Analysis of the Public Management Profile in Brazilian Municipalities and the Differentials Found in Smart City Management

Fernanda Ferreira de Araújo Ribeiro[1], Daniel Jardim Pardini[2], Greiciele Macedo Morais[3] & Valdeci Ferreira dos Santos[4]

[1] Master in Business Administration from Fumec University, Executive Secretary at the Federal University of Ouro Preto, Brazil

[2] PhD in Administration from the Federal University of Minas Gerais. Professor at Fumec University, Administrative Director at Cruzeiro Esporte Clube, Brazil

[3] PhD in Business Administration from Fumec University, Administrator at the Federal University of Vales do Jequitinhonha and Mucuri, Brazil

[4] PhD in Business Administration from Fumec University, Administrator at the Federal Institute of the North of Minas Gerais, Brazil

Correspondence: Valdeci Ferreira dos Santos, PhD in Business Administration from Fumec University, Administrator at the Federal Institute of the North of Minas Gerais, Brazil. E-mail: valdeci.santos2354@gmail.com

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Abstract

Global population growth is a subject of debate in governmental, non-governmental organizations, and academia, as well as a concern for contemporary society. The projections of weakening and depletion of urban infrastructure, difficulties in supply, scarcity of natural resources, associated with primary needs (health, education, housing, and security) created a demand for alternatives to attending the population needs. Some cities, called smart cities, already stand out for achieving their management goals with the help of technology. This article aims to identify the management elements that differentiate the management of a city considered smart (Belo Horizonte, Minas Gerais, Brazil) from the others in the Brazilian context. For the analysis, secondary data for 2015 provided by the Brazilian Institute of Geography and Statistics were used. The analysis allowed us to identify the management characteristics of the 5,570 Brazilian municipalities. The characteristics of the management of the municipality of Belo Horizonte, considered a smart city, were identified through interviews with the managers of the municipality. With the analysis, we identified the differentiating elements of the management models, which made it possible to create environments that propelled the increase of creativity and proposals of technological bases in the management of a smart city.

Keywords: profile of Brazilian municipalities, municipal public management, smart cities

1. Introduction

Today about 50 % of the world's population lives in urban centers. It is expected that, by the year 2050, more than half of this population will be living in cities, and the prospect is that by 2075 this number will reach approximately 75 % (Kobayashi, Kniess, Serra, Ferraz, & Ruiz, 2017). In this sense, city governments should pay attention to the planning and execution of public policies capable of meeting the social and environmental demands of this population (Masutani, 2015; Weiss, Bernardes, & Consoni, 2017).

This concentration of the population in the cities leads to worsening social and environmental problems. These problems are related not only to economic factors, such as the concentration of income and high unemployment rate. There are also other impacting problems, such as the low educational quality of the population and growing crime (Reis, 2000), increased social inequality, and poor access to health (Rocha, 2008).

In this context, the search for efficiency and effectiveness of management is necessary so that resources can bring greater benefits to the population. In Brazil, a large number of public policies focus on mitigating economic inequality, which tries, through financial aid, to reduce other social problems such as violence and access to education. However, there are still a few prevention actions and specific programs for the mitigation of social ills (Rocha, 2008).

Some cities, called smart cities, have already become highlighted by the success in achieving their management goals with the help of technology. The main aspect of the smart city is related to the mode of planning of the city and the possibility of integration between the demands of its population and the actions of public agents (Masutani, 2015).

The theme "smart cities" has been the subject of studies and actions in many European, North American, and Asian cities, and starts to raise attention in Latin America. In Brazil, some initiatives begin to be noticed in Porto Alegre, Curitiba, Rio de Janeiro, Búzios, Aparecida, Belo Horizonte, where civil society promoted discussion and cooperation forums to envision the future of these cities (Weiss, Bernardes, & Consoni, 2015).

Smart cities can build innovative solutions for urban centers. In them, the priority characteristics of management by the local government are identified to find ways to increase the potential to implement solutions to the problems of the population. These cities use their resources to solve the demands of their inhabitants without wasting money and high creative potential. Thus, innovations in the management of municipal governments become a differential in Public Administration to intelligently and assertively face contemporary problems experienced by the population (Kobayashi, Kniess, Serra, Ferraz, & Ruiz, 2017).

These cities are unique spaces for the dissemination of global knowledge. They enhance the creation of social and economic development networks, with the creation of values and wealth generation, using technologies and participatory public management. This is possible by architectures that will foster creative solutions, i.e., placing information technology at the service of the public good and benefiting the population (Weiss, Bernardes, & Consoni, 2017).

Wooldridge (2017) indicates that the fourth revolution in our society would already be underway. This revolution is based on a new way of rethinking the State's attributions, having the use of technology as the main link in the improvement of the quality of services, mainly in health and education. This revolution would be smart and sustainable cities, where technology-based management would focus on better ways to spend available resources.

