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## **Relations between sonic environment and architectural space regarding architectural and musical composition.**

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### **Abstract:**

Michel Foucault used to say that the obsession of the current era was space in contrast to 19<sup>th</sup> century, which was obsessed with the idea of history. A lot of researchers who study soundscapes tend to highlight the relation between sonic identity and architectural identity of a place. But, what is the meaning of the term architectural space and identity and how does it correspond to sonic space and identity?

The proposal consists of a literature review regarding sonic and architectural identity. According to history the idea of “place” was born after the Second World War and concerned architects for a very long time. A philosopher who evolved his entire thinking towards the way we experience places was Gaston Bachelard. Needless to say, he did not make any direct reference to the sonic environment, but he studied lived space in counter to indifferent, geometrical space. Peter Zumthor, a Swiss architect and winner of the 2009 Pritzker Prize, applied Bachelard's thought to his own architectural practice. In his writings he claims that “The Sound of a Space” is one of the nine aspects that concern him in order to generate a certain atmosphere in his buildings. Another classic architectural theorist and architect, Juhani Pallasmaa, was very critical towards the visual realm in today's technological and consumer culture, which has pervaded architectural practice and education. As a result architectural schemes which look good on the drawing board can be very disappointing in reality.

Space and place also affected musicians over the last century. Iannis Xenakis, a composer, music theorist and architect introduced spatialization in his music by dispersing musicians among the audience. But Xenakis was interested in physical space and architectural space as well. He designed music for existing spaces and he designed spaces to be integrated with specific music compositions and performances. Olivier Messiaen, Karlheinz Stockhausen and Edgard Varese were also famous for their sonic experiments concerning architectural space. All the previous combined with the notion of soundscape, the rise of sound art and the site-specific practices, created a plethora of questions regarding architectural and musical composition.

The second part of the proposal consists of the correlational research, which evolves around the relationship of sonic and built environment, by studying the possibility of an architect to use soundscape in favor of her architectural concept. Over 100 architecture students, at the beginning of their studies, were asked how they experience different places. The results revealed that participants had

distinctive mental images of different sonic urban environments of Thessaloniki and their homes as well. They could easily remember the sonic environment of an area and relate the notion of soundscape with their intimate spaces. We believe that the sonic environment can be used as a tool to create desired architectural intervention and change that noisy world of ours for the best.

## **1. Introduction:**

In this research, the sonic environment is confronted in relation to architectural space, not as two different subjects but as a natural ecosystem. In order to test this idea, it was examined whether the sonic environment plays a role in the construction of architectural identity of a place. Correlation research, most common in psychology, study to clarify patterns of relationships between two or more variables [1]. In this case the two variables were sound and architecture. A survey questionnaire had been carried out in over one hundred first-year students in the school of architecture in the Aristotle University of Thessaloniki in Greece.

The results revealed that participants had memorized mental images of Thessaloniki and their intimate habitat as well. The soundscape of each area was part of these mental images and the participants could easily describe it but not in full detail. They used mainly words like noisy or quiet sonic environment and the notion of noise in order to describe unwanted sound. They could also relate sounds with their intimate space and revealed what kind of soundscape characterized their home. The authors believe that the sonic environment is inextricably linked with the lived space and that fact can be used as a tool to create desired architectural intervention.

Furthermore, this method makes it possible to encounter with one of the biggest problems in Greek contemporary cities, environmental noise. According to the numerous European laws, the problem can be solved by defensive strategies like soundproofing. But the authors believe that sound on sound could be used in order to build a better habitation and create a better sonic environment. Architectural design that relies on all the senses, encounters architectural space and soundscape as a whole, is possible to be another part of the solution.

## **2. Literature Review**

### a. Subject of architectural identity – Philosophy, architecture

The studies of space can be classified into four major categories: 1) philosophy, 2) physical sciences, 3) social sciences and 4) architecture, art and urban sciences [2]. In this article we are interested in the first and the fourth category.

One very crucial period, was the era after the Second World War. World War II was an unprecedented catastrophe to humanity and as a result, a diffuse feeling of pessimism, melancholy and a denial prevailed over the intellectual theories of the time being. The idea of place versus space and the turn towards a more romantic sense of lived space was the starting point of a series of theories and different schools of philosophy. All the previous shared the notion of personal, sentimental and private. Reacting against the modernist disdain for personalized space and thereby reconsidering the artisanal respect for the local and the traditional, postmodern architecture reinscribes place while meeting the challenge of present – day globalization [3].

