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Urban environment, spatial fragmentation and social segration in Latin America: where does innovation lie?

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Abstract

To "review the urban question" in terms of sustainable development, the premise is formulated that improving infrastructures, equipment and services to preserve the natural and built urban environment is costly and generates expenses of all kinds—at economic and social levels. Without the introduction of equalisation mechanisms, these expenses will increase inequalities between different parts of the urban population.

As confirmed by 2 Latin American case studies in Buenos Aires, Argentina, and La Paz Bolivia, the quality of urban environment depends directly on improving living conditions for the resident population. The aim is to assist the poor in developing a rubbish disposal service for the families living in the informal settlements of La Paz, or to extend water supply to the poorer areas on the outskirts of Buenos Aires. The collective benefits of these "innovations" are self-evident. However, understanding the environmental issues involved, and evaluating the social impact of these innovations, means examining what motivates their implementation.

The first difficulty was in finding financial and economic information on the global cost of the new technologies, due to the lack of managerial culture and the discretional attitude of private enterprises and public administration.

A second observation is that the social dimension of the environmental upgrading process in Latin America cities has been neglected by the main urban decision-makers. In all the contexts, the evolution of the projects' implementation clearly demonstrates that social issues cannot be dissociated from political

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ones. Although the players themselves often find it difficult to estimate economic costs, these are nonetheless real and represent burdens that should be distributed equitably among the beneficiaries of services; but which are, in practice, often viewed in terms of profit. This leads to conflicts between different population groups, the political authorities and private intermediaries.

Rather than viewing technological action as an unique "source" of innovation, we must consider its global dimension via the social practices it generates. On the other hand, we should reposition every specific event in its immediate environment and see how it reflects contemporary macro-social processes, in a world of "globalisation".

Keywords: Globalisation; Technology innovation; Social disparities; Urban environment; Latin America; Argentina; Bolivia

Sustainable development for the urban environment

Societies have long been based on a mythological and religious order, and only later on a political and technical one. Over the past 20 years, contemporary societies have found a new order to strive for: *sustainable development*. This concept, which today enjoys great popularity in scientific, political and administrative circles, often seems more like a magic incantation than an analytic tool. This prompted the present research, which investigates the concept in terms of the urban environment, which authors have been studying for quite sometime.

Grounding investigations in urban reality, an attempt is made to decipher the "meaning" of sustainable development, as to both its theoretical content and the methodological options it proposes to renew. Since this is a vast objective for the research team's relatively modest means, the focus is directed at one specific aspect of urban change, which plays a vital role worldwide—the environment. The paper examines the interaction between environmental innovations implemented at the technological and process levels, their economic consequences (what is the cost of these interventions and how are expenses covered?), and their social impact (what are the repercussions of these investments on consumers, users, residents, citizens or customers—whatever name they may go by?).

The urbanisation of the so-called "developing countries" leads to two apparently contradictory trends. On the one hand, there is the introduction of ever more sophisticated technical and institutional environmental protection mechanisms. On the other hand, it is obvious that environmental protection operates in parallel with the widening of the gap between the rich and the poor.[1] These observations are valid at the national level, between rich and poor countries, and within each society and its social stratas. Caught up in the movement of ever more globalised economic exchange and technical progress, the persons concerned, their leaders, cultures, the countries and regions of the world, find it impossible to elude this "single path", a path considered right and beneficial by its proponents, inequitable and destructive by its opponents (Baricco, 2002; Hardt & Negri, 2000; Klein, 2001). As stated by Leff (2001), without a new theory to guide

[1]The newest figures from the international organisations, including the World Bank and the World Trade Organisation, show that disparities have grown strongly over the past decades, in spite of the steady rise of economic development indicators (Stern et al, 2002; Norström, 1999)

sustainable development, the policies implemented in this area will continue to be dominated by neo-liberal policies.

To "review the urban question" in terms of sustainable development we have formulated the premise that improving infrastructures, equipment and services to preserve the natural and built urban environment is costly and generates expenses of all kinds. Without the introduction of equalisation mechanisms, these expenses will increase inequalities between different social groups of the urban population.

In this research, the urban environment corresponds to more than "the city"—in Latin America as in other parts of the world. The notion of the city only poorly reflects the territorial growth and social developments that contribute to the expansion of the large urban agglomerations.[2] It is necessary to therefore opt for a term that is more in line with a global and multidimensional approach, i.e. the urban environment. However, this option also raises a number of questions. The first relates to the extent to which instruments and decision-making processes are adequate to the nature and scope of relevant problems. In practice, it is seen that "modernisation" introduces an all-enveloping dynamic that disrupts the human and material landscape by imposing new political imperatives (market liberalisation, for example), and sets new objectives, such as increased international competition, which in turn generates new forms of relations between cities, social groups and individuals. These are accompanied by the appearance of types of norms—economic flexibility, social mobility and environmental compatibility—and their direct or indirect consequences. The latter may give rise to an increasing territorial and social segregation, going hand in hand with the discourse on responsibility and freedom.

