POLITECNICO DI TORINO
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Master of Science in Architecture
Honors theses

Sustainable Scholastic Building: contextualization and application of the SBC international method

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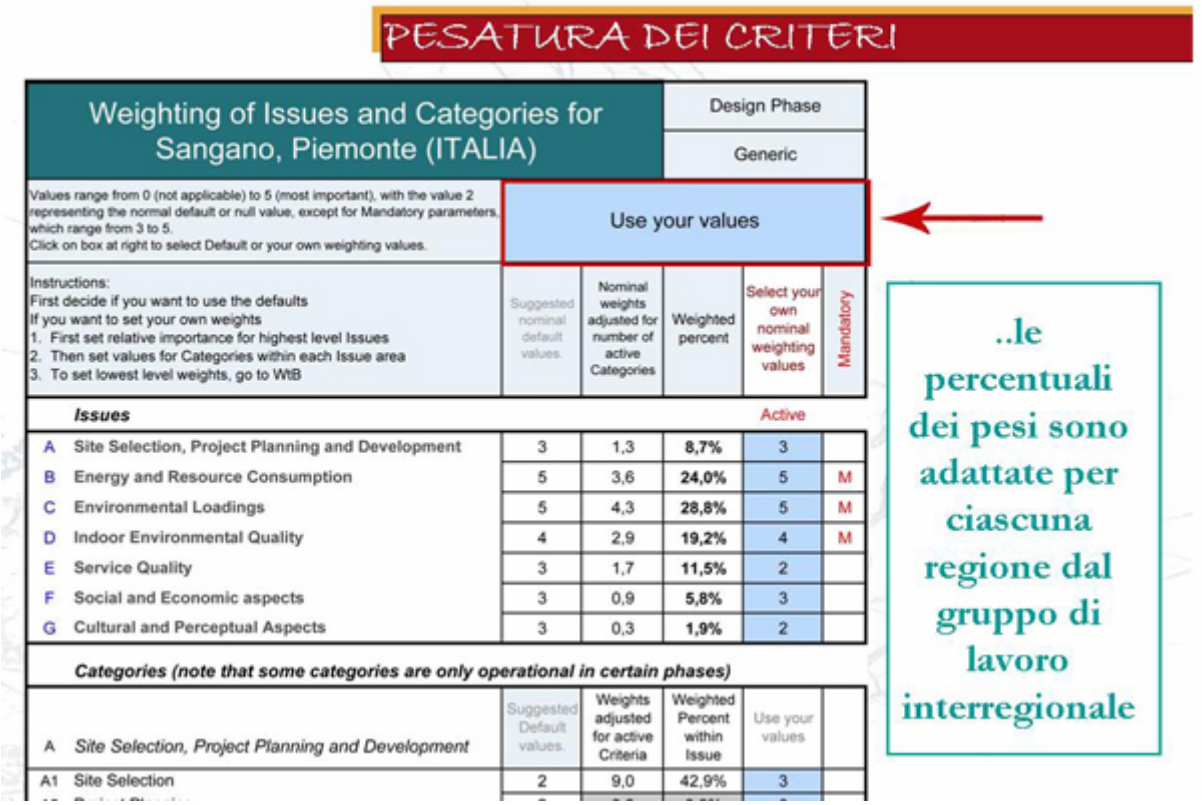
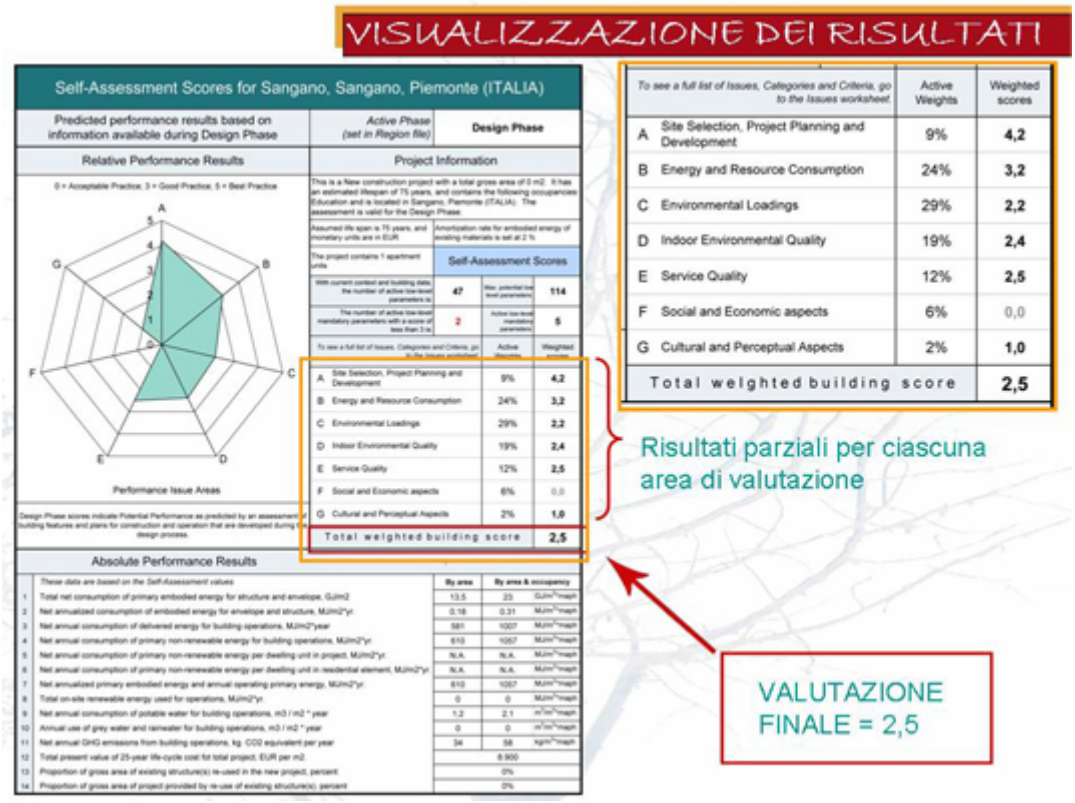
The work developed in this thesis arises from the desire to quantify the real benefits for the external environment and the built environment related to certain design choices of sustainability.
The aim of the thesis is the assessment of sustainability in school construction through a tool that can quantify the real benefits resulting from design choices and design strategies for sustainability.
The instrument used is called SBTool and it has been conceived, at an international level, in the process called Green Building Challenge since 1996 within a network of 19 countries, including Italy and in 2007 renamed in Sustainable Building Challenge SBC.
The conceptual pattern is very similar to BREEAM, but SBTool appears to be the most complete. It is the result of studies conducted by an international network, currently composed of institutions and public and private research organizations from 25 different nations, having a high know-how in this area. The environmental energy certification systems developed so far have an intrinsic structural limit. In fact they are applicable only in the geographic area for which they were designed. The calculation parameters are preset and they are proving inadequate for the calculation with parameters of different realities. The distinctive element of this system of calculation can be found in the purpose to create a tool applicable at international level, and able to fit its calculation to the local climatic, economic and cultural real characteristics in which it is applied maintaining the same terminology and structure.
SBTool is a generic structure that allows each local reality to develop one or more assessment systems that meet local circumstances of the project, replacing the generic reference data provided by the system with the specific data of a definite area.



