations on different spatial scales. Thus, strength of this research is its multi-scalar approach. It is important to understand that cities or national states are not self-contained entities but rather connected to other places in the world in multitudinous ways through a broad spectrum of different actors. A particular strength of the network approach is that it integrates various spatial scales rather than giving preference to just one (Dicken 2011). With the proposed research we apply an innovative approach that uses a triangulation of methods consisting of an interlocking network analysis, a value chain approach, and a qualitative network analysis.

The first pillar of our methodology is the analysis of the intra-firm networks, developed by the GaWC Research Network at Loughborough University. This approach estimates city connectivities from the office networks of multi-location APS-firms. These services are described as advanced because they sell high-value information and knowledge (Taylor and Evans 2005). The basic premise of the model is that the more important the office, the greater its flow of information to other office locations.

In the first stage of this empirical work, a reliable company database had to be created. To identify knowledge-based firms within the emerging city of Doha the Zawya Database was used. Zawya is one of the most exhaustive company databases in the Middle Eastern regions providing around 12,500 company profiles. The firms were allocated to the sectors using its (NACE) codes. The following lines of business have been analysed in the present research project:

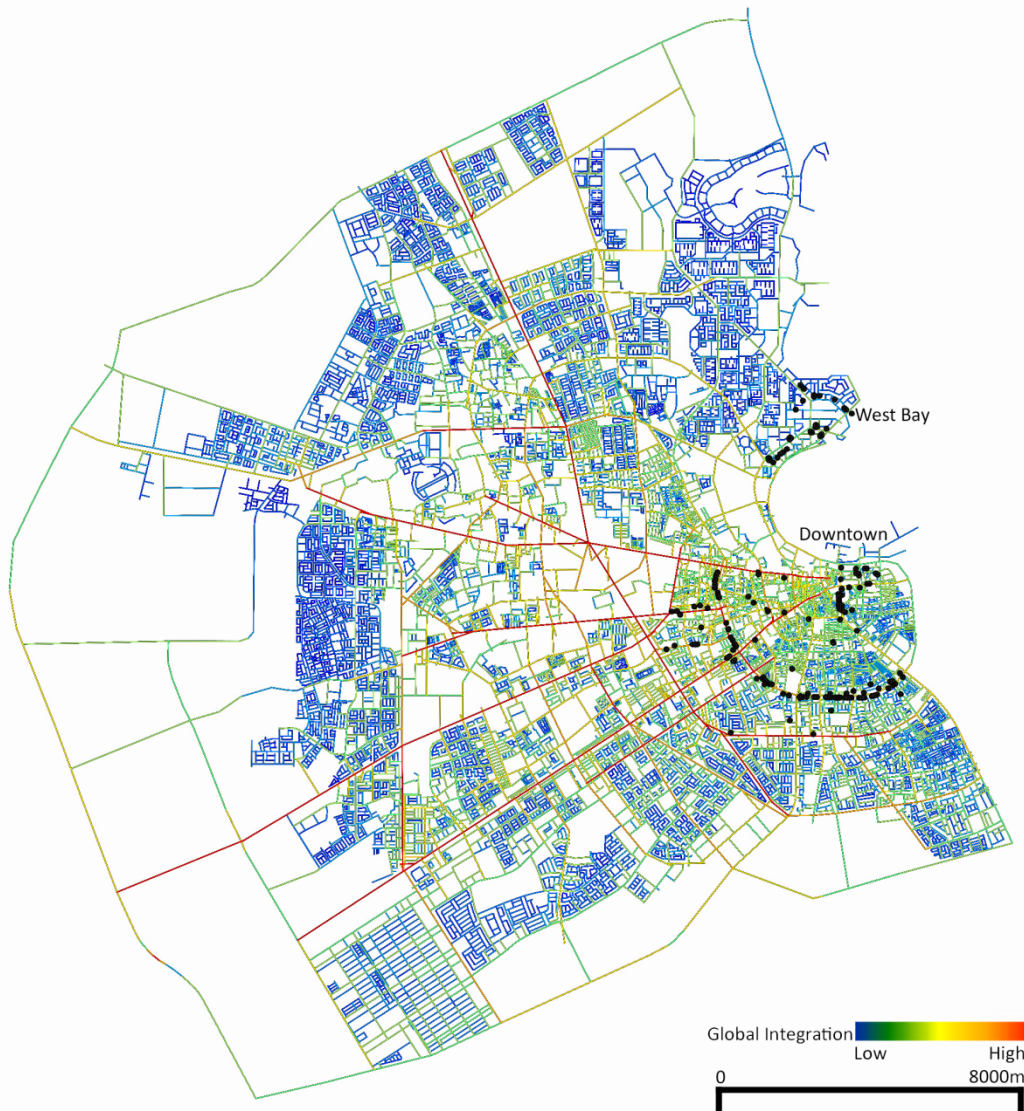
**Figure 1: Operationalization of the knowledge-economy with NACE-codes.**

