

Heritage values and thermal comfort in Neoclassical residential buildings of Athens, Greece

Tension or co-existence?

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Abstract – This paper explores how meanings and values assigned by residents to historic buildings, drive or prohibit their energy efficiency interventions. More specifically, the paper examines the possible tension between the residents' need to improve the sense of thermal comfort while preserving the original features of their house. The focus of the study is located in the context of listed residential buildings in Athens, Greece. The selected buildings represent the so-called 'neo-classical' architectural style. Currently, the need of residents to improve the energy performance of the neo-classical built heritage leads to interventions that may jeopardize the heritage significance of the buildings, despite the rigid (if not too restrictive) legislative framework. Semi-structured interviews with residents recruited via 'snowballing' methods reveal that there is indeed a tension between the need to improve the thermal comfort during the winter period via the installation of mechanical means at the sacrifice of original features of the building. However, most residents are against the installation of air-conditioning systems on the façade of the building but very receptive to the adoption of photovoltaics and double-glazing windows. In conclusion, despite a few cases in which the façades were dramatically affected by double glazing and external shades, it was noted that the changes adopted by the residents were complying with the legislation in place and the architectural significance of the building.

Keywords – energy efficiency; thermal comfort; heritage values; neoclassical buildings

1. INTRODUCTION

Residents of traditional or historic buildings have been underutilized as a source of information concerning the building's performance. However, they should be considered as a guide regarding the indoor environment quality, since their behaviour can highlight whether its effect on comfort is positive or needs further attention [1]. There are many factors affecting inhabitants' behaviour towards thermal comfort with the most significant being the type of the dwelling, the orientation and the type of the room [2]. Drivers that can influence human reactions can be divided in the following categories: external, internal/individual and building properties where external include physical drivers (such as temperature, humidity, noise); internal include physiological (age, gender, etc), psychological (e.g. lifestyles, tendency for thermal comfort), awareness and social (interactions

with inhabitants)' and contextual drivers such as building properties, ownership status, etc [3]. While most research on thermal comfort has mainly focused on a set of optimum comfort conditions based on physiological models that can be universally applied, there is a growing acknowledgement that more research is needed on the perceived thermal comfort and the means people wish to employ their sense of comfort [4].

This paper offers an empirical study to the widely acknowledged tension between thermal comfort and heritage conservation in historic buildings. The paper focuses on the historic centre of Athens, Greece, where the majority of neoclassical, listed buildings are located. Currently, the remaining neoclassical stock lies deserted or restored with uncontrolled interventions, harmful to the integrity of their architectural form [5]. Thirteen in-depth, semi-structured interviews were conducted in summer 2016 and thematically analysed in order to explore residents' perceptions concerning values, thermal/acoustic comfort, renovation, energy efficiency, behaviours towards discomfort and the existing legislative framework. In this paper, focus will be placed on residents' behaviours towards energy efficiency interviews as they are dictated by heritage values and/or prioritization of thermal and acoustic comfort. The paper will argue that the ways in which residents value their houses relate to the ways in which the heritage elements of the structure evoke a sense of 'home' and 'comfort/cosiness'. At the same time, there are changes targeted to thermal comfort that can alter the character and integrity of the buildings, thus disturbing the balance between thermal comfort and heritage values.

2. METHODOLOGY

Thirteen semi-structured interviews were undertaken with residents of neoclassical buildings in Athens. This type of interview offers the flexibility of open-ended and non standardised interviews, in the sense that the interviewer can deviate from the question script and better communicate and interpret the objectives of the survey [6]. Free answer questions have the benefit of providing a variety of responses, acquiring elaborations, evaluating arguments and exploring descriptively the interviewees' point of view [7]. Participants were recruited through the snowballing method not only for logistic reasons but also for health and safety issues due to the fact that the interviews took place within the residences. Interviewing within the buildings was critical since this allowed the observation of physical changes over time, while the interviewees could pinpoint the aspects of their residences they valued the most. During the interview process, participants were shown pictures illustrating energy efficient alterations made to historic similar-type buildings in order to provoke reflections and discussions (photo elicitation method) [8]. At the end of each interview, after connection and trust was established, participants were asked to take photographs using the researcher's equipment, capturing some of their favorite characteristics of the house. Thus, participants were given the opportunity to dictate the aspects of their house they valued the most (photo production) [9]. The interview data were thematically coded via *detailed coding* (identifying keywords) and *axial coding* (classifying the

