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Fecha		Autor	Susana Finkelievich
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Cities, and Science and Technology Parks Innovation environments as a new urban hierarchy

Susana Finkelievich

1. Cities as innovation grounds

Which are the characteristics of XXI Century cities? Do cities still exist, as we have known them, or are they the new agents of economic, political, and social changes? How are they related to scientific and technological innovation? In this paper, strongly based upon Castell's, Hall's y Sassen concepts, I wish to contribute new ideas to this debate.

The first hypothesis is that *urban changes are characterized by the overcoming of Industrial cities, as dominating structural elements of economic, geographic, and social organization, in different levels; some signals are identified, which suggest the upsurge of a society based on innovative forms of social cohabitation, which are not based any more on the classic formulas (family, neighborhoods, local community), and*

which eventually leave aside their territorial anchorages to wave global economic and social networks. At the same time, a new urban hierarchy is built in the world's urban network. It has already been intensively studied by Saskia Sassen, and by Manuel Castells, who have created the concept of global and nodal cities, according to the importance of the financial and political fluxes they concentrate.

But also, cities can be classified in central and peripheral to the Information Society urban system, according to their capacity of becoming innovation environments. Castells and Hall (1998) define innovative environment as: "The social, institutional, organizational, economic, and geographic structural system, which creates the conditions for a continuous generation of synergies, and for their investment in a production process originated from this synergic capacity, for production units, as well as for the environment as a whole". The development of innovation environments is, in the new Millennium, not only a decisive factor for local economic development, but also, a matter of political, and social prestige. Innovative cities would be those that are capable of concentrating and interrelate elements such as:

- ★ Development of technological parks. Local production of goods and services of high Information Society- technologies' value. This refers to hardware and software (as shown in cases such as Seattle and Silicon Valley, in USA, and Bangalore, in India), but not exclusively: it also refers to cities' capacities to attract innovative enterprises, not only manufacturers of electronic items, but enterprises that use ICTs, and mainly the Internet in its more recent generations, as place and means of networked organizations (such as Cisco Systems).

- ★ Individual and collective consumption of ICT intensive goods and services - urban services that use ICTs for their operation and management: education, public health, transportation, etc.; urban technological networks, such as water and sanitation, managed through ICT systems; and mainly, local electronic government.

- ★ The emergence of new social organizations, supported by ICTs. This refers specifically to electronic community networks, defined by the Spanish Association of Citizens Networks as "Systems of intervention, instrumentalization, articulation, and promotion, of local developments in all its areas". Different groups and social movements find in these networks means of communication and development, forums to transmit their ideas to the citizens, tools to interact with groups with similar interests around the world.

These cities attract the interactions between risk capital, State actions oriented to become key cities in the new economy, and production of high-quality knowledge in Universities, research centers, and technological parks. Depending on the cities capacities and possibilities to fulfill this role, a new map of urban centralities and peripheries will be established around the world, a map, which will possibly differ from the one, inherited from the Industrial Society. Innovative environments will be territorially concentrated in cities and their hinterlands, articulated and connected through telecommunication networks, with the rest of the world.

The third hypothesis is that *this network of central and peripheral cities, defined by their innovation capacities, will not necessarily be coincident with the present urban hierarchy of Capitals, large, intermediate, and small cities, in developed or developing countries or regions. It may also be non coincident with the Sassian hierarchy of global, and nodal cities.* As in a juxtaposition of transparent maps, some central, global, or hierarchically relevant in the present *Norths* and *Souths* will be coincident with the innovative cities, and many will not. Only cities that have the goal to become innovative environments (through the development of S&T, and the implementation of S&T parks, in their many forms) will achieve a new protagonism.

This paper attempts to build a conceptual basis to analyze the concepts referring to the urban hierarchies specific to the Information Society, as well as to sketch a first attempt to build an appropriate research methodology to analyze the phenomenon of urban centralities and peripheries, according to the mentioned hypothesis.

2. Cities: Cinderellas or divas?

What do the classic definitions of central and peripheral cities in the transition from Industrial Society to Information Society? ¿What does centrality mean, in a globalised world, and in a network society? Do *central* and *peripheral* cities, coincide with the metropolises of the, respectively, *central* and *peripheral* countries? ¿Are these centralities and peripheries physical, or are they defined by a different, virtual geography? Which is the CENTER, the 0 mile, which serves as referent? This paper does not pretend to answer their questions, but to generate a debate around these issues.

