Global Influences VS Local Architectures: Two Aspects of a Sustainable Approach

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Abstract

Sustainability, energy efficiency, low resource consumption, responsible building and design are real actual issues of contemporary architecture and which the current practice can not ignore. Globalization, industrialization, technological progress coupled with population growth and environmental concerns urge us to find sustainable alternatives for the conservation of planet resources on the one hand and a rethinking of the final architectural product that has both a low impact on the environment and that is durable during use.

The article investigates two different hypostasis of the contemporary architecture illustrated by the recent concerns that I have both in the practice of architecture and as a teacher, responsible for the formation of new generations of architects: In the first case, an office building built in Bucharest illustrates studies and thoughts regarding the use of technology and resources offered by new materials in order to obtain energy performance, minimal consumption of resources and low impact on the environment producing meaningful and strong architecture in the same time.

The second one, theoretically investigates how to build sustainable, with local resources, based on the lessons that tradition, the vernacular, the call to local materials and techniques can provide a model of architecture that can withstand in time and offer the respect to the environment and to the framework in which it is located.

The occasion is given by the individual research work that I was assigned during my stay at KKU under the guidance and advice of Prof. Dr. Chumnan Boonyaputthipong and it refers to the proposal for the new building for the University's Textile Workshop.

Keywords: SUSTAINABILITY, ENERGY EFFICIENCY, CONTEXT, TRADITION

1. Introduction

Sustainable, when the term is used to describe architecture, is a general term referring to conscious-ecological design techniques. In the broad sense, a sustainable architecture aims to minimize the negative impact of the built object on the environment by increasing efficiency and

optimal use of materials, energy and spatial development. In other words, the idea of sustainability or ecological design means concluding that the actions and decisions we take today do not hinder the opportunities of future generations.

The concept of Sustainable Architecture can be organized in several areas of applicability, including sustainability and permanence over time, materials, energy efficiency, proper land management and waste reduction. By carefully analyzing the production of contemporary architecture it can be concluded that this is obviously influenced by several factors: new materials, experimentation with new forms and the use of sustainability principles. The link between the three elements is consistent in many situations, their corroboration providing an architecture whose stake is the transformation of the consumerist society into a society that reports its needs to the existing resources, sensitive to the same extent for the future. The principles of passive buildings involve the correct location of the construction on a site, the location according to the cardinal points and the infuences of the winds, the topography of the chosen place. Summarized these aspects lead the architect to continually experiment with the right forms to imagine a building that through design and conformation implies a minimum consumption of non- regenerative resources. Similarly, the use of modern, state- of- the- art materials is the instrument by which most architects and investors choose to meet the A second approach is, as I state earlier, a study that was part of the individual study I did during my stay at KKU. It is a rather theoretical hypostasis, which originates in the concerns about local architectures, traditional techniques and how natural resources, climate and environment influences a sustainable and durable architecture over time. Many times building on technology, performing materials can be expensive and does not necessarily mean a sustainable attitude for the future. The dynamics of materials development, deployment costs, and the duration of their exploitation can induce a high consumption of resources, a transformation that, in the long run, brings a much more damaging impact to the built environment. Encourage consumption, production, recycling and regeneration cost.

On the other hand, the appeal to local techniques and local produced materials, in other words, the lesson we can learn from tradition and vernacular can be a very environmentally friendly and highly responsible attitude towards the long term future. For thousands of years, the vernacular lesson has taught us a model of conservation and sustainability that sometimes seems too easy forgotten. Sustainable means building first of all lasting, with care towards the future and resource consumption.The simplest way to understand vernacular architecture is to look at it as architecture without architect, a pure and simple response to a particular person basic building needs. One of the most important characteristics of this type of architecture is the simple, low-tech method of which a building is created and adapted to local context and the building's users.

What is to learn from that experience is to prevent something that we, the architects, are often tempted to do: sacrificing the comfort, function or environmental friendly approach searching for some aesthetical qualities or egotistical approaches.