Weights of the criteria used in system

Each country taking part in this project is represented by a national team whose task is to adapt the system to local realities, correcting the values and weights of the criteria used in the system.
SBTool values the sustainability of a building giving a score to architectural choices since it is a method belonging to “metodi a punteggio”, and not only to the materials used as it happens to the “bilanci ambientali”. As a matter of fact SBTool is based on fulfilment of a list of 113 criteria organized according to a clear hierarchy in 28 categories grouped in 7 areas of evaluation.



Representation of the final score

The aim of the thesis was to create a version of Tool, calibrated for the Italian national and regional specific circumstances in the assessment of Secondary School Buildings.
The assessment methodology system SBC is based on the concept of "Building REFERENCE" that is to say an hypothetical building representing the base constructive practice of the typology of buildings considered. This concept represents the heart of the thesis and at the same time the heart of the work of tool's contextualization. For this purpose two Secondary Schools built recently in the same geographical area of the case examinated have been studied and analyzed.
These buildings called "benchmark buildings" have been breaked up into a list of materials showing their relative quantities, with the purpose of determining the effective weight of each material.

MATERIALE	densità kg/mc	KG	E. Energy MJ/kg	E. Energy MJ	coeff di trasformaz	CO2 GJ
Acciaio (ferri armatura)	7800	63947,69	32	2046326,08	55	112547,934
Acciaio (scala e profilati)	7800	20569,48	32	658223,36	55	36202,2848
Alluminio (serramenti)	2700	17911,53	227	4065917,31	55	223625,452
Cartongesso 8+8 cm	900	63936,00	6,1	390009,6	55	21450,528
Ceramica (pavimenti)	2300	32545,00	2,5	81362,5	55	4474,9375
Cls (autobloccanti)	1000	12800,00	0,94	12032	55	661,76
Cls (blocchi faccia a vista 50x20 sp12 mc)	800	97944,00	0,97	95005,68	55	5225,3124
Cls (magrone)	200	300980,00	1	300980	55	16553,9
Cls (sottofondo per pavimenti in conglomerato leggero)	200	56600,00	1	56600	55	3113
Cls (struttura)	2100	8185863,00	1,3	10641621,9	55	585289,205
Ferro (profilati)	7870	116,55	32	3729,6	55	205,128
Ferro (ringhiere scale)	7870	783,80	32	25081,6	55	1379,488
Ghiaia (per sottofondi)	1700	826200,00	0,05	41310	55	2272,05
Gres porcellanato (pavimenti)	2300	8832,00	5,4	47692,8	55	2623,104
Gres porcellanato (zoccolo battiscopa)	2300	17020,00	5,4	91908	55	5054,94
Intonaco	1400	121632,00	4,5	547344	55	30103,92
Lamiera zincata (paraspigoli)	7500	2622,38	86	225524,25	55	12403,8338
Lana di roccia 6 cm	150	9182,25	14,6	134060,85	55	7373,34675
Lana di roccia 8 cm	150	7020,00	14,6	102492	55	5637,06
Lana di vetro con resine termoindurenti	85	6013,75	9,48	57010,35	55	3135,56925
Laterizi (pignatte)	1800	420480,00	3,5	1471680	55	80942,4
Laterizi forati	1800	42120,00	3,5	147420	55	8108,1
Laterizio (tegole)	1800	40887,00	2,3	94040,1	55	5172,2055
Laterogesso (blocchi 100x30 sp12 cm)	115	14079,45	3,08	43364,706	55	2385,05883
Legno (orditura tetto)	600	24600,00	2,82	69372	55	3815,46
Legno (porte)	550	2305,05	3,6	8298,18	55	456,3999
Pietra di luserna (scalini)	2700	8583,03	0,79	6780,5937	55	372,932654
Polistirene estruso in lastre alta densità 35 Kg/mc	35	1785,44	117	208896,1875	55	11489,2903
Rame (Tubi e pluviali)	8900	1566,00	70,6	110559,6	55	6080,778
Scagliola (rasatura su carton gesso)	1100	13836,90	3,2	44278,08	55	2435,2944
Vetro(vetrocamera 6-9-12+antisfondamento 4+0,76+4mm)	2500	14373,45	21,5	309029,175	55	16996,6046

Analysis of the benchmark building's material

Once the basis for the definition of the scale of assessment have been fixed, in compliance with the dictates of national laws, the tool was tested on a new secondary school building, confirming in this way the goodness of work.
The decision to tackle this theme was further strengthened by the possibility to adopt this work by iiSBE, in order to create a Simplified Protocol for mainly use from public administrations for the environmental assessment of school projects.

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