The management characteristics of smart cities stimulate their development through integrated investments between mobility, urbanism, environment, energy, technology, innovation, economy, education, health, security, entrepreneurship, and governance (Kobayashi, Kniess, Serra, Ferraz, & Ruiz, 2017). Knowing the characteristics of this management is necessary to identify factors capable of building innovative solutions for urban centers and improving the population's quality of life.

This article aims to present the common characteristics present in the management of Brazilian municipalities and the characteristics present in the management of a city considered smart (Belo Horizonte, Minas Gerais - MG). The study compares the characteristics of the two management styles, as well as the factors that differentiate the management of the smart city from the others. The research also relates how Information and Communication Technologies (ICTs) are inserted in the municipal management scenario. We identified the essential attributes that a good management model should have to act as a marker in the construction and implementation of strategies and public policies capable of obtaining better results by the municipal public administration.

In addition to this introduction, the article consists of five more sections. The second section analyzes the characteristics of contemporary Brazilian municipal public management, in its current State of the art, to understand the relationship between current management characteristics and the possibilities of managing municipalities as smart cities. The third section deals with the concept of smart cities and their main indicators. The fourth section presents the methodological path of the research, and the fifth section presents the data and the discussion of the results of the field research. The last section brings the final considerations and presents the limitations of the study and suggestions for future research development.

2. Characteristics of Contemporary Municipal Public Management

A characteristic of municipal public management, which is understood as a differential of the private sector, is the composition of human resources staff, which, for the most part, are distributed among two types of employees with distinct characteristics: one part would be permanent career employees, who would have entered the public service through a public tender, related as statutory employees, and the other of non-permanent groups, who may have contracts through the Consolidation of Labor Laws (CLL), temporary contracts or may be linked to outsourced companies, contracted by the municipal public service (Marin Filho, Sausen, & Allenbrandt, 2008).

Marin Filho, Sausen, & Allenbrandt (2008) emphasized that the permanent body is formed by career servers whose objectives and the organization's continuity characterizes culture. However, the non-permanent one is composed of administration people for a short period without further deepening of ties with it, in the sense of its continuity, of the

objectives, and, generally, with external desires and even indifferent to the present difficulties. The authors also point out that this functional body is primarily made up of people linked to party forces that anchor the elected government, and is provided through positions in commission. The authors also point out that these employees show little knowledge of the organizational reality they belong to.

These typical differentiations between the management of public and private entities are reflected in the municipality's public space more directly and broadly, and the impacts generated are more sensitive to the actors that interrelate in this field. In this State-space, most ostensibly issues related to conflicts, interests, and power appear ingredients that, according to Boyne & Walker (2004), are made up of people with potentially diverse and conflicting motivations, giving the organization its intrinsic political face.

The conflict between these two functional bodies is strengthened by the replacement of non-permanent workers with each new mandate. This situation mostly leads to administrative discontinuity. This leads the municipal public management to have to achieve its objectives only in the short term. Therefore, at the beginning of each mandate, the new ruler wants to leave its mark on the municipality, even if the products generated do not differ from the past (Neirotti et al., 2014; Marin Filho, Sausen, & Allenbrandt, 2008).

There are also differentials in terms of corporate interests that are difficult to mediate between permanent and non-permanent bodies since managers remain in this function for a short time and are easy and quick to replace. Besides, there is, throughout the country, an amateur municipal public administration, undertaken by managers with little knowledge of local history and culture and often with little preparation required for the position they occupy, in addition to the conditioning to mostly party political criteria for their recruitment (Marin Filho, Sausen, & Allenbrandt, 2008).

The Brazilian municipal public administration's characteristics are the highest percentage of statutory employees in its direct administration, reaching 62.7% of employees, while in indirect administration, this percentage is lower, reaching 41.1% (national average) (IBGE, 2015). This higher percentage of statutory employees may be a positive factor for the maintenance of projects initiated at the municipal level. It may help in the continuity of projects related to the implementation of municipal management technologies, following the example of smart cities (Marin Filho, Sausen, & Allenbrandt, 2008).

In some municipalities, as in the case of Belo Horizonte, innovation in management is directly linked to the public company Prodabel (Information and Computer Company of the City of Belo Horizonte), linked to indirect administration, whose staff without permanent ties is in the majority, which may be an obstacle to the continuity of ongoing projects in the next managements.

In this work, these issues are the basis and assumption for the analysis, considering the repercussions of their direct influences on the formulation and formatting of strategic adaptations that public organizations go through and, consequently, the possibility of inserting innovation strategies management. The distinctive characteristics between public and private sector management require the need for analysis and debate if public policies are aligned with the interests of the population (Boyne & Walker, 2004).

