Requalification of Residential Space in Tirana - Methodologies and Intervention Strategies

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Abstract

The city of Tirana is subject to constant physical and spatial metamorphosis. In its urban territory, the different residential typologies are well distinguished by socio-economic conditions and the technical-constructive characteristics which have been influenced by political development of the country. The multi-family residential buildings from the post-war period up to the 1990s, in addition to the problems that accompanied them from their initial construction, are found today in front of a physical degradation derived from the years they have. Problematic residential spaces are also most of the buildings constructed in the first decade after 1990, characterized by a low technological and housing quality, derived from an uncontrolled and informal development of the building sector. The building quality in this research, is focused on the applied architectural standards, the technological solutions adopted and the energy consumption derived from them. From the analysis made it has been reached in the conclusions that a renewal and requalification process is necessary to reduce the energy waste and to increase the quality of housing within residential spaces. The main objective of this research is to contribute to the sustainable development of the residential area of Tirana, referring to both the architectural and technological scale. Sustainable development in this paper is closely linked to the quality of residential spaces, which is directly related to the quality of life of the inhabitants. Due to the complexity of the urban environment and its transformations over time, the identification of light regeneration and redevelopment strategies is fundamental, minimizing demolition works. This article includes numerous European examples and a theoretical part, from which proposals for the future development of the residential areas of the city of Tirana can be extrapolated.

Keywords: Requalification, regeneration strategies, sustainable development, residential space, energy efficiency

Introduction

The vast stock of multifamily residential buildings in Tirana is very dynamic. A part of this building stock is inherited from the regime period that means that they have fulfilled their life cycle of 50 years or that they're near to this process. Another part of the building stock has been constructed in the first years of 90s and for more than 15 years, the buildings were raised in a turbulent political situation that led to the poor quality of buildings in terms of their technology and energy efficiency parameters. Due to these phenomena renovation and requalification is needed in order to respect new energy savings in the buildings and to create more qualitative living spaces. Over the last decade, some improvements are made in this field, but there is nevertheless much to do in this area. It is valuable to find through the research some possible strategies for its future development.

The objective of this research is the definition of some possible interventions in order to improve the residential living spaces in Tirana neighborhoods. Due to the complexity of the urban environment and its transformations in time, the urban regeneration processes are the subject of an urban and architectural multi-scale study. The strategy proposals will be in this paper both in the architecture scale and in small scales accompanied with technology details. By defining some requalification strategies inside the existing urban pattern, some sustainable strategies for future development residential forms can come up, in order to be applicable in the analogue existing residential neighborhoods or in the new one. The sustainable development is here linked with the quality of the living spaces, which is closely linked to the quality of life of the inhabitants in these spaces.

Being in an existing urban pattern, drastic changes cannot be done and regeneration strategies can be identified in situ. Regeneration concept has been used from two centuries up to now in Europe but it is still an un-explored and a very new concept in Albania and in Balkans. In England, Germany, Netherland, France etc, there are projects applied in different social neighborhoods or peripheral ones and many academic studies has been conducted in Italy regarding to this topic. Important reference book has been used here as, "*Rigenerare le aree periferiche*" of A. de Cesaris and D. Mandolesi; "*Linee guida per la riqualificazione dei quartieri innovative nell'Italia centromeridionale*" edited by F. Dematteis and B. Todaro; *Sustainable design. A Critical Guide, Princeton Architectural Press,* D. Bergman, (2012); *The building envelope. Applications of new technology cladding,* Brookes, A. J., Grech, Ch.; the collection of researches in *A HANDBOOK OF SUSTAINABLE BUILDING DESIGN AND ENGINEERING. An Integrated Approach to Energy, Health and Operational Performance,* edited by D. Mumovic and M. Santamouris, etc.

Existing Buildings Structure

Various constructive and technological systems of the buildings before '90 and their conditions today

Residential neighborhods with multifamily houses started to be constructed in Tirana in the 1940s. The first buildings were constructed by italians as the 'Aeronautics buildings", "La casa degli impiegati", "Blloku Miqesia", etc. After the first years of forties, with the political regime changes new building strategy were applyed. New neighborhoods of residential blocks raised up. Some of them are *50 Vjetori*, *1 Maji*, *Shallvaret*, *21 Dhjetori*, etc. After 1945, in Albania, as in other countries of East Europe, was a centralized economy and a constraint city planning. In this period there, follows a reconstruction post war process and an urban evolution based on the principles of the *modern architecture.*[1] *«The modern architecture was never officially accepted by the regime of the Albanian state and it was secretly smuggled by the architects. Modern buildings were constructed not only in Tirana like Hotel Tirana (V. Pistoli), Flora residence (arch. M.Pepa and arch. I.Prushi), those in Dibra street (arch. M.Velo) but also in the city of Korça (arch. P. Kolevica) or in the buildings constructed in the residence center of Shkodra, etc.»*[2] Elements of traditional or classical architecture were substituted by pure forms and volumes. This was particularly noted not only in the residential areas, but also in the administrative and tertiary buildings.

