

Frontiers of Corporate Architecture - From Its Origin to The Era of Knowledge and Innovation

Edson José Machado Filho

Master's degree at the Mackenzie Presbyterian
University
Partner at EMF Consult SS Ltd.
edson@emfconsult.com.br

Dr. Roberto Righi

Full Professor at Mackenzie Presbyterian University
São Paulo – Brazil
Roberto.righi@mackenzie.br

Abstract - This article has as main objective to show the development, the relevance, and the maturity of the concepts on corporate architecture achieved in the era of knowledge management and innovation, facing the historical evolution of the most relevant architectural paradigms and projects to date.

Keywords - Corporate Architecture, Corporate Architecture, Innovation, Knowledge Management

I. INTRODUCTION

The corporate architecture emerged in the Renaissance and gained relevance throughout the Industrial Revolution, characterized by the transition between the processes of artisan production for machine production. The spaces had in themselves the necessity to shelter, not only the industrial activities, but also the administrative ones. A corporate building has been gradually defined, as one that follows architectural and engineering standards focused on efficiency, spatial and technical quality, expressed by the layout, the standardization of furniture and even environmental conditions that provide greater comfort to the employee and consequently greater productivity. Frederick Taylor (1858-1915), with his "Scientific Administration," emphasized the tasks, elimination of waste and worker idleness. His theory has led to the creation of rational corporate spaces. Already in the late nineteenth and early twentieth century, inspired by the Chicago School, Frank Lloyd Wright led the creation of innovative corporate projects, using steel in their structures allowing cleaner facades and more open spaces.

On the other hand, a major leap forward in corporate architecture in the knowledge and innovation society, also called the "digital revolution", started in the early 1990s via the Internet. The impact is so intense that the physical space that holds corporations has a secondary importance in the success of organizations. This is the great challenge for architecture offices today.

Thus, the question arises: how is it possible to align the demands of a generation already connected with the new technologies, with the goals, mission, and vision of the corporations in the development of their corporate projects?

The purpose of the article is to help answer this crucial question, at least initially, by helping to elucidate, by surveying innovative and relevant corporate spaces from the beginning to the current projects.

II. METHODOLOGY

The research methodology used for the survey on corporate architecture is done through research techniques, history and project references, This article is composed by a broad approach formed by bibliographical survey through personal archives, books and magazines Specialized; As well as visits to corporate units in operation; Interviews with architects, collaborators and users; And also access to the internet, which is justified by a current and mutation of the contents addressed by the article.

III. THEORETICAL FRAMEWORK

A. Corporate Architecture Concept and History Before Knowledge Society.

To define "corporate architecture" it is necessary to approach the concept of "corporate building". The corporate building is a physical place determined to exert a specific activity that produces and offers goods or services, meeting the needs of public or private enterprises, a consequence of the productive process and the return expected by investors. The Corporate building involves a complex system that contains perceptions of reality, organizational processes, and corporate behaviors. Corporate identity arises from a common consensus of an organizational philosophy that manifests itself in a distinct corporate culture. (GUERREIRO, 2010). For Marc Lankhorst, corporate architecture is:

"A coherent set of principles, methods, and models that are used in the design of an organization's organizational structure, in addition to its business processes, information systems, and infrastructure" (Introducing Agile Service Development-2012).

After this brief conceptualization, it is important to analyze some relevant buildings of the corporate architecture, according to its design concept to base the line of reasoning regarding the corporate projects for the new Digital revolution.

The "Palace of Uffizi" is considered the first corporate building with modern features, as early as the sixteenth century. It was built in Florence between 1560

and 1574 by the architect Giorgio Vasari. The project shown in figure 1, has as premise to gather in one place, the offices (uffici) of the thirteen principal magistrates (public services) of the city of Florence. In this new building, the duke controlled the magistrates directly from the old contiguous Palazzo della Signoria, which became the new seat of government. Vasari designed a U-shaped building with a long eastern pavilion, which incorporated the old Romanesque church of "San Pedro Scheraggio" and another short section to the west, encompassing Zecca Vecchia (post office) and which, after the restoration of 1988, was incorporated into the museum (<http://www.uffizi.com/galeria-dos-uffizi/historia-da-galeria-dos-uffizi.asp>)