Efficiency is now required by the Brazilian Federal Constitution (1988) for all Public Administration entities, as a characteristic of management, but this item is not always considered (Marin Filho, Sausen, & Allenbrandt, 2008). The principle of efficient management was inserted in article 37 of the Federal Constitution (1988): "The direct and indirect public administration of any of the Powers of the Union, the States, the Federal District, and the Municipalities shall obey the principles of legality, impersonality, morality, publicity, and efficiency (CF, 1988)".

The term efficiency is related to the cost of production or how resources are consumed. Efficiency is evidenced when the consumption-to-product ratio is within expectations. Thus, it would not be simple to adapt this concept to the Public Administration. What makes measuring efficiency more challenging is how to arrive at the ratio of production cost and consumption of the product within expectations since the Public Administration's products are the services offered to the population. Thus, it is necessary to have parameters to consider the resulting waste and whether the real demands of society are attended (Slomski, 2005).

Slomski (2005) reinforces the idea that efficiency refers to the lower amount of resources consumed in the production of services and products for society and the quality of the services offered to the population. The public administration must provide a noticeable improvement in the standard of living of its population from what has been collected by various means, such as taxes, duties, and transfers.

It is relevant to understand the difference between the terms efficiency, effectiveness, and effectiveness. Pereira (2008) points out the differentiation of the terms, stating that efficiency relates to resources, which should be used in

the best possible way, without waste. On the other hand, effectiveness persists in correctly achieving the objective, so that maximum use is made of it. According to the same author, effectiveness, in the public and private sectors, would be the congruence of the terms mentioned above, efficiency, and effectiveness. For effectiveness, the correct execution of the proposed objective is identified, with the least possible waste and maximum reach, providing the best possible result, which determines a standard of quality.

In an attempt to maintain the focus on strategic management, the municipal public administration has as a characteristic the use of procedural issues in its planning action seeking greater efficiency in its actions. The importance of a Municipal Master Plan (MMP) or a Municipal Strategic Plan (MSP) can be its simple realization, without even considering its results. These plans offer the possibility of popular participation through a technical understanding of reality and communication between agents with diverse interests (Rezende & Ultramari, 2007).

Only half of the total Brazilian municipalities with more than 20,000 inhabitants had drawn up the Master Plan, a percentage that remained parallel to the one measured in 2013 (IBGE, 2013). However, it is notorious how much progress has been made compared to 2005, when only 14.5% of Brazilian municipalities with more than 20,000 inhabitants had a Master Plan as a guiding instrument for municipal public management (IBGE, 2015).

Another characteristic of municipal public management in Brazil is that in smaller cities, there are difficulties in carrying out planning, given that 52.2% of municipalities with less than 20,000 inhabitants had no Master Plan in 2015, while, in larger cities, this percentage is only 5.5% (IBGE, 2015). Thus, the Master Plan's preparation and use are related to the size of the municipalities' population, since, in 2015, all Brazilian municipalities with more than 100,000 inhabitants said they had the Master Plan (IBGE, 2015).

The master plan functions as a strategic plan, and previous successes and failures in municipal management, among other factors, determine the form that will be adopted. For example, the failure of master plans that have only prioritized land use planning. Municipalities justify the choice of forms of planning that value the more integrated dynamics of public action, characterized by the delay in viewing results, compared to master plans that have succeeded in imposing models of physical-territorial occupation, which has led public administrators and the private sector to opt for more immediate result planning (Rezende & Ultramari, 2007).

Among the most widely used instruments for the acquisition of resources by Brazilian municipalities are the real estate register, the collection of fees, and the adoption of incentive mechanisms to implement projects. For example, 94.8% of Brazilian municipalities charge urban property tax (English for Imposto Predial e Territorial Urbano - IPTU) IPTU from their population; 61.7% of Brazilian municipalities, in 2015, use some incentive mechanism for the implementation of projects, and 93.7% charge some kind of fee (IBGE, 2015).

Concerning outsourcing labor, a percentage of 85.6% (4,789) Brazilian municipalities outsourced at least one type of service in their management in 2015. In these municipalities, the most frequent outsourcing activity was collecting solid hospital waste, performed in 76.1% of the municipalities. In second place was the collection of household waste done in 53.6% of the municipalities (IBGE, 2015).

Another data verified in the survey by IBGE (2015) relates to computerization in municipal management. The following activities were verified in the municipal management: elaborating databases related to the health, education, heritage, and civil service sectors. In the survey, the use of digital resources was verified in practically all Brazilian municipalities. Only in the North Region, there is a drop in this percentage, reaching the number of 94.7% regarding the use of these resources in municipal management.