¿Do cities still matter? asked Saskia Sassen (1996) Many urban experts stated that globalization and information and communication technologies (ICT) marked the end of the cities economic importance. This is not a fantasy: in fact, many cities have suffered, in different degrees, the consequences of globalised economy. Many urban centers that had shone in the past for their industrial power undergo at present diverse degrees of decadence. In an era marked by factories' offshoring, the increase of urban fragmentation, the enlargement of world networks of enterprises, and developers operations, which transfer the population from urban centers to the suburbs, urban observers had valid reasons to suppose that cities would become obsolete. Sassen remarks that, defying these predictions; some cities have concentrated an important economic and political power in their territories.

In her essay "Whose City Is It? Globalization and the Formation of New Claims," in "Cities and Citizenship" (1996), Sassen argues that cities are *locus* of the new claims stated by different classes and economic groups. The representatives of the global capital's interests base their claims on the importance of a modern *hi-tech* urban infrastructure, to be able to develop their capacities to organize efficiently their investments abroad, and to attract foreign investments. Representatives of underpaid working groups resist these claims. This working force, integrated mainly by women, immigrants, and minorities, respond through urban demonstrations to the objectives of global capitalism. This tension does not only show a new, strong rebirth of an urban life, but it also questions, which cities are central, and which are peripheral.

According to the Sassenian theory, three factors in the current economy explain why a network of 30 to 40 "global cities" has acquired more importance than ever. In the first place, global economy isn't just a market, but a system that needs a specialized administrative work, which is concentrated in cities. Second, privatizations and deregulations have transferred certain functions from central, regional, and local governments to the private sector, centralizing these activities. Last, digitalization means that the dominant economic sectors need access to a services infrastructure that is found precisely in the financial cities centers. Instead of becoming obsolete, these cities concentrate political functions; they serve as production environments for financial activities and for the leader industries of "post-industrial" times. They provide markets in which enterprises and governments can acquire financial and technological tools, as well as hiring the human resources they need.

At present, there is a huge academic debate on these urban issues. Cities are discussed as innovation environments. A world network of cities as strategic places in the

global economy (not only New York, London, Tokyo, Paris, Frankfurt, Zurich, Amsterdam, Los Angeles, Sydney, and Hong Kong, but also Sao Paulo, Bangkok, Taipei, and Mexico City) create a new world economic geography, which crosses national borders, as well as the traditional North-South division of the industrial economy. The emergence of a parallel geography seems inevitable.

Cities, as Castells (1997, 2000) and Sassen (1996) remind us, have always been deeply incrustated in regional economies. Many cities still are, but global cities tend to disconnect themselves from their countries. Therefore, the present world situation demand a renewal in he debates about the following issues:

- ICT and globalization. Digitalization has reorganized the economic and social space. A new economic, social, and political geography emerges, fluctuating between physical territory, and cyberspace, or coexisting in both territories. We urgently need new and better research on ICT impacts ob urban economic and social networks, as well as on the space where these changes are featured.

- The distribution of electronic infrastructure (the Internet, etc.), and the conditions to access it, can accentuate or diminish regional and urban imbalances. It becomes urgent to understand which strategies can cities assume regarding these networks, and the populations connectivity.

- New concepts arise, such as cities as innovation environments, and their links with their regions and countries. Even if this new geography is determined more by central and peripheral cities, than by developed and developing countries, at present there is no equality –in terms of income redistribution, equity in infrastructures and services, the role of the State, citizens participation- between developed cities in developed countries, and developed cities in peripheral countries.

3. Informational Cities

As mentioned above, the third hypothesis is that *this network of central and peripheral cities, defined by their innovation capacities, will not necessarily be coincident with the present urban hierarchy of Capitals, large, intermediate, and small cities, in developed or developing countries or regions. It may also be non coincident with the Sassian hierarchy of global, and nodal cities.* As in a juxtaposition of transparent maps, some central, global, or hierarchically relevant in the present *Norths* and *Souths* will be

coincident with the innovative cities, and many will not. Only cities that have the goal to become innovative environments (through the development of S&T, and the implementation of S&T parks, in their many forms) will achieve a new protagonism. These cities will concentrate the interactions between risk capital, State actions tending to become key cities in the new economy, and the generation of high quality knowledge, in Universities and research centers, besides new social organizations that use ICTs as a ground for social innovations.