<b>High-Tech</b>	<b>Advanced Producer Services (APS)</b>
<i>Chemistry &amp; Pharmacy</i> 2330, 2413, 2414, 2416, 2417, 2420, 2441, 2442, 2451, 2461, 2463, 2464, 2466, 2511, 2513, 2615	<i>Banking &amp; Finance</i> 6511, 6512, 6521, 6522, 6523, 6711, 6712, 6713, 7011, 7012
<i>Machinery</i> 2911, 2912, 2913, 2914, 2924, 2931, 2932, 2941, 2942, 2943, 2952, 2953, 2954, 2955, 2956, 2960	<i>Advertising &amp; Media</i> 7440, 2211, 2212, 2213, 2214, 2215, 9211, 9220, 9240
<i>Electronics</i> 3110, 3120, 3140, 3150, 3161, 3162, 3210, 3320, 3330	<i>Information and Communication Services</i> 6430, 7221, 7230, 7240, 7250, 7260
<i>Computer-Hardware</i> 3001, 3002	<i>Insurance</i> 6601, 6602, 6603
<i>Telecommunication</i> 3220, 3230	<i>Logistics (3p &amp; 4p)</i> 6030, 6110, 6220, 6230, 6340
<i>Medical &amp; optical instruments</i> 3310, 3340	<i>Management- and IT-Consulting</i> 7210, 7222, 7413, 7414, 7415
<i>Vehicle construction</i> 3410, 3430, 3511, 3520, 3530	<i>Design, Architecture &amp; Engineering</i> 7420, 7430
	<i>Law</i> 7411
	<i>Accounting</i> 7412

Source: Lüthi 2011, 126

In addition to this, the collected firms were cross-checked and where necessary completed with a company list provided by the GaWC Research Group (Taylor et al. 2011) and by Forbes. All in all, 162 companies have been identified whose office locations are mapped in Figure 2.

**Figure 2: Selected knowledge-intensive companies and its location in Doha**



Source: TUM 2013, Visualization: Wafa Al Ghatam

Carrying out an interlocking network analysis requires the construction of the so-called service activity matrix. Each cell in the matrix is a service value ( $v_{ij}$ ) that indicates the importance of the location  $i$  to firm  $j$ . The importance is defined by the size of an office location and its function. By analysing the firms' website, all office locations were rated on a scale of zero to five. In the first step, the connectivity between two locations ( $a, b$ ) of a certain firm ( $j$ ) is analysed by multiplying their service values ( $v$ ). In this respect, the following equation respects the so-called elemental interlock between two locations for one firm:

$$I_{abj} = v_{aj} * v_{bj} \quad (1)$$

To calculate the total connectivity between two locations, the elemental interlock for all firms located in these two locations have to be summarized. This leads to what is known as the city interlock ( $r_{ab}$ ):

$$r_{ab} = \sum r_{abj} \quad (2)$$

Aggregating the city interlocks for a single location produces the interlock connectivity ( $N_a$ ). This describes the overall importance of a location within the network:

$$N_a = \sum r_{ai} \quad (a \neq i) \quad (3)$$

Finally, if we relate the interlock connectivity for a given city to the city with the highest interlock connectivity, we gain an idea of its relative importance in respect to the other cities that have been analysed. These scores, creating a scale from 0 to 1, are used to indicate hierarchical tendencies.

The second pillar of our methodology acknowledges that knowledge exchange and business activities do not come about through intra-firm branch office networks alone, but also from the division of labour between companies. In many cases, outsourcing strategies with respect to single activities are often efficient and lead to a higher quality of products and services. It is assumed that these extra-firm networks are strongly anchored within cities due to the quality of existing infrastructures like airports, universities with good reputation, and large settlements of leading global companies, which all provide a wealth of specific knowledge (Lüthi et al. 2010). We asked firms located in Doha via a web survey to localize and assess the importance of their extra-firm relations to other APS and high-tech firms. In order to relate the extra-firm relationships to a stylized value chain, the responding firms have to localize their business activities along the individual value chain elements of 'research & development', 'processing', 'marketing', 'sales & distribution' and 'customers' (Lüthi et al. 2010). With this procedure, we obtained a comprehensive picture about the spatial value chain patterns of APS and high-tech firms on the global and supra-regional scale.

The third pillar of our methodology consists of a qualitative network analysis. Seven in-depth, face-to-face interviews with senior business practitioners and organizations were conducted. The interviews provided qualitative evidence complementing our two quantitative data approaches. This produced an extensive and rich data source on the actual changes and issues relevant to the study that could not have been created by alternative means. The next section presents the study area of our empirical research.

### **Introducing the case study: the capital city of Doha**

Especially during the last decade, Qatar's economy has dramatically prospered with continued high real GDP growth rates. In contrast to 2007, when the real GDP growth reached 18 %, in 2012 the GDP slowed down to a still high rate of 6.2 % (General Secretariat for Development Planning 2012). The tremendous economic development in the recent past has led to a population explosion. Between 2004 and 2011 the total population more than doubled from about 700,000 to over 1.6 million inhabitants. Currently, approximately 2 million people are residing in Qatar (General Secretariat for Development Planning 2012: 10), 90% of them expatriates



with a temporary residency status. It is expected that the robust economic environment, performance, and the ongoing diversifying process of the national economy will likely continue to drive population growth and the demand for employees (Qatar National Bank 2012). This tremendous transition has a deep impact on both the spatial morphology and the country's economic landscape. Doha, Qatar's capital city, has been undergoing a new period of urbanization that has created a new perception of the city as an emerging urban centre in the Gulf region (Wiedmann et al. 2012).

Parallel to its growing political engagement, various projects were launched to develop the capital city of Doha into a global hub. Investments in Al-Jazeera Broadcasting Station to establish an international media hub were followed by mega projects in the education and science sector as initiatives of the Qatar Foundation (Miles 2005). Additionally, new airport and harbour developments aim to turn Doha into an international transit hub, which is furthermore accelerated by the public engagement to establish Qatar Airways as one of the leading global aviation providers. Various public investments in real estate projects have moreover established Doha as one of the major investments hubs in the region (Adham 2008). A very distinct development strategy has been the launch of diverse projects to establish Doha as a new tourism and cultural hub in the Middle East by investing in international sports events and cultural projects, such as the redevelopment of the historic city centre (Wiedmann et al. 2012).

