International Sport Federations in the World City Network

Abstract

In this paper, we analyse the transnational urban geographies produced by international sport federations (ISFs) through their global, regional and national headquarter locations. Data on the global urban presence of 35 major ISFs is examined through connectivity analysis and principal component analysis. The connectivity analysis reveals the relative dominance of cities in Europe and Pacific Asia, whereby Seoul, Tokyo, Kuala Lumpur, Cairo, and Lausanne stand out. The principal component analysis reveals the main subnetworks produced through ISF location decisions, which includes *inter alia* a 'winter sports subnetwork' centred on Ankara, Belgrade, Helsinki, and Stockholm; an 'Olympic subnetwork' centred on Lausanne; and a decentred subnetwork with truly 'global sports'.

Keywords: global civil society, international sport federations, world city network, connectivity analysis, principal component analysis

Introduction

The concept 'civil society' refers ideal-typically to the broad societal sphere in-between the three 'domains' of modern society (i.e. market, state, and family). In this 'sphere', citizens unite and interact with each other through a set of organizations in order to achieve a broad array of objectives. In practice, the concept 'civil society' is obviously chaotic in that it consists of a complex and multi-layered assemblage of organizations as diverse as tightly controlled institutions, casual interest groups, and loose coalitions of involved citizens that interact in myriad ways with each other and with the other 'pillars' of society (Anheier, Glasius, & Kaldor, 2001). Organizations that are typically situated in 'civil society' such as non-governmental organizations (NGOs) are, just like major corporations and other market actors, increasingly organized on a worldwide scale. As a consequence, there seems to be a growing consensus that we have gradually been witnessing the emergence of a 'global civil society' (GCS). It is however clear that the epithet 'global' in reality refers to a very diverse range of transnational geographies varying in coverage and intensity. An-Na'im (2002, p. 56-7) spells out why GCS is in practice concentrated in space: he argues that the physical location of interactions within GCS is fundamental because this reflects power relations, in particular the ability to set policy agendas. Thus the European Union as an important donor for humanitarian causes explains the sizable NGO presence in Brussels, while the longstanding Swiss 'neutrality' explains the relative concentration of myriad GCS organizations. The purpose of this paper is to provide insight into the 'sports dimension' of GCS (see also Giulianotti, 2011). In particular, we will focus on the transnational social spaces produced by international sports federations (ISFs)[1,2].

The observation that GCS is made up of myriad transnational social spaces does not reveal what *kind of social space* we are dealing with. In any case, the salutary acknowledgement that globalization processes are premised on large-scale transnational processes leads to the suggestion that states – although obviously important in many respects – are not the most suitable scale of analysis. According to Taylor (2004a), the appropriate spatial framework for understanding GCS geographies has been provided by leading urban sociologist Castells (2009) with his concept of a 'space of flows'. Castells argues that from the 1970s onwards a new 'network society' has emerged based upon the enabling technologies that have resulted from the merging of computing and communication industries. This has increasingly created a new type of social space because social relations no longer depend upon spatial contiguity: with the new technologies social activities can be organized simultaneously across the world thus opening up new spaces of flows. Castells describes his space of flows at several levels, including the necessary infrastructure and the 'nodes' through which transnational social organization is constructed. Thus there are global networks of NGOs sharing projects on a day-to-day basis but being located in separate cities (e.g. New York, Geneva and Nairobi).

Castells (2009, p. 445) identifies Sassen's (2000, 2001) work on 'global cities' as the "most direct illustration" of the 'nodes' in the space of flows. Sassen (2000, 2001) essentially argues that such global cities constitute the strategic nodes in the development of new transnational geographies. Her argument is most well known in reference to the emergence of global marketplace for advanced services in key cities around the globe, but she has also transferred this argument from the global services market to GCS (Sassen, 2002). That is, the argument that cities are the key elements in a "strategic cross border geography" is seen as more generic because cities provide a "thick enabling environment" (p. 217) through which transnational and sub-national activities can be brought together (see also Amin, 2002):

"The density of political and civic cultures in large cities localizes global civil society

in people's lives. We can think of these as multiple localizations of civil society that

are global in that they are part of global circuits and trans-boundary networks"

(Sassen, 2002, p. 218).

Despite their groundbreaking conceptual research, neither Castells nor Sassen have

empirically specified the exact nature of the worldwide urban networks that they frequently

invoke. This has meant that it has long not been possible to measure and analyze these

transnational social spaces empirically. Recent research by Taylor (2001, 2004a, 2004b) in the

context of the Globalization and World Cities (GaWC, http://www.lboro.ac.uk/gawc) has

opened up new analytical possibilities in this regard. In his work, Taylor specifies a 'world

city network' (WCN) with the overall purpose of allowing systematic empirical analysis of

the transnationally networked social spaces that constitute contemporary globalization. In this

paper we adopt Taylor's WCN approach to empirically explore the transnational social spaces

constructed through the location strategies of international sport federations (ISFs).