2. Research Methodology

Research Methodology includes the materials, tools and method of the study. The research is based mainly on the office planning activity and study during the development of the projects: drawings, studies, work and design meetings with suppliers and technical specialists, site visits and observations at the end of the process and building completion. Also, for the second part of the research, study trips across Thailand, lectures and studio's activity along with professional discussions with the KKU teacher have been very helpful for the results and the conclusions of the research.

Part one: GLOBAL

In 2014 a local investor, involved in important projects on the Romanian market, invited us to design a building that would host offices for young companies in Romania as support for their further development.

The building was funded by a European Union funding program to support young entrepreneurs and, besides requirements for flexibility in time and user development, had to meet the latest and most demanding requirements for energy efficiency, low consumption and impact on the environment required by the European standards in force.

Together with the entire design team (architects: Alexandru Calin, Vlad Draghescu, Toader Popescu, Daniel Bondar, structure: Popp And Associates, Mihai Bita, Alexandru Hoaghia, Sorin Vasile, installations: Amb Design Project, Ing. Mihai Nedelcu (Sanitary), Ana Maria Bardac (Hvac), Mihai Husch (Electric), Ing. Alina Rogojanu (Gas), we produced an eight stories (basement, ground floor and 6 floors)with a build area of 710 square meters and a total built surface of 5,070 square meters. Each floor has a rectangular shape so that the surface can be easily divided according to the needs of the customers.

Figure 1: CSDA Siriului. Exterior views © Andrei Margulescu, Marius Grigore

Located in northern Bucharest area, the Siriului Support and Development Center (CSDA Siriului or SSDC) enjoys a favorable position in the city, in a growing area (probably the most dynamic of the moment) and with attractive prospects for the future.

The local neighborhood context resulted from the articulation of an 80's residential complex with single plots of individual private housing without special or cultural values was not a valid partner for an urban dialogue and was a major challenge at the start of the design. Thus, the building had to assume the task of taking out the surrounding area from anonymity and diminishing its peripheral status. The scheme for financing the investment from European funds imposed the adaptation of its functional configuration to the needs of small and medium enterprises.

Thus, each level is modularly designed, with the possibility of dividing leasable areas for office space into a flexible and sufficiently large number of autonomous units, with areas adapted to the needs of SME's (80-160pc) with equal access to a series of common facilities - level meeting rooms, sanitary groups, services of common interest on the 1st floor of the building (conference rooms, copying service, professional services, etc.).

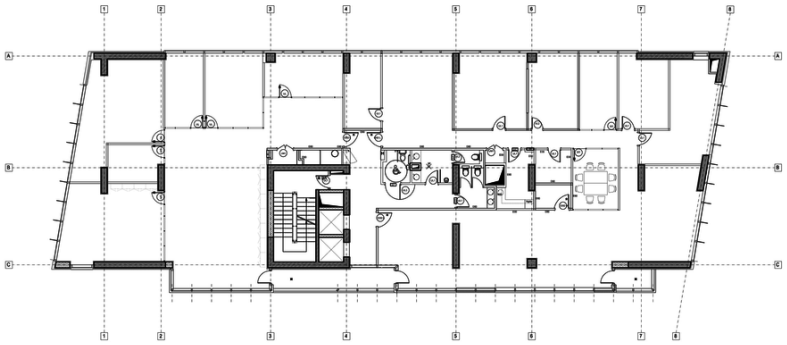

Figure 2: CSDA Siriului. Current floor plan © Alexandru Calin

Regarding the exterior image, a balanced composition was chosen, in which the vertical gaps in the side of the main façade are counterbalanced by the horizontal dominance of the central area, supported by a succession of alluminum bris-soleils, by emphasizing the edges of the floor planes, the corrugated board texture and three wide horizontal windows. The latter highlight the three accent elements of the main façade - the "Trespa" yellow boxes.