Evidently, not all the cities that have created innovative environments will have the same innovation proportion in all their areas and sectors. Some cities will be remarkable for their technological innovations; others, for their social, economic, or cultural innovations; in others, it is possible that an innovative phase could become antagonist to another one. The complex reality will confirm or contradict these initial concepts.

For Manuel Castells¹, cities, in their transition to Information Society, can be defined as *the cities of the new economy*. He analyses the cities role in the new economy, and their problematic relationship between this new economy, and the urban social and institutional processes. He defines the Information Economy through three interlinked features:

- a. It is centered on knowledge and information, as basis of production productivity, and competitiveness, for enterprises, as well as for regions, cities, and countries.
- b. It's global, which implies that the dominant economic activities – globally articulated, working as a unity in real time- work around two systems of economic globalization: the globalization of financial markets, interconnected through electronic means, and the planetary globalization of goods and services production, and management.
- c. It works in networks: decentralized networks within the enterprises, networks between the enterprises, and networks between enterprises, and their subsidiary firms.

This network economy, which allows an extraordinary flexibility and adaptability, is informational, global, and organized in networks. It has a technological basis: ICTs, and a central organizational form: the Internet. Castells underlines the fact that the Internet is not a

technology, but a form of activities organization. Cities play a double role. Castells (2000, 2001) develops the hypothesis cities are key elements, as producers of the processes that generate wealth in the new economy, as well as producers of the social capacity to correct the disintegrating and destructive effects of a network economy without references to larger social values, non measurable in the market (such as cultural identity, or environmental preservation).

Cities are the most important technological and managerial innovation environments. Castells and Hall confirm that technological innovation environments, generally cities associated to science and technology parks, are located in large metropolitan areas, driven by potent cities: Paris, Marseille, Barcelona, London, Taipei, San José, etc. These metropolitan innovation environments are essential, because through the synergy they generate, of the networks of enterprises, the innovations, the capital, they attract the two key elements of the innovation systems: innovation capacity – talent, people with knowledge and ideas -, and capital –mainly risk capital, which allows for more innovation.

As Sassen explains, global economy has nodes, territorial concentration. *The innovation environments are territorially concentrated in cities or their hinterlands, articulated through telecommunication networks, among them, and with the rest of the world.* An innovation environment is an attraction center. Castells (2000), through his empirical research, confirms that innovation environments, based on science and technology parks, or technopoles, and concentrated around dynamic cities, are the sources of wealth in the new economy. For this to be accomplished, the articulation between cities, S&T parks, and Universities, is essential.

S&T parks, as well as Universities, are the engines of economic, technological, and managerial growth, but they are also a factor of urban creation and re-creation. At present, S&T parks are key elements for the dynamization of urban areas, while they originate qualified labour force, and innovative individuals. It is important to produce technological actions on applications, advanced software systems, and network technologies: briefly, telecommunications technologies. These types of actions need not only traditional technological parks that concentrate large industrial installations: these innovation environments are more intelligence-intensive than building-intensive. The key issue is to search for articulation forms between the physical territory, and these much subtler social,

1 Conference delivered at the Salón de Ciento del Ayuntamiento de Barcelona, on February 21st, 2000, (<http://www.fbg.ub.es>).

spatial, economic, cultural, innovation mechanisms, linked to the innovation dynamics, and particularly, to the innovation of small and medium enterprises.

Civil society has an important role to play in the construction of innovative environments: Castells establishes an intimate link between citizen's politics, and the development of the new economy, and new information technologies. He develops the idea of local technology markets, information-intensive, based on civil and environmental policies, and in advances information processing, from the modernization of public services, to the creation of interactive citizens participation systems through the Internet. Not only these developments would improve local management, but they would also create local markets, for innovative small and medium enterprises, the basis of future development.

Massive use, and social appropriation of the Internet, will generate new types of technology. Intensive technology use, in a city with innovative policies in terms of public services, with strong links to an innovative environment, such as a S&T park, with interactive public participation, would in turn, through consumption's demand, generate the development of new technological applications, and therefore, to new uses, and new information and communication technologies, enlarging the use of the Internet. To the current commercial uses of the Internet, new uses and application would be added. Besides generating important markets, these new uses would also allow to use the information to improve life quality, and to create innovative forms of social organization. This process changes the place these cities occupy in the global hierarchy.