codes into general categories/themes). The following themes were extrapolated: expert/non-expert; reason for choosing residence; values; period of residence; perception of thermal comfort; changes concerning comfort improvements; attitudes towards energy efficiency; attitudes towards renovation; listing; future intentions.

3. FINDINGS

3.1 ATTITUDES TOWARDS ENERGY EFFICIENCY MEASURES

Overall, changes of the façades of the buildings under examination appear to have been respected since the decorative elements and the coat colour are intact and there is a lack of additional equipment at the façade (Figures 1a, 1b, 1c). Most of them are in a good condition, although in some cases further maintenance is required.

However, in three cases alterations driven by the need to improve both the acoustic and the thermal performance of the building—especially in the winter months—severely affected the appearance of the building. The implementation of aluminum double glazing, the addition of external shades and the change of the original coat colour, were some of the interventions altering the character of the corresponding neoclassical buildings (Figures 2a, 2b, 2c).

The photo elicitation process during which residents were shown images of neoclassical buildings with double-glazed windows, photovoltaics, plasterboards, air-conditioning and change of the coat colour on the façade provoked opposition to such alterations mainly justified by the impact of such interventions on the aesthetics of the buildings (Table 1).

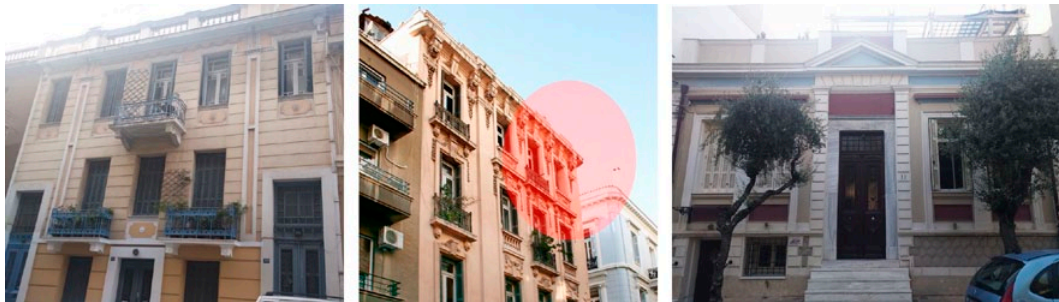


Figure 1a,1b, 1c. Façades without interventions, case studies. Photos: Koukou, T. 2016.



Figure 2a, 2b, 2c. Exterior changes. Photos: T. Koukou 2016.

Table 1. Summary of residents' attitudes towards energy efficiency

Attitudes towards energy-efficiency								
	Expert / Non-expert	Owner / Tenant	Double glazing	PV	Plasterboard (ceiling)	Plasterboard (interior)	A/C	Colour change (façade)
1	Non-expert	Owner	Difficult	–	●	●	●	●
2	Non-expert	Owner	v	●	●	●	●	●
3	Expert	Owner	●	●	●	●	●	●
4	Non-expert	Owner	v	●	●	v	●	●
5	Non-expert	Owner	●	●	●	●	●	●
6	Expert	Tenant	●	Difficult	●	●	●	●
7	Expert	Owner	v	●	v	v	●	v
8	Expert	Tenant	●	–	v	●	●	●
9	Non-expert	Owner	●	●	●	●	●	●
10	Expert	Owner	●	●	●	●	●	●
11	Non-expert	Owner	●	●	●	●	●	●
12	Non-expert	Tenant	●	●	●	●	●	●
13	Non-expert	Owner	●	●	●	●	●	●

v Already installed ● Yes ● Maybe ● No

One of the interventions that was unanimously disapproved by the respondents, was the potential installation of an air-conditioning device on the façade. Their contradiction was intensely expressed ‘No, no never’, ‘Certainly not’, ‘It would ruin the façade’ (male, 55–65, homeowner) and was attributed mostly to the listing of the façade, the restrictions it may pose, and aesthetic reasons.