In the recent past, economic policy has advanced the idea of a service-based economy to shift away from oil and gas dependency (Qatar National Bank 2012). In terms of a knowledge-based economy, Qatar is still weak but increasingly enhancing its global position as the World Bank's Knowledge Economy Index (KEI) indicates. The Knowledge Economy Index takes into account whether the environment is conducive for knowledge to be used effectively for economic development (World Bank 2013). It is "constructed as the simple average of the normalized values of 12 designated key knowledge indicators, with three indicators representing each of the four KE pillars" (Byrnes 2012), which are the Economic and institutional regime pillar, innovation pillar, education pillar, and information and technology pillar (World Bank 2013). With a Knowledge Economy Index value of 5.84 Qatar is ranked 54th among 145 countries. Compared to other Gulf region countries, Qatar comes above Kuwait which is ranked 64th but below Bahrain (43th), Oman (47th) and Saudi Arabia (50th) (World Bank 2013). The country with the best performance in the Gulf region is the United Arab Emirates, which ranks 42th with a Knowledge Economy Index value of 6.94 (World Bank 2013). For the time period until 2030, it is expected that Qatar will continue the diversification process of its economic landscape towards a more knowledge-based economy. In this context Qatar's aim is to boost the share of services to GDP and the raising of research and development spending to 2,8% of GDP (Qatar National Bank 2011).

### **Doha's position within functional networks**

We first look at the spatial dimension of intra-firm connectivity for Doha. Figure 3 shows the 20 most intensively connected locations on an international scale. In our analysis New York, as the world's most important financial centre, shows the highest interlock connectivity value for APS firms based in Doha. This finding indicates that these APS firms most often choose New York as their second most important location. APS firms based in Doha show a strong orientation towards Europe and Asia. Of the top 20 agglomerations, two

are located in the Americas, six are located in Asia, one in Australia, and however 10 cities are situated in Europe. With the listings of Moscow, Sao Paulo, Shanghai / Hong Kong, and Mumbai, four cities of the emerging BRIC-States are represented among the 20 most connected cities. Within the Gulf region, Doha's neighbouring city Dubai, the region's top economic centre (Thierstein and Schein 2008a), shows the most intensive connectivity patterns with Doha.

**Figure 3: Numerical values of global connectivity of advanced producer services in Doha**

<b>Rank</b>	<b>City</b>	<b>Country</b>	<b>Gross Connectivity</b>	<b>Proportionate Connectivity (1=New York)</b>
1	New York	United States	60747	1,00
2	London	United Kingdom	59431	0,98
3	Hong Kong	China	49972	0,82
4	Tokyo	Japan	49216	0,81
5	Paris	France	48042	0,79
6	Singapore	Singapore	47210	0,78
7	Sydney	Australia	47056	0,77
8	Frankfurt	Germany	46364	0,76
9	Milan	Italy	46124	0,76
10	Shanghai	China	45474	0,75
11	Sao Paulo	Brazil	44515	0,73
12	Vienna	Austria	44171	0,73
13	Dubai	United Arab Emirates	43684	0,72
14	Hamburg	Germany	42838	0,71
15	Istanbul	Turkey	41961	0,69
16	Moscow	Russia	41811	0,69
17	Copenhagen	Denmark	41772	0,69
18	Madrid	Spain	41771	0,69
19	Mumbai	India	41302	0,68
20	Prague	Czech Republic	41030	0,68

Source: TUM 2012, own calculation.

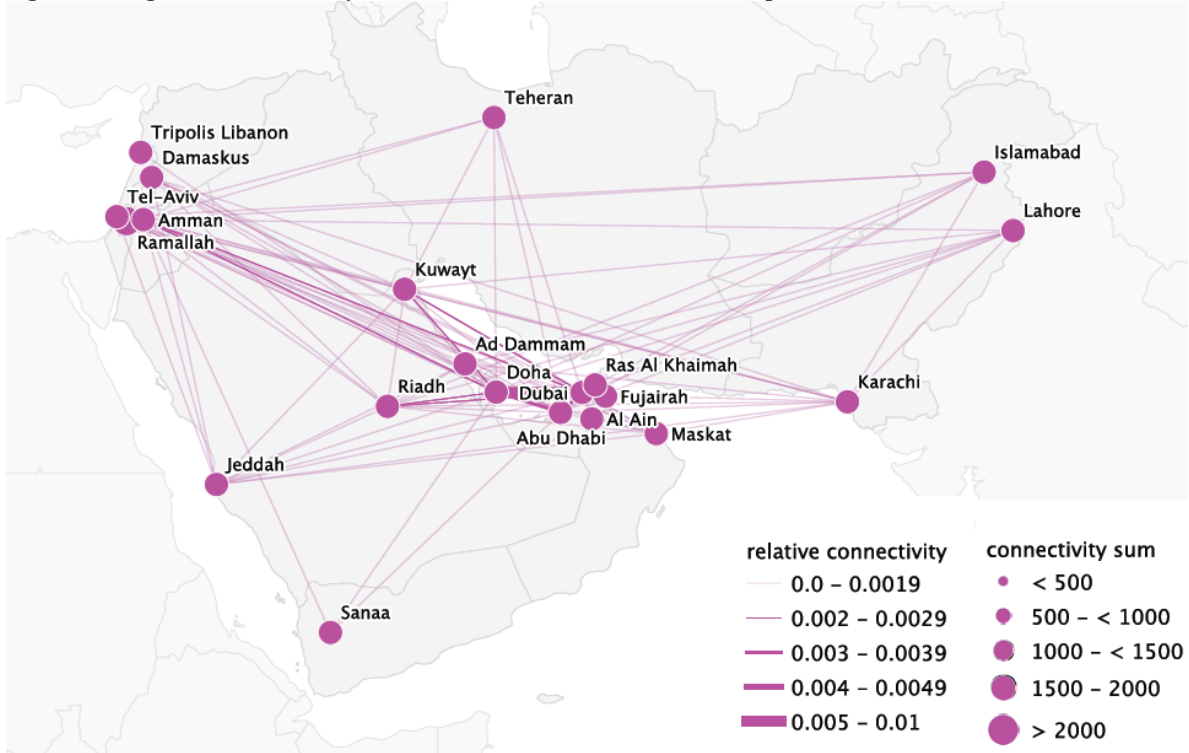
Taken together, Doha's APS economy shows a strong spatial linkage to major European cities. The high number of cities ranked among the top 20 in terms of the interlocked connectivity of APS firms underlines this. For US cities, New York is ahead in the ranking, but it is the only American city to be in the top 20. This finding confirms previous analysis showing surprisingly low levels of connectivity for US cities (Taylor and Aranya 2008). According to Taylor (2011), this tends to be related to the high national demand for services in the United States itself, which has resulted in a much more nationally-oriented connectivity pattern than in other countries (Taylor 2011). On this global scale of analysis for Doha, only Dubai appears as a Gulf location, notably a finding that supports previous studies that compared Doha, Bahrain and Dubai as potential knowledge economy hubs in the Gulf region (Thierstein and Schein 2008b).