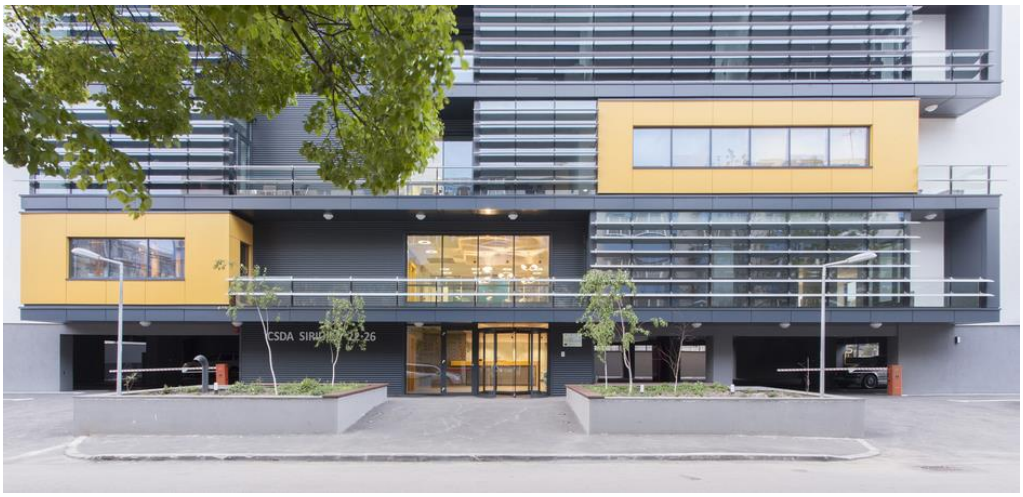

Figure 3: CSDA Siriului.Yellow boxes on main facade © Andrei Margulescu, Marius Grigore

The function of the building - offices, the necessity to use glass as a predominant material and the orientation of the long building side to the South allows a good natural illumination of the working space, but brings with it the problem of solar protection and saving of resources. The same protection and treatment required the Eastern and Western sides as well as the glass showcase on the Nordic side.

The required quality standards have led to the use of energy-efficient and technologically-performing materials to ensure efficiency, isolation, resource saving, low consumption and durability over time. So we used a high performance, SunGuard SN 51/28 glass, 6mm thick outside, produced by Guardin. SunGuard® Glass is made by sputtering multiple layers on a patented glass base, called Silicoat ™. This advanced technology puts ultra-thin layers on a uniform stencil regarding the looks and high optical qualities as well. Silicoat ™ is an extremely efficient solution for mechanical and chemical durability, high visible light transmission, superior U-value and low shadow coefficient.

The material offers a light transmission of up to 75% and 76% respectively, 5% and 6% more than other Guardian SunGuard SuperNeutral glass products. This great light transmission supports building owners, architects and designers in their efforts to bring as much natural light into their projects as they can.

In addition to the high light transmission, Guadian SunGuard SN provides a 40% low solar factor and excellent thermal performance - with a 1.0 W / sqmK Ug value that balances the indoor room temperature throughout the year. Thanks to this combination of unrivaled properties, SunGuard SN contributes to a more comfortable living and working environment. For the NORD facade we used courtain walls in the SCHUCO FW50 + aluminum profile system consisting of senkklapp type openings with the glass panel sticked on the frame, while for the EAST and VEST facades the structural curtain walls SCHUCO FW50 + SG being combined with vertical "glass bevel" panels and the shadow box area covered with bond-type composite material.

The SOUTH facade consists of SCHUCO FW50 + curtain walls with vertical / horizontal caps and horizontal sun shading system 350 mm adjustable angle blades from METRA as supplier. The FRANGISOLE sunshade profile line from METRA guarantees ideal conditions in any environment. Sun visors let the desired light pass, block unwanted solar radiation, and allow temperature control inside the building. Sun protection has an increasingly important role in designing workspaces.