The remainder of this paper is organized as follows. We begin by introducing the

conceptual building blocks emerging from the WCN framework. We then discuss our

methodology and data, after which we provide an overview of the main results of our study.

These results will then be compared with WCN research drawing on other transnational

organizations and firms (see also Toly et al., 2012), after which the paper is concluded with an

overview of the main implications and some avenues for further research.

Starting point: world city network analysis

World city networks as interlocking networks

 Taylor's (2001, 2004b) specification of WCNs starts from the observation that such

urban networks should be conceptualized as *interlocking networks*. An interlocking network

has three levels instead of the usual two: as well as the network and nodal level, there is a critical *subnodal level*. In the case of WCNs, this subnodal level is occupied by the actors 'interlocking' cities through their organizational networks. In the most commonly studied WCN example of the emergence of a global marketplace for services such as finance, advertising, accountancy, etc., this means focusing on those service firms that have developed location strategies centered on major cities in the world economy. This enables them to offer a global 'seamless' service to their existing clients as well as attracting new clients in worldwide markets. In this context, globalized service firms are the prime creators of the WCN: they 'interlock' cities through their everyday practices. Put in the perspective of Castells/Sassen, the idea is that the WCN is constituted by the myriad intra-firm flows of information, knowledge, advice, plans, strategy, personnel, etc. between the archetypal high-rise offices occupied by globalized service firms.

Although originally cast in the context of a global marketplace for services, the interlocking network model can also be applied to study the transnational social spaces within GCS by focusing on, for instance, NGOs as in Taylor (2004a) and on ISFs as in this paper.

Empirical building blocks: activity values

The crucial advantage of using the interlocking network model is that it provides the basis for empirical analysis of transnational urban geographies. The empirical building block in the model specification is the measurement of the importance of the presence of organizations j in cities i. This importance is gauged through the activity value v_{ij}, which is standardized across organizations through the use of a four-point scale ranging from 0 to 3. An activity value of 0 simply means that the organization has no presence whatsoever in that particular city, while a value of 3 means that the global headquarters of that organization are located in a city. The presence of a 'continental' organization results in an activity value of 2,

while a value of 1 is used for the presence of a national organization. In the cases where a city

has multiple presences (e.g. the national organization and the global headquarters), the largest

value is retained. Thus the basic input to the interlocking network model, described in some

detail in the methodology section, will be an activity value matrix V_{ij} summarizing the

location strategies of major ISFs across the world's major cities. The next section describes

the way in which the data for the ISF activity value matrix V_{ij} was gathered.

Data: international sport federations

To study the transnational social spaces constructed by ISFs, we had to make a

selection of federations to be included in the analysis. Inclusion was based on membership of

SportAccord (until 2009 known as General Association of International Sports Federations),

an organization that brings together ISFs with members in at least 40 countries across 3

continents. For ISFs involved in winter sports, this threshold is lowered to 25 countries in 2

continents. These ISFs feature different degrees of membership, but here we only focus on

'full members'. The latter are the only members that can change the rules and organisation of

the sport during general meetings of the ISF, while in most cases these are also the only

members who are allowed to participate in international competitions[3].

Just before the general assembly of 2011 in London, SportAccord had 89 members. A small

number of these are confederations, bringing together ISFs administrating similar sports. The

World Confederation of Billiard Sports, for example, unites the ISFs for pool, snooker, and

carom billiards. Through the membership of these confederations, a total of 97 ISFs are

member of SportAccord, 9 of which did not pass the above-mentioned location thresholds.

The websites of the ISFs were consulted to collect information about their location strategies.

Not all sites could provide this information. The website of International Baseball Federation

(IBAF), for instance, was under construction, so that contacts of national organizations were

not mentioned. The Confédération Mondiale des Activités Subaquatiques (CMAS = World

Underwater Federation) and the Fédération Aéronautique Internationale (FAI = World Air Sports Federation), on the other hand, were not clear about their 'continental' organizations. Ultimately the complete networks of 35 ISFs were mapped (see Table 1). This implies that only a subsection of all ISFs was considered, with a bias towards sports that have strong organizational roots vested in history (e.g. the Commonwealth heritage of cricket) and Olympic sports (as this requires some sort of formal organization). Overall, this implies a bias towards 'large' and 'well-organized' ISFs, so that our results need to be interpreted as primarily relating to formally organized social spaces as in Houlihan et al. (2010) and Sakka & Chatzigianni (2012), rather than more informal social spaces as detailed in the work of Madan (2000) and Grainger (2006).