Likewise, the use of plasterboard on the ceiling was perceived to result in the concealment of the ceiling decorative plasterwork and the alteration of the building’s analogies (Figures 3a, 3b, 3c). A respondent stressed: ‘These buildings have their own personality and if you change it they cannot function in the same way’ (female, civil servant, 51–60, homeowner). On the other hand, two participants who had replaced the original ceiling plasterwork pointed out

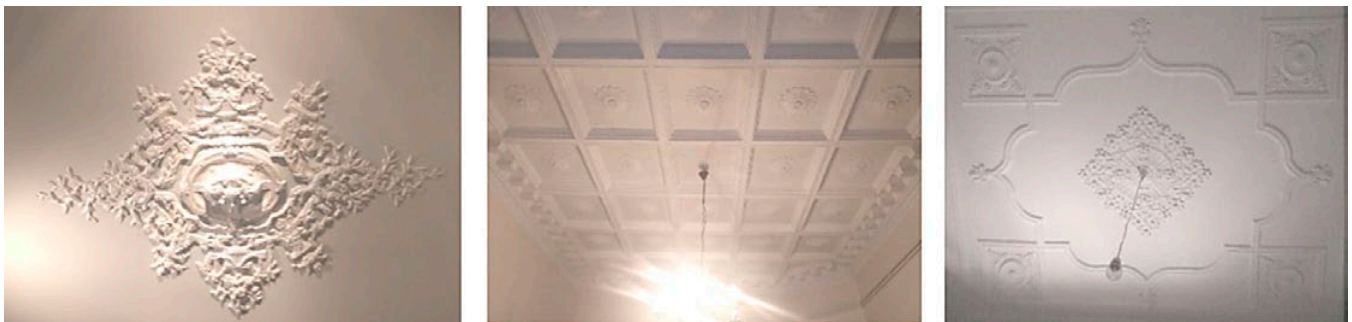


Figure 3a, 3b, 3c. Ceiling plasterwork, case studies. Photos: Koukou, T. 2016.

that 'the ceiling plasterwork was not considered to be of a significant architectural importance' and that the plasterboard reduced the floor-to-ceiling height, achieving a height closer to the human scale (male, director, 31–40, homeowner).

The application of new coat colour on the façade of the buildings caused diverse opinions. Seven of the interviewees maintained the original colours, even if they had to take a sample from the wall in order to recreate the original colours. Three of the participants commented on the strict legislative framework that dictates a restrictive range of acceptable colours. One individual had already altered the coat colouring while an additional four would do the same, 'with pleasure'. Another resident mentioned 'I would not like to apply a different coat colour, but a coating that can provide the appropriate insulation' (male, 61-70, homeowner)

The question about photovoltaics raised great skepticism among the interviewees. Most of them were negative due to aesthetic reasons ('photovoltaics are very ugly' (male, 61-71, homeowner)), lack of space, high cost, and/or unsuitable orientation in conjunction with the shading of the surrounding buildings. Despite the fact that one resident showed strong affiliation to photovoltaics, most of the respondents declared their lack of awareness in terms of how much energy savings they can make through the use of photovoltaics.

The most acceptable alteration that residents were willing to undertake was the replacement of the original windows with double glazed ones. Actually, three of the respondents had already replaced them. Some of the reasons provided by the respondents for this decision, were linked to the need to reduce heat loss and the perceived endurance of aluminum over timber. In a few cases, the alteration was imposed by the need to sound proof the interior. When participants were interrogated about their future plans of alterations, they prioritized the use of solar heating, the installation of ceiling fans and central heating and the replacement of the windows with double-glazed ones.

