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Urban green innovation: Public interest, territory democratization and institutional design

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Abstract

This paper has the objective to analyze the elements of urban green innovation based on the guarantee the public interest, decentralize the infrastructure to democratize the territory and innovating the institutional design to address the complexity of the challenges in the city. The method employed is the critical analysis supported by a review of the literature and consult to experts in the field. It is concluded that the urban green innovation capacity planning has a critical role in urban innovation development in specific areas of economic growth, social inclusion and equality, environmental sustainability, health, education, business, etc. To achieve these aims, urban green innovation requires to guarantee the public interest, the democratization of the territory and the new institutional design.

Keywords: Urban green innovation, public interest, territory democratization, institutional design

1. Introduction

Cities are very different lively ecosystems brooding places of urban innovation, imagination and creativity. Cities shape and are shaped by the vision of urban green innovation ecosystem elements that anchor investments into environmental and sustainable development. Larger cities generate more innovations because the interactions between people socially distant to each other and weak ties, aggregating information when they meet (Arbesman, Kleinberg and Strogatz, 2009; Granovetter 1973) ^[3, 26]. Large cities have more educated and transient people (Arbesman *et al.*, 2009) ^[3].

Urban green innovation may have the objective to improve the high technology and services business labor market while restructuring old urban industrial and shrinking areas creating new urban development mixing economic, science, media, leisure and living activities. Green innovative technologies processes supporting the green urban environment may become more complex when affecting the pace of changing the city. Urban green innovation challenges sustainable and environmental development of the city at various scales and across sectors. The multi-level conceptual analysis of urban green innovation takes into consideration the micro, meso and macro levels the corresponding niche-innovations, sociotechnical regimes and sociotechnical landscapes.

Defining need of urban green innovation is a first step required to advocating investment in specific local spaces and areas and encouraging external funding support. The intention to introduce urban green innovation requires an enhanced level of corporate governance environmental responsibility and sustained level of implementation of the city's environmental strategies and policies to put urban green projects into practice and overcoming of environmental challenges and risks. Integrating environmental sustainability, economic growth and social development issues into urban green innovation into an in-depth approach represents a challenge. Other innovative urban green projects are related with alternative and renewable energy saving buildings, neighborhoods and spaces.

There are different approaches can be used, each one with different reasons and ends, for example: radical versus incremental, environmental performance, etc. Urban green innovation essentially intends to respond to the environmental changes and new societal expectations, integrate sustainability issues into the achievement of economic growth, social development, environmental sustainability, community welfare and good.

Urban green innovation practices contribute to sustainable urban planning of infrastructure and urban green areas. The cities and urban undertakings are innovation hubs for urban green areas with relevant impacts on economy, technology, social, organizational, etc.

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Urban green areas are a potential testing ground for innovations in several issues and disciplines. Urban green areas are hot spots for green innovation (Burch and De Luca, 1984; Krott, 1998) ^[10, 35]. Innovation can be social, technical, socio-technical, ecological, socio-ecological and environmental.

The urban innovation ecosystem has the levels of interaction shaping, implementing and operating. The urban plan based on an urban green innovation ecosystem is interconnected and supported by a network of organizations, firms, local government, educational centers, communities, etc., aimed to create an inclusive economy based on innovation and encouraged by local business to make local improvements. The urban green innovation ecosystem is interconnected and supported by a network of communities, neighborhoods, social organizations, business firms, local governments and authorities, educational and research centers, etc., are the foundations for the environmental urban planning and design.

Urban innovation and entrepreneurship network systems in the local ecosystem play a crucial role to promote and adapt to new situations (Granovetter 1973) ^[26]. A green innovation ecosystem is form with urban planning and development programs, living labs and future internet experimental facilities for users and citizens, policy-makers, researchers, scientists, ICT business companies, etc. Urban cyberspace is crucial in technological innovation in city management of digital cities to deliver benefits to people in green public spaces and developing civic networks in areas of economic regeneration and community building.

Urban green innovation may contribute significantly to urban sustainable development providing an opportunity for research to define a new direction for green environments (Cronon 1991; Goudie 1994; Forman 1995) ^[16, 25, 25].

There are three fundamental elements of urban green innovation: Guarantee the public interest, decentralize the infrastructure to democratize the territory and innovating the institutional design to address the complexity of the challenges in the city.

2. Guarantee the public interest

Urban territorial sustainable planning is a means of public decision and expression of political will. It is aimed to regulate and organize land use and urban infrastructure and facilities through territorial democratization and safeguard of natural, environmental and cultural resources. The main purpose of urban territorial sustainable planning is to improve quality of life. The urban planning process is developed by a democratic government meeting the public interest, one of the essential requirements (Benabent, 2018) ^[9].

Public interest is defined in the context of planning expertise as equal access to common goods and services, such as the public spaces and urban green areas, etc. Public interest is a fundamental concept and one of the most used terms in democratic government and public administration. The public interest is an amorphous concept typically not defined in specific actions that may change over time in accordance to the circumstances. The public interest is a commitment over time that have short and long term implications of common interests.