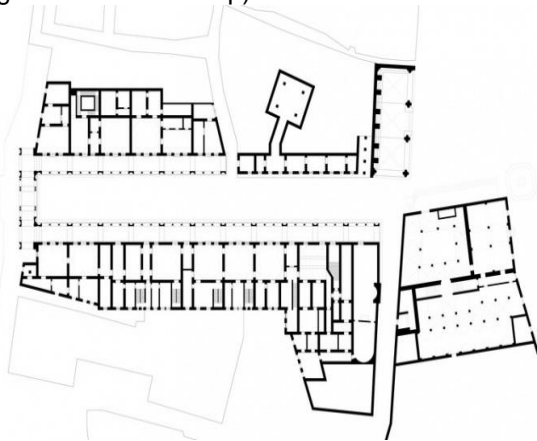


Fig.1: Uffizi Palace
Source: [.wikipedia.org/ Galleria degli Uffizi](http://www.wikipedia.org/Galleria degli Uffizi)

The industrial revolution was an important milestone in the history of office buildings in the 19th and 20th centuries. The industries brought with them the need for spaces where administrative activities could be carried out in conjunction with production control. With the passage of time several office systems were developed, translating the needs of industries and cities. In this process several patterns of physical arrangement (layout), furniture and environmental conditions were adopted to meet the demands of the industries and their workers.

According to Taylor "the best way to rationalize the work of the workers was from the study of times and movements." He considered that, in order to be better and economically profitable, the work should have all the necessary movements for its implementation, divided and subdivided into simple operations. Thus, the ideal times were defined for the execution not only of each task: how to type a letter, write a digit, open a folder, get up of the chair, open a drawer, etc. (Reis, 2003). His ideas brought a new look at the workplace, organization, management and spatial configuration as a spatial conception, he adopted the premise of spatial segregation to highlight hierarchical differences, encouraging internal competition and stimulating the improvement of individual performances. The standardization of furniture and the rigidity of the layout were assumptions used to ensure the discipline and linearity of the work process. The Taylorist office

designed to be physically separated from the factory, featured a spatial organization that very much resembled an industrial plant. Composed of a large central hall intended for lower-level employees, tables arranged in rows subject the vision of a strategically placed supervisor in front of them, in a Foucault panopticon configuration. The staff of the upper echelons occupied the upper floors and their private rooms, in spots with better eyesight and heatstroke.

On the other hand, the School of Chicago (USA) devised a form of construction that began to use steel in the structures. He created constant façades, without much variation or detail, as we know it today. It made building cleaner, faster and more practical. In addition, it allowed a new scale and division of the construction weight, with the increase of the feedback. It is the basis of the construction of the skyscrapers, with great influence in the evolution of the offices. It has greatly contributed to the development and execution of innovative building designs, with façades without structural function and increasingly large openings in slender buildings, where the distribution of internal pillars was rationalized, providing more flexible layouts independent of the structure (FRIEDMAN, 1986).

This way of designing in a global and integrated way, aligning architectural design, design of working environments and instruments, in accordance with the constructive ideals of the School of Chicago, was extensively developed by Frank Lloyd Wright. The Larkin Building, 1906, Buffalo-NY project, shown in Figure 2, shows with its elevated right-foot central atrium, intended for employees of lower echelon, illuminated by wide skylight and surrounded by four gallery floors, where were the private rooms of the hierarchically superior officials. The vertical circulations were made through four towers, one in each corner of the building, a very innovative solution for the time. For the first time, a central air conditioning system was adopted, with ducts embedded in the masonry and ventilation grills. In an innovative way Frank Lloyd Wright designed a specific work furniture, "a temple of white-collar work" (greatbuildings.com/buildings/Larkin_Building.)

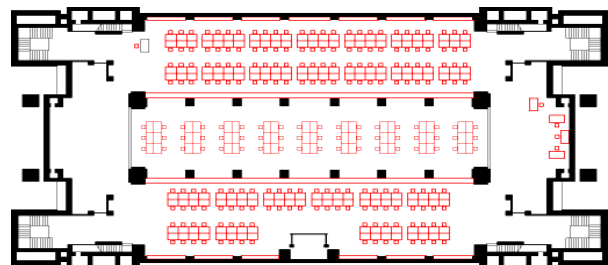


Fig. 2- Larking Building (1906) de Frank Lloyd Wright, NY.
Source: https://arqteoria.files.wordpress.com/2013/11/31-history_larkin-plan.gif

As a demonstration of the dynamism already present in the industrial era, thirty years later, in 1936, Frank Lloyd Wright innovated again by designing the Johnson Wax Building, also known as Johnson Wax Headquarters, the world headquarters of SC Johnson & Son, Inc.