The ultimate goal is to optimally and intelligently use the resources at your disposal, guaranteeing a high degree of internal comfort, optimizing the use of solar energy to minimize energy consumption, while satisfying the need for daylight and visual contact with the outside world. The main parameters in sun protection are: the heat coming inside the building, the yield of sunlight that is filtered by the windows, the protection against light from the light, the visibility outside. Ideal sun protection protects against heat and dazzle, but does not block outward visibility and light.

For the ventilated facade with HPL TRESPA METEON on the Eurofox structure and the blind facades of the building we used thermal insulation with 100 mm basalt mineral wool from KNAUF. The product has an improved thermal performance due to the low thermal conductivity that provides better thermal protection of the building.

The product is non-combustible, good heat insulator, mass hydrophobic, durable, chemically neutral and very permeable to water vapor. Plate dimensions do not change over time due to high temperature variations. It is a solution that substantially reduces energy consumption with a high recycled raw material content, the Gold Standard of the Eurofins Indoor Air Quality certificate, fulfilling all the existing European criteria for indoor air quality.

In terms of installations in the four-seasons climate, the integrated energy system increases the efficiency of the building being thermo-insulated, well-oriented on the ground, the heat being recaptured (to be used immediately or stored). Waste water recycling contributes to reducing water consumption.

Figure 4: CSDA Siriului. Sun protection system on the South Facade. © Andrei Margulescu, Marius Grigore

From our point of view, CSDA Siriului represents an important achievement for the Bucharest and Romanian market, demonstrating the plus-quality value brought by the European funding mechanism, the feasibility of a high-level construction under the conditions of responsible cost control and at the same time answering to an important contemporary challenge: how to obtain architectural quality in the restrictive (but so necessary) context of structural funding, maintaining high quality standards and efficiency for long-term use.

Part two : LOCAL

During my indiviudal study assignment at KKU I was invited to think of a proposal for a new building to host KKU's Textile Workshop. The research is based on the study of local climate conditions, location, local materials and techniques and how they can be a response to the issue of sustainable architecture for the future. The building proposal is based on a few basic principles of composition of space and takes into account the local climate and location features: a simple, compact, ventilated, natural, flexible, sun and moisture-proof building, where local bamboo materials play an important role in protecting and creating in the same time a sort of green barrier.

Figure 5: KKU Faculty of Architecture, Textile Workshop.Exterior view © Alexandru Calin

The plan is a rectangular layout that allows maximum flexibility of use and separates traffic and services from the work area. The staircase is open and allows the circulation and ventilation of natural air. The large openings on the long sides of the building, the communication of the spaces also ensure a permanent movement of the natural air. On both sides the building is protected by the sun and heat: continuous loggias on the main facade allow both the expansion of the working space and the necessary shade against the sun. Sun protection is made with vertically arranged bamboo sticks and a system that allows the vegetation to provide a favorable microclimate.

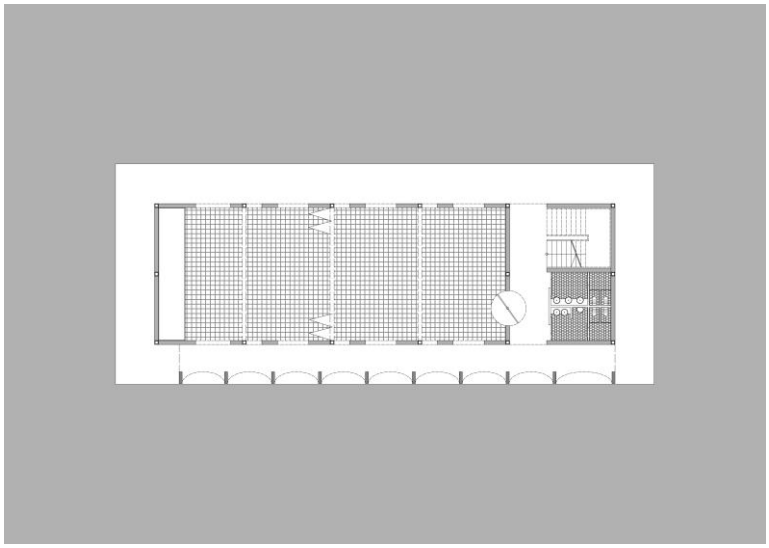

Figure 6: KKU Faculty of Architecture, Textile Workshop. General layout plan © Alexandru Calin