Public interest is a crucial element to the analysis of green urban sustainable planning. Urban planning analysis is more based on quantifiable factors than qualitative. However,

normative planning has the tool of descriptive science, evident in the notion of public interest or common benefits of planning solutions. An elaboration of an operative concept of public interest in green urban sustainable planning as a political decision process must be the result of a debate on economic, socio-political and ecological priorities of the whole society.

Defining the means and ends in planning is left to urban planners under the assumption that they know better what is the best for the citizens (Banfield 1973) ^[5]. Subjective motivation on participatory planning analysis may distort the objectivity of common good and the realization of public interest. Urban planners rely more on facts that have scientific basis and on rules based on his authority (Forester 1987) ^[20]. Advocacy planning theory argues that determinations of public interest of a society with many diverse interest groups are of contentious and controversial nature (Davidoff 1973, 279) ^[17].

Public interest is a common concern for the public good, the well-being and welfare of the whole society and among citizens of the general public that have a stake in public affairs, management and protection conducted by national, state and local governments and agencies. Public interest is concerned with society as a single whole with the acceptance of sharing common ethical values. Public interest is related with the well-being and welfare of the general public where all the society has a stake in opposition to the private interest related to the welfare of a person or firm. Public interest covers a wide range of issues, principles and values of legitimate public concern in the best interest of the whole society. Thus, the matters and issues are of legitimate concern to the public and in the public interest.

Public interest is a fundamental criterion for establishing and determining the necessary and acceptable legitimation of political power and the best form of government in order to have the ability to realize goodness and wellbeing. The best form of government is the one that is best suited to attain public interest for the entire society, nation or group. Most of national and local government are constitutionally obliged to act and serve in the public interest. The form of government best suited to public interest is democracy through mechanisms of representation and public debate. Political and government regimes where public interest is dependent on one or few people, they do not take into account the interest of the whole society, nation or group. In a democracy, people have rights and obligations, among which is to contribute to the debates on what ought to be public interest in society.

Acting in the public interest has as components the objectives and outcomes as well as the process and procedures followed in the decision-making process, sometimes difficult to identify. Public interest definition can rest on the method or procedure to attain consensus. Clarification of the public interest requiring economic analysis of all viable alternatives to achieve the greatest aggregate utility becomes a questionable public interest. Not always the achievement of the greatest utility represents the public interests.

The analysis of the theoretical concepts of public interest offers to consider a non-subjective and ethical concept to sustain the framework of green urban sustainable planning. For Montesquieu, the wise law-giver must formulate the laws based on the spirit of the people in correspondence to

the public interest. There different methods and processes to determine the public interest, either by the results or consequentialism as utilitarianism and contractarianism, or by the procedure, as in the theory of communicative action. From the consequentialist perspective, public interest is not supported by public participation as it is essential in the theory of communicative action.

The concept of the public interest arises from utilitarianism, contractarianism and the perspective of communicative action introduced by Habermas. All of them have in common to consider public interest as an achievement of a fairer society. Public interest of a society is a means to achieve its fairness. For utilitarianism, the public interest is the increase of wellbeing although does not explain how should be distributed. On the other hand, contractarianism proposes the principle of difference in distributive equity replacing the utilitarianism principle of efficiency in the public interest. To achieve the distributive justice in public interest is necessary to differentiate the treatment in the distribution of resources to guarantee equality between the members of the society.

The utilitarian perspective defines public interest by the consequences for those affected people. However, this concept of public interest defined by the sum of private and individual interest, has some problems. Government may regulate some practices for the public interest or good of society opposed to current practices. Also, not necessarily what is in the interest of the executive government is considered to be in the public interest. Public interest transcends individual interests when favoring an action that realizes public interest although the members of the group do not agree. That is, what is public interest for the government is not for a large group of population, although this group can express what considers is public interest.

In another perspective, Habermas replaces instrumental reason with communicative action-based reason, which considers that public interest emerges when all the people accept the best argument through rational communication. Public interest communication multiplies information and discussion for a more informed citizenry geared toward democratic participation for the common good. Habermas's analysis makes rigid and imperative the distinction between lifeworld and system understood as economy – state, removing this one from democratic transformation. Also, the analysis limits participatory democracy to the lifeworld undergoing new threats from the system such as the colonization by technologies of information and communication.

The libertarian-liberal perspectives of public interest, Marxism and post-modernism, reject the concept of public interest, allowing no place and leading to a critical questioning on the existence of public interest in urban planning. The analysis of philosophical theories on the concept public interest reveals it is a conflictive one, difficult to reach consensus, and its existence is questioned by the Marxism under the argument that the social classes have antagonist interests, and the postmodernism because individuals have different interests. The public interest is an ideological concept used to legitimize the social order.