Digitized cartographic bases are relevant to the municipality because they provide the cartographic support for geoprocessing projects for environmental management. According to IBGE (2015), in 2015, only 20.7% (1,152) of Brazilian municipalities digitized the municipal cartographic base. The lowest percentage is found in the Northeast Region, where none of the region's states has managed to match the national average. Another data that stands out in the survey is the fact that, among the municipalities with more than 500,000 inhabitants, 90.2% have a geographic information system (set of equipment and computer programs that, in addition to spatial information, produce and integrate the data obtained, thus obtaining a spatial representation more consistent with reality (IBGE, 2015)) and 87.8% have digitized cartographic base.

Regarding the granting of some type of license by the Brazilian municipalities, 66.6% carry out the prior licensing, 66.2% carry out the installation licensing, and 71.8% carry out the operation licensing (IBGE, 2015). Regarding the existence of public consortiums in all regions of Brazil, the public consortiums carried out by municipal entities fall into the areas of tourism, transportation, culture, education, water management, assistance and social development, tourism, basic sanitation, urban development, environment, solid waste management and, especially, consortiums

related to the health area. In the percentage of 75.9%, the Brazilian municipalities have some agreement related to these areas (IBGE, 2015).

The high percentage of Brazilian municipalities that have inter-municipal partnerships should be highlighted. In municipalities with more than 500,000 inhabitants, this partnership occurs in 100% of them. Public consortiums are a way to solve issues that affect the population, in a collegial way and, generally, are made possible in favor of solving specific problems, which reach a large percentage of the population. In 2015, 96.7% of the Brazilian municipalities claimed to participate in some horizontal public consortium, i.e., public consortia between municipalities.

3. Smart Cities: Concepts and Indicators

The origin of the concept of smart cities comes from the late 1990s, although it has its roots in the concept of so-called "cyber-planned cities," which was identified as a proposal for networked cities or cities with urban development plans from the 1980s onwards (Höjer & Wangel, 2015). For these authors, the term "smart" means an instrumental rather than a normative concept. Furthermore, smart is understood here as a resource rather than a sign of performance. This means that the opposite of "smart" is not "dumb". In the use of these terms, for cities, the use or not of advanced information and communication technologies would be verified.

Table 1 shows the evolution of the concept of smart cities since the year 2000, with the increased use of technologies and creativity in municipal public management, adapted from Weiss, Bernardes, & Consoni (2013), with the addition of other more current concepts, which consider the issue from other perspectives.

Table 1. Evolution of the concepts of the smart city

Author	Definition
Hall (2000), p. 1	Identifies the concept of smart cities as those that monitor and integrate the conditions of operations of the critical infrastructure of the city, acting in a preventive manner for the continuity of its fundamental activities.
Kanter and Litow (2009), p. 2	Identifies the concept of intelligent cities as those capable of connecting in an innovative way physical and ICT infrastructure, efficiently and effectively, converging organizational, regulatory, social and technological aspects in order to improve the conditions of sustainability and quality of life of the population.
Toppeta (2010), p. 4	It lists cities that combine TIC and Web 2.0 facilities with organizational, design and planning efforts to dematerialize and accelerate bureaucratic processes, helping to identify and implement innovative solutions for managing the complexity of cities.
Giffinger and Gudrun (2010), p. 13	They are those that, in a satisfactory way, realize the vision of the future in several aspects - economy, people, governance, mobility, environment and quality of life - and are built on the intelligent combination of decisive attitudes, independent and aware of the actors who act in them.
Washburn and Sindhu. (2010), p. 5	In this concept, smart cities are analyzed as those municipalities that use smart computing technologies to tailor critical infrastructure and services - which include city administration, education, health care, public safety, buildings, transport and utilities - more intelligent, interconnected and efficient.
Dutta and Mia (2010), p. 87	For these authors, smart cities focus on a particular model, with the recognition of urban development and the growing importance of information and communication technologies in the pursuit of economic competitiveness, environmental sustainability and overall quality of life; this concept goes beyond the purely technical aspects that characterize cities as digital cities.
Neirotti, DeMarco, Cagliano, Mangano, Scorrano (2015)	For these authors, the concept of the smart city is still under debate, relating not only to technological aspects, since the chances of a city increasing its level of intelligence also depend on some specific variables that go beyond its economic, technological and environmental aspect and its development rate. In summary, according to these authors, relevant would be the municipality's capacity to implement public policies, governance, and maintain public-private partnerships.

Câmara, Carvalho, Silva, Souza, Souza (2016)	For these authors, the definition of smart cities refers to the condition of an active population, committed to the collective interest of being motivated to participate in its management, identifying the problems that are resistant and contributing proactively to the achievement of solutions. In this context, it is understood the relevance of the participation of popular management in the management of municipalities, which can be carried out through representative municipal councils, the participatory public budget or the real action of public ombudsmen. Smart cities would need to serve the population, ensuring that technology and creativity are linked to projects that directly benefit the inhabitants of that locality in an efficient and sustainable manner.