4. New Geographies, and virtual distances

European Tele work Online, or ETO, (www.Telework/netdist.htm) has published an interesting work on the distances that separate different countries in the network economy (January 26, 2000). ETO states that in the global network economy, or Information Society, the commerce and economic development geography is changing fast. ETO has built a table, which features a new way to measure the "distance", based on the relative cost of international phone calls. The lower the cost, the shorter the distance is considered. The relative cost, and the "new distance" is shown in ETO's work, referring to the cost of calls between US, and UK (at present, the most competitive international route), which represents a distance unity.

National strategies between Great Britain and the UK have made their communication links the cheapest in the world. Other distances are shown as multiples of this original unit. I.E., Austria's distance from the network economy "center" is twice U.S., or Great Britain's distance. Cyprus distance is five times longer, Bolivia ten times, the Seychelles fifteen times. This table shows clearly the impacts of proactive, positive deregulations in telecommunications. In European countries, a phone call from UK or France, its nearest neighbor, costs twice than a phone call to the other shore of the Atlantic. Even Australia is nearest France, in telecommunications terms.

This new geography has important impacts on peripheral countries, and on their cities. Some regions in India (such as Bangalore) have become attractive for software enterprises; but an Indian enterprise that wants to compete with British enterprises, faces communication costs that multiply by six the costs of a French colleague, and by four the costs of Israeli firms. Some thoughts can be derived from this telecommunications-based geography:

- a. The first is, evidently, about the dimension of the telecommunications market influence on cities development as innovative environments, and therefore, their significance as a key indicator for innovative environment.
- b. The second is that the distance to the communications center does not depend so much on the countries economic development, nor of their degree of centrality in the Industrial society geography –although it is undeniable that the most developed countries, as (US, great Britain, Sweden, Canada, Australia, Holland, Belgium, France, Germany, Norway, Switzerland, Denmark (even if the Virgin Islands are also in this group in the new centrality) enjoy shorter distances -, but on the way the telecommunication market is regulated and standardized. Countries considered economically more developed, such as Greece and Portugal, are more peripheral –telecommunications costs wise- than other less developed countries, such as Mexico or Dominican Republic.

c. Evidently, distances, centralities, and peripheries, depend also on the domain and ownership that countries have on telecommunications enterprises, and on the agreements achieved between these enterprise and their respective governments, as on the national telecommunications regulation policies, and on competition among enterprises. Probably, if the telecommunications enterprise belongs to the country (I.e. Telefónica in Spain, Telecom in France) the agreements on phone costs will be more favorable to national users than if the enterprises are foreign.

d. In the case of the new telecommunications geography created by ETO, the basic measure unit is simple: the cost of a call between UK and US. However, if we want to draw a new geography of cities as innovation environments, measure units will be established as the interface of much more complex and numerous indicators. Among these indicators, we can mention: *the existence of innovative productive environments, mainly S&T parks, technopoles, etc.*; local telecommunications policies; hardware and software production; number of universities that interact productively with enterprises; degree of the populations access to ICT; social innovations; consumption of ICT-intensive goods and services, etc.

5. New indicators for urban centralities and peripheries?

The interfaces between these indicators should consider:

- **The regional and/or local concentration of S&T activities, resulting in local production of high added value in Information Society technologies**, including telematics, but also biotechnologies, which are also a form of information technologies this concentration should be supported by an S&T system, oriented towards a local/regional sustainable development, associated to an overall national project. This demands the inclusion of technopoles, S&T parks, Science Cities, briefly, of all the installations that encourage synergies between high technology industries, Universities, and research centers. Some possible indicators in this area are: **local S&T efforts and investments**, governmental as well as private. This includes technological development support programs for small and medium enterprises; implementation of enterprises incubators; tax facilities for S&T initiatives; human resources dedicated to research; occupational areas for high level professionals; distribution of research teams per knowledge areas; etc.
- **Education, oriented towards the production of new knowledge**. In this case, the indicators to be considered are: number and academic qualification of universities, research centers; public and private expenditure in undergraduate and graduate education: scientific production, evaluated by the number of postgraduate thesis, including doctorates; publication of scientific and technological papers; papers presented in scientific and technological events; number of graduated students. Another important indicator is **primary and secondary education**. Castells (2000) states that education means that the development of the education system is capable

of producing people who are autonomous in their thoughts, and capable of self-education for the rest of their lives. It's necessary to advance further on, to the concept of *educational cities*: these cities do not rely only on the school system, but on the whole local society. Through a series of interactions, including cultural activities, the media, interactive museums, the whole local relationships system, it generates an interactive communication system, which develops citizen's capacities for education in an active, larger sense than the mere acquisition of information. Some valid indicators are: the number of schools connected to the Internet; number and quality of ICT courses given to teachers; existence of interactive urban services, such as science museums.