The Marxist concept of public interest is equated with interests of the bourgeoisie which is protected by the capitalist state. The public interest in Marxism is only feasible in a classless state. Postmodernism rejects the existence of shared values of a plural society to represent

the public interests. In postmodernism, the fragmentation of society does not necessarily reject the argument of public interest. The libertarian liberalism perspective argues that the concept of public interest interferes the individual liberties.

An issue that concerns to the public interest does not necessarily means that the whole society can be affected or a large portion of it. Also, individual private interest may be of wider public interest under the assumption that damage to individual interests may concern and damage the society as a whole. So, it is relevant to recognize personal interests through the public interests. People may have an agreement on the public interest in several critical issues despite their different objectives. Sometimes, general consensus if people does not represent the public interest or the public good such as in the case of a genocide. In this situation, the public interest demands to act not being favored by the majority.

An operative approach of public interest may be the results of shared solutions after the opinion of everyone is taken into account in transparent deliberations and consensus is achieved. Decision making regarding public interest should be close to the involved people and communities. On plural, cosmopolitan and post-modern society, public and good interest should be defined on the basis of a consensus on actions and values after a social and political debate. However, rarely public interest cannot have consensual basis.

State, economics, business, society and media, as the main institutional forces of contemporary capitalism should be serving the public interest in constructing the democratic society toward the common good. Ecological integrity and sustainable society requires cooperative efforts among the institutions of the local and state governments, economic, industry, business and public interest groups to ensure the public interest and good of the concerned whole society. The public interest in green and sustainable urban planning cannot be defined in objective terms as it has unsatisfying results in terms of green innovation in urban green areas, aesthetic and social dullness, necessary urban infrastructure and services, etc.

Democracy is intricately intertwined within the state, society and economy. In contemporary societies, the major institutional forces are the economy, state, society and the media, which have crucial functions to create a democratic transformation and maintain a democratic social order by promoting social democratization and serving the public interest. The public interest should be the expression of the social and political process, but it is not due to the dysfunctional ties of the democratic systems. Predominant and hegemonic interests of a corporate society replace the public interest and good of the whole society.

Representative local authorities can be strengthened or weakened through recognition and institutions supporting their ability to serve public interest. Official bodies of local governments and local civic organizations involved in formulation of public policy and legislative information, can put forward meeting agendas on issues of public interest. Also, they can plan and manage institutional transitions from weak governance to enabling national, state and local governments to act in the public interest, although they cannot be expected to function only on the basis of public interest. Identifying and determining when to act and serve in the public interest is an obligation of public officials to perform their functions and duties. Public official must act

and serve resolving the conflicts and incompatibilities derived from the flexibility of conduct standards expected to comply.

Strikingly, the issue of public interest in socio-environmental affairs has been taken on seriously by the local governments and communities. Stakeholder engagement in the public interest dialogue to clarify and prioritize the needs of the whole society should include local government policy makers, public interest social organizations and groups, industries and business, etc., all of them expecting environmental and social benefits. The public interest is specific, contingent and situational regarding the needs, objectives and values of a given time by society within the wider and shared framework.

Urban community organizations advocating local environmental and sustainable development are catalyzing urban resilience by making regulatory procedures and monitoring institutions in their deliberations of public interests. Urban community greening innovation is a community-based tool able to strengthen resilience through social learning, adaptive management and urban green innovation ecosystems. Innovativeness in urban green areas have developed from motivations to engage in environmental and sustainable development performance issues, risks and challenges. This means producing and developing green innovation with environment impact.

The concept of public interest applicable to green urban sustainable planning afford awareness of values and the consequences in the planning analysis. People who share the same public interest, however, this assumption may be questioned because they do not always share the same values and preferences. Public interest is used to justify the formulation, implementation and evaluation of a green urban sustainable planning and other alternative planning proposals. The public interest as a concept is used to justify the green urban sustainable planning and the distribution of natural resources, although the concept is not always specified.

In situations in which local governments want to be acting actors of independent public and private agencies, they are faced with harshness at higher levels of uncertainty in order to have knowledge and to confront their ability to manage in the public interest as well as to promote general welfare. The exercise of public management in environments of high complexity and uncertainty requires that managers and public executives have the tools of analysis for the treatment of various public issues concerned with the public interest of the society as a whole through the development of critical analytical skills and through training in applied heuristics.

Those who are users of public and social services from local government agencies and institutions do not always also have clarity about many interdependent and non-competitive structures when there is only one choice for public interest. Then, it is assumed that local government agencies also have to make more choices than the citizens as consumers of goods and services themselves. It is also relevant in this order of structural relationships, the analysis and determination of satisfaction levels for the client-consumer-final citizen, as well as the determination of what will be most appropriate for the public interest and general social welfare.