The first '*social realism' buildings* in Albania realized in classical style were mainly inspired by the Russian Academy which itself is based on ancient Greek style, Roman Renaissance architecture and European neoclassicism. Some social, administrative and cultural buildings which belongs to this category are Kinostudio, the Ministry of Internal Affairs, residential buildings in Kombinati i Tekstileve "Lenin", the Lenin-Stalin museum, the Central Comity of the Albanian Communist Party, the theater of Shkoder, *the Parliament in Tirana*,[3] Shallvare palaces, Agimi palaces (arch. A. Strazimiri), etc. The architecture language of these buildings facades was a mix between classic European elements and local architecture elements.

After these first constructions in the end of fifties and the beginning of sixties due to the weakening of relations between Albania and the Soviet Union, having also a low economic level in the country, the architecture itself was oriented through certain standards that guaranteed minor costs of their constructions. The key factor of this '*new trend era*' was the influence of many architects that had studied abroad: in Poland (Enver Faja, Vasilica Silco), Bulgaria (Valentina Pistoli), Hungary (Mergim Çano), Romania

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[1] *The modern influence in Albania was clearly seen in the architecture of Albanian architects such as Q. Butka, arch. S. Luarasi, arch. A. Lufi, E.* Faja, etc. Some administrative buildings in Tirana which can have elements of Modern architecture are the National Gallery of Arts, the National Historical Museum, etc

[2] Faja, E., *Gjeneza e Arkitekturës moderne dhe e realizmit socialist në Shqipëri, në vitet 1945-1980*, 16/12/2010 (in 55 Magazine Online, http://gazeta55.al/gjeneza-e-arkitektures-moderne-dhe-e-realizmit-socialist-ne-shqiperi-ne-vitet-1945-1980/)

[3] The foundations of the Albanian Parliament in Tirana were built based in the project of Bosio, but during the communist regime, the project was adapted according to the tendency of the time by the Albanian architect *Anton Lufi*.

(Kristaq Sahatçiu) and many others who brought many modern elements influencing the way that the projects were implemented. The classic trend of Russian Academy was left aside and the orientation was more on the modern *l'Existence Minimum.* An example of this new way of planning was the residence area in the "Miqesia" block. The local architecture art had to be free of any oriental influence and without any decoration elements. The architecture had to be functional, minimal and built for the masses usually using volunteering labor. The prisoners constructed the Agimi Palaces (in the end of 50's) through volunteering labor.

Architecture, as any other form of art, was developed through a strong control of the state. The projects were adjusted to the rules and approved by a very strict commission. The minimum standard of the apartment was 40-42 meter square, which included a number of four or five beds confirming the necessity to increase illumination and ventilation of each building. The control of the state in the architectonic development, actions against the western influences and the drastic reduction of the state investments led to poor architectonic solutions in terms of esthetics and quality. The development of the construction materials sector led to the standardization of buildings and their constant repetition through the entire city firstly with bricks and after 1965 with prefabricated panels. In this period, the four-five floor residential buildings were mostly developed. Analog plans were replicated through all the country. «The phenomenon of the standardization of the apartment space's design also included the standardization of dimensions and was called '*tipization*'. *»*[4] Consequently, in this way there were implemented standard coded projects (60.1; 60.2; 60.3 etc., referred to the years 1960, 70.1; 70.2 for the 70's and 80.1, 80.2 etc., for the 80's) used in all the new collective residential blocks. Rarely any modification would occur based on the exact location and in that case they had to be approved by the "the Central Comity"[5]. The construction material of the buildings in this period of time was realised with traditional brick walls of 38 cm and 25 cm for buildings of 3 and 4 floors and sometimes 50 cm in the first floors of the buildings with 5 and 6 storeys. The buildings were plastered in both sides mainly or only in the inside part. This technology was simple withoiut any exterior layer. Another construction typology was with concrete panel walls which was a technology coming from China. The concrete panels were ready to be installed in construction site and the plans were very rigid because of their construction typology, differently from the brick walls typology which allowed for greater flexibility. These multifamily buildings come today, after more than 40 years of life, with the need to repair facade elements, heating plants, doors and windows in order to improve indoor living conditions, minimize energy losses and improve aesthetic quality of the facades.

[4] Dobjani, E., Barandovski,I., Nelkovska, O., *Quality of life changes the quality of space*, Habitat 3, Tirana 2015, p.29

[5] The Central Comity in the Communist state is the term used to designate the most important political body of the state, directing the organization of congressional sessions and conducting deliberative functions electing the executive bodies. It takes on a greater relief over the parliament duties, which ratifies the decisions taken by the central committee.