This all-embracing dynamic produces "disrupted" agglomerations in which planners, urbanists and other specialists deal with only a limited portion of the territory, seconding the public authorities, who are often disappointed or disarmed, and withdraw from the fray. Urban specialists likewise show little inclination to solve the burning issues that bedevil the population. Seeing the negligence of their governments, the most energetic residents develop autonomous strategies and launch measures to solve their daily problems independently, and on their own terms. The poorest completely lose their bearings. This distance between "those who make the city"[3] and the decision-makers, and the dysfunction it provokes in urban management, generates problems that are all too well known:

- A disintegration of the social fabric and a shift of poverty from rural to urban regions;
- A dual urban space with well equipped business and residential areas, and precarious settlement zones that are ill integrated within the urban structure;
- Urban territorial planning that is disconnected from land occupation, and self-help housing;
- Incoherent distribution of responsibilities between urban players (political authorities, civil society organisations and residents' associations);
- The rapid deterioration of the urban environment, due to the degradation of the built environment and the contamination or depletion of natural resources.

[2] Ascher F. (2000), extends this to all contemporary societies, when he speaks of 'massive changes that have begun to revolutionize cities and urban forms of living (…) which will not limit themselves to the principles of urbanism nor urban planning methods '.

[3] Terminology we used in the work by Pedrazzini, Bolay, and Bassand (1996).

In less technical terms, one could say that the present analysis expresses both a problem and an opportunity. The introduction of new environmental technologies in response to the expectations and needs of only those who can afford them is a real problem, contributing directly or indirectly to the growth of socially and physically impoverished areas. On the other hand, there is an opportunity that these environmental changes might lead to new and original processes of concerted action, extending their hitherto mainly hypothetical benefits to all social strata.

In fact, the discussion on alternative forms of urban management and regulation has only begun. Almost everyone agrees that it is necessary to create environmental conditions "to meet the needs of the present without compromising the ability of future generations to meet their own needs"[4]. But a detailed analysis of urban change, viewed from the perspective of the players involved, has made it clear that the battle against urban discrimination—be it social, territorial or economic—must have absolute priority status in urban planning policies. It also suggests that to refocus urban studies, hitherto inspired mainly by space, construction, and sometimes nature, on social issues; will require a new approach to the design and realisation of urban projects as well as a new urban theory to elucidate management issues. The old technocratic, vertical view must be abandoned in favour of one that corresponds to the needs of citizens and bottom–up social dynamics.

Two settings for two environmental studies

In the present research, three studies were conducted in three specific urban contexts, investigating the local repercussions of the global changes to environmental conditions. Each study was run in partnership with a university-level institution or a local NGO.[5] The countries—Bolivia, Argentina and Cuba—and the selected urbanised regions by no means fully illustrate all problems that beset Latin American cities in their convulsive growth process. They are nevertheless representative of the major questions concerning the built environment today, and of the doubts urban management specialists in Latin America must contend with. They must cope with the unforeseeable character of urban phenomena, and the unprecedented growth of social inequality, which seemingly deepens regardless of the policies implemented by the authorities, and of their political orientation.

Two of these studies refer directly to new modes of urban governance in both Argentina and Bolivia. In both countries, responsibilities tend to pass from the public to the private sector. Although strongly influenced by each country's specific historic evolution, they ought to be useful to highlight this transfer of competencies and its impact in terms of social development for the benefit of the poorest citizens.

In Latin America, since the 1980s structural adjustment policies transformed the capability of the State to continue providing infrastructures considered as basic, and urban services started to

[4]To quote the famous principle of sustainable development, as stated by the Commission in Brundtland (1987).

[5]The study, co-funded by the SDC and the EPFL, brought together four interdisciplinary teams: IREC (renamed the Urban Sociology Laboratory), ENAC/EPFL, the Faculty of Architecture and Urban Design at the University of Buenos Aires, Argentina; and the NGO Pro-Habitat in La Paz, Bolivia. El estudio tambié n incluyó Habitat-Cuba a Cuban organisation whose activities were suspended by the government in July 2001.

appear as a source of capital accumulation for economic actors concentrated at the global scale. In this respect, it is worthwhile mentioning the recommendations of international credit organisms to orient the State towards privatisation, among other things, of the provision of urban infrastructure—organisms which continue to strongly influence the definition of the agenda for the future.

The privatisation of basic urban services is one of the most characteristic traits of the urbanisation process in Latin America. Urban studies contend that the vast scope of privatisation makes it necessary to update certain concepts which were predominant during the 1970s, and were based on investigations of urban issues in political economy terms. Various authors characterised public services, transport and infrastructure as collective consumer goods (Castells, 1974), complex use values (Topalov, 1979), basic spatial use values (Jaramillo & Cuervo, 1993). These were supplied by the State—usually in the form of devalued capital—and were expected to go hand in hand with the introduction of a body of institutionalised social urban policies. These approaches are undercut by the current situation in the Latin American countries. Since the 1980s, they implemented structural adjustment policies that modified the State's capacity to supply basic services and infrastructures. Public services began to function as a means of capital accumulation for global economic agents, partly as a result of the recommendations of the international credit institutions which directed the State's privatisation activities relative to—among other things—the provision of urban infrastructures, and which continue to exert a powerful influence on the State agenda at subsequent stages.

In this context, the privatisation of urban services means that in fact innovation depends on the financial profitability of all operations, although these provide services that are indispensable to the well-being of individuals and to a coherent organisation of urban life (supply of drinking water, waste water and solid waste disposal, public transport).

