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Is smart urban governance possible in developing countries? Constraints, resources, innovative tools and strategies

Abstract

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Until recently, we were talking about urban management, local management and territorial management. We are now talking about smart city or intelligent city, terms that have become fashionable in specialized literature and even in everyday language to such an extent that those who ignore them could consider themselves overtaken by the passage of time.

But what does the term "smart city" actually mean?

Smart city is a city equipped with the tools enabling it to observe, learn and react from the data collected. To observe itself, the smart city needs a large set of various sensors and materials. To this definition, some prefer to oppose another, which would define the smart city as a city that is more liveable, less polluting and in which the user is given a place. This definition obviously does not exclude neither the fact of the connection and the acquisition of essential information necessarily multiple and numerous, nor the complexity of the internal system of analysis and automated decision-making oriented towards the comfort of the user. Some see the smart city as a process and an approach and not as an end.

So what about in developing countries where society is undergoing profound and rapid change? Can we adapt the concept in the implementation of a new governance of the city? Answering these questions is not easy. To get around the difficulty, we will instead offer the concept of a sustainable city where the management of essential information can be made less complex. In this article we will successively deal with the theoretical foundations of the "transition to the smart city" and sustainability, the need for the establishment of a new vision of urban governance and smart governance tools. To illustrate our point, we will present a few simple and didactic examples for the Algerian city of medium importance.

Keywords: smart city, sustainability, local governance

Introduction

The term "smart city" appeared during the 1990s.[1] At that time, the emphasis was on the importance of new ICTs (Information and Communication Technics) for modern infrastructure in cities. However, the authors note 23 different definitions of the term from 22 different sources. We thus obtain a wide range of conceptual variations by replacing "intelligent" with alternative adjectives, for example "digital, cyber, wired, informative, knowledge-based or simply connected". S. Alawadhi et al.[2] note, moreover, that "The California Institute for Smart Communities" was among the first to focus on how communities could become smart and how a city could be designed to implement technologies of the information. Dirks and Keeling[3] highlight the importance of the organic integration of various systems (transport, energy, education, health care, buildings, physical infrastructure and food water and public safety) to create a smart city.

The "Smart City" thus seems to appear as a concept based on a global approach to city governance; this concept would have as a fundamental basis the integration of many and various relatively complex information systems on the city such as: multiple networks (energy, water, sanitation), transport, health, services, shops, infrastructures. The objective is then to build an innovative tool for analysing the information collected and the data generated to propose solutions to the multiple problems of the citizen user such as access to a better quality of life, the solution to the problem of unemployment, safety, training and adaptability to new work contexts.

In the expression "smart city" we have the term "smart". We can then recall for the record, that an intelligent being is a being endowed with the ability to adapt to a situation and to choose means of action according to the circumstances. As this definition can be adapted to any living being. A transposition to the city would then allow us to say that a smart city is a city equipped with the tools allowing it to observe, learn and react, from data. collected, to propose one or more solutions to a detected problem. To be observed, the smart city needs a large set of various sensors. To learn, it needs complex data processing facilities at its disposal, and to react, it needs sophisticated models of analysis, design and forecasting. A smart city would thus necessarily be connected, possibly in a vacuum or in a closed system. A smart city would thus be a city that "can" solve the problems of its citizens (or at least most of them). But in the term "intelligent" one should also include the idea of lifelong learning and therefore of continuous improvement. This means that problems that are not solved by a date T should be able to be solved at a later date T + t.

Going further in the sense of the term 'intelligent'. GJ Guglielmi[4] notes that the smart city would modify its own inhabitants, some of whom have hypothesized that they would become, because of the digital revolution, co-citizens a neologism that evokes many other terms including the first is fellow citizen, a term which prompts us to insist on the fact that the citizen is not an isolated individual, simple holder of political or administrative rights, but an individual in a community who exercises his rights with other citizens of this

Is smart urban governance possible in developing countries? Constraints, resources, innovative tools and strategies

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same community. Other terms, now part of everyday language, are carpooling, roommate, co-work, co-author; these terms contribute more and more, through social networks and the Web, to the making of the co-individual, the co-citizen and, thereby and beyond our conscious will, to the city smart.