Source: Adapted from Weiss (2013, p. 54).

Although there is a theoretical gap on the concept and its specific characteristics, smart and sustainable cities (SSC) are territories that use TCI for sustainable urban development practices, in order to provide a better quality of life to the citizen, inhabitant of that municipality (Kobayashi, Kniess, Serra, Ferraz, & Ruiz, 2017).

Smart and sustainable cities are cities in which public resources are used effectively, making a noticeable return on the resources paid by the citizen. This perception goes beyond the effectiveness of management, because the citizen perceives management as a facilitator of his daily life. In these cities, public spending takes place in a sustainable manner, with the articulation of solutions that would bring improvements, really concrete, for the local inhabitants (Kobayashi, Kniess, Serra, Ferraz, & Ruiz, 2017).

There are differences between the concepts of sustainable city and smart city. The sustainable city is conceptualized as the place where the inserted society is aware of its role as a transforming agent of reality. In this context, actions are carried out in a synergetic way, relating concepts of energy efficiency, equity and prudence. A smart city has a management focused on its human capital, making the resources invested favor the creation of new TCIs and technological infrastructure of communication that will facilitate people's lives, increase quality of life and create new opportunities for economic growth (Abdala, Schreiner, Costa & Santos, 2014).

The concept of development of smart cities can be evaluated as an evolution of cities, because the development for municipalities in previous decades would have been analyzed only as a synonym of growth, with exacerbated emphasis on the economic sphere (Corrêa, Martins, Snoeijer, & Silva, 2018). However, moving on to a transitional analysis, in which multidisciplinary issues were integrated, it is important to emphasize, mainly, the scope of social issues, since economic development, without increasing the quality of life of the population, is not rational (Corrêa, Martins, Snoeijer, & Silva, 2018).

Today, the importance of environmental issues is also highlighted, with the distinction of the term sustainable development, which is understood as the development achieved without the allocation of resources used in the future. Only the economic growth of a municipality cannot characterize it as more developed. The municipality needs to guarantee the quality of life of its inhabitants, and this issue is directly related to the concern with environmental problems, which have repercussions on the population's health and depend essentially on the improvement of the educational level of its population, consistent, therefore, with the understanding of what sustainable development is (Corrêa, Martins, Snoeijer, & Silva, 2018).

Smart cities, identified with the concept of sustainable development, are more than economically active cities with the potential to catalyse investment. They are cities in which the local population is proactively involved in the development of the municipality. This participation is enhanced by public management, which uses creative and technological means to solve the demands and provide means to facilitate the lives of local residents.

In the Brazilian context, there are several initiatives of smart cities: The National Front of Mayors houses the Network of Smart and Human Cities; the My Intelligent City Program of the Ministry of Science, Technology, Innovation and Communications; the Mixed Parliamentary Front in support of smart and humane cities, in formalization, in the National Congress; Curitiba, Vitória, and Rio de Janeiro are some examples of cities with smart initiatives; multilateral agencies and development banks are implementing financing lines for this area; and technology suppliers, on a global scale, are strongly interested in the subject (Przeybilovicz, Cunhha, & Meirelles, 2018).

In the October 2016 municipal elections, smart city and e-government were the subject of the government plans of several candidates. It is explicit that TIC management and governance in Brazilian cities are deficient and present

challenges to be overcome. Moreover, the Brazilian context presents low aggregation of technology to government processes and poor information and communication technology infrastructure (Przeybilovicz, Cunhha, & Meirelles, 2018). So far, few Brazilian municipalities have the characteristics of smart cities.

4. Research Methodological Approach

In order to understand the management characteristics of the Brazilian municipalities, we used the statistical data from the Brazilian Institute of Geography and Statistics (English for Instituto Brasileiro de Geografia e Estatística – IBGE) for the year 2015. In addition to these secondary data, data collected in semi-structured interviews with managers of the municipality of Belo Horizonte, capital of the State of Minas Gerais, which is considered a smart city, was used.

The statistical data found in IBGE surveys served as a basis for comparing the city of Belo Horizonte to the other Brazilian municipalities, and the interviews, with a script based on Weiss (2015), identified the initiatives of the city of Belo Horizonte from the perspective of being a smart city, becoming a better managed municipality to meet the demands of its population.

The choice of the municipality of Belo Horizonte as the location for the interviews was made due to the following criteria: Brazilian cities, with a large urban concentration, different geographical, socioeconomic and cultural characteristics, great exposure on the national scenario and great exposure on the international scenario. Observed these criteria, four cities were included as possible objects of study: São Paulo, Rio de Janeiro, Curitiba and Belo Horizonte.