By way of example, the soccer ISF would result in the following standardized measures summarizing its worldwide urban presence: Zurich has an activity value of 3 because the city houses the headquarters of FIFA; Kuala Lumpur and New York have an activity value of 2 because these cities house the headquarters of the Asian Football Federation (AFC) and the Confederation of North, Central American and Caribbean Association Football (CONCACAF) respectively; Brussels and Rio de Janeiro have an activity value of 1 because these cities house the headquarters of the Koninklijke Belgische Voetbalbond (KBVB = Royal Belgian Football Association) and Confederação Brasileira de Futebol (CBF = Brazilian Football Confederation) respectively; and Dubai and Melbourne have an activity value of 0 because there are no offices of the soccer ISF in these cities.

The soccer ISF is of course an idiosyncratic example, but the idea is that the combined measurement of the organizational networks of major ISFs allows constructing a sensible overview of how sports organisations construct transnational spaces through cities. The final

result of our data gathering is an activity matrix V_{ij} of 35 ISFs in 744 cities with 26040

activity values.

Methodology: connectivity and principal components

WCN analysis is premised on the study of the activity value matrix. In this paper, two

different techniques are used to analyse the data. First, we use the interlocking network

specification of Taylor (2001, 2004a, 2004b) to gauge the relative importance of cities in the

ISF networks straddling the globe. Second, the above overview is complemented with a more

encompassing analysis of the social spaces constituted by ISF through the application of

principal component analysis on the activity value matrix.

The interlocking network model allows computing two related, but slightly different

measures of a city's position in the WCNs generated by ISFs. The first measure is the activity

status S_a of a city a:

$$S_a = \sum_j v_{aj}$$

This activity status S_a is a simple aggregation of the activity values across all ISFs for

a specific city. This measure provides a straightforward indicator of a city's position in the

ISF WCN, but it can be complemented by an actual *network* measure that is calculated as

follows:

$$TNC_a = \sum_{i,j} v_{aj} . v_{ij} \qquad a \neq i$$

In contrast to S_a, the total network connectivity TNC_a of a city invokes a network

perspective in that the contribution of an office to a city's position hinges on the intensity of

an ISF's location strategy. The conjecture behind conceiving the aggregation of the product of

the activity values v_{ij} and v_{aj} as a surrogate for the actual connectivity of a city is that the

presence of ISFs with extensive coverage leads to more connections. Thus although S_a and

TNC_a are obviously related in that cities with large activity values will have higher scores, the

latter measure brings an extra dimension to the analysis in that the presence of ISFs with an extensive coverage will lead to a relative higher score on TNC_a.

The interlocking network model described above allows producing different rankings of cities based on their position in the networks of ISFs. However, these do not allow revealing the basic spatial dimensions of the different networks. To this end, we complement the rankings with an analysis of the basic spatial dimensions in the transnational social spaces produced by ISFs by analysing the activity value matrix V_{ij} through a principal components analysis (PCA). PCA is part of the factor-analytic family of multivariate techniques, which are used to reveal the pattern of independent sources of variation in a data matrix. The factors are then rotated through a Varimax rotation to ensure that results are as clear and interpretable as possible. A possible disadvantage of PCA is its sensitivity to sparseness in the data. As a consequence, we only focused on those 113 cities where at least 15 ISFs are located.

The results of a PCA are composed of three elements:

1.   Component loadings on the original variables: The correlation between a component and an original variable. With this measure ISFs adopting a comparable location strategy can be discerned. The components are ranked based on the percentage of variance explained. For ease of interpretation, only component loadings > 0.4 will be considered for the interpretation of a component.

2.   Component scores on the objects: The standardised value of a city on a component. Large positive values imply that a city is an important articulator of this component. To make the results readily interpretable, the city maps feature the following component score scale:

        a.   Articulator cities: cities with a score higher than 4.0

        b.   Primary field: cities with a score between 2.0 and 4.0

        c.   Secondary field: cities with a score between 1.0 and 2.0

        d.   Above median cities: cities with a score between 0 and 1.0

3.   The eigenvalues of the components: The portion of the variance in the original activity

matrix that can be explained by a component.

A crucial choice in reporting on PCA results relates to the number of components

being extracted and rotated. In this study an explorative method is used (cf. Taylor, Catalano,

& Walker, 2002). Here we focus on the five main components that collectively explain 42.6%

of the original variance in the data.

Results: ISFs in the WCN

Connectivity in ISF networks

Table 2 ranks the 20 cities with highest activity status S and total network connectivity

TNC. The highest positions in both rankings are occupied by Seoul and Tokyo. Beyond both

cities, it can be noted that especially European cities are well connected (cf. Taylor &

Derudder, 2004). Thus 11 out of 20 cities in the TNC top 20 are located in Europe, while of

the remaining cities 8 are Pacific Asian and 1 is African. A first conclusion, therefore, is that

ISF location is inclined towards Pacific Asian and European cities, while Latin American and

Northern American cities have few connections to other cities through ISF. In general terms,

this European/Pacific Asian dominance can be explained by the colonial heritage whereby

some major European sports have 'gone global' (e.g. cycling) or at least followed extensive

colonial ties (e.g. cricket) on the one hand, and the fact that Asian-originating martial arts

sports have been successfully disseminated across the globe as well. Other regions have had

more difficulties in establishing a formal global presence for their sports (e.g., basketball is

the sole United States sports that is popular across the board), or have little or no region-

specific sports (e.g. Latin America). Thus both Europe and Pacific Asian are both originators

and adopters of globally popular sports, and hence the sizable involvement in ISFs in a broad

range of cities.