V. Rialle[5] approaches the definition of the Smart City as a city using information and communication technologies (ICT) to "improve" the quality of urban services or even reduce its costs. He confirms that "these smart cities are developing rapidly in countless places around the world, starting with France, which is experiencing a real boom in this area". However, it poses the difficult questions of: i) "what do these smart cities offer (and the concept behind them) that can awaken our attention, inspire our search for solutions and invite us to follow their example" , ii) what concretely do these cities offer to improve health courses, break with the loneliness and forgetfulness of old people abandoned to their solitary death, reduce the "technopenia" now rampant and not only among the elderly? (technopenia denotes the lack of access to "new" technologies) and the source of a new handicap which alters the access to social life of a part of the population, in particular that of the elderly "; Moulias R. et al.[6] and iii) will they finally be able to re-establish solidarity, proximity, efficiency of health policies, care, well-being and the harmonization of "global thinking" and "local action"? This reflection allows us to pose here, within the framework of this work, the question of the meaning to be given to this concept and its adaptability to the local contexts of developing countries, countries invaded by new technologies (starting with the mobile phone). and the inevitable social networks) but whose daily concerns are of a completely different nature: eating, drinking, washing, building roads before even talking about road networks or hospitals in the proper sense of the term and before even talking about health system.

In the same vein, M. Vidal[7] asks the question of which inhabitants and which users of the smart city. Based on the observation that the world's population is now predominantly urban - the milestone being crossed in 2007[8] - and that trends suggest that the proportion of urban dwellers could be around 70% of the world's population by 2040, it is deduces that it seems essential to think differently about the management of cities, whether for example in terms of energy, transport and use or data management. He then proposes that the expression "smart cities" should henceforth regroup the problems and questions developed until then in particular around "Green Cities" and "digital cities", and is made possible by the integration of the possibilities offered by the digital development. It should be noted in this regard that the urban population in Africa reaches 41% of the total population.[8] M Sebti et al.[9] note that in the Maghreb, in two decades (1985-2005), the proportion of the population living in cities has increased by 15 points in Algeria, 10 points in Morocco and 11 points in Tunisia. This induces an accelerated growth of cities, even the creation of new cities around metropolises. We can then ask the obvious question of which models to adopt (or adapt) for these new urban spaces. Would the smart city be a suitable solution? What should be the involvement of central and local authorities in the integration of this concept (or another) in the policies of the new cities? N. Douay et al.[10] partially answer this question by presenting the Chinese model and noting that the development of smart cities in mainland China as in Hong Kong is a recent phenomenon that takes place in a context of ecological and energy transition, but also of financialization of the city and its services. They then add that smart city policies in China reflect the conditions of Chinese urban production, characterized by strong supervision of central and local authorities, as well as the establishment of local growth coalitions. S. Khan et al.[11] report that

the Indian government launched a program in 2015 to transform a hundred of its cities into Smart Cities.

So what about in developing countries where society is poorly informed and generally unprepared for the concept of ecological transition while undergoing deep and rapid change? Can the concept be adapted in the implementation of a new governance of the city when the financial means are sorely lacking? Answering these questions is not easy. To get around the difficulty, we will instead offer the concept of a sustainable city where the management of essential information can be made less complex. In this article we will successively deal with the theoretical foundations of the "transition to the smart city" and sustainability, the need for the establishment of a new vision of urban governance and smart governance tools. To illustrate our point, we will present a few simple and didactic examples for an Algerian city of medium importance.

The concept of "smart city": constraints, tools, procedures

We saw in the introduction that a smart city would be a city that "can" solve the problems of its citizens (or at least most of these problems for the majority of citizens). In technologically advanced countries, this concept is especially common at the level of large metropolises which are increasingly faced with security problems, social demands of all kinds, and the management of disability in many forms (disability physical, psychological, societal for access to digital), the isolation of certain categories of citizens. On the gazette of the communes of France of May 27, 20090,[12] one wonders whether video surveillance has become commonplace? We can see that in the streets, stations, stores, shopping malls and parking lots, cameras are proliferating, noting that in 2007, more than 1,500 municipalities had chosen to equip themselves (compared to 800 in 2005). The deployment of video surveillance is now raised to the rank of "absolute priority" in the national crime prevention plan.