The research constructed properly consists of the evaluation of explanatory and comparative frames of reference, the proof of models centered on structures / cultures /

organizations / spatial contexts and the comparison of different instruments to achieve the verification of the same results. The reference model defining the urban green innovation ecosystem must describe the characteristics taking into consideration the different characteristics of the cities to tailor the model of local urban green innovation accordingly. In addition, the new public management in local government organizations takes into account the organizational culture of the private sector, accountability for results rather than the traditional public sector, processes of accountability and the vocabulary of efficiency and service rather than the justice of the public interest.

If the efficiency of the private market economy is questioned on its own, then this argument implies that private companies need a more critical and differentiated analytical approach to public interest before they are recommended as models of organizational efficiency to public organizations. These concerns are often equated to the public interest with the same interest of the current government, this is the public interest is what the current government says it is. The society that is democratic is concerned about income disparities between citizens and their public interest in their well-being, so it has to make policy decisions that often involve questionable negotiations.

There is a genuine concern for the application of the entrepreneurial model from the perspective of the new public management of democratic ideals, either because the public entrepreneur is capable of abandoning self-interested behavior in favor of the public interest. It is worrying that the concept of public interest does not provide specifically enough guidance for ethical-centered behaviors. There is concern about the urgency of the behavior of public servants that to pursue the public interest may induce some of them to inject excessively their personal values into the decision-making processes, in such a way that they achieve their personal advantage instead of social benefit. The behavioral assumptions on the public interest involved in the new managerialism of the public entrepreneur is another area of concern.

Negotiation in urban innovation processes among local authorities, city planners, land-use preservationists, communities, neighborhoods, developers, and any stakeholder with interests can contribute to find innovative solutions concerning public interest for urban planning, design and development of public open spaces, urban green areas and housing. The interests and expertise of each one of the stakeholders' steer and enable to reframe of the problems and the developments of innovative solutions. Freedom and independence of stakeholder's participation to address political sensitive problems, are relevant factors in contributing to collaborative planning to explore innovative solutions based on the public interest. The expertise of stakeholders contributes to facilitate the access to broader and innovative research networks of public interest.

In turn, urban governance harness networks of urban green innovation ecosystems to sustain services to the city, locate resources of and challenging the urban resilience. Urban innovation drives urbanization influencing negatively the resilience of ecosystems, which needs to be reinvigorated. Innovation is supported by resilience and transformative capacity systems human dominated. Society innovative capacity in urban green spaces is based upon resilience and sustainability of the city. Urban green spaces are essential

components of cities (Husqvarna Group, 2012) ^[30] to promote ecosystems and human health (Tzoulas *et al*, 2007) ^[50].

Integration of environmental sustainability into green area innovation is a key challenge. Green innovation is the result of interaction between innovation, sustainable and environmental development, and economic growth. The green areas innovation model can be refined into urban green innovation ecosystem supported by the theory of systems to determine city processes.

Finding urban green innovative solutions do not necessarily come out of confrontations based on ideological clash, although conflict resolution or third-party negotiation processes between the participant parties and stakeholders can be used in specific disputes of diverse public interests. The concept of user-driven open urban innovation ecosystems are sustained by the urban needs and interests of stakeholders, such as citizens, local governments, social organizations, business. This concept of urban innovation ecosystems can bridge the gap between urban development priorities and technological research and experimentation based on public interest.

Popular mobilization on the street serves to produce political results in the street, because the institutions with their current configuration do not respond, they are co-opted, taken for other values and interests that are neither the interests of the population, nor the public interest. The development of forms of participatory democracy of organized and well-informed citizens who participate in decision-making processes will enhance social policies based on the public interest of the society as a whole.

The public interest is an ethical concept and an operative that is consubstantial essence of political discourse and a guide for political action attempting to justify the policies and acting of government on decision-making in the green urban sustainable planning and empirical evaluation processes. Public interest must be identified, demonstrable and the implementation process and results must be evaluable. Public interest is a basic premise for a territorial democratic process of green urban sustainable planning. The public interest emanates from the acting of the state because it can be demonstrated that it reflects that green urban sustainable planning. This is an instrument for the expression of territorial democratizing with the explicit objectives and consequences of decisions affecting all the individuals equally.

3. Decentralize the infrastructure to democratize the territory

The debate around the urban public space, the housing and urban justice revolve around the proper object of the struggles for the right to land, city infrastructure and territorial order. Public space emerges as a situation of paradigmatic spatial transition, from a space that is a box or vehicle, to a space that is an entity in itself. It is a collective presence rather than social movements in the city and in public spaces, it is a different type of claim to space.

The green urban resources and infrastructure for innovation, research and innovation networks between governments, business and higher education and research institutions are determinants of the city welfare. The position of the different actors in the innovation network facilitates the access to diverse information and knowledge flows and provides the potential to create and develop innovative

opportunities (Burt 2002, 2005) ^[11, 12]. For example, Green roofing is an innovative practice in design and wastewater technologies. The use of innovative practices in green roof are in both in the promotional policies and in construction as a tools in a broader plan to create green infrastructure for ecosystem services, although may not completely mitigate the ecological footprint in urban ecosystems.

