Methodological assessment application: Architecture of low human and environmental impact

Roberta Kronka Mülfarth¹, Ladislao Pedro Szabo², Dominique Fretin², Ivana Bedendo², Luís Martinelli², Paulo Corrêa² and Gerusa de Cássia Salado³

¹ NUTAU/USP, Universidade de São Paulo, São Paulo, Brasil
² NAU, Universidade Presbiteriana Mackenzie, São Paulo, Brasil
³ EESC, Universidade de São Paulo, São Carlos, Brasil

ABSTRACT: This paper brings about the experience in introducing the Methodological Assessment of ABIHA – Architecture of Low Human and Environmental Impact. The procedure evaluation was developed as a result of Roberta Kronka Mülfarth PhD research. The discussion approaches not only the reduction of the building sector’s environmental impact, but also the modification of human patterns of needs (reduction in standard of living) and decrease in social deprivation. The reflection taken in this research not only deals with the reduction of the environment impact in the building sector, but also of the modification of the human standards of necessities and the reduction of the social privation. All these variable result in new design parameters, come back toward all the life cycle of the buildings. Under these new circumstances, an increase of the complexity of this process is observed, becoming necessary a new conscience on the part of the involved professionals in this process so that if it promotes, in fact, the desirable changes. It is basic that goals are established during all the phases of the cycle of life of the buildings. These goals not only enclose the ambient, but also social, cultural and the economic one aspect that are the human aspects of ABIHA. The evaluation is subdivided in four great groups, that approach the aspects, building site, the material construction used and the aspects related to the proper construction human, having considered parameters that they could serve of base for the actions proposals, considering the phases of: manufacture, in the case of the constructive materials, project, construction, operation/maintenance and disposal/recycling, respecting itself therefore all the cycle of life of the construction. This study will analyse the difficulties and modifications that had occurred during the first application of this methodology that had for study object the Building of the American South Bank, projected in the decade of 60 for architect Rino Levi. Thus being, the present research intends to verify, in another context, the relevancy of the parameters considered for Kronka Mülfarth, as well as, to implement them when thus to judge itself. This research has been developed by NAU – Architecture and Urbanism Center, of Mackenzie University.

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1. A MORE SUSTAINABLE ARCHITECTURE

The actual global environmental context, is of threatening degradation that if it reflects in the exhaustion of natural sources, in the increase of the pollution of air, the land and the water, and in social and economic crises. The whole world, if it believes (scientists, economists, philosophers, politicians and citizens) that the survival of our society depends on the balance between the variable: population, natural resources and environment. The effect greenhouse, the increase of the urban population, the degradation of natural resources, the change of the climate, the poverty, the unemployment, the health ness, the social instability, the traffic and the several types of pollution are examples of this scene. In the reality, social crises, economic politics and if become insignificant when comparative the ambient crisis. [2] In fact, mainly in developing countries, almost nothing was made to reduce or to minimize the ambient impact [4] [13]. Our buildings still demonstrate a little strategical responsibility for the control of the mechanical system, as integrant part of the dynamic ecological system of the construction, and us we can not say that the projects have been enriched with the technological and ecological integration, in answers to the cultural necessities of the Brazilian user. The social and economic crises aggravate this scene and, probably, they are the main reasons for the recklessness with on subjects to the environment, making with that some questions are raised:

a) How could in deciding them for the job of materials of construction of low energy if it has an enormous percentage of the urban population that still does not have a ceiling to take shelter?
b) Which is the real dimension of the ambient problems and the sustainability in the developing countries?

c) What it is sustainable in these countries?

d) How can we measure in responsible way the advantages of project directed toward the environment if the cycle of life of a building alone is seen under the economic approach?

Although all the uncertainties and contradictions on the subject sustainability, should be proposals solutions that came to contribute so that if reach the responsible integration with the environment [13] [23]. Decisions taken during the project phase and construction make possible the evaluation of the occupation and demolition or reutilization of the building structure, contributing to guarantee the ecological reply [10]. Obviously, the objective of the sustainability can be fortified by gradual ambient innovations, such as the use of recycled materials and efficient methods of energy use in the construction. But, these innovations will only have resulted to happen deep psychological and cultural changes in our society. The best solution in the long run, is the global reduction of the demand, through the modification of the human standards of necessities and consumption, and the practical one generalized of conservation how much to the use of materials and the resources of energy [7] [10].

### 2. ABIHA METODOLOGICAL ASSESSMENT

Besides the conceptual matters, practical applications of ABIHA are carried out, in the example of the sustainable garden, warehouse recycling and the movable environmental laboratory (sensors and data loggers).

During this research there were opportunities to apply the methodological assessment, which were necessary to certify the principals that should be proposed.

Such experiences of practical applications were fundamental to create the basis for the methodological assessment proposed. However, this procedure of evaluation is understood merely as the beginning of a big range of other researches, which should be developed towards a more sustainable architecture.

This methodological assessment was developed in order to help professionals using ABIHA. It is key that goals are established during all stages of building lifecycle. These goals approach not only environmental features, but also the social, cultural and economic ones, which are the “human” aspects of ABIHA.