We now zoom in on a supra-regional scale of analysis – figure 4 – and find the broader Middle-East-Gulf region as characterized by a high amount of very well connected cities. Bassens et al. (2011) explain this empirical finding, especially with respect to the Gulf cities along the shoreline, by stating that the “fragmentation of the narrow strip along Gulf into small emirates and kingdoms”. (...) “Except for Dammam, all Cities on the list are state capitals (Abu Dhabi, Doha, Kuwait City, Manama, Muscat) and / or emirate capitals (Abu Dhabi, Dubai),

and they quite often occupy a large proportion of the state territory (except for Muscat). As a result, these cities are often the main foci of economic development and are in fact run as city-states, locked in a competition for regional dominance as nodes in global flows of capital such as the attraction of foreign direct investments (FDI), trade and tourism” (Bassens et al. 2011):285).

Figure 4 shows the spatial patterns of the intra-firm connectivity between APS firms on a supra regional scale. The thickness of the lines and the darkness of the colour illustrate the relative connectivity between the different cities on a supra-regional scale. These connectivity values are standardized to the highest interlock connectivity of the case study, which is the connection between Doha and Dubai. On the supra-regional level, connections to the United Arab Emirates’ cities of Dubai, Abu Dhabi, Al-Ain, and Sharjah seem to play the biggest role: taken all together, the UAE accounts for 30% of overall connectivity, followed by Saudi Arabia with 15% and Lebanon with 10%. A very pronounced degree of linkages can be seen with Riyadh and Jeddah, and to the Lebanese cities of Beirut and Tripoli. In contrast to this, Kuwait and Manama account for 8% each, Jordanian cities like Amman come up to 7%, while 6% of the total connectivities can be ascribed to Omani cities. Weaker connections of approximately 5% exist with cities Israeli cities like Tel Aviv or Haifa. Damascus and Tehran with 3%, Ramallah and Sana with 2% each, and Bagdad with 1% are nearly not integrated within the Qatari regional network. Towards a regional orientation, Doha shows the strongest connections with Dubai, the regional leader and according to the GaWC Research Network, the internationally best-connected City of the Gulf region (GaWC 2000-2010). The high value is due to the fact that many APS companies have relatively important and highly rated offices in Dubai and Doha.

**Figure 4: Regional connectivity of Advanced Producer Service companies based in Doha**



Source: TUM 2012, own calculation.

These results confirm earlier findings by Schein (2009), where she identified similar connectivity patterns and connectivity intensities, revealing Dubai, Kuwait, and Riyadh as the most connected cities (Schein 2009). Following Schein, the strong connectivity between Doha and Riyadh results from Saudi Arabia’s sales market size, the biggest on the Arabian Peninsula, and the fact that Riyadh is one of the region’s strongest financial locations in term of total annual GDP (Schein 2009).

Looking at High-Tech firms they seem to be networked much more with Asian locations than Advanced Producer Services, while North-American locations play no role (figure 5). Singapore, Moscow, Paris, Sao Paulo, and Buenos Aires are the most connected cities for High-Tech, and at present the most important region is still Europe. However, there are also two Latin American cities among the top ranked cities, Sao Paulo ranked 5th and Buenos Aires ranked 6<sup>th</sup>, and both cities represent the economic gateway to their respective countries.