The building's terrace allows outdoor activities and it is a complement to the interior space. The bamboo grid allows drying of textiles, provides shading, protects in the same time. In addition, it allows the installation of photovoltaic panels or installations for the production of renewable energy, insofar as the building can incorporate innovative technology as long as it remains anchored in tradition and low-tech construction techniques.

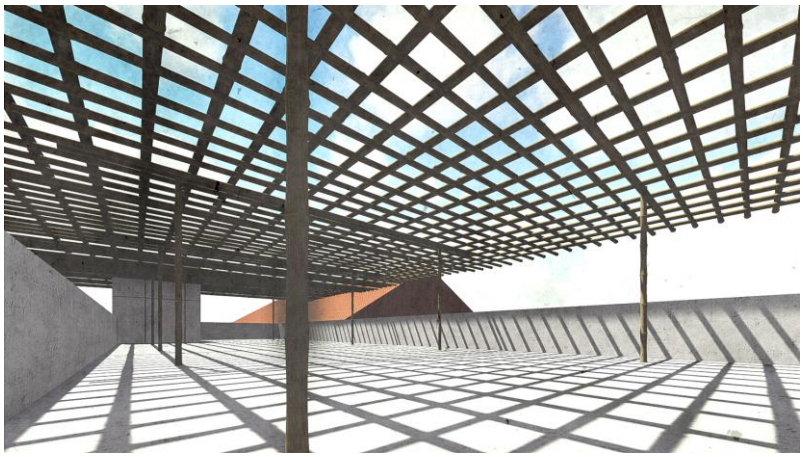

Figure 7: KKU Faculty of Architecture, Textile Workshop.Roof terrace © Alexandru Calin

The building is made entirely of apparent concrete. As an attitude may seem unsustainable and perhaps has a little to do with the ecological approach but in the long run it allows for a very long life and flexibility of use so that the intervention is done for a long time now, without generating additional costs over time.

In addition, the concrete is a composite material obtained by homogenizing the mixture of cement, aggregates and water. It is a low cost material per ton of static loading, is easy to use and requires low maintenance costs. From an ecological point of view, the production and transport of concrete require less total energy than many other building materials.

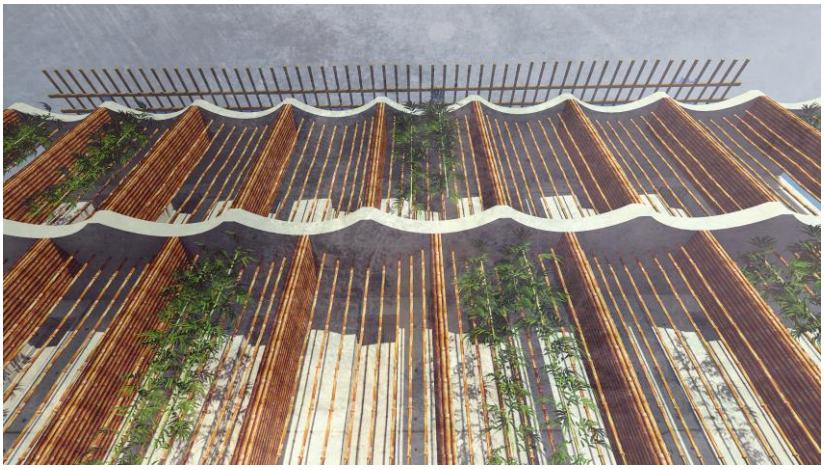

Figure 8: KKU Faculty of Architecture, Textile Workshop. Sun protection system © Alexandru Calin

3. Research Results

Research Results tell the clear result of the study. From the technical specifications provided by our technical partners involved in the design process and in the constructions works for the building one can have a better understanding on how much the quality of the products and the technology helped us achieve better building performances in terms of sustainable design and performance. Globalization plays a defining role in this building design process. Having the chance to involve international partners means also a better possibility to achieve outstanding results in design process.