Constructive and technological systems after '90s and the main problem issues

The city grew up from a single function to a multi-functional center and developed in vertical level and in horizontal too. The rapid urban growth and the lack of capacities of public control because of the political transitions, influenced in the creation of an irregular urban landscape and in the low quality of the residential space. The increasing demand for new homes, created an unpleasant situation of informal parasites interventions in the facades of the buildings, both existing and new ones. The intrusion of new volumes on the existing building facades and in the urban pattern, implies a critical situation due to the lack of open collective spaces and public services. Consequently, not only the quality of the building facades that surround the open space has deteriorated, but in the meantime there were also created low aesthetic, environmental, compositional, architectural and technological quality open spaces. The presence of informal and individual interventions in the facades, without homogeneous material, dimensions or colures, has created a diversified pattern creating so an uneven façade interrupting the façade continuity by punctual interventions.

Figure 1. Building constructed after '90. Facade degradation.

Figure 2. Building constructed before '90. Facade trasformation

The new buildings have different typologies: tower typology or linear typology. Usually more buildings volume are joint together creating long buildings with more than a hundred meters. The stairwells are mostly closed and their relationship with the public space is missing. The façade development follows a division between the base, the body and the building crown. The ground floor is intended for commercial functions. The upper floors are used for houses function repeating the plan on multiple levels. The top floor is the roof that usually houses a smaller housing plan, so a different typology.

The new buildings are built with load-bearing concrete structure (concrete beams and columns). The technology used for the building envelope is a very low quality. The exterior walls are made of 20 cm hollow bricks and in the most of the cases are only plastered. This poor technology influences the low quality of life in the interior spaces of the house as a derivative of the great heat dispersions. The lack of thermoinsulation or the presenze of thermal bridges shows problems as mold and humidity inside the apartaments and plaster deterioration in the façade.

Requalification and regeneration strategies of residential building

Building adaptation with new requirements of nowadays

«If new buildings must respond to the changing needs of society, then we must also consider how to adapt the vastly greater number of existing buildings.»[6]

The urban fabrics are considered as organisms constantly evolving that should be changed and adapted to the new needs of contemporary life. As Rogers states in his book Cities for a small planet, new buildings as also existing ones should satisfy the daily needs of their inhabitants and their needs change over time. The permanent high demand in Tirana for new housings and the lack of government institutions control in the partly modification of the building volume by inhabitants, matching with their apartment position in facade, led to the chaotic development we have today in multifamily housing shells and urban shape. Furthermore, in Albania there is no normative framework that regulates individual informally interventions in façade and neither do we have any requalification program how to adapt existent buildings to the new needs of the residents. Related to all these observations, the regeneration strategies in Tirana buildings, are focused in the process of sustainable development, energy efficiency and life quality, identifying possible strategies of interventions. Some important issues of intervention have been identified referring to the building regeneration and envelope transformation in terms of energy efficiency.

The façade of the building is considered an important element that relates and divide the interior inhabited space of a building and the outside space. It is not only an important element because of its aesthetic function but is also an important element because of its function as a protection layer against outside weather conditions. It is important because of the comfort that should insure to the inside space. In the first Venice Architecture Biennale in 1980, with the title 'The presence of the past'directed by Paolo Portoghesi, the attention was brought toward the façade and among 13 other installations, Dardi participated with the installation of Strada Novissima. In his text, Behind The Façade, he see the facade «as a meeting layer between internal structure and urban dimension, filter and diaphragm, a layer that function as a fence between public space and private one and relates them.»[7]

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[6] Rogers, R., *Cities for a small planet*, ed. by Philip Gumuchdjian Faber & Faber, 1997, p.79

[7] *Catalogo della I motsra Internazionale di Architettura, La Biennale di venezia, 1980* oggi in Costanzo, M., (a cura di) *Costantino Dardi. Architettura in forma di parole*, Macerata, Quodlibet, 2009, e in Giancotti, A., *Trasformare l'involucro. Conservazione e riscrittura dell'imagine nel patrimonio dell'edilizia residenziale pubblica*, in Todaro, B., De Matteis, F., (a cura di) *Interventi sull'abitare. Linee guida per la riqualificazione dei quartieri innovativi nell'Italia centromeridionale*, Propsettive Edizioni, Roma, 2012, p. 151

Germany, with sensitive policies towards the environment and energy saving, has organized during the past two decades, programs for restructuring and renewal operations to increase the quality of the internal space of the houses through improved thermal and acoustic performance by intervening in external envelope and improving the quality of the spaces in-between at the neighborhood level. The surgery helps retrain these neighborhoods and use new technologies or renewable materials.