Bolivia, which became a parliamentary democracy again in 1982, focused the brunt of its political and regulatory efforts on "legal and institutional innovation". The aim was to decentralise administrative and political structures, and introduce urban governance linking municipal authorities with private and social players. In spite of the somewhat populist overtones of this long-term structural legislative and executive reform, there can be no doubt that it has strengthened urban communities, making them more independent of the central government, and giving them greater leeway when negotiating the management and maintenance of collective services. (The example of solid waste management in the poorest peripheral districts of the country's principal agglomeration, La Paz, is discussed below.) In this area, Bolivia remains exemplary. Certainly it is among the countries to have experienced the greatest legal and legislative upheavals over the past 15 years, creating a set of highly sophisticated and innovative political instruments. Aiming both for more autonomous territorial management by the municipalities, and greater civic control over institutions that represent the population (law on popular participation), these instruments define environmental control as a key element of public management. The aim is not simple, and practice still lags behind the legal provisions. Local administrative bodies are highly volatile, and have virtually no financial powers; coordination between private and public players is poor, and corruption is widespread. This has led to a rise in the costs of privatised services for the population, to a need for larger public subsidies and general dissatisfaction among users. We found out, for example, that until a short time ago non-regulated precarious settlements on the outskirts of La Paz had no access to rubbish disposal services,

although relevant municipal regulations had been adopted for quite some time. In fact, they are applied only in city districts equipped to implement classic solid waste treatment solutions and are simply ignored in the areas where topographic conditions make it impossible for garbage trucks to go. Later it will be seen how popular initiatives have developed innovations to cope with this problem.

The privatisation of the water supply system in the greater Buenos Aires area well illustrates "an innovative approach within a market economy", a trend that sums up policies implemented in Argentina over the last ten years.[6] State reform was on the public agenda of the Alfonsín government (1983–1989), but relevant projects were combatted by both the opposition and by large parts of the radical party that was in power at the time. The economic and social crisis that led to its defeat enabled President Menem (1989–1999) to launch a plan in which privatisation functioned as an essential factor in the global redefinition of the relationship between the State and society (Thwaytes Rey, 1993).

Even before privatisation, the sanitary system of the Buenos Aires Metropolitan Area (AMBA) illustrated the shrinking importance of the State company Obras Sanitarias de la Nación (OSN), a process that went back to the 1950s. According to the data of the National Census (Censo Nacional de Población y Vivienda CNPV) of 1991, 73.0% of the population were at the time supplied by the OSN through the public water networks, and 55.7% were hooked up to the waste water disposal system (these percentages diminish considerably when we exclude Buenos Aires City). As for the areas serviced by public networks at the time of the Census, OSN was in charge of Buenos Aires City and 13 of the 19 districts of Larger Buenos Aires, the Municipalities of Quilmes and Berazategui took care of their respective jurisdictions, and the Administración General de Obras Sanitarias of Buenos Aires province (AGOSBA) of the other AMBA districts. A small proportion of areas and households were serviced by private cooperatives.

At the time the concession began to operate, AMBA households without access to the sanitary networks were heterogeneously distributed, in a characteristic configuration that could be resumed under three main headings: better urban conditions and quality of life in the northern than in the southern districts, in central areas than on the outskirts, and along the main urban axes than in the intermediate, poorly accessible and poorly served areas (Torres, 1999). As signalled by Thwaytes Rey (1994), "in view of the growing inequality of service distribution, privatisation-based solutions were based on the real policies of the previous administration: on the one hand, services were not supplied to the poorer districts since social fragmentation had weakened the feeling that such services should be universally available. On the other hand, the dynamics of the 'benefactor' institutions made it possible for dominant sectors of the real power structure to expropriate them in order to enforce their own feudalistic ends via the bureaucratic structure". Also, constant investment shortages created the generalised feeling that privatisations were legitimate. However, all these elements should not obscure the fact that, as demonstrated by other studies[7] the economic rationale behind the privatisations arises primarily from macroeconomic issues linked to a policy of economic stablity and state reform.

[6]Recent months have shown the terrible social and economic consequences, in terms of the social movements and political turmoil that affect the entire country.

[7]Para un mayor desarrollo ver trabajos anteriores: Catenazzi and Kullock, (1997); Catenazzi, Guzzo, and Kullock (1996).

The liberalisation of urban services and internationalisation of their control have been extended to the entire metropolitan Buenos Aires area, imposing both technical and environmental imperatives (quality of the water) and economic factors (profitability of new investments). According to type of concession, the concessionary pays no fees for the use of the infrastructure nor for the water resources. In exchange he is bound by contract to guarantee the realisation of two main objectives by the end of his licence: the link-up of all inhabitants to the water supply network, and of 95% to the waste water disposal system, and the treatment of all collected waste water.

Sustainable development, a major focus of urban dynamics

The analysis of sustainable development, viewed as a social aim, as a multinational strategy and as an ideology, is historically embedded in the "common" scientific context of our time, i.e. the globalisation of the economy and information (Bolay, 2004). Hence, the present research never intended to consider this concept as a miracle solution to long-lasting ills. Instead, there was a desire to use it as a critical tool with which to analyse urban phenomena by deconstructing their various aspects. The aim is to study the impact—improvement or deterioration—of technological innovation on the natural and built urban environment.[8] Therefore, this "overview" is based on a preliminary premise stating that over and above the environmental issue, sustainability depends on three other key dimensions of development: social equity, economic prosperity and "governance" (a term used to designate open and projective concerted political action). In order to question both the new "truths", and the theoretical bases of their critics, it must be seen whether a concept that is as widely manipulated as sustainable development may conceivably bring about the aim which supposedly underpins it—a more equitable society—or whether it will continue to function as a purely utopian proposition (Bolay & Pedrazzini, 1996).