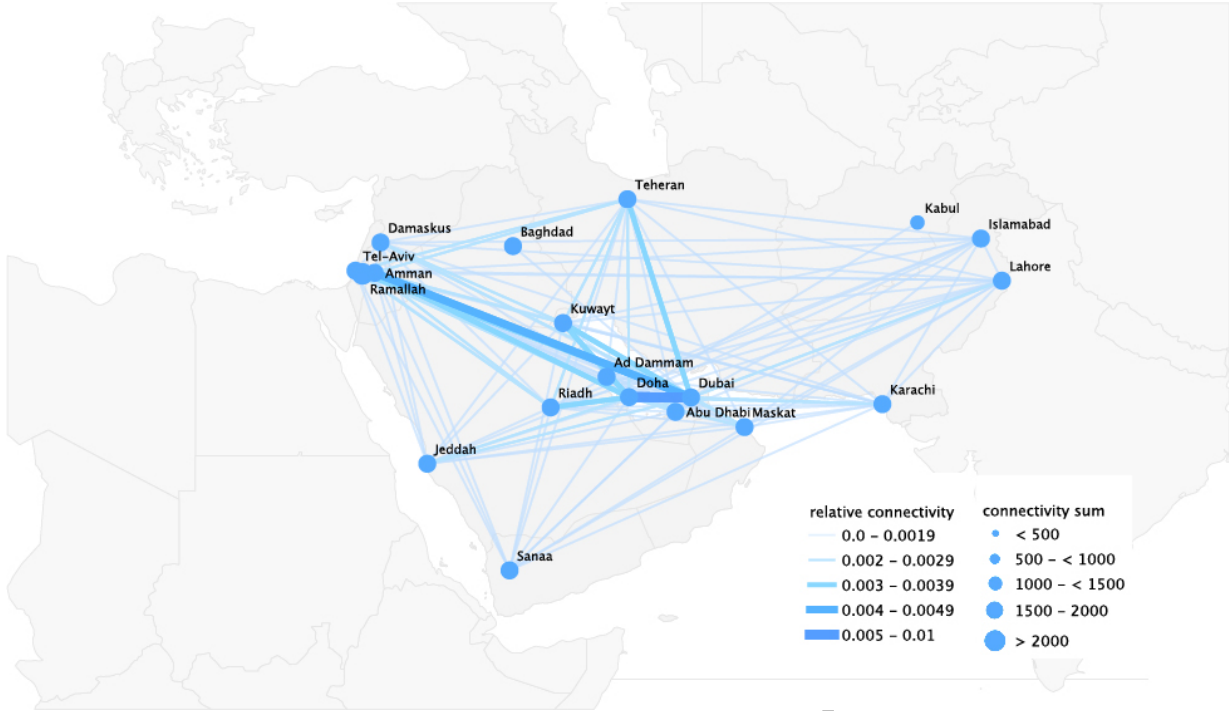
**Figure 5: Numerical values of global connectivity of High-Tech firms in Doha**

<b>Rank</b>	<b>City</b>	<b>Country</b>	<b>Gross Connectivity</b>	<b>Proportionate Connectivity (1= Singapore)</b>
1	Singapore	Singapore	30462	1,00
2	Moscow	Russia	28478	0,93
3	Paris	France	28034	0,92
4	Sao Paulo	Brazil	27756	0,91
5	Buenos Aires	Argentina	27067	0,89
6	Shanghai	China	27037	0,89
7	Brussels	Belgium	26610	0,87
8	Vienna	Austria	26415	0,87
9	Seoul	South Korea	25788	0,85
10	Beijing	China	25518	0,84
11	Tokyo	Japan	25364	0,83
12	Prague	Czech Republic	25147	0,83
13	Milan	Italy	24764	0,81
14	Johannesburg	South Africa	24505	0,80
15	Hong Kong	China	24367	0,80
16	Bangkok	Thailand	23991	0,79
17	Istanbul	Turkey	23506	0,77
18	Budapest	Hungary	22904	0,75
19	Madrid	Spain	22552	0,74
20	Mexico City	Mexico	22480	0,74

Source: TUM 2012, own calculation.

Figure 6 visualizes spatial ranges and importance of spatial scales for High-Tech companies. For High-Tech firms located in Qatar we see on the global scale the relevance of the European and Asian spatial scale within their value chain processes. More than 46 % of all connectivity is with firms in Europe. Contrastingly, Asia only accounts for 27%, North America for 11%, South America for 7%, Australia and Oceania for 3% and Africa for 6% of all connectivity.

**Figure 6: Regional connectivity of High-Tech companies based in Doha**



Source: TUM 2012, own calculation.

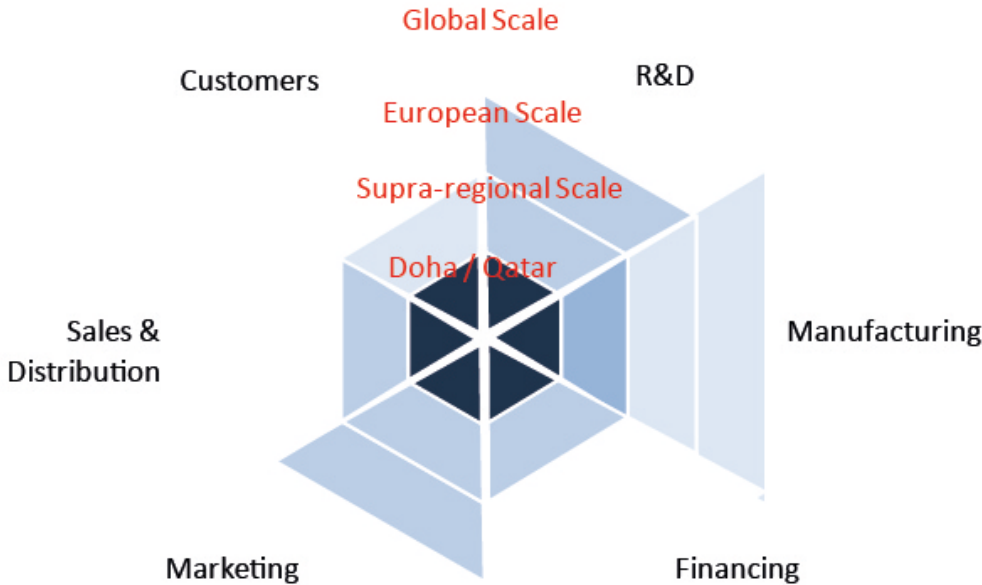
On a supra-regional spatial scale, Doha shows the strongest connection with firms in the United Arab Emirates and Saudi Arabia. While the United Arab Emirates account for approximately 20%, Saudi Arabia accounts for around 17% of all connectivities. In contrast, Syria accounts for 5%, Israel, Lebanon and Kuwait for 8% each, Palestine 1%, Bahrain and Oman for 6% each, Iran for 7% and finally Yemen for 4% of all connectivities. Comparing the global spatial patterns of High-Tech firms with APS we observe a distinct pattern. High-Tech firms located in Doha are much more connected globally with strong investment goods markets, production locations and locations that serve a larger area in terms of after-sales services. APS firms in contrast are still oriented to some of the Old World global cities, mainly due to the sub-branches that dominate the Doha case: banking, finance, consulting, and engineering.