Racine, Wisconsin. In this project, as shown in figure 3, the famous circular capital pillars were adopted, as well as the metallic furniture of rounded corners, arranged in an organic way, anticipating the new transformations that occurred from the 1950s and 1960s. According to Chávez (2002) these transformations were called General Office or Bull Pen. The system was based on the distribution of the chiefs and managers on the periphery of the pavement, while the subordinate employees occupied the center, as if it were in a corral. At that time, there was also the Single Office or individual office, where again the executives were in the periphery of the pavement, with the only difference being that other employees no longer occupied the center.

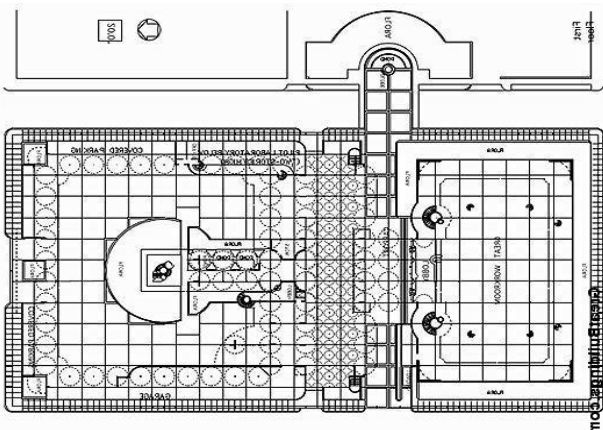


Fig. 3: Johnson Wax Building (1936) - Racine, Wisconsin - Frank Lloyd Wright
 Source: http://www.greatbuildings.com/buildings/Johnson_Wax_Building.html

As a result of the refinement and adjustments between the Bull Pen and the Single Office, the Executive Core One system, employed at Gordon Bunshaff's Chase Manhattan Plaza-1961, Present in figure 4. Curiously it had as main proposal the use of the inverse of the two other systems. Thus, as a result, the holders of higher positions were concentrated in the center surrounded by their teams

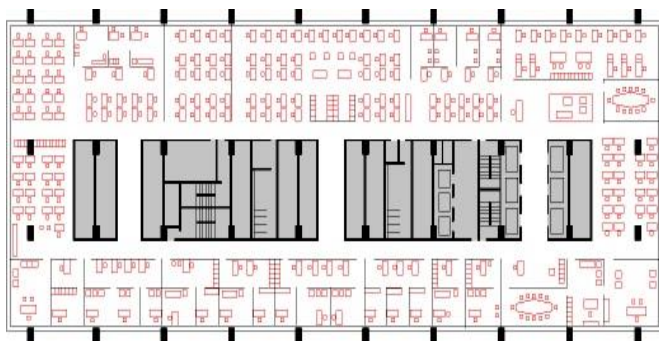


Fig. 04: Layout and layout of furniture One Chase Manhattan Plaza-1961 by Gordon Bunshaff
 Source: <http://www.archdaily.com/127371/ad-classics-chase-manhattan-plaza-som>

On the other hand, in the late 1950s, therefore still early, the Open Plan proposal was conceived,

considered as a breakthrough in the design of office work spaces and which has survived until today in some commercial corporate projects. This system allows faster communications, with great flexibility both individually and in groups and reducing hierarchical differences.

Also, as an unfolding of the Open Plan model followed a new paradigm in Germany. This occurred in 1958 with the proposal of an office planning system, known as Bürolandschaft or Office Landscape - the famous panoramic office, shown in figure 5. The great novelty of this office planning system was that the physical arrangement had free plan. Thereby, space was not delimited by fixed walls, thus providing greater interaction between people with faster and more efficient communications. This created a space that reconciled the work carried out in the individual space, but which, at the same time, was at the same time a collective fruition. In this concept of office was minimized the isolation of the heads and managements and also the physical separations between the different departments of the companies. Therefore, the Opens Plan Office and Office Landscape systems, based on the physical arrangement in free plan and widely distributed among administrative companies (CALDEIRA,2004).

Nowadays, the spaces suitable for the management and dissemination of knowledge and innovation formally adopt a similar configuration, avoiding confinement, but with diverse goals.



Fig. 05: Plan of Osram Building (1962) – Walter Henn, Munich
 Source: <https://br.pinterest.com/pin/288863763586778672/>

In the 1970s, with the oil crisis, there was a need for a reduction in energy consumption for corporate buildings. The behavioral study developed by Levi-Strauss highlights the importance of favoring cohesion among small groups (cluster) as expressed in figure 6. It creates a sensation in people belonging to a particular community or group.