The dominant constructions of territory, land and urban space in the contemporaneity are the complementarity of capitalism and the large-scale colonialism brought about by geospatial concentrations and the creation of great inequalities in cities. The spatial urban organization shows dysfunctional ties such as the abandonment of public spaces, organization in a way that hinders the agglomeration of people, the distancing of institutions from city centers in such a way that access is difficult. Democratizing democracy has a very broad meaning.

The territorial unitary vision of urban spaces is problematic in the sense that they are the reflection of the production of hegemonic imaginaries and fictions, from colonial fictions to nationalist fictions. Alongside authoritarian urban spaces, the spaces of the excluded coexist as a response, which gives rise to the struggle for public spaces that show many arists and many dimensions to accommodate urban social movements. The public space of the new social movements today is the space itself, the space itself is the value, it is the question of the political arena.

The extractivism of natural resources territorializes economic and political relations, giving rise to a contradiction in the processes of economic globalization under the assumption that it considered the deterritorialization of production, distribution and consumption processes. The processes of deterritorialization is just one of the sides of the condition of globalization as opposed to the processes of reterritorialization because there are certain elements inherent to the processes of production, distribution and consumption in certain places.

The struggle for land, territory and urban space is a struggle against the colonial and capitalist heritage of territorial space. Cities considered plurinational in geopolitical terms and may have territorial autonomy that is not merely administrative or political, so they are not independent territories. This type of autonomy is the result of the recognition of the existence of other ways of administering the territory, Cosmo visions, cultures, etc. The land and its natural resources today are within a geopolitics of the territory much more complex than the one that had been built before.

The struggles for land, territory and urban space prosecuted by the new social movements form a front that is common to territorial fascism with its forms of colonial domination and exploitation of the territory for the defense of territorial ecological conceptions in the face of capitalist pressures and colonialists. Territorial fascism refers to the logic of the territory that crosses the cities and ends up fracturing them, giving rise to spaces within cities that have an abysmal line between civilized areas, private urbanizations that go against public spaces and wild areas, where the popular classes live. These wild areas proliferate in cities that do not have the capacity to accommodate populations in an urbanistically reasonable, socially and politically decent way.

The different forms of territorial fascism exist in spite of political and legal homogeneity, but where institutions are

able to act in a totally different way according to whether they consider the enemy territory or not in a civilized or savage conception of war. The internal territory can be a very poor neighborhood or groups of terrorists, etc. The internal territories are subject to forms of internal geopolitics that import the relations of international conflicts for the territory itself and that reproduces internal colonial relations.

A great innovation based on a new idea of territory that focuses on the neoliberal capitalist logic that validates the function of the territory as it is exploited is the consideration of the original groups that hold the logic that the territory has no commercial value. A great alteration occurs at the beginning of the 20th century in the conception of the land, because previously there was a conception, if you will, more human of the territory and of the earth.

The social struggle around territorial land in urban centers in Latin America is part of the logic of geopolitical concentration of territory and land through colonial history and colonial cultures. These situations that condition the current struggles over land and territory become relevant to the discourse of hegemonic and dominant practices. There are many international pressures for the exploitation of primary goods, foodstuffs and speculation about minerals, and consequently, the pressure on land and territory is causing all political conquests to be undermined by the governments that have instituted them.

The counter-hegemonic movements are movements that fight for territory, land and urban spaces. Movements that fight for a more equitable distribution of land are movements of indigenous peoples, populations that today are largely indigenous or aboriginal. The territory is the very root of the cultural identity that is expressed in urban spaces where they try to recover the memory destroyed by capitalism and colonialism. The emergent political protagonisms of colonialism consider that for certain social groups there is no dignity without territory. This is the case of indigenous peoples who try to claim respect for their culture and knowledge with respect for their lands and territories, in such a way that they seek to guarantee their dignity with the guarantee of territorial autonomy.

The nature, the territory, the use of the land and space have colonial, capitalist and ecological dimensions. The ecological dimension marks the ecological limits of the other two dimensions. What is at the bottom of the cause is a change of civilization that forces to modify the habits of production, distribution and consumption. The conceptual foundations of Southern epistemologies, the ecology of knowledge, the sociology of absences and emergencies, and of intercultural translation well established as reference frameworks, can help developed countries with a colonizing past, recognize more experiences and the knowledge to value the origins that come from the colonized territories.

In the traditional conception of urban territorial space, there is a conceptual attempt to create the idea of an urban territorial space that would be outside the hegemonic space of subaltern colonialism that was constructed as such, rather than settler's colonialism, colonialism of intense and direct occupation, within a very unequal colonial relationship. Colonialism created an arrogance that has incapacitated the colonizing countries to learn from experience and to teach the world because they despise all the innovations that may come from the colonized countries that have always been considered inferior.