3.2 PERCEPTIONS OF THERMAL COMFORT

In Athens' climate, the neoclassical buildings function well during the hot summers but less so during the cold months. To avoid overheating indoors, internal blinds are often chosen, as external shading is not permitted in listed buildings. Generally, it becomes apparent that residents use heaters, or gas heaters and fan heaters, to improve the thermal comfort during the winter months. Only two respondents adopted more natural methods, such as using extra clothing, separating the rooms by closing certain doors, and in case of extreme moisture and cold, using a dehumidifier. In one case, the interviewee highlighted the positive effect of an internal atrium in terms of thermal comfort especially during winter, as the atrium facilitates circulation of hot air upwards, heating the upper levels of the building.

Additionally, it was noted that previous experiences can form one's behavior towards thermal discomfort, as residents of an elder generation, who adapted to the cold weather conditions in the past, were able to use passive ways for improving thermal comfort. On the other hand, residents growing up with certain

comfort expectations seemed to be leading a less natural and more luxurious way of life, as improving their thermal comfort in winter depended largely on the immediate use of mechanical means.

How varied and subjective the perceived thermal comfort can be, can be illustrated by the case of a non-listed, neoclassical building comprised of a stone masonry ground floor and a concrete first floor. Interestingly, despite the different construction materials (the thick stone wall tends to be cooler in the summer and winter months), the residents' views on thermal comfort did not differ. This case is a living example of how the properties of a building material cannot ensure comfort by themselves. Parameters such as the poor construction work, alongside the small amount of light penetration due to the surrounding environment, caused dampness and discomfort among the residents of the masonry ground floor, which is intensified by the lack of a heating system. Moreover, in this case the residents reported that 'the owner is unwilling to sell the building, as she loves it so much, that she could not bear its demolition and replacement by a block of flats' (female, dancing teacher, 31–40, tenant). This is an example showing that the designation of a building apart from potential restrictions, can have positive impact on sustaining the historic building stock and its values.

3.3 WHAT DRIVES OR PROHIBITS CERTAIN ENERGY EFFICIENCY STRATEGIES IN HISTORIC RESIDENCES

Generally, the ownership status is believed to strengthen interventions for the energy efficiency and the improvement of thermal conditions indoors [10]. In this case, the ownership or tenancy status does not seem to be an important factor, as energy-efficient measures have been taken by both owners and tenants. Moreover, the placement of plasterboard on the ceiling, and the change of coat colour on the façade, has only been employed by experts, while the plasterboard internally and the double-glazing has been used by both experts and non-experts. Moreover, other energy efficient means were mentioned, such as the addition of external thermal insulation and acoustic insulation in the internal walls (expert, owner) and acoustic insulation in the slabs (non-expert, owner).

The current financial state, with restricted motives in conjunction with the lack of the residents' awareness concerning environmental, economic and energy-efficient benefits, can act as impediment to the further implementation of certain strategies [11]. This was proved by the interviews as the high maintenance cost and lack of funding were deemed to be major obstacles, along with legislation regulation, its long delays and bureaucratic issues. The effort and time that one needs to spend, and the difficulty of finding suitable materials and craftsmen, were some of the obstacles mentioned. The phrases 'I can't', 'It is not permitted', 'I don't have the right', 'it was imposed by the legislation', 'it is restrictive', 'the cost is huge', 'I feel wronged by the state', were mentioned more than once, highlighting even more the restrictions set. Specifically, in the case of renovation, all of the residents remarked the high cost. This appears to be an extremely negative parameter, as this was the reason for one resident who revealed to have partially regretted choosing to live in a neoclassical building.

Following the aforementioned obstacles, the sense of freedom for any desired changes showed to be very limited for most interviewees, especially due to the facts that ‘the façade of the residence is listed’ or that ‘the entire building has been designated a listed national monument’. Less than half of the residents replied that they feel free, supporting that ‘the restrictions are right and, in some cases, even useful’ (male, editor, 61–70, homeowner).