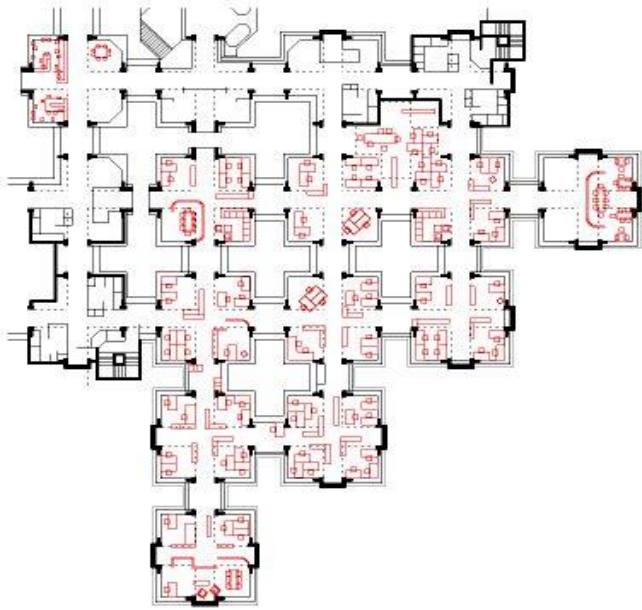


Fig. 06: Plant and furniture layout of the Centraal Beheer Building (1974), Hermann Hertzberger, Apeldoorn
Source: http://www.greatbuildings.com/buildings/Central_Beheer.html

In the 1980s, as a result of the crisis, there were concerns of the companies with the reduction of costs, agility in the work processes and increase of the production capacity. These objectives were only possible to be achieved with the introduction of integrated technologies, logic and telephony networks, Chavez (2002). This innovation has been a real revolution in the system of organization of the workspace.

B. The Society of Innovation and Knowledge

Analyzing the relationship between globalization and processes in the spatial evolution of innovative corporate spaces, there are factors that permeate all of them: the search for total quality of life in the workplace and the consolidation of strong corporate images. The application of these factors results in a greater interaction between work areas, humanization and optimization of the corporate space, and adoption of aesthetic standards consistent with the organization's image. On account of Internet-based communication processes, mobile devices (smartphones, tablets, laptops) and information technology increasingly comprehensive and accessible, the relationship of man to work. Because the creative process does not occur linearly or in a single environment, people need environments that stimulate their senses positively and support the interaction. The effect is that the system can flow naturally and in the same way as it occurs in the neural networks, potentiating the desired results. (Apud LUBART, 2007).

"A new world is forming at the end of the millennium. It originated in the historical coincidence of three independent processes: information technology revolution, economic crisis of capitalism and the apogee of social and cultural movements. The interactions between these processes gave rise to a

new social structure, the networked society; A new economy, the informational / global economy; And a new culture, the culture of real virtuality "(CASTELLS, 1999).

In order to achieve more relevant results in the design of projects for corporate spaces, in relation to collaborative knowledge and innovation, methodologies such as Design Thinking are developed, with a focus on the collaborator. The term Design Thinking originated in 1969 in the book "Science of the Artificial" by Herbert A. Simon. Rolf Faste, Stanford professor, defined and popularized the concept of "design thinking" as a form of creative action and was adapted to management by David M. Kelley, Faste's colleague at Stanford and founder of IDEO, an American product design consulting firm.

C. Telework

For Lévy (1999), the term telework arose from the researches of Jack Nilles in 1972. For Pinel (2004), the first remote works were from 1857 with the use of telegraphs. Nilles worked as a consultant in the city of Los Angeles and worked for the US Air Force in Washington D.C. In 1973, he managed his first Telework project using technology. For this reason, today Nilles is known as the "Father of Telework". In 1982, he founded JALA International Inc. which provides business management consulting services. Telework is not simply a technical innovation or a paradigm shift, it has a much more important function, to transform the relations between individuals and social organization. It was motivated by the new hierarchical relations of work, the increase of intellectual work, the difficulty of locomotion in the big cities, the search for a better quality of life and growing unemployment. Telework has been increasing in recent decades, in the 2002 United States budget, President George W. Bush has allocated \$ 20 million to the "Telework fund access" (for people who work at home via a computer), designated to assist disabled people with communication, which would be administered by the states, and also provide low loan rates to help people unable to buy domestic telecommunications equipment. (A BLUEPRINT, 2001).