The pressures of the international institutions of neo-liberalism, argue that the comparative advantage of less developed territories are mineral resources and that they should be exploited already. For this reason, extraordinary initiatives that had been designed to completely alter the development model based on extractivism, to protect biodiversity requires financing projects with a lot of political will. From a question of struggle for a distribution of land as an agricultural resource for a political construction of a territory with its own cultural identity, it has changed to become the reservoir of biodiversity precisely when the great orgy of natural resources occurs.

The concept of green bio economy is rationalized based on territorial decision making for smart city investments and capitalize on business models (Belissent, 2010 and McGeough and Newman 2004) [37, 8]. Smart city solutions must start with the city solutions not the smart solutions (Belissent, 2010) [10]. The term smart city was coined in the 1990s to suggest that urban planning and development was incorporating innovation, information and communication technologies inserted in globalization processes (Gibson, Kozmetsky and Smilor 1992) [22].

Smart city is an initiative that promotes innovation and efficiency of urban planning and design of public services, facilitates access to government information and communication. To create, develop and promote urban green innovation values are needed the relevant contribution of instruments for and innovative communication. Innovation is a novel way of doing useful things embodied and implemented through recursive communication and alignment in urban social networks. Urban social networks underpin green areas innovation.

The Smart City model aims to foster the creation and development of knowledge, innovation and creativity, increase the efficiency and provides information access and cohesiveness for all the parties involved in sustainable urban development. The policy formulation and implementation of urban green innovation ecosystems must be supported by a sustainable urban planning involving structures and resources.

From another territorial perspective of green urban sustainable planning, smart embedded technology devices are a characteristic of smart cities to distinguish it from intelligent cities and used to create territorial innovation ecosystems by sharing and supporting cooperation between knowledge-intensive activities, institutions for learning and knowledge development, and web-based devices and applications to generate collective intelligence (Komminos, 2008a, b, 2002) [31, 32, 33]. Living Labs (European Commission 2010) [19] is a user-driven open research and innovation ecosystem to facilitate creative roles of users with the goal to involve communities of users in local urban contexts territories.

Open urban innovation and open business models are two concepts elaborated by Chesbrough (2003) [14]. The Living Labs concept is user-driven open urban innovation ecosystems which can be applied to smart cities embodying an open business model based on willingness and relationships of collaboration between the citizenry, local governments, social and non-governmental organizations and business enterprises to engage in innovation activities in a kind of deterritorialized space.

Finally, territorial collaboration for urban green innovation systems is based on the concept of competitive advantage

(Porter, 1990) ^[41] and is driven by urban and regional development policies aiming to create the best conditions for sustainable development.

4. Innovating the institutional design

Innovative urban governments tend to be more democratic and accountable supported by institutional and cultural frameworks that allow development of the population in general while providing local funds for initiatives to benefit low-income groups and communities (Satterthwaite 2002) ^[44].

Researchers have focused on distinctive theoretical approaches and practices of green area innovation by analyzing radical and incremental innovativeness from different perspectives such as energy-based, material driven, pollution-prevention, etc. Innovation is incremental and radical changes in ideas, practices, changing rules and institutions, ways of organizing society. Both radical and incremental innovativeness in green areas have a relevant impact on addressing the challenges of the urban environmental and sustainable development. Therefore, urban planning must provide green areas innovation to contribute to sustainable development and economic growth. The innovation ecosystem is a strategic concentration and interrelations of intensive knowledge-based activities provided by different institutions such as business incubators, technology parks, technology transfer centers, efficient energy centers (Barcelona urban studies 2011; Duchesneau, Cohn, and Dutton, 1979) ^[18, 6] etc. Urban planning and designing are challenged by innovative abilities and an innovative culture to capitalize on the creation of urban green innovation ecosystems to attract individuals and business (McGeough, Newman 2004; Atkinson, Castro 2008 ^[2]; OECD 2003 ^[40]; The creative class 2011) ^[37, 2, 46]. The model of smart city can promote the public involvement framed under at improving and exploiting the urban culture heritage.

The urban natural and green resources and infrastructures are basic elements in the innovation ecosystems that can be capitalized and may develop into new business models. Innovation ecosystems start from the formulation and implementation of urban green innovation policies supported by urban planning, resources and structures. Urban and surrounding areas can evolve towards open, sustainable innovation ecosystems to boost research and experimentation of services driven by users in real-life environments.

Urban green area innovation is characterized as incremental versus radical, radical versus routine, revolutionary versus evolutionary, discontinuous versus incremental innovation, new versus extensions, pioneering versus modifying, original versus adapted and basic versus improvements, etc., by scholars and practitioners (Anderson and Tushman, 1990; Nord, and Tucker, 1987; Baker and Sweeney, 1978; Stahl and Steger, 1977; Van de Ven, 1988; Zaltman, Duncan, and Holbeck, 1973) ^[1, 39, 4, 45, 53]. The context of the last 40 years is a context that is not in any way revolutionary, but perhaps counter-revolutionary. In a counter-revolutionary context, expectations are frustrated and democratic institutions do not respond.