Although S and TNC are obviously related, there are some interesting differences as well. Belgrade and Budapest, for example, house several (important) offices that have relatively few connections to offices in other cities. Both cities are part of the top 10 by activity status S, but not for TNC. The opposite pattern can be observed for Cairo and Singapore. Although these cities have relatively few offices, they boast major connections because they house offices of ISFs with larger networks and/or house a lot of continental headquarters. Thus Singapore is ranked 7th and Cairo even 4th in the TNC ranking.

To what extent does this analysis of WCNs created through the location strategies of ISFs differ from earlier analyses focusing on other vectors of transnationalization? To answer this question, we discuss the most notable differences between the ISF TNC ranking and three other rankings drawn from data on (i) diplomatic missions (Taylor, 2005), (ii) globalized service firms (Taylor, 2010), and (iii) NGOs working in the field of environment, development, human rights and humanitarian missions (Taylor, 2004a).

Table 3 displays the top ten cities by TNC in ISF networks, and compares this with their positions in the three other WCN analyses. When comparing these results, it becomes clear that the sports dimension of GCS is only weakly related to other dimensions. Most cities with major connections in the ISF WCN are only modestly connected in other WCNs. Lausanne is the major example here, as it is not even listed in other WCNs while being one of the 'sports capitals' of the world. But major differences also arise when looking from the perspective of other frameworks. Major cities in the articulation of global capitalism such as New York and London, for instance, dominate the ranking in terms of connectivity in office networks of global service firms, but are unimportant for ISFs (i.e. New York is ranked as 200th and London 197th). Thus although major cities are increasingly emerging as key sites in the reproduction of a globalized society/economy, there is quite a lot of diversity so that – to put

it in Taylor's (2004a) words – "the geography of global civil society is quite complex" to say the least.

Subnetworks in ISF networks

Table 4 and Figures 1-5 summarize the results of the PCA. Each of the figures features a cartogram, whereby cities are placed in their relative geographical position. A two-letter code is used for identifying cities (e.g. TY for Tokyo); codes are given in the Appendix.

Component I accounts for 11.46% of the total variance. ISFs administering winter sports dominate this component as 5 out of 8 ISFs contributing to this component are winter sport federations. There is no articulator city, but the primary field has four cities: Ankara, Belgrade, Helsinki, and Stockholm. In general, most (important) cities of this subnetwork are located in Eastern and Northern Europe. Other cities with major scores for this winter sport component are Moscow and Almaty on the one hand, and Taipei, Seoul and Beijing on the other hand. Thus a first major pattern within the transnational social spaces produced by ISFs relates to a city network centred on winter sports organizations articulating Northern and Eastern European cities alongside major Asian cities located in countries with a winter sports tradition.

Component II accounts for 10.11% of the original variance. Within this subnetwork, Lausanne is a very dominant articulator city with a value of 7.39. As there are no other cities in the primary field, this component is really oriented towards the IOC capital and the most hierarchical subnetwork of all components. The ISFs constituting this component confirm this appraisal as they cover sports that – in contrast to, say, soccer, cycling and basketball – primarily derive their global status from being an Olympic sport. Thus the ISFs overseeing rowing, equestrian sports and gymnastics display a geographical pattern that is rather encompassing but firmly focused on Lausanne. Only Sub-Saharan African cities do not really feature in this component and hence the networks of these ISFs.

Component III accounts for 7.83% of the total variance. Tokyo is an articulator city, and there are four cities in the component's primary field: Melbourne, Buenos Aires, Johannesburg and Kuala Lumpur. The remaining cities are a mixed bag, but there is a clear-cut dominance of Pacific Asian cities. The component loadings show that this component brings together two (types of) ISFs. First, there is the cricket ISF, which explains the presence of British Commonwealth cities. Second, major martial arts ISFs (with the exception of Taekwondo, which originated in Korea) seem to have similar location strategies: they commonly have their headquarters in Japan, but from there have spread regionally as well as globally as these sports become more popular.

Component IV accounts for 7.31% of the original variance. It represents a quasi-encompassing location strategy in that it brings together ISFs straddling the globe. Thus the soccer (FIFA), basketball (FIBA), and cycling (UCI) ISFs, which have a presence in at least one city in almost every country, dominate this component. In contrast to the Lausanne/Olympic component, however, this component is strictly non-hierarchical as there are many cities with a modest component score. The cities with the highest scores stand out because these bundle one or more 'continental' offices. Thus Cairo is an important node in this transnational social space as it 'grounds' these global ISFs through regional headquarters for the African continent (e.g. the regional headquarters for Africa for soccer and cycling are located in Cairo).