**Doha as localized system of value chains**

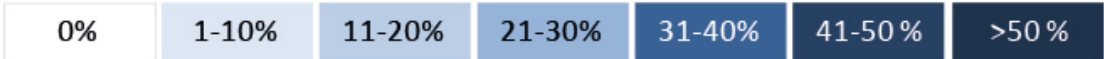
Value added is always created by a combination of in-house and external competencies. The firms analysed in Doha have backgrounds such as accounting and finance, real estate as well as information and communication services. Figure 7 shows our findings for extra-firm relations of knowledge-intensive companies in Doha. APS firms most frequently interact with other APS firms in Qatar, particularly insurance, law, advertising & media companies. Even for knowledge intensive firms a considerable amount of back- and forward linkages along a firm’s individual value chain are organized locally respectively nationally. These branches assume an important role as an entrepreneurial support network within the city and thus these findings support other studies (Goebel and Thierstein 2006; Lüthi et al. 2010). Beyond local sourcing and physical proximity, multi-branch multi-location firms need expert inputs along their value chains from wherever the most suitable partners are located. The supra-regional spatial scale shows that quite some interactions along the value chain are organized within

the larger Middle-East Gulf region, while on the global scale, only some relationships in manufacturing are reported. In other words, very many knowledge intensive firms in Doha/Qatar rely on local and regional exchange, especially in financing and end customers. Albeit many of these firms are internally linked globally, their external exchange predominantly serves the Qatar and supra regional markets; we only find very limited interaction concerning the extra-firm linkages with companies outside Qatar.

Figure 7: Extra-firm relations of knowledge-intensive companies in Doha.



Proportion of business relations within each individual segment of the value chain (=100%).



Sample: 19 firms; 55 business relations.

Source: TUM 2012, own calculation.

**Potentials and Challenges for knowledge-intensive Firms in Doha**

In order to identify the various potentials and challenges for knowledge-intensive firms in Doha from the vantage point of internationally acting business practitioner, seven face-to-face interviews were carried out. According to the interviewees, Doha offers a unique combination of strengths that are very helpful in establishing and promoting the emergence of Doha as an influential city on the regional and global stage. The tremendous wealth from and around oil and gas industries makes Qatar one of the richest economies in the world. During the current global economic downturn, Doha is still characterized by a prospering economic landscape with economic growth rates that are far above average. The revenues of the oil and gas production permit large-scale infrastructure developments, including the construction of a new port and new international airport. The ability to embark on new projects and far reaching development activities of the urban landscape in

times of a global crisis and global instability illustrates the power and potentials of Qatar. The economic potentials of Doha are thus found along two key dimensions. One is capital, which permits state-of-the-art infrastructure and the ability to launch various new initiatives, such as Education City, one of the five hub strategies of Qatar (Wiedmann et al. 2014). The second is the fortunate geopolitical location of Doha within the Gulf region, finding it positioned between the Kingdom of Bahrain and Kuwait in the north, main urban centres in Saudi Arabia in the west and the UAE and Oman in the south.

Nearly all companies interviewed are exclusively focusing their activities on the local market and more often than not, cooperating with companies and research institutes located in Doha. Most of the companies have established their own independent entities that are fully responsible for the domestic market. Cooperation on shared projects can happen but are not usual. Based on the estimation of the interviewed companies, Qatar has such an attractive and extremely fast growing domestic market that there are enough projects and business opportunities to go around, and therefore no need for an international acquisition of further projects.

None of the firms interviewed assume a function as supra local headquarter for a larger market are like the Gulf-region. Instead, offices that serve such a regional headquarter function are operating out of the Emirate of Dubai. According to the interviewed executives it is not expected that Doha will serve the function as regional business hub in the nearer future. With regard to project collaborations these firms often prefer digital communication. Nevertheless there are differences between the internal and external forms of communication, for example with business partners or other companies. While a firm's internal communication mostly happens digitally via Internet and conference calls, external communication mostly happens face-to-face. Only if the external relationship has been established over a long time, especially to Arab business customers and clients, the form of communication might switch to digital forms of communication. However, all firms interviewed have underlined that face-to-face contacts is of absolute importance in the Arab business context.

Many knowledge-intensive firms are currently facing severe challenges to establish businesses in Doha. The main problem identified by interviewees is that of attracting skilled, gifted and talented people for long-term employment. Although attractive and far above average compensation packages are offered by the companies, other aspects and incentives seem to be important, for example urban amenities and design qualities, facilities for families and an adequate form of housing. The fact that more than 86% of the people who live in Qatar are expatriates documents that Qatar can attract people. However the problem is that the pool of human capital includes very few people from the knowledge economy. Wiedmann et al. (2014) underscore these assessments: "The urban quality of diversity is mainly dependent on the spatial practice of investors, companies and inhabitants. In the case of Doha, developers and their investors play the most decisive role in diversifying the urban environment, because their speculative interests have been the driving force of the recent urbanization process"(Wiedmann et al. 2014). All interviewees agree that presently, Doha cannot be considered as a hub for knowledge-based activities in the Gulf region. But the ambition for the near future is clearly articulated by decision makers: to become a service centre for regional as well as global markets.