The assessment is composed by filing forms, divided in four (04) areas that should be analysed: humans, site, building and materials. These forms were called:

- Reduction Humans Impact evaluation form
- Reduction Site Impact evaluation form
- Reduction Building Impact evaluation form
- Reduction Materials Impact evaluation form

![Figure 3: Reduction Impact filling forms](image)

The design, construction, operation maintenance and disposal/recycling stages are verified in the cards (left column).

In Reduction Humans Impact evaluation form is analysed:

1. Environmental features (thermal, accessibility, acoustics, ergonomics, day lighting);
2. Community valorization (employment generation, open spaces, cultural features, community participation);
3. Community communication (local / global)

In Reduction Site Impact evaluation form is analysed:

1. Site selection (environmental impacts);
2. Neighborhood reduction impact (site, fauna/flora, water, energy);
3. AMERICA SOUTH BANK ABIHA APPLICATION

The South American Bank was designed by Rino Levi, a Brazilian Modern Architect, and is located at Paulista avenue at São Paulo city, Brazil. It is an important example of bioclimatic architecture with brise solei, and concern with building location.

Figure 5: Banco Sul-Americano building in 1964 (Anelli, Renato, Rino Levi: arquitetura e cidade, pp. 241).

In order to understand the systematization proposal for Kronka Mülfarth, we decide to detail the premises that had taken the author to organize in four areas: human, site, building and material. Considering the human aspects, Kronka Mülfarth suggests action that:

- They provide to the using satisfactory conditions of ambient comfort;
- Respect and involve the communities and the residents in participating actions;
- The phases of the cycle of life of the construction use to advantage the potential of the local hand of workmanship during all;
- They project places for the communitarian life;
- Refuses the use private of public activities;
- Integrates local cultural aspects to the project, preserving the cultural inheritance;
- Refuses segregations of any nature;
- Provides half of information aiming at a bigger understanding of the social matters, economic, ambient and of local and global sustainability.

Related to the building site, the suggestions are:

- Stimulate the variety of uses in the area where if it establishes the project, promoting, not only the residential use, but commercial and of services, also reducing the use of automobiles, besides promoting a bigger integration to the site of the community;
- Promote restore it of neighboring areas, degraded, integrating them not only to the local community, but also respecting the local ecosystem;
- Prevent overloads to the existing infrastructure already (garbage water, energy, transport, collection) and to use to advantage the maximum the local natural resources as, for example, the water of rain for irrigation (preventing the drinking waters use);
d) Use the system of collective transport, minimizing the dependence of the automobile through the best distribution of the areas of commerce and services, of the creation of ways of pedestrians and cyclists;

e) Value the area of intervention through the use of the vegetation, areas of leisure, access to the sun, water sources (when possible) etc.

f) Implant the constructions looking for to minimize the impact in the area, modifying the minimum the topography of the land, preserving areas of springs, using the native vegetation, preserving the visual comfort of the existing community (visual impact);

g) Implant the construction keeping the satisfactory conditions of the local microclimate (ventilation, insolation, natural illumination, humidity), not harming the neighborhood;

h) Construct way of protection during the construction to prevent the erosion and sedimentation in contiguous lands;

i) Use materials for support of the construction that can be reused and/or recycled;

j) Construct infiltration points, for draining of the water of rains, during the construction and in the useful life of the construction;

k) Promote in the area the possibility of handling of the rainwater, through a landscape that propitiates the draining, with the creation of paved areas when only necessary;

l) Optimize the use of artificial illumination in the area, with the equipment choice that presents greater energy efficiency and evaluation of the localization of the same ones;

m) Carry through a project that propitiates an easy area maintenance; n) to prevent the use of insecticides and pesticides in the landscape maintenance and to analyse the future urban plans for the adopted area, verifying if solutions can come to be affected by the future projects.

Already for the constructive materials, the suggestions are:

a) Choose the constructive system being aimed at the minimization of the losses in the constructive process, flexibility of uses during the useful life of the construction and easiness of reutilization (and/or recycling) in the end of its cycle of life;

b) Balance the environmental aspects (impacts) with the traditional ones (costs, durability, maintenance, resistance, performances thermal and acoustic, among others) in the choice of the constructive materials;

c) Define the constructive materials with bigger durability; d) to define the constructive materials with low maintenance;

e) Prevent the choice of materials that bring risks to the workers during the construction of the construction;

f) Define materials with potential greater of recyclables and reutilization;

g) Choose materials with lesser impact in its productive process (in the process of extraction of the substance cousin and the production of the constructive material they must be observed the degree of pollution of the water and the ground, the potential of substance emission that can be harmful to the ozone layer, promoting the global heating, and of harmful pollutants to the health of the man);

h) Define materials with low embodied energy (extraction, manufacture, transport, construction);

i) Define constructive materials of the locality, preventing unnecessary consumption of energy with the transport;

j) Indicate constructive materials with lesser degree of toxicity for the man and the environment in the cycle of life of the construction;

k) Prevent the use of constructive materials excessively packed (plastic, papers, etc.);

l) not to choose constructive materials that use workmanship hand doubtful (enslaved or infantile work);