In other post-socialist countries, as Serbia, Macedonia, Albania, etc., requalification programs have been missing totally. In Albania there are different laws related with the preservation of the "heat in the buildings" (Nr. 8937, date 12.9.2002) or the law on "approval rates, terms and conditions of design and construction, production and retention of heat in the buildings (DECISION no. 38 dated 16.1.2003), the LAW no. 9379, dated 28.4.2005, On energy efficiency or the Decision Nr.584, of 2.11.2000, on Energy savings and warmth keeping jobs, but these laws first of all have no "power" in the process of executive control in the field application leading to new buildings with low quality conditions; second, there is not any low related with the regeneration or requalification process of existing building stock constructed during the regime period.

A well-designed building enclosure, according to Magwood 2017, does four things: Keeps water out; Controls air flow into and out of the building; Keeps heat energy in or out, as desired; Manages vapor migration. A building that effectively controls water, air, heat, and vapor according to the demands of the climate and the needs of the occupant is a successful, comfortable, efficient, and durable building. Your basic understand of building science begins with identifying each of these four control layers in your building[8]

The current situation of the residential buildings in Tirana is categorized according to three construction periods, which also indicates their constructive character and façade quality:

_ Buildings constructed before 1944, which are mainly villas of one, two or three floors. Referring to INSTAT data, the stock of housing built before 1945, consists in 215 thousand apartments, mainly for individual family units, or more households, depending on the generation.

_ The period of the communist regime, from 1944-1990, led to the construction of public residential buildings, characterized by their height from three to six stores. During this period, only residential condominiums were built. The architectural and spatial composition of the condominiums and apartments was standardized in only a few typologies. Public residential buildings were owned by the state and were built with

[8] Magwood, Ch., (2017) *Essential Sustainable Home Design_ A Complete Guide to Goals, Options, and the Design Process,* New Society Publishers, pg. 62

public funds using very often the volunteer work. Referring to the INSTAT data in this period are built almost 450 thousand houses.

_ After nineties, in the first decade of the capitalist period, it prevails the construction of private houses in the suburbs of Tirana in comparison with residential buildings of 6-12 floors, more widely spread in the second decade.

Buildings constructed during this period, increased the density in the central urban areas and spread to the outskirts of the city, creating a current housing stock of poor technological quality and rigid architecture.

	Up to 1960	1961-1980	1981-1990	1991-2000	2001-2005	2006-2011	Inhabited buildings*	Non-inhabited buildings*	Total
Tirana	6,066	8,087	8,204	34,259	16,175	12,424	13,895	11,173	110,283

Figure 3. The quantity of multi-family residential buildings in Tirana in different periods after 1960. (font: INSTANT)

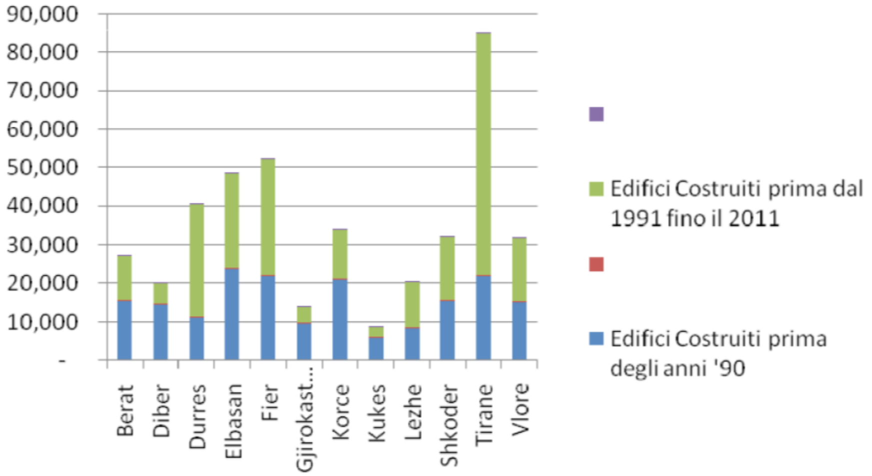

Figure 4. Edifici residenziali plurifamiliari costruiti prima e dopo gli anni '90 a Tirana. (fonte dei dati: INSTAT, grafica: l'autore)

Due to the low level of architectonic quality in houses and apartments, 25% of the total energy spent in Albania goes in residential sector. These parameters reflect on ways how to build and how the architects can improve the housing conditions. If regeneration and revitalization programs will be developed referring to the building envelope, the cost of energy for each housing unit, will be lower than the present. This intervention will improve consequently the thermal comfort inside the apartment, and at the same time will reduce the energy costs in the residential sector at the state level.