In addition, the importance of the school of phenomenology should be

highlighted, as much as the turn towards the concepts of human and body. Phenomenology was the philosophical study of structures of consciousness and experience and was founded the first years of 20<sup>th</sup> century [4]. In contemporary architecture, phenomenology was defined by the notion of place and was based on the sensory properties of building materials. According to the postwar generation of phenomenologist architects, architecture should participate in the liberation of human experience from the constraints of status quo [5].

Architectural phenomenology was considered by many to be the continuity of the modernistic architecture. The replacement of perfect, absolute, abstract space with the notion of historical, human and lived space had also another result, the birth of a new approach to architecture that is called critical regionalism [6]. This school of architecture defined by the interaction between the global language of modernistic architecture and the local identity of the topical regions.

Aris Konstantinidis was a Greek architect, an example of this architectural school in Greece. He believed that architectural space and place should exist in an organic relationship, using his own words: "...But also regarding interior space, every building has something from the landscape that it is built onto. In other words; the architect through a transcendental situation, has identified the spiritual quality of natural landscape and builds with the «vocabulary» of nature, land, rocks, trees, sea... Thus architectural work is similar to the figuration of landscape structure." [7].

#### b. Architectural identity and sound

There are certain architects that tend to highlight the deep connection of sonic environment and architectural space. It is widely accepted that sound has nothing to do with architecture but it is a common knowledge that we experience places not only by seeing but also by listening.

In the 1950's Steen E. Rasmussen, a Danish architect and urban planner, acknowledged that "It is possible to speak of hearing architecture." He believed that sound is a major factor of architecture; even if many could say that a building does not produce sound, and therefore cannot be heard. But Rasmussen concludes that, "Though you cannot hear whether or not it is good architecture, neither is it certain you can see whether it is good or not, you can both see and hear if a building has character." [8].

There are a lot of examples of contemporary architects that take sonic environment into consideration. Peter Zumthor is one of them. He is a Swiss architect and the winner of the 2009 Pritzker Prize. He claimed that "The Sound of a Space" [9] is one of the nine aspects that concerned him in order to generate a certain atmosphere in his buildings. He believes that interiors are like large instruments that collect sound, amplify and transmit it. According to Zumthor, the particular sound of his spaces is a result of the certain shape of each room, the surfaces of the materials they contain and the materials that have been applied to them.

Furthermore Juhani Pallasmaa, a contemporary Finnish architect and theorist, has more to say regarding the "acoustic intimacy" of the architectural structures. He associates the architectural and the sonic identity of built environment and he reminds us a lot of Murray Schaffer's point of view towards the postindustrial soundscape of contemporary cities. Using Pallasmaa words "Every city has its echo which depends on the pattern and scale of its streets and the

prevailing architectural styles and materials. The echo of a Renaissance city differs from that of a Baroque city. But our cities have lost their echo altogether. The wide, open spaces of contemporary streets do not return sound, and in the interiors of today's buildings echoes are absorbed and censored. The programmed recorded music of shopping malls and public spaces eliminates the possibility of grasping the acoustic volume of space. Our ears have been blinded." [10].

### c. Sonic identity and space – Music, sound art

The notion of place affected also contemporary musicians. Many decades ago, acousticians and physicists argued that; "The room acoustics have an important influence on musical composition and performance that the architectural characteristics of different places, especially the acoustic characteristics, influenced fundamentally the type of music that they developed." [11]. What's more, the result of the technological changes that occurred in the beginning of the 20<sup>th</sup> century changed dramatically what people heard and how they listened to. The new sound of the modern technology changed radically the experience of sonic space [12].

Iannis Xenakis, composer and architect, was one of the first musicians that was interested in the "form that the musical performance must have". His famous Philips Pavilion, built in 1958, constitutes an important chapter in the history of contemporary architecture and is one of the first attempts to manufacture a space connected with a certain sonic and visual environment. Furthermore his Polytopes (many places in Greek) in certain historical sites like Persepolis and Mycenae were ambitious creations that exceed the current notion of musical work and associated directly with the sites and the complex notion of architectural space [13].

Some years after Xenakis, a lot of composers treated the natural environment as space for music performance and at the same time as music material. As Barry Blesset and Lind – Ruth Slter stated; "A derivative art form derived from Schafer's concept of soundscape (1977) gave rise to musical performances in natural spaces such as meadows and woods. Soundscape music merges with acoustic ecology to become the art of a living world with natural sounds and acoustics. As with very early cultures in previous millennia, the distinction between sound and space once again disappears. Two aural components contribute to a listener's associations to a particular space: its unique sounds and its characteristic acoustics." [14]. Soundscape music should be performed in an outdoor sonic environment with a distinctive sonic identity, characterized by open, natural acoustics and sounds of nature.