Component V accounts for 5.86% of the total variance. Similar to component III, it brings together different ISFs and geographical patterns. Thus wrestling is featured alongside sports such as badminton. Seoul and the World Taekwondo Federation it headquarters are interesting here, as this is the sole martial arts sport that is not firmly centred on Tokyo.

Discussion

A variety of global actors take advantage of proximity and the dense networks available in major cities to organize their activities. Accordingly, these cities become interconnected through a range of material and immaterial flows, thus obtaining meaning in transnational spaces through their network interactions (Amin, 2002). Obviously, not all cities are equally important in this regard, while the prominence of cities may differ based on the actors involved. In this article, we have – in the spirit of Toly et al. (2012) – tried to broaden the discussions of cities as strategic sites from which global activities are organized by focusing on the transnational spaces created by ISFs.

Our analysis reveals that the most important cities in the networks of ISFs are Seoul and Tokyo, in part because of the large number of martial arts ISFs. From a network perspective, it becomes clear that cities such as Cairo and Singapore are also important as these cities host continental headquarters of major ISFs (e.g. the African branch of the soccer and cycling ISF are headquartered in Cairo). When compared with other analyses from a WCN perspective, the absence of London and New York and the prominence of Lausanne stand out. The success of the latter city is obviously drawn from the presence of the IOC headquarter, but we have shown that the ramifications of this IOC HQ are extensive as this spills over in the presence of major ISFs in 'typical' Olympic sports.

The latter example shows the relevance of summarizing ISF location networks through a PCA. Our analysis has thereby suggested that there are four clear-cut transnational social spaces through which global sports are controlled: (i) a winter sports component, (ii) an Olympic component, (iii) a martial arts component and (iv) a global sports component. Translated in geographical terms, it can be said that the social reproduction of global sports organizations thus primarily occurs through the four city networks summarized in Table 4 and Figures 1-4.

Admittedly, this focus on the global urban presence of ISF represents a quite narrow analytic window into the myriad transnationalization processes of sports. However, the relative simplicity of the framework provides researchers with a straightforward framework to assess the on-going globalization of sports. Thus a first avenue for further research will be to replicate this research with the purpose of mapping shifts in the global organization of sports. A second avenue for further research relates to framing these results in the context of actual transnationalization of the popularity of sports. The martial arts component, centred on Japan and spilling over regionally in Pacific Asia as well as globally, is an example of how organizational strategies of ISF are related to the actual spreading popularity of the sport. A systematic comparison may thus result in a more comprehensive framework for studying the globalization of sports.

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Notes

[1] The International Olympic Committee (IOC) describes ISFs in its Olympic charter as "international non-governmental organisations administering one or several sports at world level and encompassing organisations administering such sports at national level" (IOC, 2011, p. 51). Generally speaking only one national federation is allowed by ISFs, although the practical definition of what constitutes a 'state' varies widely in this context as dependent territories can establish their own proper federation if the federation of the controlling state concurs. The Falkland Islands, for instance, are listed as a separate member of the Badminton World Federation. For practical or historical reasons, there is also often an intermediate level between the national and the global level in ISFs through 'continental' organisations, e.g. UEFA as the level between national football organizations and FIFA.

[2]Today, ISFs potentially have a large variety of financial resources at their disposal: annual fees, fines, television rights, sponsor contracts, payments by the IOC after participation at the Olympic Games, etc. Following Croci and Forster (2006), it can therefore be said that ISFs – or some at least – bear more and more resemblance with multinational enterprises (MNEs). Forster and Pope (2004), however, stress that – despite the increasing importance of profit-making – ISFs remain firmly within the domain of GCSs in that, much like NGOs, symbolic and humanitarian values remain of key importance (e.g. further development of the sport, the fight against doping, etc.). Furthermore, ISFs operate in another legal framework and are unlike MNEs not owned by shareholders.