In order to achieve "sustainable development" one might be tempted to define a specific approach for each urban situation, to multiply recommendations enforcing compliance with it, perhaps even to set up adequate instruments of "good governance"[9] (Rakodi, 1999; Pugh, 2000; Stren, 2002; Peemans, 2003; Bolay & Rabinovich, 2004). It was decided to analyse "environmentally compatible" social practices as they are implemented in specific areas and cities. An understanding of what is at stake for the environment and development in socio-political terms required an examination of the approach adopted by players who are different but pursue the same objective, i.e. improving living conditions by improving the urban environment. These complex motivations run in parallel with a multiplicity of social and economic repercussions, which are often overlooked by decision-makers when they set up an action strategy. On first sight, environmental improvement goes hand in hand with sustainable development. It is indeed difficult to imagine that clean air, drinkable water and healthy housing

[8]One may refer to the theories developed by Ignacy Sachs on the basis of the notion of " eco-development" (1997) to recover the spirit of what should stand behind sustainable development terminology.

[9]This is the case of the Agenda 21 projects, which disseminate new programs set up by local authorities willing to redefine their action with a view to greater sustainability throughout the world (http://www.un.org/esa/sustdev/hsd.htm).

could counteract the objectives of public health and of a city offering more "viable" living conditions for all. That said, such an equation may not limit itself to two unknowns (environmental improvement and a more harmonious urban society). Other parameters necessarily intervene, and render an evaluation more complex. A better environment is based on three factors: (a) the implementation of technologies capable of curbing the deterioration of living conditions and environmental pollution; (b) public and private investment that makes it possible to realise this objective and extend its effects to the rest of the community; (c) social and institutional control over the complex network of natural and material elements that outline the essential framework of "good management" of the urban environment.

The complexity of the urban phenomenon offers a starting point from which to examine this axiom. The city, large or small, now home to a majority of the world's population,[10] is a human construction crisscrossed by technical and social networks managed by persons and institutions. The "socialisation" of every environment via the personal and collective experience of the individuals who live in it is as essential as its physical characteristics. Thus, it is impossible to reduce the urban environment to its natural components; water, air, and soil, and energy resources obviously constitute a basic element of life in society. But urban development also depends on their transformation and integration within a built environment. Housing, means of transport, pipes and mains, electrical networks and other elements of the collective infrastructure are as indispensable to the survival of the species as our "basic biological equipment".

A second characteristic has to do with the economic dimension of urban development. Every environmental improvement has its cost in terms of scientific research and technical experimentation, of the desired application in a given location, and of the real impact on the resident population. The financial resources that are available, the human resources to implement them, maintenance, and the organisation of projects require that priorities be defined and choices be made. These in turn will have economic and social consequences on individuals and their environment.

The third aspect is more sociological and has a bearing on the access of individuals and groups to what we have called "environmental innovation", i.e. innovative changes introduced to improve environmental conditions. Depending on the cost of these operations and on local policies, they are variably implemented in the urban space. Individual financial resources also segregate individuals, distinguishing between those who live in a healthy environment and those who must be satisfied with worsening living conditions. Case studies conducted in La Paz and Buenos Aires have shown that in Latin America, as well as in Europe or in the United States, the difference between social classes is not only defined in terms of wealth; it is increasingly based on access criteria (Rifkin, 2000).

Sustainable positive effects, will above all depend on the degree to which these technologies are adaptable to a given context[11] and society, which in this case is the present-day Latin American city. In urban environment there is the outcome of local, national and regional history, torn between aspirations to modernity and growing social inequalities. Such inequalities, both social

[10] According to UNCHS (2001), 47% of the world population lived in an urban environment in 2000. This percentage is expected to rise to 53.4% by 2015 and 60.3% in 2030. For all of Latin America, it already comes to 75.3%.

[11] In English one speaks of " appropriated technologies" , i.e. appropriate and thus adequate, but also understood and accepted by their users.

and spatial, characterise the contemporary world, and are definitely not archaic. They may not always be the direct consequence of technological progress; nonetheless, structural inequality *expresses* itself most vividly in the technological and environmental area.

By accounting for specific traits of the urban environment we came up with the hypothesis that true environmental improvement requires *technological creativity*, that is to say innovative social knowledge and control of the new technologies. From the point of view of sustainable development, an innovation is "real" not only when it is *technically implemented*; it must also be accepted socially and integrated within a given social and cultural context. This is an absolute prerequisite for new technologies, and their environmental applications, if they are to have a positive impact on society as a whole. The mechanisms of territorial and social distribution of technological and environmental "benefits" will have to target and reach the largest possible number of citizens. On the contrary, a technological innovation that reinforces spatial or social segregation will not be considered as contributing to sustainable urban development or to a better environment. There is no superior "environmental argument" that may be invoked if an innovation leads to greater poverty or a more precarious existence for the greatest number.

Hypotheses tested by facts: urban concepts and reality

Having examined the study hypotheses in the light of reality, it is observed that each improvement in Latin American urban environmental conditions that is planned and subsequently evaluated in purely technical terms, inevitably brings with it phenomena of social and spatial disparity, since complex and highly segregated social situations are viewed unilaterally.