Urban green innovation projects can capture an old and shrinking area of the city and turns it into restructured and revitalized creative metropolis. Attractive and cost-effective projects of green innovation should take into account innovative planned building and green spaces outside.

Redevelopment of vacant and abandoned urban spaces and buildings in shrinking cities for farming is a green innovation for revitalization. Adopting urban green innovation practices correlates with institutional design and policy changes that empower urban planning and development.

Some examples of urban green innovation projects are community gardens and farms, forestry projects, Etc., which support biological diversity and spatial heterogeneity (Tidball and Krasny 2009, 2007) ^[47, 48]. All require investments, active participation and involvement in decision making process by local residents. Community gardens in the form green innovation exhibiting different types of management offer an opportunity for innovation in green space governance with innovative solutions to individuals, business, communities, etc. These different types of management are formed by local government, private organizations, health centers, schools, an organized group of gardeners, etc. (Lawson, 2005; Hou *et al*, 2009) ^[28, 28].

Urban green innovation can be steered toward an opportunity for sustainable knowledge, practices, institutions and solutions. Citizens and business demands for urban green innovation and green services quality are potential welfare of urban areas. An urban green innovation ecosystem use user-driven innovation methods and requires the support of an open platform for heterogeneous technologies intended to be used for designing and implementing innovative and creative green cases. However, the use of innovative technologies requires also an innovative institutional design.

Operational innovative institutional mechanisms such as differential land taxes and payments for environmental services to support sustainable urban greening activities that contribute to benefits such as carbon sequestration. Stressed urban green innovation systems require an institutional design shifting from the industrial economy and innovative bio economy towards a more ecological economy to effectively support the generation and use of urban ecosystem services. Urban innovation processes can use industrialization aimed to reach sustainable economy. Urban research, experimentation and innovation technology-oriented ecosystems may be aimed to contributing and developing potentially attractive environments to fulfill the needs of the citizenry.

For example, innovations in urban planning and policies on land use can integrate farming into multi-functional buildings. Urban farming in open rooftop generate several green-roof effects such as reducing the rooftop surface temperatures, reducing summer cooling load and heat losses, insulation against cold, etc. The spread of urban agriculture and gardens development and adaptation requires technological involvement, social organization techniques, diffusion and extension of production techniques. Comprehensive urban planning of cities and food policies can include farming and agriculture as an urban green innovation.

The creation of a collaborative approach to urban green innovation ecosystems is based on sustainable partnerships among the stakeholders from citizens, local government, leaders of the community, business firms, social organizations, etc. aimed to achieve resources and specific goals. The institutional design of the urban space is an object to attract considerable scientific-technological

innovations interested in meeting the needs of people and supporting collaboration for the development of innovative solutions to sustainability issues. Smart Cities initiatives are more characterized by public interventions than by new technology deployment in policies of innovation and social inclusion aimed at creating societal and institutional design conditions.

The public space is used to carry out demands in which the public was not in itself a vindication: it was the new work code, the rights of women, and from then on. If the population goes through the non-institutional space it is because the institutions are not democratic or lack vitality and democratic force and therefore the understanding between institutions and institutional spaces is not achieved. Democratic institutional design does not fulfill their mission because they deviate from their functions. The people who have been expelled from the institutions are manifested in the streets depending on the capacity of democracy to respond. That is to say, the transition is manifested in a struggle for real democracy initiated by those who feel expelled and that is historically uncertain. What is claimed is an entry that implies a fundamental reform of the institutions.

Popular knowledge, rescued by the ecologies of knowledge, is knowledge that is often embedded in a practice that is born of struggle, is born in struggle knowledge, and only exists in the practical contexts in which it exists and does not exist in the institutions of knowledge production. The theory and ecological knowledge as a practice opens spaces to multiplicity and diversity, insofar as it maintains that link to the social and moves away from privileging a certain type of knowledge, the knowledge that triumphed from the seventeenth century, scientific knowledge and the Eurocentric philosophical tradition.

The ecology of knowledge brings some hope in the post-institutional design times because it is carried out in other instances than the traditional ones because the institutions no longer manage to accommodate the echoes of the new generations, which in some way makes new and diverse forms of action are positioning themselves in the urban space, opening new political spaces.

The political struggle takes place in that space because the indignados believe that the institutional spaces were colonized by neoliberalism, neutralizing the right to political manifestation within the institutions, under the conceptualization of post-institutionalist. The post-institutional design moment is also translated into that occupation of spaces, and the logic is the same: it is a political response to a situation of frustration of expectations that were built in the last 40 years, obviously not accrediting institutions, nor in the rights that sustain them, because the right to private property is violated and the right to public property is violated.

Social movements are engaging in cultural innovation challenging conceptual frameworks an identity of the city and urban communities. The new forms of structural articulation between urban social movements and institutions, as well as lines of formalization between a micro and a macro policy, are essential components to improve urban green innovation processes. The acknowledgment of the role of social movements occurs in a neo-liberal pressure boom for natural resources that causes the re-privatization of the economy, that is, a return to that idea, which is the curse from colonialism, that Latin

America it exports nature, exports commodities, exports natural resources, exports raw materials, and not industrial goods.