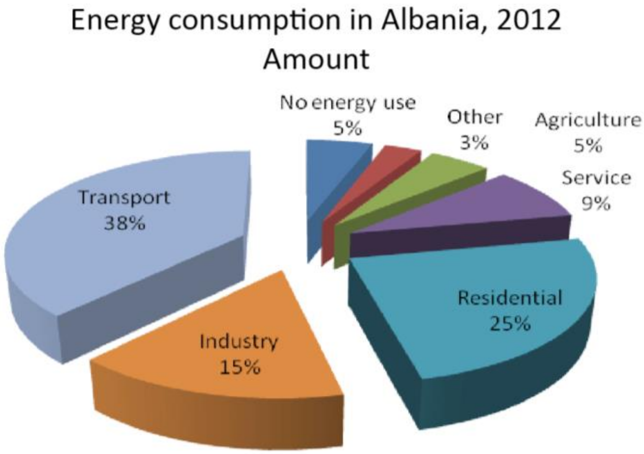

Figure 5. Energy consumption in Albania on various sectors, 2012. 25% of total budget goes for residential sector. (font: INSTANT)

As Rogers also states in his book Cities for a small planet, «the construction of our habitat continues to be dominated by market forces and short term financial imperatives. Not surprisingly, this has produced spectacularly chaotic results. It astounds me that the built environment in so many places remains an incidental political issue. »[9] This phenomenon is also very actual in Albania, because due to political change and the very long transition period the quality of residential spaces was very low. The total number of dwellings in Tirana in 2011, according to INSTAT data, is 1,012,400, and only 545.001 of these houses are in urban areas, the rest are rural housing. The biggest problems on the present situation of residential buildings, are their poor insulation of the walls and the roof, presence of thermal bridges and high energy consumption.

The current situation led to the necessity to improve the inside living conditions by improving the building facades or give suggestions for a residential building renewal. With all the efforts that Albania is making to join the European Communities, a very important area to invest in research is the new building stock, very problematic for its poor current conditions, which in 1950 will be considered at the end of their rehabilitation cycle (30-50 years).

Directive 2010/31 / EU requires all States Member or candidate countries to set minimum energy performance requirements for new and existing buildings, to ensure the energy certification and disciplinary controls on air conditioning systems and provides that, by 2021, all new buildings are "Nearly Zero Energy Buildings". State's Member should establish a national system of mandatory energy efficiency with the aims to achieve a cumulative goal of the final energy savings by 31 December 2020, at least 1.5% of the total energy sold to final consumers, for the period 2014-2020. These goals

[9] Rogers, R., *Cities for a small planet*, ed. by Philip Gumuchdjian Faber & Faber, 1997, p.17

are not fulfilled by Albanian development and a lot of investments should be done in this field in the architectonic and technological conditions of the house, in order to reduce energy costs and at the same time to increase the quality of the inside living conditions of the inhabitants. In recent years, Albania has taken important steps in the approval of energy efficiency laws in particular with Law No.124/2015 (Energy Efficiency Law) and Law No.116/2016 (Law on the Energy Performance of Buildings), which comply with Directive 2012/27/EU and Directive 2010/31/EU, respectively. The Albanian legislation has not yet defined the minimum requirements of envelope, plant solutions, including those using renewable energy sources for new buildings or energy refurbishment.

Are analyzed below two multifamily residential buildings in Tirana referring to their architectonic details and their energy consumptions. These buildings belong to different periods of construction.

The first one has four floors and has been constructed in 1959. It has a constructive systems made of with retaining brick walls. It is located near the Blloku area, in Abdyl Frasheri street and Wilson ring.

Figure 6. The first multifamily house location, taken as case study

The building analyzed is a multi-family residential building with two staircases from which access four apartments per each floor. It was initially designed for four floors and then a fifth floor was added over time. It has a depth of 9 meters, a length of 26 meters and a height of 16.6 meters, with a load-bearing brick structure of 25 centimeters in width.

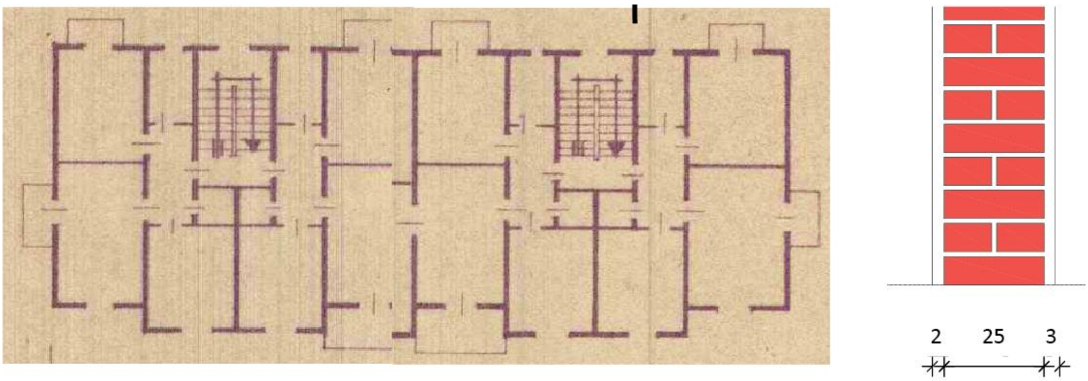

Figure 7. The first multifamily house plan and detail of the perimetral wall.