We are moving towards a society characterized by the importance of technological resources and the advancement of Information and Communication Technologies (ICT) with an impact on social, business and institutional relations. It is the so-called Information and Knowledge Society that needs a constant capacity for innovation.

[...] technological capacity and regional development are mutually influential: a high spatial pattern of adoption of new technologies will be expected to bring about new innovative activities, leading to new territorial structures, through the installation of more advanced enterprises or the restructuring of existing, more efficient and competitive. (LOPES, 2009).

D. Architecture Projects in the Innovation and Knowledge Society

A new concept of project arises and has as premise to create common spaces of work and to integrate the collaborators of the organization. Standardized areas with work stations (cells) are opened, with low partitions allowing visual contact between staff members and team integration. The need for visual contact influences the height of other equipment, such as archives, usually grouped together to facilitate its use and rationalization in this new configuration, to a large number of common spaces with small meeting rooms and large living areas equipped with a small Cup and tables for interaction of employees and group work.

The architecture of workplaces in the late 1990s and early 2000s seeks to take into consideration the growing technologies that suit the humanization needs of the user. According to Steve Jobs, "Happy collaborator, produce more!". To achieve maximum space suitability, different types of office layout were designed to meet the needs and expectations of the company and the user (<http://hbrbr.uol.com.br/as-verdadeiras-licoas-de-lideranca-de-steve-jobs>)

The latest trend is presented by Thomas J. ALLEN, Professor of Organizational Studies at the MIT Sloan School of Management, proposes the "Non-territorial Office" theory to characterize new forms of office work containing various areas of activities available for use by any team member, combining systems with greater freedom of layout, flows of people, materials and information; "Employees don't have a room, a workstation, or a fixed table. The use of space or technology depends on their needs and tasks" (SIMS, BECKER & QUINN 1995).

From this concept were developed several forms of "non-territorial offices" and different uses of space and technology, exemplified below:

"The Group Address" has been used by IBM in its units worldwide to define the internal space without predicting individual tables.

"Hoteling" was a system adopted by Ernst & Young of Chicago to describe its program of non-individualized offices on a permanent basis. The use of the environments is carried out through a hotel type reservation system, with the support of support teams.

"Red Carpet" was the sharing workstation program developed by Hewlett-Packard, which "adds, in addition to the concepts of Hoteling and Free-address, other areas for social and leisure, and is usually deployed in satellite offices" (ANDRADE 1996: 22)

"The satellite office" [telework centers] or telework centers are fully equipped environments located nearby or in the homes of employees or customers, also called coworking.

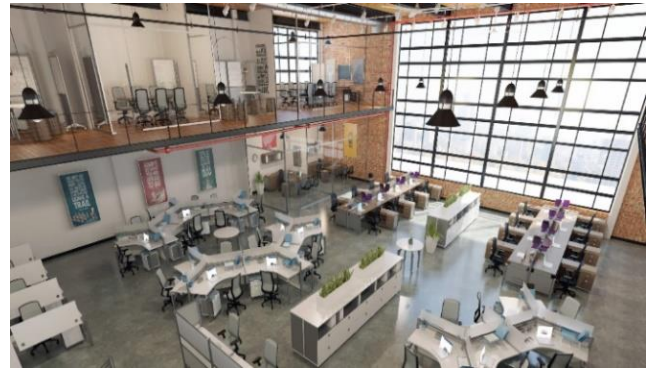


Fig. 08: Internal view

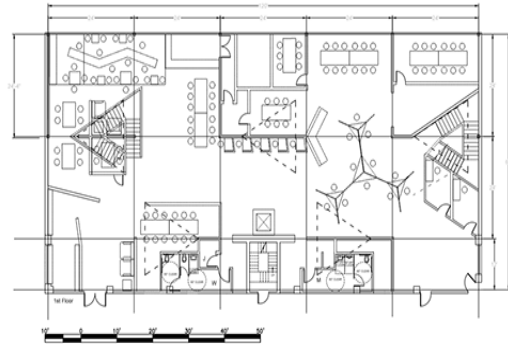


Fig. 09: Furniture layout

Source: <http://portfolios.risd.edu>

The "Just in time" system is used by Andersen Consulting in San Francisco. We describe its program of non-designated offices as a permanent basis for an individual.

The "Puzzle" layout was adopted by the international office of Skull candy, the worldwide manufacturer of wireless Bluetooth headphones & speakers, in Zurich-Switzerland. N. The layout of furniture can be modified at any time to work individually or in a group, reaffirming the concepts of modern office design: mobility, flexibility, and collaboration.