Of course, this link between technology and greater segregation is not automatic: its causality is qualified by the impact of the economic and political processes that influence it. They nevertheless play an overwhelming role at the current stage of trade globalisation (Mander & Goldsmith, 1996). It is interesting to see that present-day urbanisation boils down to a process of economic, social, spatial, as well as technological differentiation. In the major agglomerations, the use of new technologies turns out to be a factor that discriminates against certain urban territories, and upgrades others—financially, socially and even symbolically. It is seen that certain parts of this territory are earmarked for specific purposes (residential, business, scientific or industrial); their commercial value is multiplied by their technological added value; at a symbolic level, they express both the city's belonging to the "modern" global world, and exclude the social strata that are unable to benefit from it.[12]

The deterioration of the urban environment (infrastructure and equipment, housing) is considerable, and of course it is the poorest inhabitants who pay the price. This becomes even more apparent when one analyses the practical repercussions of the public policies implemented to rehabilitate such sectors. They usually reinforce the stigmatisation of the areas that have not been

[12]One of the most common examples in Latin America are the American style *malls,* gigantic shopping centers with retailers selling international trademark products at international prices, which have become leisure centers for the crowds that stroll through them, although most know that they can do no more than window shop.

rehabilitated, and contribute to the expulsion of the poor population from these newly "gentrified" zones.[13]

The issue of services should be approached from a similar point of view, with the focus less on immediate improvements and more on their ultimate impact. One should also keep in mind that urban authorities are usually great believers in technology and have a vision of public management that clearly benefits certain parties to the detriment of the "great minority". This is illustrated by the current situation in Argentina and Bolivia; environmental problems were to be resolved by means of the privatisation of *collective services*, a term which was preferred to public services. For one thing, they are no longer administered by the public sector; and they are no longer universal. Privatisation is meant to improve their technical efficiency and economic profitability. Both aims require the influx of new capital. In Bolivia, international development organisations provide capital to local private companies; in Buenos Aires, it is generated by the globalisation of the water market, and the arrival of a Franco–Spanish–Argentine syndicate that specialises in this highly profitable sector.[14]

The environment—technical imperative or economic necessity?

Unfortunately, there is always the danger that environmental issues will be treated primarily—or exclusively—in technical or sectoral terms, and that their social aspects will be overlooked.

Those who promote innovation in Buenos Aires have a dual interest, both economic and technical. In a first step, the population is reduced to the status of the company's real or potential "customer". The water supply concessions reduce the authorities' increasingly heavy financial burden; but they also contribute to the deterioration of the water mains and render them inaccessible to a growing number of consumers. The international syndicate, which is used to this type of contractual situation, seizes the opportunity to move into a market of over 12 million consumers offering long-term profitability. It nevertheless selects its potential customers—several times it has failed its initial commitments, deciding to extend the mains in highly profitable areas. It therefore had to renegotiate the relevant agreements and contracts in terms favourable to itself, and put non-profitable areas on the back burner.

It would seem that in La Paz the trend concerning solid waste management is similar. The Bolivian company entrusted with this task has a monopoly, and benefits from certain implicit agreements with the municipal authorities thanks to which its gains are in no way proportional to the services it provides. In parallel, small community companies assume the most risky and difficult tasks, without any long-term guarantees, using obsolete equipment, untrained staff, and generating little profit. This is indeed a malfunctioning service facing a "captive market", in which users are already overtaxed by their electricity bills.

Table 1 shows the cost to families of waste collection, broken down into families that spend less than one minimum living wage, between one and three minimum living wages, between three and six minimum living wages, and more than six minimum living wages.

[13] A typical example of this is revealed in the thesis by Wü st (2000) on relocation in Ho Chi Minh City, in Vietnam.

[14] Concerning major international companies and water, consider the example of Vivendi (Joseph, 2001).

Table 1
Representation in percent of the cost to families of waste collection in La Paz

	Frequency	Per cent
No answer	23	16.9
Less than 1.6%	99	72.8
Between 1.6% and 3.2%	8	5.9
Between 3.2% and 4.8%	5	3.7
Between 4.8% and 6.4%	1	0.7
Total	136	100.0

Source: Fundación Pro-Hábitat (2000).

Approximately 73% of the inhabitants of the area studied, an outlying area of La Paz, devote less than 1.6% of their total monthly expenses to rubbish collection. For families living in the city on a medium to high income this represents between 0.05 and 0.2% of their monthly expenditure.

In Argentina and Bolivia technology predominates, though it is implemented with unequal rigour and frequently increases dependency on the big foreign corporations which rule certain markets. Construction is based on financial profitability criteria, but no attention is paid to its capacity to adapt to the territorial and socio-economic situation of the most disadvantaged parts of the urban population (although this does not entirely apply to certain micro companies). Indeed, the process of concentration of income and de-industrialisation that characterised Latin America in the 1990s was accompanied by the opening of borders which largely benefited private companies specialising in the management of public services (not only water, but solid waste management, waste water treatment, transport, etc.)

Managing the urban environment: a market to be conquered or an opportunity to innovate?

Although improving the environment by means of innovative technologies and processes is evaluated above all in terms of economic and financial costs, there are other costs that are ecological and social. This prompted us to estimate new costs for each of the cases examined, and to evaluate who will cover them. A difficult undertaking, sometimes owing to poor information, or to problems with applying such a "pattern" to very disparate situations. It nonetheless provides a concrete view of an urban economy consisting of public and private expenditure, revenue, and the social distribution of investments.

Information on the financial mechanisms of public services was needed. But access to such information in Argentina and Bolivia is impossible, since private companies block all "sensitive" data, while the public sector is highly inept at managing its own information. Still and all, the two cases studied, both marked by a redefinition of the roles of public and private players, suggest that environmental management may be considered a promising market, capable of generating significant revenue for companies that view all consumers of a basic resource such as water as customers, among whom they will favour the most privileged.