Given the time limitations and the willingness to attend the survey in a more agile and easily accessible manner, it was decided to conduct a comparative study of the municipal public management profile of the Brazilian municipalities and the smart city of Belo Horizonte, capital of the State of Minas Gerais.

The environment where the survey was carried out is characterized as a center of government at the municipal level and the choice of respondents sought to meet the needs for full compliance with the objectives of the work and, especially, to answer the survey question: What are the characteristics of municipal public management of a smart city that can be considered as differentials in management of other Brazilian cities?

According to Gil (2010), people who are culturally and sensitively articulated with the group or organization need to be selected for interviews. In this way, researchers have chosen, on a preliminary basis, the public power agents, holders or their delegates, with authority and responsibility over the elaboration and execution of plans and projects related to the characteristics of an intelligent city in the municipality. The interviews were answered by the Assistant Secretary of Planning of the City of Belo Horizonte (by phone) and by the President of the Informatics and Information Company of the City of Belo Horizonte (PRODABEL) (by email).

5. Presentation and Discussion of Research Data

In this topic, we present the data obtained from the interviews organized and analyzed in three categories: smart city concept, strategy and scope, and management of priorities and follow-up plans.

5.1 The Concept of a Smart City

At this stage of the analysis, we verified the concept of a smart city used by the public agents that are part of the Belo Horizonte Municipal Administration.

Interviewee 1, Deputy Secretary of City Planning, defines a smart city as a municipality that uses technologies and urban infrastructure to improve the quality of life of the population, increasing responsiveness and promoting greater participation of the population in the use of public spaces.

Also for the Assistant Secretary of Planning, the motivations of the municipality of Belo Horizonte to engage in the perception of a smart city on the domestic and international scene are:

> The city of Belo Horizonte has a great urban densification and the Municipal Administration seeks planning attempts, implementing smart strategies that allow people to have access to public services and commercial areas close to their living area. Thus, we seek to solve the mobility problems of the city. At the international level, we see the possibility of attracting investors who respect the environment, since the municipality of Belo Horizonte follows the precepts of Global Agenda 21.

The Secretary's positions reinforce the precepts of sustainability of smart cities, in which the city needs to develop by opening up opportunities, but respecting the environment. The President of PRODABEL thus defined the concept of smart city:

> A Smart City is one that manages to use the available technological infrastructure to develop solutions that have a direct impact on improving the quality of life of the citizen. A smart city is above all sustainable in the use of its resources.

For the President of PRODABEL, when also asked why his city decided to enter and engage in the scenario of intelligent cities and what their motivations were, he answered:

> Belo Horizonte already has a favorable scenario for technological growth. The intention of the Municipal Administration is to be an ally in this process, alongside the entire entrepreneurial ecosystem, integrating the actions. The main motivator is to transform the reality of the city of Belo Horizonte (which is already one of the most connected cities in Brazil), using the growing technological infrastructure. For this, several actions have been implemented in the last two years, such as the Public-Private Partnership (PPP) for public lighting, one of the largest in the world, with the installation of 182 thousand LED luminaries, 33 thousand of which with a new layer of network for tele management, the creation of the digital rotary with Blockchain technology (something new and innovative in Brazil and that has gained prominence in several parts of the world), the creation of an open laboratory at Prodabel's headquarters, among others.

The same respondent when asked if his motivations were to cover the domestic or international scenario, answered:

> They are geared towards the domestic scene, but end up being recognized worldwide. This is because they are innovative actions that come from public power, which is difficult to happen in many places. Surely the world knows what is happening in Belo Horizonte.

For Câmara et al. (2016), the definition of smart cities refers to an active population's condition, committed to the collective interest of being motivated to participate in its management, identifying the resistant problems, and contributing proactively to the achievement of solutions. When analyzing the city of Belo Horizonte, one understands the relevance of popular management in the management of municipalities, which can be carried out through representative municipal councils, the participatory public budget, or the real action of public ombudsmen.

Smart cities would need to serve the population, ensuring that technology and creativity are linked to projects that directly benefit the inhabitants of that location in an efficient and sustainable manner. Actions related by the President of PRODABEL such as the public-private partnership (PPP) for public lighting, one of the largest in the world, with the installation of 182 thousand Light Emitting Diode (LED) luminaries, 33 thousand of which with a new network layer for Telemanagement, the creation of the digital rotary with Blockchain technology (something new and innovative in Brazil and that has gained prominence in several parts of the world), and the creation of an open laboratory at Prodabel's headquarters, among others, demonstrate the possibilities of projects of utility value for the beautiful-horizontine population.