Table 1. Performance specifications for SUN Guard SN 51/28 Glass panels from Guardin

Applications	Conservatories and orangeries, curtain walling, spandrel panels, structural glazing, windows and doors
Applied Detail	n/a
Certification	n/a
CoatingDesign	Solid
CoatingType	High Selective Surface 2 (Combines High Light Transmission, Low Solar Factor and an Ultra Low U value)
ColourRenderingIndex	93 Ra
Composition	Soda lime silicate
DirectEnergyTransmission	26%
EnergyAbsorption	37%
EnergyReflection	37%
GlassSubstrateOptions	ExtraClear float glass, Laminated glass
GlazingThicknessOptions	4 mm, 6 mm, 8 mm, 10 mm, 12 mm
HeightOptions	<3210>

ImpactResistance	n/a
LightPerformance	Light transmission: 51%
Pattern	n/a
ProcessingOptions	Annealed, Bendable, Heat soaked, Heat strengthened, Laminated, Toughened/ tempered
Selectivity	1.82
ThermalTransmittanceOptions	Double Glazed: 1.0 W/m2K, Triple Glazed: 0.5 W/m2K
Thickness	4
TotalShadingCoefficentPerformance	0.32 g/0.87
UVTransmission	16%
WidthOptions	<6000>

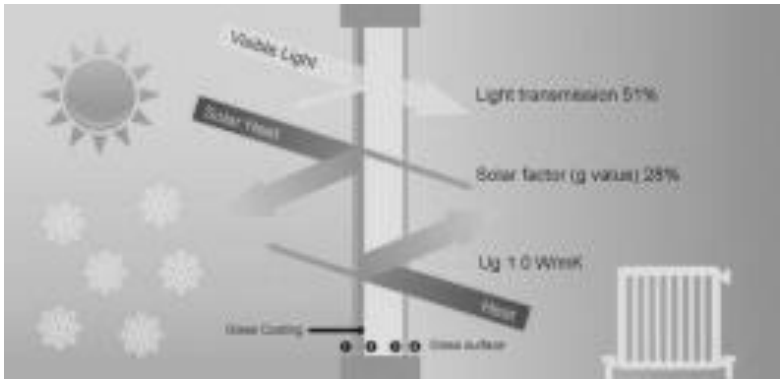

Figure 9: Sun Guard Super Neutral SN 51/28 Tech Specification provided by Guardin

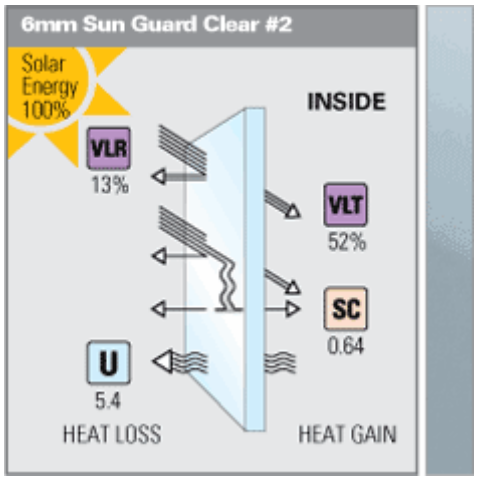

Figure 10: Sun Guard Clear Glass provided by Guardin

Sun Guard Clear Glass from Guardi is a pyrolytic type coating made by the Guardian Silicoat Process. It is a highly innovative solar control glass product, light sky blue in exterior colour, with low reflectance, high light transmission and good solar control performance for a clear glass. The coating must be glazed to surface 2, and gives a very light silvery blue appearance.