- **Collective and individual consumption of ICT-intensive goods and services:** it refers to consumption of urban services that use ICT for their work and management: education, public health, transportation, public safety, community integration, environmental preservation, urban technical networks, such as electricity, gas, water, sewerage, etc. In this case, valid indicators would be the used ICT systems, their results concerning efficiency, costs, services reliability, billing systems, etc.
- **Implementation of e-government in urban areas.** This means putting the local government in a network, in the Web, to contribute to generate a transformation in the political and institutional culture, in order that citizens can have access to the informations that interest them, and to proactively participate in the decisions that affect their life quality, and their citizens rights. Some measurable elements are ICT-supported municipal decentralization programs, interinstitutional information networks, institution-citizens information networks, inter-municipal networks, access to urban services through the Internet, civil servants - citizens discussion forums, ICT use programs and projects in local governments, number and type of city services accessible through the Web, municipal websites: contents, services to citizens, interactive spaces, online services for the community, proportion of the City budget allocated to ICT-supported services, and to the training in ICT for civil servants; proportion of the City budget allocated to ICT training for the population, among others.
- **The emergence of new, ICT-supported social organizations.** This refers to ICT-supported citizens networks, systems of instrumentalization, articulation and promotion of local development. Possible indicators are: the number of existent

ICT-supported citizens networks, their scope, the number of citizens involved in them, their goals and actions, the contents they put into the Internet, their web sites, forums, discussion lists, their articulation with national and international networks, their demand or creation of community informatics tools.

- **Degree of the population's access to Information Society tools.** Accessibility is economic (measurable by telecommunications costs, ISP costs, national and local policies and telecommunications strategies), or physical (number of public centers to access the Internet, such as telecentres, either government or community managed, private access points, such as cibercafés, or any of the emergent varieties; computers park; number of citizens connected to the Internet from their homes or jobs; relative density of cybernauts. But, cultural access to ICT should also be considered: technological training campaigns, creation of citizens contents in the Web, community radios and newspapers in the internet, etc. Other indicators for connectivity degrees are ISP addresses, geographical density of ISP, etc.

These are only a few of the possible indicators of the degree of innovation in different cities. In a later phase of the work, these indicators should be related, not only with each other, but also with the level of urban life quality, to know if the degree of socio-technical innovation does have an influence on the improvement of the citizens everyday life. Let's hope that the evolution of research may also generate in a short period a new map of central and peripheral cities in Information Society, based on their degree of social, scientific, and technological innovation.

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The new telephonic geography, according to ETO 2000

Countries Distances

United States	1.0	<i>Mexico</i>	2.6	Grecia	4.8
United Kingdom	1.0	Bahamas	2.9	<i>Guatemala</i>	4.8
Sweden	1.3	Israel	2.9	Slovakia	4.8
Canada	1.4	Mónaco	2.9	Swaziland	4.9
Virgin Islands	1.5	Japón	3.0	Cyprus	5.1
Australia	1.6	Corea – Sud	3.0	Faeroe Islands	5.1
Netherlands	1.6	<i>Mexico</i>	3.0	<i>Holanda. Antilles</i>	5.1
Belgium	1.8	Spain	3.0	Bosnia-Herzeg.	5.4
France	1.8	<i>Chile</i>	3.1	Bulgaria	5.4
Germany	1.8	Vatican City	3.3	Latvia	5.4
Norway	1.8	Eslovenia	3.4	Albania	5.5
Switzerland	1.8	Bermuda	3.5	British Virgin Is.	5.5
Denmark	1.9	Singapur	3.5	Cayman Islands	5.5
<i>Puerto Rico</i>	1.9	Malaysia	3.6	Croatia	5.5
Austria	2.0	Hungary	3.8	<i>Costa Rica</i>	5.6
Guam	2.0	<i>Dominican Rep.</i>	3.9	Lithuania	5.6
New Zealand	2.0	Taiwan	3.9	<i>Ecuador</i>	5.8
Finland	2.1	Iceland	4.1	Philippines	5.8
Ireland	2.3	Malta	4.1	<i>Brazil</i>	5.9
Hong Kong	2.4	Portugal	4.3	<i>Venezuela</i>	5.9
Italy	2.4	Czech Republic	4.4	<i>Antartica</i>	6.1
Liechtenstein	2.4	Poland	4.5	<i>Aruba</i>	6.1
Luxembourg	2.5	Andorra	4.6	Gibraltar	6.1
		Estonia	4.8	Turkey	6.1