Thus, the company set up to this effect in greater Buenos Aires plans its investments in the long term. It signed a 30-year contract with the authorities, with profits planned after 20 years of

operation. However, once the capital and technical investment had been negotiated, the contract was modified rapidly, both as to expected results and rates. The public authorities and the company agreed to reduce services and raise prices, allowing the company to become profitable faster than planned, although this renders access for the poorest impossible. Thus, a large part of the population finds itself cut off from a vital resource. Faced with "inaccessibility" for those with low purchasing power, the state has to assume its social responsibility and intervene. In fact, the company is the first to encourage the state to pay a direct or indirect subsidy to these consumers. It can only win: it does not have to reduce its rates, since its solvent customers consume and pay, and the authorities pay for the others. It even integrates this "social insecurity" in its planning, extending its networks and providing new services only to the most "reliable", although it is well aware that the financial situation of the state may not enable it to meet its social obligations. The state, on the other hand, would like to divest itself of these by privatising all public services. Thus, choices, priorities, and orientations are primarily profit-based. As was to be feared, they are detrimental to the infrastructure in certain areas of the city and certain population groups, which already receive little aid from the Argentine state, preoccupied by other priorities in view of the current widespread crisis.

In Bolivia, the consolidation of municipal structures and the rights newly acquired by municipal authorities do not seem to have had a significant impact on the cost of household waste disposal services, at least for the time being. Studies in the poor areas of La Paz show that they continue to be financially viable. 70% of beneficiaries pay between 0.1% and 0.7% of their monthly income for rubbish disposal, which remains highly profitable for the private company that operates the service. Indeed, in an international comparison, the prices that the company negotiates with the municipality seem absurdly high and apt to generate fantastic added value. Not only have they more than doubled since these new contracts were introduced, but they seem to be among the highest in the world! On the other hand, it appears that the complementary services offered by community micro-companies are still not controlled economically. In order to cover the precarious districts that are not yet serviced by dump trucks, the Municipality encourages the population to set up small teams of collectors with carts who negotiate the service individually with each household. Their equipment is very primitive and the workers are unskilled, so their prices are much lower—US$22 per tonne of collected rubbish against US$48 for the private company. The micro-companies practically do not require any equity capital, which therefore need not be written off. Still, a true cost-benefit calculation of their operation has not yet been made. Technological and material aid for these new players is bound to have a positive repercussion on their profitability in the poorer districts, particularly in view of the fact that only 50–60% of all rubbish is collected. Theoretically, the law on popular participation provides leverage for the democratisation of public management, but the connection between this new instrument of control and administrative practice is still not clear. Although the residents say they know the law, it never enters into the processes meant to take greater account of the needs of the most disadvantaged. Could this be due to the fact that procedures are set up at a uniform municipal level—La Paz has nearly one million inhabitants—but applied variably, depending on a district and its residents? The population must be educated and informed so that these instruments may become an effective and tangible means of decision-making and participation.

The two studies show that the sectors examined are real investment markets, able to guarantee a sound urban environment—at least for a part of the population—and generating benefits under

certain conditions. But the question persists—how to ensure optimal efficiency at the lowest possible cost for the consumer? And who are the hypothetical beneficiaries of such projects, if it is kept in mind that costs are often covered by consumers at the price of their democratic right to access a certain number of public services?

The initial withdrawal and all too rapid return of the Argentina authorities, and the incapacity of the La Paz municipality to curb the cost of urban waste management—both situations illustrate how far urban management still has to go to become economically viable, and how these difficulties affect social problems.

Social needs, business strategies and the role of the state

As confirmed by the two Latin American studies, improving the urban environment depends directly on improving living conditions for the resident population. There can be no doubt that these two innovative experiences are extremely pertinent socially. The aim is to extend the water supply to the poorer areas on the outskirts of Buenos Aires (where the relevant infrastructure is largely unsatisfactory), and to provide the families living in the informal sectors of La Paz with a rubbish disposal service, which does not exist. The collective benefits of these "innovations" are self-evident. However, to understand the environmental issues involved, and to evaluate the social impact generated by each element of the process, it is necessary to examine what guides their implementation. For this, the following hypothesis is formulated: if such projects are designed with a purely sectoral approach and without any social equalisation mechanisms, they are bound to counter run their original intentions and deepen both social inequalities and territorial divisions. Social players with very different political interests apply these innovations. It is necessary therefore to investigate the conflicting strategies arising from their specific position in the social system.

In each of the cases, three players are invariably present on the urban scene: the city government, which must define standards and see to it that they are applied; citizens, be they producers of their environment and/or consumers of services they are provided with; community micro-companies or non-profit making organisations and, in our case, the private companies. The standpoint of each of these players on urban management issues will influence the "dynamics", making them more or less apt to view a sector in more "social" terms. However, their theoretical position does not always correspond to what they do in practice.

In Bolivia, the municipality has not succeeded in providing impetus for change, in spite of the new constitution which gives it significant powers arising from decentralisation. To speak in concrete terms, where waste disposal is concerned, it reproduces the usual system of differentiated services provided by companies which offer worse service where the problems are most acute.