The tried and tested thermally insulated mullion / transom façade systems Schüco FW 50+ creates impressive vertical façades – particularly with large module widths and installation heights, and facetted inwards or outwards.

The .SI (Super Insulation) system option not only fulfils current energy-saving standards, such as the EnEV, but with Uf values of up to 0.7 W/m2K, already exceeds some of these requirements today. In this way, aluminium curtain walling suitable for passive housing is now an option.

The Schüco systems FW 50+ CW for ventilated / non-ventilated façades accommodate all smooth-faced panels and are supplied with all the necessary wall attachment fittings and substructure fittings. Another advantage is the significant reduction in construction time as façade fabrication and interior building work can be done in parallel. Very economical solutions thanks to composite constructions, great flexibility in positioning the ventilated and non-ventilated areas.

System System	Art der Prüfung Type of test	Grundlage Basis	Prüfinstitut Test institute	Nr. des Prüfzeugnisses/ Bescheids No. of the test certificate / certificate	Prüfergebnis Test result
FW 50+SG	Fugendurchlässigkeit Air permeability	EN 12152	ift Rosenheim	105 25509 108 31193	AE 1200 PA AE
	Schlagregendichtheit Watertightness	EN 12154			RE 1050 PA RE 1200 PA
FW 50+SG [FW 60+SG]	Isolierglasprüfung Double glazing	prEN1279-2		601 25611/1	positiv Positive
FW 50+SG	Europäisch-technische Zulassung (ETA) European Technical Approval regulations (ETA)	ETAG 002	Deutsches Institut für Bautechnik	05/0114	erteilt Issued
	Allgemeine bauaufsichtliche Zulassung General building approval	–		Z-70.1-46	
	Absturzsicherheit Safety barrier	E-TRAV EN 12600	PSP RWTH Aachen	S-47-01	voll absturzsichernd Kategorie A Category A, fully protected
	Luftschalldämmung Airborne sound insulation	EN 20140-3: 1995-01 EN ISO 717-1: 1996-12	ift Rosenheim	161 26794/1.0.0 161 26794/2.0.0	R_w (C; C_{tr}) = 38 (-1; -3) dB R_w (C; C_{tr}) = 44 (-2; -5) dB
	U_f-Wert U_f value	–		432 28487/1 432 28487/2	U_f = 2,2 - 2,8 W/m²K U_f = 1,6 - 1,8 W/m²K
FW 60+SG	Air, Water, Structural Seismic Interstory Movement Air, Water, Structural Seismic Interstory Movement	AAMA 501-05 AAMA 501-05	ATI	56821.02-120-47-RO 58438.01-122-34	PA 1436 psF 30

Figure 11: Schuco FW50 Curtain Walling System

Sun Blades solutions were provided by the Metra Sun Blades series.This is more than a simple sun protection tool, it can be widely applied from skyscrapers to private homes, increasing energy savings. Its bold aesthetic appearance enhances any architectural form and is capable of transforming any habitat into a satisfying and entertaining place to live, offering the choice between darkness, light, sunshine and complete shade at whatever time of day and with great ease. The simple insertion of photovoltaic panels onto the blades produces clean energy with a low environmental impact. The Sunblades can have the same finishings as all METRA systems and the automatisms are managed by a domotics system.