5.2 Strategy and Scope

When checking the strategies presented by the municipality of Belo Horizonte to promote the development of the concept of smart city, the interviewee 1 - Deputy Secretary of Planning of the municipality, when asked about how the public power has positioned itself to stimulate innovation for the search and provision of solutions to the problems of the municipality, reported that:

> The Belo Horizonte Municipal Administration promotes discussions with civil society to update its Master Plan, with municipal conferences and regional chambers, to listen to the population. For example, the BH Smart Program, which seeks to engage the private sector to stimulate innovation. The Municipal Administration makes public calls for the promotion of innovation possible, in which private companies and universities can become partners of the municipal government. Among the calls already made, the example of microclimate sensors, which detect the possibilities of rain in the city's regions, as a prevention factor and the possibility of using bicycles by the population, in partnership with Itaú Bank.

As already analyzed in this study, the Municipal Master Plan is a marker of government strategies. For the municipality that wishes to become a smart city, the strategies for this must be described in this plan and approved by the City Council.

In defining the strategy used for Belo Horizonte to be affirmed as a smart city, the President of PRODABEL stated:

> To guide all actions, the program "Belo Horizonte, the Smart City" was created. Several sectors of the Municipal Administration, including Prodabel, are working together, planning all the steps to transform Belo Horizonte into the country's most smart capital. This is not only a commitment made by current management. It is also an invitation to the population and the city's productive chain to, together with the Municipal Administration, build this historic milestone in the lives of all citizens.

When asked about the existence of a long-term plan defined and communicated about the intended projects, the President of PRODABEL replied:

> The goal is to prioritize projects that can be executed during the current municipal administration, although most of them will have long-term results. Indeed, the work developed now will bear good fruit for many years to come.

The same interviewee also defined the role of private initiative in supporting public power to increase the vision of Belo Horizonte as "smart city":

> The participation of companies and startups is vital for the success of the program, as they are the ones who build and implement most of the solutions for the city. In this sense, Belo Horizonte is privileged, as it has a highly developed technological hub with large global companies and one of the largest concentrations of startups in Brazil. The role of public authorities is to create favorable conditions for the private sector to grow and develop, thus acting as a kind of partner.

About the projects already implemented, the President of PRODABEL declared:

> The Belo Horizonte's Smart City program is composed of several projects. We can highlight the Modernization of Public Lighting (lighting PPP), the improvement of the relationship with the citizen (PBH APP), Open Data, Digital Rotary with Blockchain technology, and the creation of the open laboratory, among others.

For Dutta and Mia (2010), smart cities focus on a particular model, recognizing urban development and the growing importance of information and communication technologies in the pursuit of economic competitiveness, environmental sustainability, and overall quality of life. This concept goes beyond the purely technical aspects that characterize cities as digital cities, in this concept can identify the city of Belo Horizonte as a city that seeks information and communication technologies as the benchmark of its economic competitiveness, with the use of its technological hub developed with large global companies and the largest concentration of startups in Brazil, according to the President of PRODABEL.

5.3 Priority Management and Follow-up Plans

In analyzing the management of priorities and follow-up plans for the municipality of Belo Horizonte, the interviewee 1 - Assistant Secretary of Planning of the municipality, when asked how the actors in the process would know about plans, achievements, results, available functionalities and future steps, answered that: "All programs related to BH Smart City are approved by the City Council, and a target agreement is made with the private initiative suppliers, with periodic monitoring meetings."

When asked about the priorities for future action, the same interviewee asked what the motivations and needs of the city were:

> The main priorities are related to public security, expanding the cameras and data management capabilities, improving connectivity with citizens, especially those in areas of vulnerability, strengthening agroecology as a source of income, and adapting the municipality's urban transportation system.

The Assistant Secretary of Planning informed about the current stage of the city of Belo Horizonte as a smart city:

> If we could put the results already obtained, in my opinion, on a scale from 0 to 10, Belo Horizonte would be at level 6 because we have already demonstrated our ability to

> incorporate solutions to management, and we know what technology to use. However, we have to put it to work and make the knowledge of these mechanisms reach the entire population of the city.

For the President of PRODABEL the expectations of Belo Horizonte as a smart city, when asked about priorities and plans, and the expected results for the city:

> We hope that, in up to 2 years, Belo Horizonte will be considered the smartest capital of Brazil and one of the best cities to invest, work, and live. This is our focus, and it is in search of this that we have been working day by day.

Also, for the same interviewee when asked how project priorities are defined to realize the smart city's vision, including allocation of financial, material, and human resources, he pondered that:

> The priority projects that have the greatest impact on the quality of life of the population can be executed quickly, efficiently, and preferably without large financial investments.

The President of PRODABEL, when asked about the results already obtained, on a scale from 0 to 10, what would be the current stage of the smart city initiative, answered:

> According to Gartner, the stages for a smart city are: 1 - E-gov, 2 - Open, 3 - Data-Centric, 4 - Fully Digital, and 5 - Smart. We are in stage 2 with the opening of official data from the city and the creation of the IoT Open Laboratory at Prodabel to give companies, startups, and educational institutions access to infrastructure similar to that installed in the city as official database, geoprocessing, and video monitoring cameras. We have improved a lot in the last two years, but we know it is still possible to go even further.