The common problems encountered by "less developed" countries such as citizen information on services (transport, administration, consumption) have already found, well before the concept of smart city, innovative solutions in their time in technologically advanced countries. These solutions should be connected and integrated into global intelligent governance systems, the funding to be mobilized is obviously much less important than that necessary for development from scratch. In this case, we would have saved huge amounts of time, in work and in money. Among the many security equipment, video surveillance is undoubtedly the most expensive, these costs easily ranging from simple to tenfold depending on their size, quality and the spaces to be covered. Two examples help to clarify these remarks: in Lyon, the investment cost of the system put in place - one of the largest in France - amounted to 6 million euros. By way of comparison, the unusual installation of 12 cameras in the village of Baudinard-sur-Verdon (Var) cost 60,000 euros, a significant sum for a town of 156 inhabitants.[13] The processing of the information and the data generated are also of different complexities. It should also be noted that the financial weight of video surveillance is based less on the technology chosen than on the public works necessary for the establishment of a global surveillance system and not to mention the creation of an urban supervision center, which can reach several hundred thousand euros added to the costs of installed equipment and ancillary services. If we now reduce these costs to the level of the Maghreb, the cost would be 960 million DA for a city like Constantine or 66 million dirhams for a city like Tangier (Morocco); it would be 192 million DA for a small town like Ben Nacer Ben Chohra on the

Is smart urban governance possible in developing countries? Constraints, resources, innovative tools and strategies

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outskirts of Laghouat (Algeria); we only take into account the number of inhabitants, other societal complexities are here excluded for simplicity. These data are nonetheless only indicative and are given on the assumption that, moreover, the work is done within commonly accepted standards (organization, reliability, worker awareness, respect for deadlines, use of local products). To these costs should of course be added those inherent in the multiple costs of importing products or services that inflate the bills.

It should be noted that these installations would be meaningless and ineffective if they were not reinforced by rapid response teams, also connected to the overall monitoring and control system. To shed more light, some figures can be taken from T. Le Goff et al. (2008):

- 80,000 euros: average cost of the preliminary stages (feasibility studies, assistance to the client).

- 20,000 euros per camera: average cost for installing equipment.

- 28,000 euros per agent, or a total of 140,000 euros / year: average operating cost for a system made up of about twenty cameras, operating 24 hours a day, at least five agents are necessary.

This information confirms that the calculation of the average cost of the installation of a global surveillance system must take into account many expenditure items not visible a priori. In the case of developing countries, account should also be taken of the know-how (in organization, work, forecasting) present in technologically advanced countries and absent in developing countries.

In reality, what must be remembered first and foremost is that a global surveillance system, the primary tool of the smart city, cannot be based solely on even the most sophisticated equipment. This tool, which constitutes one of the strong links of the smart city, must first be understood as a new organization and a new governance of the city, in other words a radical change of behavior among the actors of urban governance.

This requires the development of new approaches, the construction of a new vision and new strategies and a total relearning of the missions and roles of each actor as well as the relationships between the various actors (including the chain of command). In technologically advanced countries, the concept of the smart city has not collapsed suddenly; it is the combined result of a change in mentality, significant technological progress, their adaptation and integration into social life through daily use and finally by societal demand for comfort and security. All these concepts are to be learned in developing countries. This situation requires the development of new approaches, the construction of a new vision and new strategies and a total relearning of the missions and roles of each actor as well as the relationships between the various actors (including the chain of command). In technologically advanced countries, the concept of the smart city has not collapsed suddenly; it is the combined result of a change in mentality, significant technological progress, their adaptation and integration into social life through daily use and finally by societal demand for comfort and security. All these concepts are to be learned in developing countries.