[3]The International Cricket Council is a special case. For this particular ISF we selected both full and associate members, who have already firmly established and organised the sport in their country.
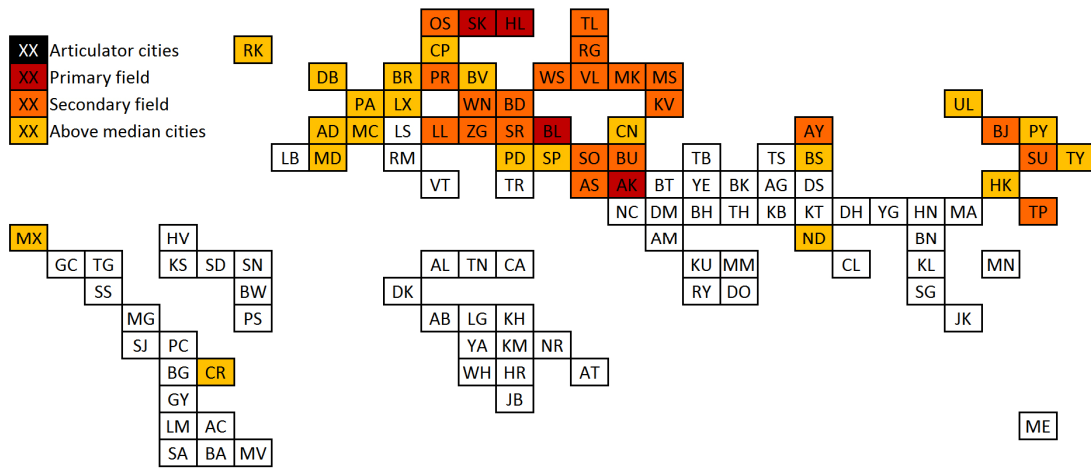
Figure 1: Component I
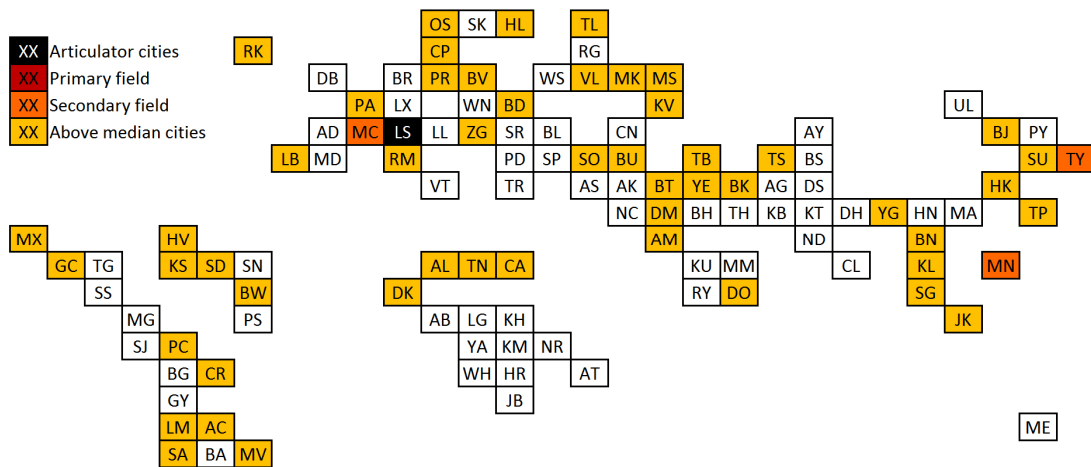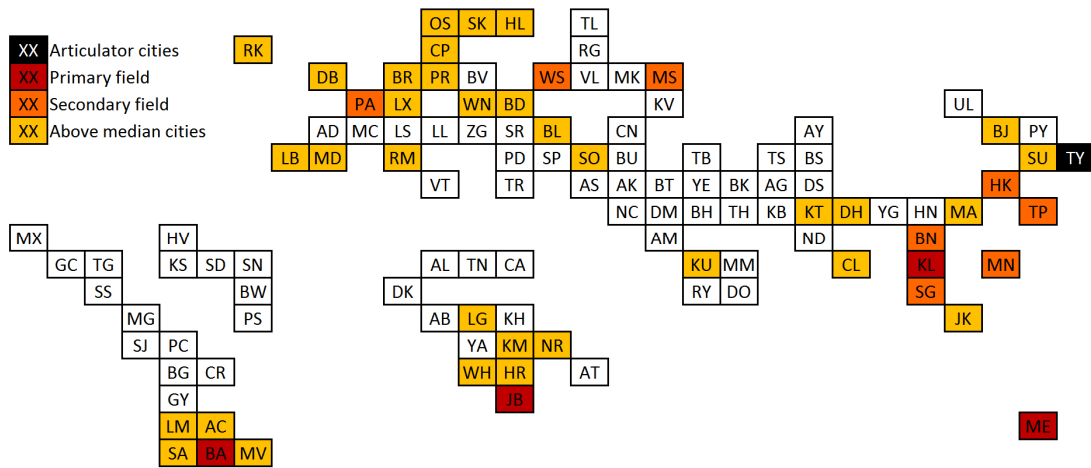