Lastly, one resident showed reluctance for making any changes, while another one expressed a feeling of inability and lack of interest in doing so. This difference between *can* and *want* is an important element that should be scrutinized, as in some cases they may coincide or be completely opposite. The latter resident’s comment (‘I cannot do whatever I want. I could not do anything, but I didn’t want to do anything’ (female, civil servant, 51–60, homeowner), pinpoints the fact that in this case legislation, which for many is seen as an obstacle, did not affect her actions. On the contrary, another resident mentioned that ‘the colour of the façade was imposed by the legislation, I wanted to paint it in the colour salmon, but I couldn’t’ (female, architect, 71–80, homeowner), which illustrates the way restrictions set certain rules that must be obeyed by the residents.

However, there were cases showing diversions from what the legislation permits. The comparison between the past and present condition of one of the case studies, showcases the result of adhering to the legislation, respecting the heritage integrity of the listed building, or breaching the regulations and radically changing the original condition, with the installation of A/C and alteration of the façade. (Figures 4a and 4b).

These incidents show that there are cases where owners do not abide by the legislative framework and that there is absence of a controlling authority concerning lawlessness. This was also observed by some residents who noted that ‘I think whatever you do, there is a way of no one ever bothering you. I don’t think that there are many reasons for someone to get anxious with that in Greece’ (male, director, 41–50, homeowner,) and ‘as people act, we will break the law as well, even if all these buildings were exactly as they were’ (female, civil servant, 51–60, homeowner).



Figure 4a, 4b. Past and present condition of a case study. Photos: Koukou, T. 2016.

4. CONCLUSION

In this paper, we showed in the context of neoclassical buildings in Athens, that works undertaken in the case studies mostly involved painting, internal changes for functionality reasons and conservation of the façade characteristics. The aesthetics of the 'façade' were highly appreciated, but functional values related to thermal and acoustic comfort were of higher priority for most residents. The residents were reluctant to install air-conditioning on the façade or plasterboards on the ceiling. Photovoltaics provoked less opposing views, while the change of coat colour and double-glazing received positive comments. Despite the varying nature of the residents' thermal comfort perceptions, their behaviour towards discomfort presented many similarities. The higher tolerance of heat was highlighted by the adaptation of the residents themselves, while the modification of the environment included light means. On the contrary, cold was mostly faced directly with the use of mechanical heating systems. Lastly, the obstacles of legislation, bureaucracy and cost appeared to be the most dominant, affecting the residents' sense of freedom. In addition, despite the existence of a restrictive legislative framework, it became apparent that state control on what works are being undertaken, is limited.

Through this research and the analysis of the findings, certain arguments can be retrieved that can be implemented in historic buildings in general. Although the perceived thermal comfort is satisfactory, there are ways to successfully integrate strategies for a higher energy-efficiency and lower energy consumption. Potential energy losses from the windows must be evaluated and be taken into account early in the process of renovation, to achieve improved comfort through better configuration of use. Moreover, public awareness needs to be fostered, as both experts and non-experts can play a pivotal role. Owners or tenants need to be informed about the legislative restrictions prior to their start of residence. Legislative frameworks that present abstraction and lack of subsidies inhibit the historic buildings' protection and, for this reason, revisiting and revising the laws could prove to be more successful. Financial incentives are fundamental, and apart from the state, other institutions, such as museums, or non-governmental organisations, could provide funds and support the maintenance of listed buildings. Additionally, it should be highlighted that the implementation of law should not only rely on citizens, but also on controlling bodies.

Steps for further research include better understanding of the dynamics of the relationship between the indoor environment and the residents' behaviour, as its integration early in the design process is critical. Lastly, a comparison of the afore-analyzed residents' behaviours with those of other geographical areas sharing a similar historic building stock, could provide fruitful feedback and inform policies beyond the national boundaries.

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