Tests and examples in technologically advanced countries

The European Commission has decided to create in 2010 an annual "Green Capital of Europe" award in order to encourage large metropolises to take up the environmental issue. In 2014, the "Industry, Research and Energy" Commission of the European Parliament published the "Mapping Smart Cities in the EU" study which identifies as smart cities 43% of European cities with 100,000 to 20,000 inhabitants and nearly 90% of cities in more than 500,000 inhabitants. according to four levels: i) level 1: the city has a smart city policy or strategy, ii) level 2: in addition to level 1, the city relies for its policy or strategy on planning or a vision, iii) level 3: in addition to the previous levels, smart city pilot initiatives are implemented and iv) level 4: in addition to the previous levels, at least one smart city initiative has been fully launched or implemented.

We can cite as examples:

- Pontevedra in Spain which is a pioneer city in terms of pedestrianization.

- The UK occupies a central position in the development of smart cities internationally. London and Bristol lead UK smart cities, followed by Birmingham, Glasgow and Manchester

- In France, we can cite the experimental operations concerning: de Lyo, Renne, Issy-les Moulineaux, the Euro metropolis of Strasbourg, Angers and Montpellier.

- Switzerland is pursuing an innovative policy concerning "smart cities". Since 2012, it has been developing the "Smart City Switzerland" project set up by the Federal Office of Energy. We will quote here Geneva, Zurich, Pully and Montreux

- The Netherlands is a pioneer country in the field of urban planning and the implementation of smart cities. There are nearly 60 cities that are developing experiments or projects and initiatives based on new information and communication technologies.

- The Finnish capital Helsinki has found its way between all-technological and all-participatory by experimenting with a platform of cooperation and innovation for the city, economic actors and citizens.

Smart city or sustainable city for developing countries

The concept of developing countries

The countries were classified as developed and the others as underdeveloped. We then coined the less pejorative term PVD (for Developing Countries); later the expression distinguished some who stood out from the developing world and thus created three classes instead of two. The term "emerging country" appeared much later in the 1980s with the development of stock markets in developing countries to denote a country that has initiated a process, both economically and socially, to raise living standards. of its inhabitants; it is also a country whose economic situation is "developing". This growth is calculated according to the GDP, new businesses and infrastructures as well as the level and quality of life of the inhabitants.

From the 2000s and especially since the start of the global economic crisis in 2008, a possible decoupling between developed countries and emerging countries (in particular the BRICS: Brazil, Russia, India, China, South Africa and the MINTs: Mexico, Indonesia, Nigeria and Turkey) is mentioned: the growth rates of the latter and their balance of payments suggest that they can live independently of developed countries.

A country is therefore considered emerging (or emerging economy or even emerging market) if its GDP per capita is lower than that of developed countries, if it experiences rapid economic growth, and whose standard of living as well as economic and social structures

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12

converge towards those of developed countries with an economic opening to the rest of the world, large-scale structural and institutional transformations and a strong growth potential. It should be noted that GDP per capita is only a partial (and partial) criterion of emergence: Kuwait, an emerging economy, has a GDP per capita close to the European Union average.

The so-called emerging countries represent nearly 50% of the wealth created in the world and two-thirds of its population. Among them, the BRICS (Brazil, Russia, India, China and Africa) are the leading figures, the MINTs (Mexico, Indonesia, Nigeria and Turkey) are other leading emerging economies and some have taken the gamble of enter fully into the concept of smart city as we mentioned above with the examples of China, India and Singapore. The still developing countries have many other concerns, other economic and societal constraints, other more vital needs. They must, however, imagine new specific strategies, new approaches appropriate to their social contexts and the inevitable vision of a sustainable future in which the city and its users will have to relearn how to consume, to create, to reinvent behaviors and tools.

Smart city projects in developing countries

In Africa: several "smart city" projects have been initiated in Africa by China. We can cite Abidjan in Ivory Coast, Gaborone in Botswana, Accra in Ghana or Lusaka in Zambia.