"Home-office", employees work in their homes, using the technology needed to communicate with their teams. Optimizing costs and reducing office areas for corporations.

The term "Virtual Office" is used to describe the idea of corporate space dissociated from a specific place or time. With the rapid adoption of smart mobile devices, cloud-based office productivity applications, the concept of a "virtual office" has become a reality. Corporations want to be able to work efficiently from anywhere, anytime. They need a virtual office to be transparent, accessible, providing them with a competitive advantage and operational agility.

The Mobile Office is a configuration that falls within the concept of the intangible office which, according to STONE & LUCHETTI (1985) "is where you are" - in an analogy to the intangible enterprises of Tom PETERS (1995), who considers that "his office is the Your own mind."

IV. FINAL CONSIDERATIONS

Shared creative thinking and innovation are pillars in the creation of a creative culture focused on innovation and knowledge management. This requires the adoption of more than a "new do", a "new thinking" that can achieve the new demands of both organizations and their collaborators. In this "new thinking" emerges the Creative Economy, a term created to name business models or management that originate in activities, products or services developed from the knowledge, creativity, or intellectual capital of individuals for the generation of work and income (UNESCO -2013).

To support this "new thinking", there are methodologies such as Design Thinking, focusing on the collaborator to deepen his knowledge of his needs and expectations, involving him in the design process, problem solving and decision making. Using techniques such as Brainstorm and testing rapid solutions (prototyping) for solving problems. This methodology is being used on a large scale in technology companies, which has in its DNA the innovation. Such as Google's headquarters and success achieved both in the conduct of its employees and in the development of innovative solutions.

To conclude from my point of view, this creative process is not of Disruptive Innovation but rather of Incremental Innovation. From what we have seen in the course of this article, Corporate architecture follows a constant evolutionary path adapting its design process to the needs of corporations and society with a new generation of office environments; creating values and results for everyone in a collaborative, ethical and sustainable way.

V. REFERENCES

- ANDRADE, Claudia. "Evaluation of Performance in Office Buildings: the work environment as a means for productive well-being" - PhD FAU-USP-2005,
- ANDRADE, Claudia. "The evolution of work environments in office buildings: a century of transformations" - Editor C4 -2007.
- ALLEN, Thomas J. "The Organization and Architecture of Innovation: Managing the Flow of Technology", 2007 BLUEPRINT FOR NEW BEGINNINGS (2001). Responsible Budget for Americas. US Government Printing Office.
- CAMEZIND EVOLUTION. Google. Available at: <<http://www.camenzindevolution.com/>>.
- CASTELLS, Manuel. "The Information Age: Economy, Society and Culture" (trilogy):
Vol. I. The Rise of the Network Society. (1996; 2000) Cambridge, MA;
Vol. II. The Power of Identity (1997; 2004). Cambridge, MA;
Vol. III. End of Millennium (1998; 2000) Cambridge, MA;
- CHÁVEZ, V.H. "La habitabilidad energética en oficina de oficinas". 2002. Doctoral Thesis, Universitat Politècnica de Catalunya, Barcelona, 2002.
- CALDEIRA, V. A arquitetura de escritórios. Idéias de Arquitetura 9, São Paulo, [20 -].
- ERNST & YOUNG. Cities for citizens: Ambitious and sustainable, 2011. http://www.doingbusiness.ro/images/files/1129597_Cities_for_Citizens_Final.pdf.
- FRIEDMANN, J. The world city hypothesis. Development and Change, v. 17, p. 69-83, 1986.
- GUERREIRO, Isadora de Andrade. Architecture-capital: the functionality of corporate buildings in São Paulo-São Paulo, 2010-256p.
- LOPES, M.A.S. Business Facility - Virtual Office. Sao Paulo. Publisher SEBRAE, 2009.8
- LUBART, Todd. "Psychology of creativity". Porto Alegre: Artmed, 2007. 192 p.
- PETERS, Tom. "Re-imagine! Business Excellence in a Disruptive Age ", 2005
- REIS, T. Contribution of Ergonomics in the processes of designing workspaces. Master's Dissertation, Department of Arts and Design. PUC-Rio, Rio de Janeiro, 2003.
- STONE, P. J; LUCHETTI, R. Your office is where you are. Harvard Business Review, v. 63, n. 2, p. 102-117, March / April 1985.
- TRAMONTANO, M - 1993 - Architecture and Concept
- WYMER, Tracy D. "A map for the emerging workplace: the Y in the road" .2010,6p