Ukraine	6.1	<i>Panama</i>	9.0	Yemen Arab Rep.	12.4
Russia (Moscow)	6.4	Turkmenistan	9.0	Zanzibar	12.4
Russia (other)	6.4	Ghana	9.1	Niger	12.6
Belarus	6.5	<i>Falkland Islands</i>	9.4	Palau	12.6
<i>F.Ant./Martinique</i>	6.5	Guinea	9.4	Pakistan	12.8
Greenland	6.5	Reunion Island	9.4	Laos	13.1
Macedonia	6.5	<i>Uruguay</i>	9.4	Nigeria	13.1
Marshall Islands	6.5	Armenia	9.5	Rwanda	13.1
Romania	6.5	Grenada – 473	9.5	Ascension Islands	13.3
Yugoslavia	6.5	Benin	9.6	Oman	13.4
<i>El Salvador</i>	6.6	Cape Verde Is.	9.6	Congo	13.5
Libya	6.8	<i>Haiti</i>	9.6	Djibouti	13.5
San Marino	6.8	St. Vincent	9.8	Madagascar	13.5
South Africa	6.8	Gambia	9.9	Mali Republic	13.5
Algeria	6.9	<i>Jamaica</i>	9.9	Sierra Leone	13.5
Tunisia	6.9	Tanzania	9.9	Vanuatu	13.5
<i>Colombia</i>	7.0	Western Samoa	9.9	Fiji Islands	13.8
Morocco	7.0	<i>Bolivia</i>	10.1	Togo	13.8
Papua New Guinea	7.0	Burundi	10.1	Cambodia	13.9
Azerbaijan	7.1	Belize	10.3	Iran	13.9
<i>Argentina</i>	7.3	French Polynesia	10.3	Somali Dem. Rep.	14.0
French Guiana	7.4	Kazakhstan	10.3	Sri Lanka	14.0
St. Kitts	7.4	Saudi Arabia	10.3	Nauru	14.4
Thailand	7.5	Uzbekistan	10.3	Nepal	14.4
Turks & Caicos Is.	7.5	Egypt	10.4	Suriname	14.5
Zimbabwe	7.5	Indonesia	10.5	Tuvalu	14.6
<i>Guadeloupe</i>	7.6	Mauritania	10.5	Seychelles Is.	15.0
Anguilla	7.8	Mayotte Island	10.5	Mongolia	15.1
Malawi	7.8	<i>Paraguay</i>	10.5	Cent. African Rep.	15.5
Nevis Island	7.8	Syria	10.5	Iraq	15.6
<i>Peru</i>	7.8	Bahrain	10.6	Tonga	15.6
Sudan	7.8	Bhutan	10.6	Vietnam	15.6
Tajikistan	7.8	Georgia	10.6	Bangladesh	16.1
<i>American Samoa</i>	7.9	Montserrat	10.6	Equatorial Guinea	16.1
<i>Antigua</i>	7.9	St. Helena	10.6	Guinea-Bissau	16.1
Botswana	7.9	Zaire	10.6	Afghanistan	16.4
Lesotho	7.9	<i>Guyana</i>	10.9	Ivory Coast	16.4
<i>Honduras</i>	8.0	Diego Garcia	11.1	Senegal Republic	16.5
<i>Nicaragua</i>	8.0	New Caladonia	11.1	Ethiopia	16.9
Brunei	8.1	Solomon Islands	11.1	Chad	18.1
Macao	8.1	Cameroon	11.3	Burma/Myanmar	18.4
Moldova	8.1	Jordan	11.3	Niue Island	18.4
U. Arab Emirates	8.1	Lebanon	11.3	Sao Tome	18.8
China	8.3	<i>Cuba</i>	11.4	Erithea	18.9
<i>Dominica</i>	8.3	Burkina Faso	11.5	Cook Island	19.6
St. Lucia	8.5	Zambia	11.5		
Barbados	8.6	Mauritius	11.9		
Liberia	8.6	Qatar	11.9		
Namibia	8.6	Kenya	12.1		
<i>Trinidad & Tobago</i>	8.6	Gabon Republic	12.4		
Uganda	8.6	India	12.4		
Angola	8.8	Korea – North	12.4		
Mozambique	8.9	Kuwait	12.4		
Kyrgyzstan	9.0	Maldives	12.4		
		Micronesia	12.4		