Figure 2: Component II

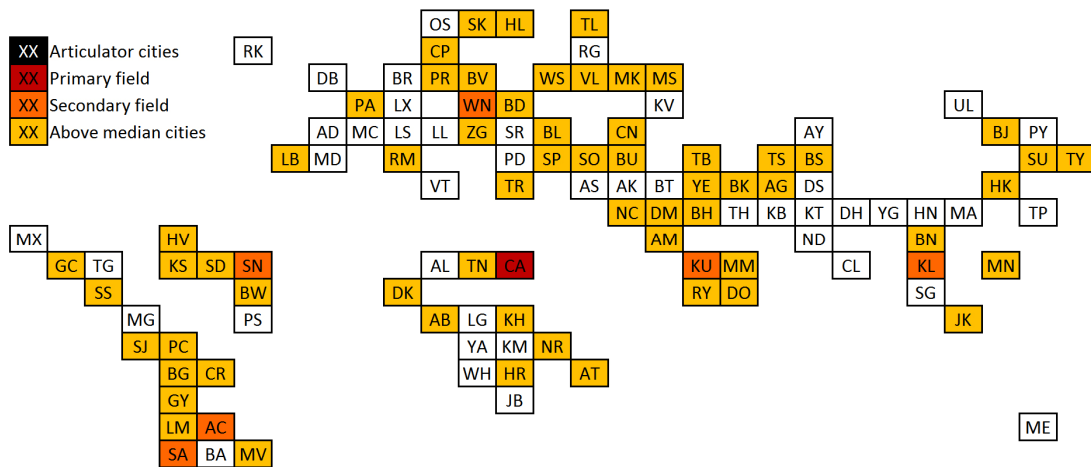**Figure 3: Component III**

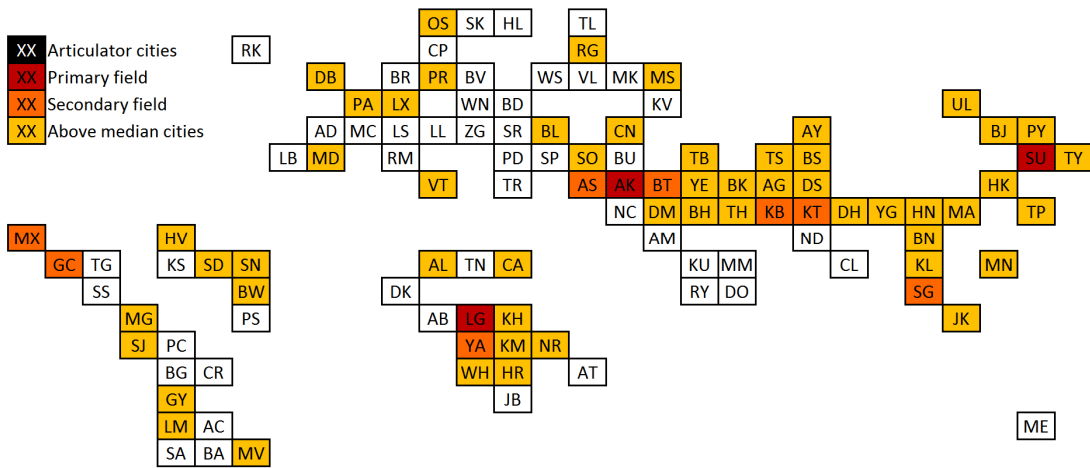**Figure 4: Component IV**

Figure 5: Component V

Table 1: Selected international sport federations

Acronym	Full Name	Acronym	Full Name
AIBA	International Boxing Association	IBU	International Biathlon Union
BWF	Badminton World Federation	ICC	International Cricket Council
FEI	Fédération Équestre Internationale	IDSF	International Dancesport Federation
FIBA	Fédération Internationale de Basketball	IFS	International Sumo Federation
FIDE	Fédération Internationale des Échecs	IFSS	International Federation of Sleddog Sports
FIE	Fédération Internationale d'Escrime	IHF	International Handball Federation
FIFA	Fédération Internationale de Football Association	IIHF	International Ice Hockey Federation
FIG	Fédération Internationale de Gymnastique	IOF	International Orienteering Federation
FIH	Fédération Internationale de Hockey	ISSF	International Shooting Sport Federation
FIK	International Kendo Federation	ISU	International Skating Union
FIL	Fédération Internationale de Luge de Course	ITF	International Tennis Federation
FILA	Fédération Internationale des Luttes Associées	TWIF	Tug of War International Federation
FIM	Fédération Internationale de Motocyclisme	UCI	Union Cycliste Internationale
FIPSed	Fédération Internationale de la Pêche Sportive en Eau Douce	UIM	Union Internationale Motonautique
FISA	Fédération Internationale des Sociétés d'Aviron	WBF	World Bridge Federation
FITA	Fédération Internationale de Tir à l'Arc	WCF	World Curling Federation
IAAF	International Association of Athletics Federations	WTF	World Taekwondo Federation
IAF	International Aikido Federation		