The second building has been constructed in the last two decades. It is a multifamily house designed for ten floors and it's located in a new neighborhood near Kombinat.

Figure 8. The second multifamily house taken as case study. Its location in the left and the plan in the right.

The building has been constructed in 2013. The type of building is an open U-shaped block with an internal courtyard. There are in total four stairwells from which four families enter per each floor. In total there are sixteen apartments per floor. It has a depth of 14.5 meters, a length of 37 meters and a height of 37 meters. The total area of the plant is 683 meters and the supporting structure is made with columns and beams in concrete material. The perimeter walls are 20 cm width, realized with hollow bricks and plastered in both outside and inside part.

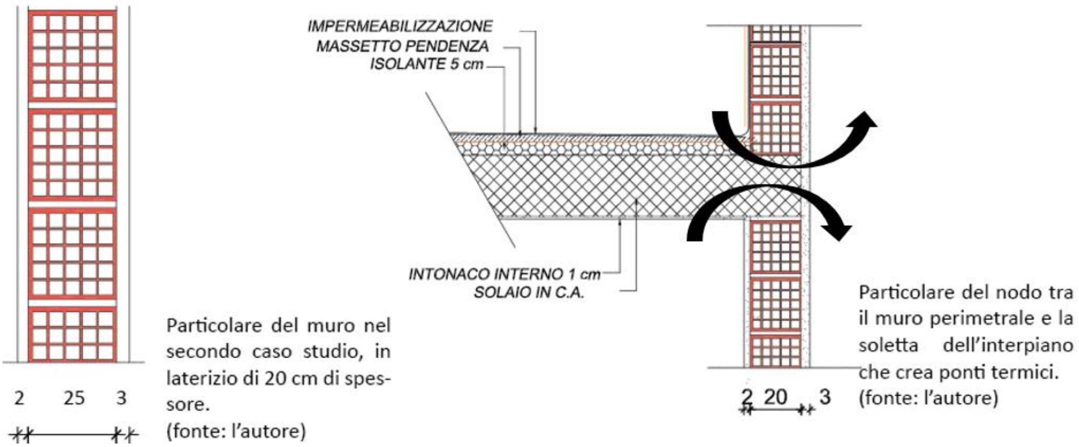

Figure 9. Details of the perimetral wall and the node between the perimeter wall and the intermediate floor.

Possible interventions in the façade can be designed *adding a layer of thermal insulation; adding a layer of thermal insulation plus a layer of perforated bricks; making green facades, green roofs, and eliminate thermal bridges nodes.*

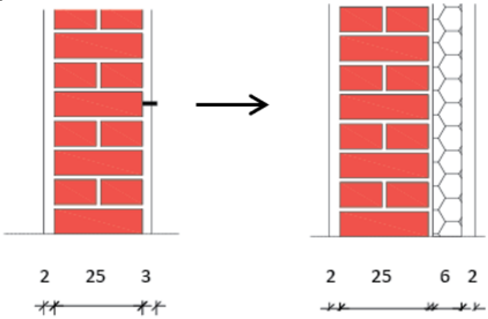

Figure 60. Possible interventions in the façade with traditional brick walls, by adding a layer of thermal insulation.

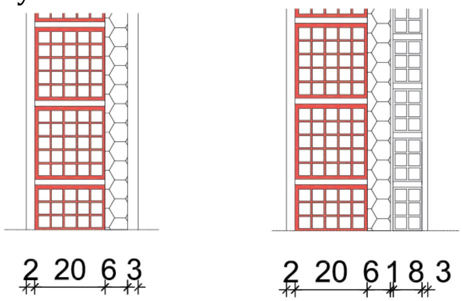

Figure 11. Possible interventions in the façade with hollow brick walls, by adding a layer of thermal insulation only, or a layer of thermal insulation plus a layer of external perforated bricks to improve thermal insulation of the external wall

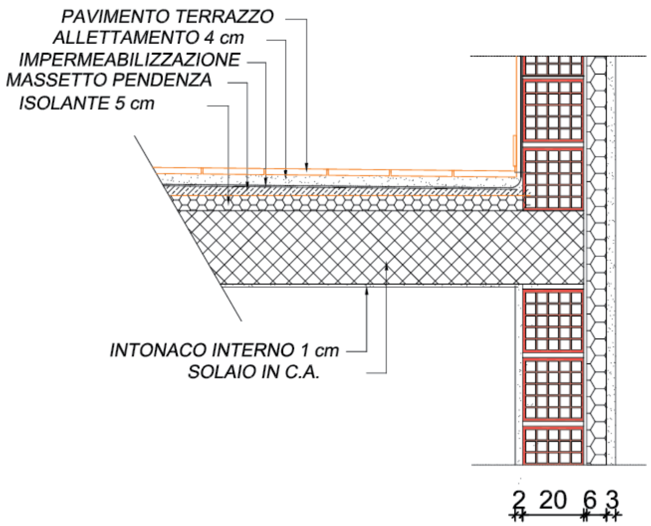

Figure 17. Possible interventions in the façade in order to eliminate the thermal bridges in problematic nodes.