### **Concluding remarks and outlook**



Cities can be regarded as nodes in a space of flows. Although our study focuses on a particular case on the Arabian Peninsula, the location cannot be studied in isolation. Each city is inserted in a broader network of exchange, connected to other cities and locations around the world and thus is part of an overarching urban hierarchy. The knowledge economy is said to alter the urban hierarchy significantly and turn it more spiky (Florida 2005). Eventually the urban form will reflect this seminal change, driven on the one hand by the knowledge workers and their demand for urban amenities and qualities, on the other hand by location choice of knowledge intensive firms, real estate developers, international financial flows and development-friendly regulations. Large-scale public investments initiated by Qatar's rulers have shaped contemporary Doha into one of the fastest growing cities in the world and a serious contender as an emerging regional hub city, see discussion on the role of hub cities in the knowledge economy: (Conventz et al. 2014). However the various public development strategies initially followed no cohesive development vision or plan. These activities are often carried out in a rather isolated manner, based on top-down and case-by-case decision-making. In contrast to other Gulf cities such as Dubai, where the trading sector played a major role in the beginning of economic diversification, the real estate boom in Doha was mainly ignited by public investments in five development strategies (Wiedmann et al. 2012).

Consequently, Doha/Qatar has experienced a rapidly growing number of knowledge-based firms, especially in the services sector, which have opened permanent or temporally project-related offices in Doha. Most of these firm establishments are part of dynamic multi-branch, multi-location companies that optimize their location network according to market opportunities and availability of qualified personnel. Our intra-firm and extra-firm network analysis shows that knowledge intensive firms in Doha/Qatar – be it APS or High-Tech firms – are strongly connected to Europe, Asia and the Americas, while regional headquarters remain in Dubai and international headquarters outside the wider Gulf region. Doha's knowledge intensive firms organize their external-firm linkage predominantly either on a local spatial scale or on a supranational scale; spatial scales beyond these scales play nearly no role. In other words these firms focus their activities mainly on local markets rather than on using their location for doing business beyond the borders of Qatar.

The outlook for Doha is therefore ambiguous. The reliance of knowledge intensive firms on local projects thus builds upon continuous urban growth in Doha. So far, public authorities do not manage to integrate a coherent urban development strategy. The economic potential of Doha goes along two key dimensions: One is the availability of capital, which allows cost intensive infrastructure investments and the ability to launch various new knowledge initiatives, such as Education City. The second key dimension is the geographical position of Doha within the Gulf region itself as well as markets in Asia and Europe. Based on our research results the rapid urban growth in recent years has led to an increasing connectivity of knowledge economies situated in Doha. This however was mainly the result of extensive public investments into local projects. Consequently, Doha was able to reposition its status through its high integration into supra-regional urban networks and its strong linkages to European and Asian Cities. Despite Doha's rather strong integration in the global urban hierarchy the role of its knowledge intensive firms remains restrained to a local or supra-local spatial realm. For the Gulf region Doha seems to be not even a regional knowledge economy hub but a globally connected location. Subsequently, Doha's emerging multi-national and multi-cultural society will be tested to transform an "instant city"-phenomenon based on public investment strategies into an actual hub city, used as operative centre of

international knowledge economies. This transition will heavily rely on the successful implementation of state-of-the-art infrastructure as well as new immigration policies permitting the gradual integration of foreign communities. In future the main decisive factor for consolidating knowledge economies in the case of Doha will be the long-term commitment of a highly educated workforce to stay and to develop a functioning self-contained service economy in Qatar. The ever-changing composition of Qatar's society can thus be identified as the main threat for any successful economic diversification based on knowledge intensive sectors.