The Secretary and the President's responses show that the Municipal Administration is concerned with engaging civil society in its project to make the city of Belo Horizonte a smart municipality. Another relevant question raised by the secretary is the administration's priorities, with public safety being the main one. The planning and priorities demonstrated that there is smart governance in Belo Horizonte, which, as already mentioned, is related to the level of computerization in the public sector and the possibility of using technological innovations in management.

It is understandable that in the context of the cities of the future, technological innovation has a preponderant role to play, mainly by demanding and involving the different skills and specializations - engineers, architects, academics, experts in information and communication technologies, technicians in general - that are found in cities and are prepared to evaluate and understand in a very particular way the characteristics and needs of these cities (Weiss et al., 2015). According to these same authors, this confluence of skills and technologies is critical to the prosperity of cities, and the steps presented by the President of PRODABEL emphasize the use of skilled labor and technology to achieve the goals proposed in management, in his speech he demonstrates the importance of partnerships with startups and educational institutions linked to the promotion of technology for the city.

6. Conclusions and Concluding Remarks

In the course of this work, the understanding of the management profile of Brazilian municipalities was sought from the analysis of secondary data, reflecting, with the support of documentary research and interviews conducted with public agents of the municipality chosen as a reference of smart city, characterizing what can be considered a management differential in a municipality considered smart.

It is understandable that Brazil is a country of great dimensions and with many regional differences, which would make it difficult, in any case, to disseminate management models in such different realities. Thus, the creation of comparison models was not the intention of this work, but the understanding of how the 5,570 Brazilian municipalities are being managed. This management could be verified as a differential in the case of the application of innovation and creativity in municipal public management.

The characteristics of the Brazilian municipal public administration are the highest percentage of statutory employees in its direct administration, reaching 62.7% of employees. In contrast, in indirect administration, this percentage is lower, reaching 41.1% (national average), which is even lower (22.1%) in this survey's smart city focus. Another characteristic of municipal public management is that, in smaller cities, there are difficulties in planning, given that 52.2% of municipalities with less than 20,000 inhabitants had no Master Plan in 2015, whereas in larger cities, this percentage is only 5.5%.

Except for smaller cities, Brazilian municipal public management is organized in parameters based on planning and environmental protection, at least in terms of the existence of legislation. It can be seen that the possibilities of intersectoral articulation, agreements between municipalities, State, and federation are still low. In the smart city research, a differential of the management is the largest amount of planning legislation in force in the municipality, almost all of it related to the protection of the environment (IBGE, 2015). This shows concern with sustainability, which is one of the concepts directly linked to the subject of smart cities.

The study of smart cities and the need for planning and regulatory legislation brings the understanding that creativity and the use of technology by public administration may result in greater participation of the population and increase the results that may be obtained more effectively. The Brazilian municipal public administration has many regional disparities. Smaller cities have limited access to technology due to lack of resources and specialized human resources, while larger cities have resources and specialized personnel. Moreover, these cities have achieved advances with the technological apparatus's help through partnerships with private initiative and education and research institutions.

In this way, e highlight the important role of the so-called intermediary actors, identified as the manufacturers and suppliers of technologies. Without the creation of new apparatuses, there would be no possibility of modifying the public administration's strategic decisions. Technological innovation enables the public service to be provided in another way, particularly modifying financial, legal, and political aspects. These aspects cannot be viewed as insurmountable restrictions on the use of new technologies since collaboration agreements, agreements, public-private partnerships, and other forms of cooperation can be used within the conceptions of public law the interest of cities.

Besides, with the possibilities of agreement and institutional partnerships cited, cities can also collaborate in order to build shared computing and telecommunications infrastructures, using technological means that provide not only rapid implementation, but also gains in scale, whether financial or to increase the management capabilities of services and public infrastructures.

Larger cities, such as Belo Horizonte, act as hubs for smaller cities, providing regional development, attracting significant opportunities for development and prosperity to themselves, and smaller cities nearby. A smart city has municipal public management characteristics that obtain better results, the increase of its development rates, such as access to education, and improvement of urban mobility, providing more quality of life to the population.

For a better understanding of the functioning of municipal public management, studies on Brazilian cities are suggested, seeking to establish similarities, particularities, complementarity of the best practices existing in smart cities, evaluation of the impact of the use of specific TIC components on the provision of public services; evaluation of the results achieved with the user and their satisfaction in receiving public services in a city considered smart. It will also be possible to research how Public-Private Partnerships are being carried out to the implementation of technology in public services and the area of scope of this service provision.

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