And finally, for the construction in itself:

a) Project aiming at flexibility of uses, durability, easiness of operation and maintenance;

b) Renew and to revitalize old buildings;

c) Adjust the constructive system of local workmanship;

d) Project aiming at advantage of the orientation of the construction (natural illumination, ventilation, site conditions);

e) Incorporate elements of the bioclimatic architecture (passive techniques of thermal conditioning, ventilation);

f) Use the natural illumination, guaranteeing the access to the natural daylight, previously establishing the indices desired in the spaces;

g) Project foreseeing areas for storage, management and recycling of the "generated garbage" in the construction;

h) Promote ways of education to the users them recycling systems;

i) Creation of systems to advantage the rainwater, with forecast of hydraulic installations appropriate and area for filtering;

j) Project for reusing of waters leached ashes and blacks of the construction, being foreseen installations special;

k) Use equipment that assists in the reduction of the water consumption in the construction phase;

l) Preference to the use of power plants you renewed, as solar and the wind one;

m) To not only reuse the constructive components of the construction, but also equipment and furniture;

n) Use equipment that assists the management of the use of energy in the construction, as light bulbs of low consumption, sensors of presence to rationalize the use of the illumination, and others.

As it suggests the author, the present systematization is only one first approach in the establishment of criteria for the analysis and verification of the sustainable level in the buildings and this systematization does not have the pretension to deplete the subject, but yes, to suggest procedures that can be incorporated by professionals who want to have in its projects a bigger commitment with the sustainability in the several phases of the life of the
construction, this are, project, construction, use and operation, demolition and recycling.

The first conflicts to be appeared during the analysis of an existing workmanship already, in the case the Building of the American South Bank, are in the contextualization of the raised parameters and in the paradigm differences, it enters the time of the project and construction of the building and the current points of view. It is necessary to consider with clarity the several phases of life of the building since its construction in the contexts human (social), urban, environmental, economic and material construction, as well as also it is basic to understand the complex nature of the interaction of great number of variables and implicit factors in the sustainability concern.

The analysis proposed Kronka Mülfarth had been created for evaluation of the sustainability level in recent projects, preference in design phases, becoming complex its application in concluded ones. Only some aspects, more technician, can be quantified and, eventually, punctuated. In order to complement this analysis it was necessary to research qualitative and supported stories, memories and depositions many vacant times that compromise a criteria's evaluation of the performance waited for the analysis. Certain item lacks of a more objective notation, compelling the answers of the type yes/no, positive/negative or attempt/do not attempt.

Analysing the human aspects it was verified the necessity of working at least with four notations: it answers fully, it answers partially, it does not answer and it does not fit or lack information. Analysing the user’s environmental comfort, it was verified the necessity of different analysis: the thermal question, acoustics, accessibility, ergonomics, appearances, and olfative. When segregation presents the question of valuation of the Kronka Mülfarth community raises the question of integration x segregation, however it is not possible to analyse these simultaneously two categories, therefore they are opposing. Another question is the generation of jobs; evidently all construction of offices generates jobs indirect right-handers and in the construction and later in the proper construction - how evaluate this question?

Dealing with sustainability and ways of information to proper construction - how evaluate this question?

Evaluating the impacts of the construction materials related the several materials used in the construction it leads to the question: must be analysed all the materials or only the main ones? Must be analysed the material in itself or tied with the building? How to analyse, in a workmanship already constructed, to questions as pollution, losses, embodied energy, degree of toxicity, flexibility, easiness of maintenance, extensive useful life, possibilities of recycling, reutilization and until biodegradability?

And finally, if arguing the reduction of impacts in the construction many doubts and questions take place. How to analyse adaptability and flexibility, reutilization, constructive system, ambient comfort, exploitation of the existing resources, by-products of the construction and the energy used in each phase of the cycle of life of the construction? With certainty, simply to tell that it answer it does not answer or it answer partially, in will not allow them to elaborate inferences that contribute in the construction of the applied concept of Architecture Sustainability.

4. CONCLUSIONS AND FUTURE STEPS

As it was observed, that this methodological assessment was developed to be preferentially used in the whole building design process: design, construction, operation and/or maintenance and disposal and/or recycling.

Although, this experience was possible to verify that this methodology has a lot of points to be adapted while used in buildings that already exists.

Pointing at a building from modern architect period it is possible to verify, that most in building impact evaluation form, aspects related to building orientation, natural lighting were verified.

Unfortunately, many of the principles of sustainability that were used in these buildings, mainly during the Modern Architecture Movement were forgotten nowadays.

Our buildings still resume the little strategic responsibility for the control of the mechanical system as an integral part of a building's dynamic ecological system, and we can not say that the building design has reached a technological and ecological integration in response to user need in Brazilian building culture.

In the next phase, it will be chosen a building to be analysed in the whole life cycle.

4. REFERENCES