In metropolitan Buenos Aires, a social perspective on the new water management system also reveals the conflicts of interest between the various parties concerned. The poor, who have finally seen their civic rights as consumers of collective services recognised, were rapidly disappointed. The water network does not reach all districts nor all houses. Having produced their own informal basic water supply system (wells simply dug in the ground), the poor continue to function as virtual consumers in precarious situations that persist or become worse. Many of those with access to a regular water supply are unable to pay. Delayed payment, cutting off of meters—these

problems confront the poor with their real position in the market: exclusion. That is the reason for a refusal of privatisation, which certainly improves the quality of services (better water quality and greater supply) but limits them to those who can pay the right price. When protest movements start—and the private suppliers do not have to deal with these—the municipalities are forced to compensate for the excesses of liberalisation, and play go-between on behalf of the population, although in fact they no longer control the situation. They must confront both a capitalist company that has acquired certain contractual rights, and the national state. The latter, completely engrossed by its economic choices, is loath to face up to the social foundations on which it rests, and the resulting social obligations. The state all too often forgets that customers and consumers are also citizens and voters.

In Argentina and Bolivia, where social issues seem to be perceived as marginal, the social aspect makes itself felt massively in Buenos Aires, since users refuse to accept "market laws". In La Paz, the interviewed households were not satisfied with the quality of life resulting from the changes.

Social issues can clearly not be dissociated from political ones, and the relations between parties involved in urban development illustrates the extent to which the political framework helps or hinders action aimed at improving the environment, with or without a sustainable development of the city. To be sure, none of the situations, be it Bolivian or Argentine, can be taken as a model, since in each case the aims pursued are subject to the constraints of a given system. Although even the players themselves often find it difficult to estimate economic costs, these are nonetheless real. They represent burdens which ideally should be distributed equitably among the beneficiaries of services; in practice they are often viewed in terms of profit, and thus lead to conflicts between different population groups, the political authorities and private intermediaries.

Nor should environmental improvement be neglected. It exists in each case—but in each case also its extent, be it spatial, technical or social, depends largely on the public policies implemented in parallel. Decision-making mechanisms, which are sometimes overlooked by innovation specialists, are vital to each and every project. They are what makes an idea real, generating a number of economic and social consequences. The impact of innovation on civil society is thus the principal challenge that must be tackled by all projects with innovative ambitions. Each time this impact is under-estimated, poor citizens are faced with insurmountable problems, which are simply the result of conscious, objective-focused decisions. The social import of these changes is always viewed as a problem, instead of being seen in terms of possible future situations and equalisation mechanisms that would transform sustainable development into social development for all.

From technologies to global processes: where does innovation lie?

Innovation is not an independent phenomenon; it is not limited to "technical discoveries" that need only be applied and used immediately. What it does boil down to is the *social application* of these innovations. Their innovative character depends on their potential to significantly improve the quality of life of all parties involved, above all of the poorest. There is no methodology nor theory that will "prove effective in practice" without demonstrating whether the changes wrought by innovation work "for the benefit" or "to the detriment" of the poor. Innovation, whatever its

technical added value, is only an epiphenomenon if it does not reinforce the sustainability of both environmental and social development.

The ideal would be for Latin American cities, as political players, to be innovative in environmental terms because they have made progress in the social field. Their technological handicap towards the scientific and economic advance of the western world could be qualified by greater social concern for the direct or indirect impact of the new technologies. It has to be said that the urban populations of Latin America (and this is also true of Africa and Asia) reveal an endless wealth of imagination when it comes to creating conditions allowing for their social and economic integration (job creation, community solidarity networks, self-financing of the construction and maintenance of collective equipment/infrastructure) which the state refuses them (Pedrazzini, Bolay, & Bassand, 1996). It is important to appreciate this creativity, caught between external constraints and the will to "find a solution" in a globalising world which tends to increase inequalities not only between the countries and regions of the world, but also within industrialised societies (Latouche, 2000).

In spite of the diversity of the situations, innovation in the cities studied is primarily the outcome of the evolution of social and institutional action: the appearance of new intermediary players and new types of relationships between traditional ones, new processes and types of action, sometimes new technologies (Bolay, Pedrazzini, & Rabinovich, 2000). In Bolivia, where the creation of rubbish collection micro-companies, which are well adapted to the spatial and social characteristics of the poor districts, contribute to a better urban environment. Yet, they are above all the result of institutional changes in the area of public management. In Argentina, finally, one may observe the opposite logic: technical innovations introduced by private companies aim primarily to increase the profit margins on invested capital, and are by no means innovative in terms of sustainable development, the extension of service networks and infrastructure, since they do not go hand in hand with more equitable access for the beneficiaries.

That said, environmental innovation can be defined by stating that it will only be effective if improvement is not purely technical. It must go beyond technology and integrate other areas: social issues, in which technological impact will only be innovative if it reduces unequal access to basic services and infrastructure; the economy, where the costs of innovation will not be a burden on the poorest; politics, where improving environmental conditions will not be the business of a privileged class but of society as a whole.

Innovations, changes and social transformation: a look at the players

Over and above these objectives, a study of technological innovation should lead to the gradual introduction of change mechanisms, i.e. in the distribution of decision-making powers between the players, and the design of urban planning strategies.

The social environment in urban agglomerations is characterised by inequalities, both in terms of property and access, social and spatial, in the private and the public sector. It is precisely this unequal "nature" of the urban world that our critical analysis of technological innovation should allow us to deconstruct.