Table 2: The twenty most important cities by activity status and TNC

Rank	City	S	Rank	City	TNC
1	Tokyo	39	1	Seoul	1.000
2	Seoul	37	2	Tokyo	0.926
3	Moscow	33	3	Kuala Lumpur	0.904
4	Beijing	32	4	Cairo	0.901
	Helsinki	32	5	Lausanne	0.890
	Lausanne	32	6	Beijing	0.860
	Sofia	32	7	Singapore	0.856
8	Belgrade	31		Sofia	0.856
9	Budapest	30	9	Moscow	0.838
	Kuala Lumpur	30	10	Helsinki	0.826
	Prague	30	11	Budapest	0.811
12	Hong Kong	29	12	Athens	0.809
	Paris	29	13	Manila	0.803
	Singapore	29	14	Belgrade	0.797
	Taipei	29		Paris	0.797
	Warsaw	29	16	Prague	0.796
17	Cairo	28	17	Hong Kong	0.795
	Minsk	28	18	Minsk	0.789
	Oslo	28	19	Bangkok	0.773
20	Athens	27	20	Zagreb	0.772
	Bangkok	27			
	Bucharest	27			
	Kiev	27			
	Manila	27			
	Zagreb	27			

Table 3: Comparison with other WCN analyses

City	ISF Rank	Diplomatic missions Rank	Diplomatic missions Difference	Service firms Rank	Service firms Difference	NGOs Rank	NGOs Difference
Seoul	1	30	+29	13	+12	112	+111
Tokyo	2	2	0	6	+4	14	+12
Kuala Lumpur	3	50	+47	18	+15	110	+107
Cairo	4	27	+23	61	+57	16	+12
Lausanne	5	/	/	/	/	/	/
Beijing	6	10	+4	10	+4	25	+19
Singapore	7	26	+19	5	-2	86	+79
Sofia	8	74	+66	77	+69	156	+148
Moscow	9	17	+8	12	+3	10	+1
Helsinki	10	31	+21	56	+46	96	+86

Table 4: Principal component analysis

Component I (11.47%)			
Component loadings		*Component scores*	
International Ice Hockey Federation	0.786	Stockholm	2.19
World Curling Federation	0.758	Helsinki	2.13
International Orienteering Federation	0.751	Belgrade	2.06
Fédération Internationale de Luge de Course	0.670	Ankara	2.04
International Biathlon Union	0.597	Seoul	1.99
International Skating Union	0.553	Budapest	1.88
International Dancesport Federation	0.518	Ljubljana	1.76
Fédération Internationale de la Pêche Sportive en Eau Douce	0.483	Oslo	1.76
		Moscow	1.74
		Riga	1.71
		Beijing	1.67
		Warsaw	1.65
		Sarajevo	1.54
		Vienna	1.39
		Prague	1.39
		Zagreb	1.38
		Minsk	1.34
		Vilnius	1.31
		Taipei	1.27
		Tallinn	1.23
		Bucharest	1.21
		Almaty	1.12
Component II (10.11%)			
Component loadings		*Component Scores*	
Fédération Internationale des Sociétés d'Aviron	0.709	Lausanne	7.39
Fédération Internationale de Gymnastique	0.653	Monaco	1.45
Fédération Équestre Internationale	0.595	Manila	1.11
Fédération Internationale d'Escrime	0.591	Tokyo	1.05
World Bridge Federation	0.554		
International Boxing Association	0.542		
International Association of Athletic Federations	0.480		
International Dancesport Federation	0.476		
International Skating Union	0.455		
Fédération Internationale de Tir à l'Arc	0.453		
Fédération Internationale de Hockey	0.428		
Component III (7.83%)			
Component loadings		*Component Scores*	
International Cricket Council	0.702	Tokyo	4.31
International Kendo Federation	0.661	Kuala Lumpur	3.64
International Aikido Federation	0.617	Johannesburg	3.35
International Sumo Federation	0.515	Melbourne	2.46
Fédération Internationale de Motocyclisme	0.474	Buenos Aires	2.20

Hong Kong	1.77
Bangkok	1.58
Paris	1.57
Singapore	1.39
Taipei	1.23
Moscow	1.21
Warsaw	1.13
Manila	1.05

Component IV (7.31%)

Component loadings		*Component Scores*	
Fédération Internationale de Basketball	0.772	Cairo	2.82
Fédération Internationale de Football Association	0.705	Kuala Lumpur	1.80
Union Cycliste Internationale	0.443	San Juan	1.66
International Shooting Sport Federation	0.404	Santiago	1.21
		Asunción	1.17
		Vienna	1.05
		Kuwait City	1.03

Component V (5.86%)

Component loadings		*Component Scores*	
Fédération Internationale des Luttes Associées	0.692	Seoul	2.93
Fédération Internationale des Echecs	0.465	Lagos	2.22
World Taekwondo Federation	0.458	Ankara	2.22
Badminton World Federation	0.434	Kathmandu	1.72
Tug of War International Federation	0.412	Athens	1.43
		Kabul	1.37
		Guatemala City	1.35
		Yaoundé	1.18
		Mexico City	1.12
		Beirut	1.04
		Singapore	1.01