Reconceptualization of the shell in residential buildings with new energy efficiency requirements

Energy Performance Calculations

The two buildings taken as a key study in the previous paragraph will be analyzed here by their physical state, such as the building width, length, height and the surface number of floors, the coefficient S / V ratio. After all these data, will be calculated the value of U (W/m^2K), thermal transmittance of the architectural elements as external wall, roof, floors and windows or external doors. Will be calculated also the building losses caused by various factors. These calculations help us understand how much each of these buildings is spending today on energy to heat the inner environment and how much energy will be spent after the regeneration interventions. The ratio between the total investments in regenerating facades interventions and the savings gives us the time of the return of the investment.

These calculations help us understand how we can intervene in existing buildings, how much time do we need for the return of the investment costs and the benefit in Euro that we have due to electricity costs for each family per year.

Case 1. Multifamily residential building constructed in 1959

No.	Case study	year of construction
1	Mulltifamily residential house	1959

Width	Length	Height	Floor Area	Volume	No. Floors	Envelope Area (5 facades)	S/V	Perimeter
[m]	[m]	[m]	[m2]	[m3]		[m2]		
9	26	16.6	**234**	**3884.4**	**5**	**1362**	**0.06**	70

Architectonic Element	Area	U	Tin - T out	Losses because of transimittion (Qt)	Thermal bridges (Qt)	Losses because of orientation (Qt)		Losses because of Infiltration	Qtot	
	[m2]	[W/m²K]	°C	W	W				[W/°C]	
wall without win	1120.0	1.83	18.5	37917.6	3791.8	1895.9			43605.2	
roof	200.0	1.39	18.5	5143.0	514.3	257.2			5914.5	
floor	234.0	1.20	18.5	5194.8	519.5	259.7			5974.0	
doors	18.9	5.80	18.5	2028.0	202.8	101.4			2332.2	
windows	23.1	5.80	18.5	2478.6	247.9	123.9		35571.4	2850.4	
								Qtotatle	96247.7	W
								GV=Q/(V*DT)	0.80764082	[W/m3ºC]

Performance Energetica	493.5861333	(kWh/m2 vit)
Bisogno Energetico per il riscaldamento del piano	115499.1552	kWh/vit
Costi annuali per il riscaldamento per l'intero edificio	1616988.173	Leke/vit
	11549.91552	euro / year

Annual Costs for a family	20212.35216	Leke/vit
Costs for a family in a month	144.373944	euro/anno
Annual Costs for a family	7.2186972	euro mese

Energy costs of the building are calculated here as the amount of total Energy needs for heating for the floor area in kWh/year and the Annual costs for heating in Leke(Albanian coins) /year.

Energy needs for heating are Initially Energy performance * floor area and "Initially Energy performance" is the [GV=Q/(V* ΔT)]/ /(1000*floor area in m2)

Q=Total losses

V= Volume

EXISTING SITUATION

Initially Energy performance	493.59	(kWh/m2 year)
Energy needs for heating for the floor	115,499	kWh/year
Annual costs for heating	1,616,988.17	Leke/year
	11,549.92	Euro/year

INVESTMENTS

Interventions	Surface	Costs	
External layer of 6 cm of thermoinsulation	3847	5,924,380	Leke
Serramenti	42.0	529,200	Leke

total investments		6,453,580	Leke
		46,097.00	Euro

	U [W/m²K]	Energy Performance of the building [kWh/m2 year]	Costs Before interventions [euro/year]	Costs After Interventions [euro/year]	Savings [euro/year]	Expenses Costs	Investments return [year]
Muro perimetrale di 25 cm	1.83	493.59	11549.92				
Muro perimetrale di 25 cm + termisolamento di 3 cm	0.77	288.1213867		6742.04	4807.88	11200.00	2.3
Muro perimetrale di 25 cm + termisolamento di 6 cm	0.49	233.6538453		5467.50	6082.42	16800.00	2.8
Muro perimetrale di 25 cm + termisolamento di 3 cm + mattone forato di 8 cm	0.32	201.0896213		4705.50	6844.42	24640.00	3.6
Muro perimetrale di 25 cm + termisolamento di 6 cm + mattone forato di 8 cm	0.26	167.2460885		3913.56	7636.36	33600.00	4.4