Morocco, meanwhile, aspires to become a benchmark in smart cities on the continent through its economic capital, Casablanca. To sustainably respond to the challenges of demographic growth, social demand and economic constraints, Morocco is counting on an intelligent organization of space, the optimization of resources and the improvement of the relationship with citizens through collection, the management and analysis of the data provided by the digital transformation currently underway.

For Tunisia, the daily "LaPresse.tn", in its edition of August 13, 2021, informs that: Despite a particularly complicated and unfavourable economic, social and health context, the TSC association has succeeded in transforming its project into a sustainable reality , and announces, today, the launch of the implementation and operationalization phase of the "Tunisian Smart Cities" program.

Algeria is still between hope, dream and reflection. The Hypotheses website (RURAL-M Études sur la ville; Réalités Urbaines et Recherches en Algérie et au Maghreb) consulted on August 12, 2021 notes: "the wilaya of Algiers is setting up a sensible project based on the use and 'exploitation of information technologies to manage databases of and on the city, with the aim of optimizing urban operational management, in order to improve the quality of life of its citizens".

Problems on a particular example

The smart city must be connected; this is not the case in a developing country. For this example we take the concept of sustainable city. This choice is also justified by: **i)** the type of particular concerns in the societal field, **ii)** the availability of resources that can be mobilized by local authorities and **iii)** the national economic context which can no longer allow us to rely on budgets from local authorities.

We take here as an example Laghouat (Algeria) which is a pre-Saharan city, a former oasis in the southern foothills of the Saharan Atlas, whose population in 2008 was 143,830 inhabitants and which has undergone a rapid evolution inducing a profound transformation of its landscape at high speeds and according to forms of evolution

exceeding all forecasts, transformations which are, in many cases, uncontrolled, even uncontrollable. In general, the growing city is scary because management issues and the occurrence of risks (and dangers) do not increase in a linear fashion and arise in sometimes unexpected areas. To the traditional aspects of housing, employment, saturation of roads and streets, are added the growing dilapidation of infrastructure and the dangers it generates, promiscuity in the broadest sense of the term with its pernicious and often intangible effects. And finally the related consequences linked to numerous nuisances (noise, smoke, and various pollution, and behaviour, relationships between individuals and between groups). Geographically, the city of Laghouat is surrounded by several satellite urban spaces as shown in figure (1). These urban spaces have become as many municipalities whose populations we indicate in 2008: Kheneg (10787hab). Ben Nacer Ben Chohra (9621 inhabitants), Ksar el Hirane (23841 inhabitants), Oued Mzi (3129 inhabitants) and El Assafia (5618 inhabitants).[14,15]

Societal problems and development constraints

A smart city or sustainable city project depends on: i) on the one hand what we want to solve as the problems of city users, ii) on the means (in particular human, financial and material) that it is possible to mobilize. We have mentioned above that the problems of users in developing countries are not the same as those in technologically advanced countries. Here, security and delinquency issues are not a priority, especially in medium-sized urban spaces as the example considered in this work. However, surveillance of spaces by camera cannot be ruled out from the outset. It must be considered and taken into account for parts of spaces (or neighbourhoods) and for other reasons that we develop below. In technologically advanced countries, public services are organized and the user is regularly informed. In developing countries the concerns are quite different and the user is viewed differently; the public service is not a service of the citizens but an administration which the user needs. There is a fundamental difference in logic, appreciation and behaviour.

In terms of urban transport, most Algerian cities have a relatively suitable urban and inter-city transport network which is developing at the same rate as the spatial extensions and the creation of new districts. Concessions (bus lines) are shared between the public (municipal services) and the private sector. However, it should be noted: i) that no indication mentions the destinations of the buses or the compulsory or optional stops; regular users know which bus (line number) they should take and at which stop they should get off; others are not part of the service concern; they just have to ask; ii) schedules are never indicated, nor respected elsewhere; the bus starts when it is full; iii) it is not known what time the services start or stop; when the shutdown is completely empty, we can guess that the service has not started or is no longer provided; no indication is displayed on the price of the transport ticket; we know it out of habit.