The occupation movement is more a dimension of the post-institutional design movement, which in this case is rape or private property or public property. Private property belongs to the owner, public property is subject to the rules of the State, so those who do not comply with the rules cannot occupy, these are the two dimensions of ownership. An opportunity for innovation for institutional design governance frameworks is a challenge that requires filling the knowledge gaps. Innovation in green urban systems at different scales and across sectors with the involvement of local society provide solutions to improve the quality of life of the urban communities.

A multidimensional measure of radical innovation is required to be applied across different institutional, community and organizational settings with acceptable reliability and validity. Radical innovation of R&D projects is a multidimensional factor which can be measured using a construct of innovation radicalness described by the amount of technological uncertainty, technical expertise, business practices and costs.

Local policies play an important role in creating the right institutional design setting to foster human capital for research and innovation capabilities to support the creation, establishment and development of incubators for hi-tech start-ups connected to global-scaled innovation systems. Cities exhibit some weaknesses and strengths on innovation capabilities. Cities located in less developed countries are more active in fostering innovation capabilities than in cities on well developed countries that are more active in hard domains. Governments are encouraged to increase investments in research and innovation to promote ICTs (Windén *et al*, 2007) ^[52].

5. Conclusions

This paper has analyzed the interrelationships between the three fundamental principles of urban green innovation: Guarantee the public interest, decentralize the infrastructure to democratize the territory and innovating the institutional design to address the complexity of the challenges in the city.

Urban green innovation projects have a relationship with other environmentally innovative activities such as green infrastructure, energy efficiency, water quality, drinking water infrastructure and waste water, etc. Urban green innovation projects are opportunities for producing goods, food, bioenergy, biomedicine, resource efficiency, farming technologies, new urban spaces, new forms of urban mobility and transportation, etc.

Local authorities of the city as the founding ground must have the potential to promote the vision of the urban green innovation ecosystem as assemblies of planning policies. Local authorities must provide support to enhance green innovation capacity and business-intelligence through discussion, debates and analysis of policies, research programs, and other forms to find solutions to meet the urban green spaces challenges.

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The urban planning policies of local government have the potential to promote an urban green innovation ecosystem. Smart local government of a city has the capacity to generate service innovation and communication to deliver to local residents (González and Rossi, 2011) ^[24]. Cities more active in improving their capacity to sense and act through ICT systems are also less likely to differentiate soft domains initiatives related to innovation, human capital and cultural heritage capabilities.

The innovation capacity on the use and development of technologies in ecosystems is incorporating parameters of sustainable and environmental urban green innovation planning projects. Urban green innovation planning projects is a strategy to stimulate organizational economic growth. Research and development programs embody urban green innovation planning to anticipate meeting the needs and aspirations of citizens to provide them green public services. Urban innovation planning has a critical role in urban innovation development in specific areas of inclusion, environment, health, education, business, etc.

Development of innovative urban green planning is required to make use of some prospective studies and methodological tools focused on improving the urban green ecosystem in various elements such as water, waste treatment, energy, etc. Urban green planning and design might integrate risk management in transition periods to incorporate innovative projects such as from fighting against water to living with water (Rijke *et al.*, 2008; Newman *et al.*, 2011) ^[42, 38].

Fostering the city capacity for urban green innovation requires the implementation of human capital investment and improvement of quality of life initiatives supported by motivated local residents, innovative business, entrepreneurs and investors, talented persons, etc., able to start up new enterprises (Caragliu *et al.*, 2009; Correia and Wünstel, 2011; Giffinger *et al.*, 2007; Hollands, 2008; Rios, 2008; Toppeta, 2010) ^[13, 15, 23, 27, 49].

Smart cities must instrument local urban green innovation ecosystems and the knowledge of innovation bio economy overall to face the challenge of securing high living standards. Future Internet technology arrangements in urban green environments involve large business and enterprises, micro, small, medium and enterprises (MSMEs), universities, research centers, etc. Future Internet facilities are used for developing and validating some service concepts and applications supported by the Living Labs approaches for smart cities.

Future Internet technologies engages users and citizens to enhance participation in the transformation process of individual and collective behaviors and social norms to discover and design sustainable scenarios to implement urban green innovation projects. To this, Learning Alliance can operate in the context of research action referring to the risk management in urban development projects. Learning action alliances are used for urban green innovation in different sectors.

The reference model of urban green innovation ecosystems can evaluate its innovative capacity to identify complementarities and inconsistencies in urban planning and designs. All the opportunities should be explored to build on the innovative urban green capacity of the cities to develop and transform a multifunctional green infrastructure

into a more urban green innovation ecosystem. Location of source of experimentation and innovation in green urban areas help to build capacities to face uncertainties and enable changes and transitions in urban governance.

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