The manner in which stakeholders in the urban world achieve ownership appears to be a fundamental element of innovation, allowing for a more global view of "urbanity" as a driving

force behind the changes that affect our societies, both North and South. It is not enough to simply compile examples of local experiences. In view of their vastly different contexts and initiatives a comparison has proven much more difficult than first expected. It is necessary, nevertheless, to reinterpret their meaning, not by viewing them in isolation, but as so many contributions to a vision of world and urban evolution. Rather than viewing technological action as a "source" of innovation, it must be considered in its global dimension, via the social practices it generates in areas in which solutions are needed for the most basic problems, those which should be seen "on a human scale". On the other hand it may be necessary to reposition every specific event in its immediate environment and see how it reflects contemporary macro-social processes. These are determined by the fundamental trends of "globalisation" (Stiglitz, 2002), i.e. the extension of the liberal market worldwide. Today, this thinking is imposed at political level by the societies with the greatest political, ideological and military power. Yet, it finds itself permanently restated by the actions and reactions of the "man in the street". Once this point of view is abandoned, one can lose sight of what is most important: city dwellers shape the city as much as the city shapes them (Percq, 1994). The reinterpretation of technological changes for the benefit of the environment by the social players endows this process with its innovative dimension. The examples we have studied illustrate what happens between the relevant players, and thus what is at stake for development.

This inclusion of a social dimension within the purely technological spread of innovation is the origin of institutional reorganisation making true technological improvement—if not innovation—possible.

In quantitative terms, one may say that in metropolitan Buenos Aires the population with access to the water supply has increased, that the quality of the water is better and that there is more of it. Similarly, rubbish disposal services are now being organised in the poor districts of La Paz, where they did not exist previously. Yet, when one sees the statistics, one is beset by doubt: who truly benefits from such "innovations"? Certainly not the most disadvantaged groups, who are not in a position to acquire these services under the newly established conditions, as in Buenos Aires, or do not feel concerned by them, as in La Paz.

An intersectoral and multi-player approach is indeed possible, but the resulting critical analysis of the traditional procedures it gives rise to is always linked to a balance of power, regardless of the country or the players involved. Whether they involve populations, political structures or businesses, the fact that environmental technology is only one element of innovation in this interaction is by no means specific to Cuba, nor to the countries of the South.

A draft theory of sustainable urban development

An examination of the social impact of urban environmental innovation is part of a larger quest, i.e. to define the present-day "urban condition" in Latin America and perhaps the world over. Urban environmental innovation is a variant of spatial and social planning in urban agglomerations. Without a complete reformulation of the concepts and ideologies behind the "urban project",[15] cities will continue to grow, both in spatial and demographic terms. This in

[15]Urban project as a notion refers to a political project that should include social, economic and cultural aspects

turn will deepen inequalities, cumulate discriminatory factors and add environmental segregation to all its other forms. Conversely, there can be environmental innovation outside of an alternative project of urban management, which still has to be defined. The only thing that is certain is that such a project must target a global improvement of environmental conditions; solving problems in only certain districts of a city only discredits—consciously, or by negligence—all the others that do not benefit.

Speaking of social equalisation under these conditions means that in a first step we must recognise that certain segments of society that do not "naturally" benefit from political decisions defining urban planning priorities and methods. During the twentieth century, public authorities introduced social redistribution measures in order to integrate the disadvantaged within the "national community", with unequal results. Free-market globalisation undermines this function of the "welfare state" in that it sees social services as a ware that becomes more costly and not readily accessible to the poorest. There are scores of new "decision-makers": decentralisation has given local administrative bodies greater authority but few resources; directly or indirectly, the private sector has come to dominate vast areas of urban management (for example, transport, the water and power supply, household waste disposal and treatment, schools, health care centres, etc.); as have certain local associations and groups that defend specific interests. Ways of regulating all these particular interests and resolving the conflicts they generate must be reinvented; for the time being "urban governance" is often an unknown entity in the hands of unidentified players, which threatens to widen the gap between the privileged and the underprivileged, and may fail to organise the city in socially and spatially coherent terms.

Sustainable urban development—which must also be social—will not improve the real living conditions of most of its inhabitants if those who promote it do not endow it with a multidimensional scope from the very start. To do so, they must consider the key elements of development that partakes of urban planning and development, economic social and environmental issues, within the framework of democratic public policies. When one is aware of the origins and ways of functioning of the vast majority of decision-makers in the Third World, this is a challenge indeed (although things are not necessarily better in western cities).

In view of the constraints that reality itself, financial and other considerations impose, and the pressure of migratory, climate, and economic change, the players involved should be more careful and insist upon the haphazard character of urban development—at least in the medium term. Unfortunately, rare are the decision-makers who are willing to admit that their efforts may be moderately successful; the others prefer to vent great prospective theories without giving much thought to day-to-day matters.

Change, be it environmental, urban or development-related, is a dynamic process that strongly depends on production conditions, the built environment and natural resources. That is why investments required for innovation (project-development application) almost automatically boost the costs of urban development, notably those of the habitat (housing, infrastructure and services). (This could change if instruments to cap added value were used for redistribution purposes, whether social or spatial.) These costs all too often cause various city districts to be "valued" differently, which in turn increases or consolidates socio-spatial disparities. It would be

(*footnote continued*)
within an urban strategy.

desirable to see the design and implementation of urban projects revolve less around innovative technologies for urban improvement, and more around using advanced technologies for the benefit of the poorest, to prevent them from widening the gap between rich and poor and instead transform them into an instrument for greater social and territorial equity. This requires a revolution in the true sense of the word: the creation and diffusion of innovative technologies while demanding that these be accessible to all urban players, including the poorest, and used by them. This will forcibly introduce the fight against social and economic discrimination in cities as a primary focus of urban planning, while striving for concerted action between those concerned—community associations, public authorities, the private sector and various non-profit making organisations—by means of appropriate participation and negotiation tools.

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