In terms of household waste collection, no information is given regarding collection circuits, days and times of passage. No standards are required for waste containers. There is also no place specifically dedicated to depositing garbage bags; some exceptions exist, however, where skips are installed. The result is alarming: i) households often leave their "bags" in a place chosen by the residents themselves of the neighbourhood ; ii) for the deposit of garbage, households generally use bags of various types and sizes; few use empty cans of paint or other products; there is no use of specially dedicated containers; we are afraid of theft; (iii) there is also no sorting of waste; iv) it should be noted finally that the stray cats or coming from the houses do not hesitate to scratch the bags and tear them to eat; result: waste on the ground.

Is smart urban governance possible in developing countries? Constraints, resources, innovative tools and strategies

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In terms of health, citizens cannot find information on health services (specialties, schedules, on-call services). But the health situation is, in truth, much more complicated than one might imagine. Figure 2 shows an example of a long-term hospital patient room. The condition of the bed and the blankets, the electric wires lying around without obeying any safety standards are as many dangers for the patient and for the institution.

So, what solutions now and here?

After this more than alarming observation, it seems urgent to find the means to quickly change the existing situation. The smart city as defined above cannot constitute a realistic or achievable project in the context and with current means. The city is a mixed complex of two interacting and inseparable entities: society and the physical space in which this population lives. As part of this work, we are proposing a comprehensive six-point solution including action on these two entities and tending to install the concept of a sustainable city:

1. The complete review of the management of local territories and the training of new "regional governors" with repetitive training sessions for local elected officials. The training sessions are aimed at two types of audiences: **i)** The administrative, technical and service staff of the APC need: **ii)** basic training on the concept of long-term vision, the management of local projects, the global governance of the local institution and with the public and ii) permanent retraining of innovative governance tools, **iii)** local elected representatives (President and Assembly of APC) need, at each installation, specific overall training in the governance of territories, regulations, methods and tools for studying and monitoring projects and territorial issues. .

2. A global information, awareness and training campaign. This campaign will focus on: i) A simple overview of the concept of land management, particularly in terms of resource mobilization, ii) The role, rights and duties of the citizen in the governance of territories, iii) the question of the importance of information in the governance of territories, iv) learning about responsible and sustainable consumption, v) the importance of work and responsible production as a contribution to the governance of territories

3. The establishment of an information system on the city and the services

4. The establishment of a unit, or even an urban supervision center and the training of associated teams

5. Training and setting up rapid response teams

6. The establishment of urban citizen information facilities.

Conclusion

We have tried to recall the ambiguities in the very definition of the expression "smart city", ambiguities due in the first place to novelty and the attempts to find expressions of consensus in harmony with the experiences carried out here and there. After reading the many articles that we had to consult on the question, a finding of the most alarming by analysing the situation of our cities (illustrated in the case of a particular Algerian city but easily generalizable), and which can be applied easily to Maghrebi cities of the same size, we hypothesized that the concept of smart city could, and should, be replaced in our context by the idea of sustainable city based on the first principle of good management of resources in order to preserve it for future generations. At least three main reasons can be put forward: i) the means to be mobilized first, both human and above all financial, which are

difficult to argue in the current economic context; ii) the considerable technological backwardness which would push developing countries to import mass media and services, thus strengthening them in the position of consumers; let us recall in this regard that the "Marshal" plan, seen in its time as an aid plan for the reconstruction of the old continent, was in fact conceived and developed by its initiators to find market openings and a solution to the crisis. overproduction of American factories; the Soviet Union, understanding the stakes, had strongly and categorically refused to adopt this plan; iii) we wondered, behind the scenes, whether the concept of smart city would not ultimately be the preparation of a central tool for total control of the individual, and perhaps to manufacture new users of the territories.

The action plan that we are proposing in six points leaves a great deal of room for human training and citizen initiatives; it seems to us to be the most appropriate and, above all, the most realistic in view of the resources that can be mobilized and the long-term objectives.

Acknowledgments

Conflicts of interest

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Is smart urban governance possible in developing countries? Constraints, resources, innovative tools and strategies

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