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## References

- Adham, K. (2008). Rediscovering the Island: Doha's Urbanity from Pearls to Spectacle In Y. Elsheshtawy (Ed.), *The Evolving Arab City* New York Routledge
- Bassens, D., Derudder Ben, & Witlox, F. (2011). Arabian Gulf Cities In P. J. Taylor, P. Ni, Derudder Ben, M. Hoyler, J. Huang, & F. Witlox (Eds.), *Global Urban Analysis. A Survey of Cities in Globalization* (pp. 284-287). London: Earthscan.
- Bathelt, H., & Glückler, J. (2011). *The Relational Economy. Geographies of Knowing and Learning*. Oxford: Oxford University Press.
- Blum, E., & Neitzke, P. (Eds.). (2009). *Dubai: Ein Zwischenbericht über die derzeit größte Baustelle der Welt*. Basel Birkhäuser Verlag.
- Boschma, R. (2005). Proximity and Innovation: A Critical Assessment. *Regional Studies*, 39(1), 61-74.
- Byrnes, S. (2012). Making the Leap. *think Magazine*, pp. 16-17.
- Cairncross, F. (1997). *The Death of Distance*. London: Orion Business.
- Castells, M. (1996). *The rise of the network society* (1ed., Vol. 1). Oxford: Blackwell.
- Castells, M. (1999). Space of flows - der Raum der Ströme. In S. Bollmann (Ed.), *Kursbuch Stadt. Stadtleben und Stadtkultur an der Jahrtausendwende* (pp. 39-81). Stuttgart: DVA.
- Conventz, S., Derudder, B., Thierstein, A., & Witlox, F. (Eds.). (2014). *Hub Cities in the Knowledge Economy. Seaports, Airports, Brainports.*: Ashgate.
- Dicken, P. (2007). *Global Shift. Mapping the Changing Contours of the World Economy* (5ed.). London: SAGE Publications.
- Dicken, P. (2011). *Global Shift. Mapping the Changing Contours of the World Economy* (6ed.). London: SAGE.
- Florida, R. (2005, October 2005). The world is spiky. The world in numbers. Globalization has changed the economic playing field, but hasn't leveled it. *The Atlantic Monthly*, pp. 48-51.
- Friedman, T. L. (2005). *The World is Flat. A Brief History of the Twenty-First Century*. New York: Farrar, Strauss and Giroux.
- Friedmann, J. (1986). The World City Hypothesis. Development and Change. In N. Brenner, & R. Kell (Eds.), *The Global Cities Reader* (pp. 67-71). Oxon: Routledge.
- Gertler, M. S. (2003). Tacit knowledge and the economic geography of context, or the undefinable tacitness of being (there). *Journal of Economic Geography*, 3(1), 75-99.
- Goebel, V., & Thierstein, A. The Mega-City-Region of Munich: A kingdom of its own or a space of inter-connected flows? In *European Regional Science Association, Volos, 30.08 - 03.09. 2006* (pp. 1-14)
- Hales, M., & Pena, A. M. (2012). 2012 global Cities Index and Emerging Cities Outlook. Chicago: ATKearney.
- Lambrechts, B. (2008). Geographies of Knowledge Formation in Mega-City Regions: Some Evidence from the Dutch Randstad. *Regional Studies*, 42(8), 1173-1186.
- Lüthi, S. (2011). *Interlocking firm networks and emerging Mega-City Regions. The relational geography of the knowledge economy in Germany*. Munich University of Technology, Munich.
- Lüthi, S., Thierstein, A., & Bentlage, M. (2013). The Relational Geography of the Knowledge Economy in Germany. On functional urban hierarchies and localised value chain systems. *Urban Studies*, 50(2), 276-293.
- Lüthi, S., Thierstein, A., & Goebel, V. (2010). Intra-firm and extra-firm linkages in the knowledge economy: the case of the emerging mega-city region of Munich. *Global Networks*, 10(1), 114-137.
- Miles, H. (2005). *Al Jazeera* New York Grove Press.
- Polanyi, M. (1966). *The tacit dimension*. London: Routledge & Kegan Paul.
- Qatar National Bank (2011). Qatar - Economic Insight 2011. Qatar: Qatar National Bank SAQ.
- Qatar National Bank (2012). Qatar - Economic Insight 2012. Qatar: Qatar National Bank SAQ.
- Rollwagen, I., & Voigt, S. (2012). Mehr Wertschöpfung durch Wissen(swerte). Folgen für regionale Wachstumsstrategien. Frankfurt am Main: Deutsche Bank.
- Sassen, S. (2001). *The Global City: New York, London, Tokyo* (2ed.). Oxford: Princeton University Press.
- Schamp, E. W. (2003). Knowledge, Innovation and Funding in Spatial Context: The Case of Germany. In A. Thierstein, & E. W. Schamp (Eds.), *Innovation, Finance and Space* (pp. 179-193). Frankfurt: Selbstverlag Institut für Wirtschafts- und Sozialgeografie der Johann Wolfgang Goethe Universität.
- Schein, E. (2009). *Built on Sand? Emerging Cities on the Arabian Peninsula in the Knowledge Economy Context*. Doctoral Dissertation, Technische Universität München, München.
- Taylor, P. J. (2011). Advanced producer service centres in the world economy. In P. J. Taylor, P. Ni, B. Derudder, M. Hoyler, J. Huang, & F. Witlox (Eds.), *Global urban analysis. A survey of cities in globalization* (pp. 22-39). London, Washington: Earthscan.
- Taylor, P. J., & Aranya, R. (2008). A Global 'Urban Roller Coaster'? Connectivity Changes in the World City Network, 2000-2004. *Regional Studies*, 42(1), 1-16.
- Taylor, P. J., & Evans, D. (2005). POLYNET Action 1.2. Quantitative analysis of service business connections. Summary Report. Institute of Community Studies/The Young Foundation & Polynet Partners.

- Taylor, P. J., Ni, P., Derudder, B., Hoyler, M., Huang, J., & Witlox, F. (Eds.). (2011). *Global Urban Analysis: A Survey of Cities in Globalization*. London: Earthscan.
- Thierstein, A., Kruse, C., Glanzmann, L., Gabi, S., & Grillon, N. (2006). *Raumentwicklung im Verborgenen. Untersuchungen und Handlungsfelder für die Entwicklung der Metropolregion Nordschweiz*. Zürich: NZZ Buchverlag.
- Thierstein, A., & Schein, E. (2008a). EMERGING CITIES ON THE ARABIAN PENINSULA: URBAN SPACE IN THE KNOWLEDGE ECONOMY CONTEXT. *Archnet-IJAR, International Journal for Architectural Research*, 2(2), 178-195.
- Thierstein, A., & Schein, E. (2008b). Emerging Cities on the Arabian Peninsula: Urban Space in the Knowledge Economy Context. *International Journal of Architectural Research*, 2(2), 178-195.
- van den Berg, L., Peter M.J., P., Van Winden, W., & Woets, P. (2005). *European cities in the knowledge economy*. Burlington: Ashgate Publishing
- Wiedmann, F., Salama, A. M., & Mirincheva, V. (2014). Sustainable urban qualities in the emerging city of Doha. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability, Online First*, 1-23, doi:DOI: 10.1080/17549175.2013.870088.
- Wiedmann, F., Salama, A. M., & Thierstein, A. (2012). Urban evolution of the city of Doha: An investigation into the impact of economic transformations on urban structures. *Middle East Technical University Journal of the Faculty of Architecture*, 29(2), 35-61.
- World Bank (2013). Knowledge Economy Index (KEI) 2012 Ranking Washington.