4. Conclusion and Discussion

Acting global the concept of Sustainable Architecture can be applied in several areas such as sustainability and permanence over time, materials, energy efficiency, proper land management and waste reduction. By carefully analyzing the production of contemporary architecture it can be concluded that this is obviously influenced as I said before by several factors: materials, experimentation with forms and the use of sustainability principles. The link between the three elements is consistent in many situations, their corroboration providing an architecture whose stake is the transformation of the consumerist society into a society that reports its needs to the existing resources, sensitive to the same extent for the future. The principles of passive buildings involve the correct location of the construction on a site, the location according to the cardinal points and the infuences of the winds, the topography of the chosen place. The practice has to experiment with the right forms to imagine a building that through design and conformation implies a minimum consumption of non-regenerative resources. Similarly, the use of modern, state-of-the-art materials is the instrument by which most architects and investors choose to meet the requirements of BREEAM or LEED energy certification programs.

Many times building on technology, performing materials can be expensive and does not necessarily mean a sustainable attitude for the future. The dynamics of materials development, deployment costs, and the duration of their exploitation can induce a high consumption of resources, a transformation that, in the long run, brings a much more damaging impact to the built environment. Encourage consumption, production, recycling and regeneration cost.

On the other hand, acting locally, the appeal to local techniques and local produced materials, in other words, the lesson we can learn from tradition and vernacular can be a very environmentally friendly and highly responsible attitude towards the long term future. For thousands of years, the vernacular lesson has taught us a model of conservation and sustainability that sometimes seems too easy forgotten. Sustainable means building first of all lasting, with care towards the future and resource consumption.The simplest way to understand vernacular architecture is to look at it as architecture without architect, a pure and simple response to a particular person basic building needs. One of the most important characteristics

of this type of architecture is the simple, low-tech method of which a building is created and adapted to local context and the building's users.

What is to learn from that experience is to prevent something that we, the architects, are often tempted to do: sacrificing the comfort, function or environmental friendly approach searching for some aesthetical qualities or egotistical approaches. A possible approach in terms of architectural theory and practice is given by the collection of studies edited by Linsday Asquith and Marcel Velinga, "Vernacular architecture in the Twenty- First Century. Theory, education and practice"[1] It is a reading that I highly recommend to those who are interested in the subject of vernacular architecture and the way it responds to the needs of modern society. The second part, with contributions from Suha Özkan, Roderick Lawrence, Linsday Asquith, Ian Davis and Geoffrey Payne provides us with interesting points of view regarding the lessons one might take from the vernacular heritage.

One of the most important principles in the new environmental ethics of the XX and XXI century is the principle of sustainability.

This is now a major criterion in the judgement of any planning practice. Vernacular architecture is, perhaps, the highest form of sustainable building as it uses the most accessible materials and employs the widest available technologies.

Roderick Lawrence [2] proposes a discussion on the way in which principles deduced from the vernacular could provide lessons to those involved in the contemporary planning of sustainable human settlements. The vernacular is a result of the active and dialectic interrelation between cultural and ecological factors. Lawrence's approach acknowledges that sustaining human settlement involves human practices and processes that ought to adapt to the dynamics of the world in both local and global levels.

Lawrence proposes a set of basic principles for the professional practice:

a) Compact human settlements;

b) Building adaptability for reuse;

c) Patterns and principles form histoy;

d) Interrelated scales from a web;

e) Ecological and cultural diversity;

f) Participatory approaches;

g) Communication, information and public awareness.

An ecological approach applied to the study of vernacular architecture reminds that construction and use of human habitats stem from the interaction between different factors. The impact on the layout and construction of the built environment, the consumption of materials and energy increased as the local cultural knowledge of traditional construction methods

declined. Today, one has to choose between traditional materials and methods, and new technologies and synthetic materials. The first choice allows the reuse of renewable resources while the other requires energy consumption, specialized expertise and produces an important amount of non-recyclable waste products.

Local resources and the understanding of traditional typologies can produce great quality spaces, can be in the same time attentive and aware of local environmental conditions, encourage the perpetuation of traditional crafts can create jobs for local people, perpetuate the tradition and carry it forward responsibly. In the long term can be the winning attitude .

5. Acknowledgement

Acknowledgement comes from both the approaches as architect designing in the studio and as a research teacher involved in the academic process. Both can offer ways and responses in the field of architecture.

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