Case 2. Multifamily residential house constructed in 2013

No.	Case study	year of construction
1	Mulltifamily residential house	2013

Width	Length	Height	Floor Area	Volume	No. Floors	Envelope Area (5 facades)	S/V	perimeter
[m]	[m]	[m]	[m2]	[m3]		[m2]		
14.5	37	32	**683**	**21856**	**10**	**4619**	**0.03**	123

case 3

Architectonic Element	Area	U	Tin - Tout	Losses because of transimittion (Qt)	Thermal bridges (Qt)	Losses because of orientation (Qt)	Losses because of Infiltration	Qtot
	[m2]	[W/m²K]	°C	W	W			[W/°C]
wall without windows	3847.0	1.72	18.5	122411.5	12241.2	6120.6		140773.3
roof	600.0	0.37	18.5	4107.0	410.7	205.4		4723.1
floor	695.0	1.20	18.5	15429.0	1542.9	771.5		17743.4
doors	52.0	2.80	18.5	2693.6	269.4	134.7		3097.6
windows	37.0	2.80	18.5	1916.6	191.7	95.8	200146.3	2204.1

Qtotatle	368687.7	W
GV=Q/(V*DT)	0.39871175	[W/m3ºC]

Energy performance	469.7270968	(kWh/m2 year)
Energy needs for heating for the floor	326460.3323	kWh/year
Annual costs for heating for the whole building	4570444.652	Leke/year
	32646.03323	euro/year

EXISTING SITUATION

Initially Energy performance	469.73	(kWh/m2 year)
Energy needs for heating for the floor	326,460	kWh/year
Annual costs for heating	4,570,444.65	Leke/year
	32,646.03	Euro/year

INVESTMENTS

Interventions	Surface	Costs	
External layer of 6 cm of thermoinsulation	3847	5,924,380	Leke
Serramenti	89.0	1,121,400	Leke
total investiments		7,045,780	Leke
		50,327.00	Euro

	U [W/m²K]	Energy Performance of the building [kWh/m2 year]	Costs Before interventions [euro/year]	Costs After Interventions [euro/year]	Savings [euro/year]	Expenses Costs	Investments return [year]
Muro perimetrale di 20 cm, con mattoni perforati	1.72	469.7270968	32646.03				
Muro perimetrale di 20 cm, con mattoni perforati + termisolamento di 3 cm	0.75	248.467303		17268.48	15377.56	11200.00	0.7
Muro perimetrale di 20 cm, con mattoni perforati + termisolamento di 6 cm	0.48	186.8795253		12988.13	19657.91	16800.00	0.9
Muro perimetrale di 20 cm, con mattoni perforati+ termisolamento di 3 cm + mattone forato di 8 cm	0.321	150.6111673		10467.48	22178.56	24640.00	1.1
Muro perimetrale di 20 cm, con mattoni perforati+ termisolamento di 6 cm + mattone forato di 8 cm	0.31	148.1020357		10293.09	22352.94	33600.00	1.5

Due to energy performance calculations made in two buildings, we can see that the energy performance of the buildings if we add a layer of six centimeters in both buildings, improve a lot in comparison with the existing situation. In the first case, the costs for energy heating are reduced from 12080.6 euro per year in 5557.65 euro per year and the time of return of the investment is seven years. In the second building the costs for energy heating are reduced from 34231.35 euro per year in 17585.54 euro per year and the time of return of the investment is three years. That means that the energy losses in the second case are bigger and the savings with the new interventions are bigger in the energy savings.

Conclusions

The main goal of this research is giving a contribution in the sustainable development of the residential space in Tirana and defining some possible strategies to be applicable in the existing residential buildings constructed before and after nineties. The quality of facades in the existing stock of the buildings, except the architectural perspective has an emergent need for interventions to improve the degradation over time and it is an important architectonic element, which is closely associated with the thermal losses of the building and the creation of residential warm environments, thus affecting also in the energy consumption costs. Residential blocks built before nineties, have established need for reconstruction and interventions to adapt the volume to the new energy requirements. New buildings constructed in the last three decades with facades made of bricks of twenty centimeter, shows high thermal losses and in the presence of thermal bridges is created mold and moisture inside the living space, thereby leading to the need for interventions in the façade, roofs and openings to reduce thermal loss, creating so warm environments with less energy expenses. The big energy losses because of the bad quality of the perimeter wall, the presence of the moisture and mold inside the living space, the plastering degradation in the major stock of new and old buildings, became a focal point of the research. Possible interventions are proposed reflecting in terms of not only international references and examples how to improve the outside wall but also referring to some calculation in situ to define better the problem. There has been made some calculations of thermal transmittance of the wall, or the U-value, to see the rate of the heat transfer from the inside living space and the energy performance of the wall as it is now and how can it improve by adding other layers.

In conclusion, there have been proposed some interventions to improve the residential living space. In the building scale, there are proposed intervention in the façade by adding other layers of thermal insulations and second layers to increase the energy performance as bricks or panels of different materials, or green element that can improve building performance in terms of architectural point of view and also the energy consumption of the building as green facades, green roofs, and the elimination of thermal bridges.

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