The rise of sound art in the 90's and the way curators curated these works of art, created a lot of questions towards the relationship of site and sound. Brandon Labelle suggested that site and sound exist simultaneously in a dynamic relationship, as both constitute a social presence and a private experience [15] and explored this relationship with a series of installations. Another artist Bernhard Leitner, fascinated by the transitory relation between space and time tried to record it and communicated it as an experience through various media. His art works can be described as sound space sculptures or as sound architecture, and characterized as a combination of art exhibition and concert [16].

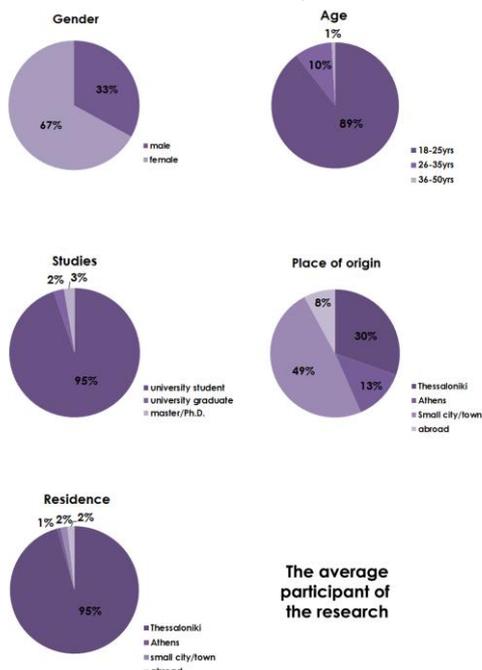
### 3. Correlation Research

#### a. General Characteristics of the research

The strategy of correlational research seeks to clarify patterns of relationships between two or more variables. This strategy uses a focus on naturally occurring patterns, the measurement of specific variables and the use of statistics to make any of these relationships clear [17]. Regarding this research the two variables were; architectural space and sonic environment. The main hypothesis lies on the fact that there is an inextricable relationship between architectural space and sonic environment that shapes mental images of certain places and forms whether or not a space has an architectural character.

The research revolves around an architectural point of view, concerns mainly architects and took place in January and February of 2013 in the school of Architecture in Aristotle University of Thessaloniki, Greece. In order to identify the different relationships between built space and sonic environment, questionnaires were used, which were consisted of five questions; two closed ones, multiple choice style and three open ones; participants were asked to contribute in their own words. The main body of the participants was students, mainly in the beginning of their studies. Specifically, the participants were one hundred and fifteen students of architecture. This group was chosen in order to disclose to the researchers the way someone copes with architectural space, without the influence of architectural theories.

The first question aimed to introduce participants to the area of Thessaloniki by choosing which part they preferred the most; there was no reference to the sonic environment whatsoever. The second question revolved around participants' favorite place and they were asked to write down a small description of it. Afterwards, the researchers studied whether the participants used words in their description related to sound. The third question, asked the participants whether or not the sonic environment constituted an important factor regarding the architectural character of a place. The fourth question intended to make students analyze the sonic environment of their favorite place in order to study which sounds manufacture the most likable sonic environment. The last question aimed to find out whether the students combined their intimate places with certain sounds and which they were.



The average participant of the research

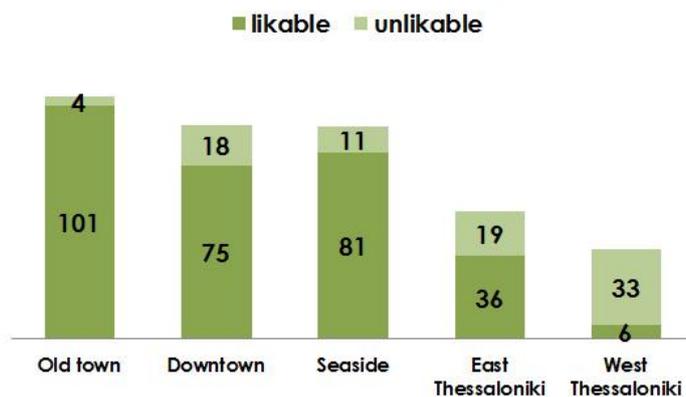
The use of questionnaires was also essential for decoding the identity of the student who forms the group being studied. So, the average participant in this research was a woman, in her 20's, a student of architecture, who originated from a small city or town located in Greece and she lived in Thessaloniki for the time being.

Picture 1: Charts presenting the characteristics of the average participant (student of architecture) of the research.

## b. Questions and data representation

The first question was a closed one, with a multiple choice format, and composed of two parts; the first part concerned the basic regions of Thessaloniki. The research sought to find out which of the main urban areas of the city, according to participants, had a distinctive architectural identity and the second part concerned whether or not this distinctive architectural identity was likeable. Pursuantly, the old town attracted most of the participants, downtown and

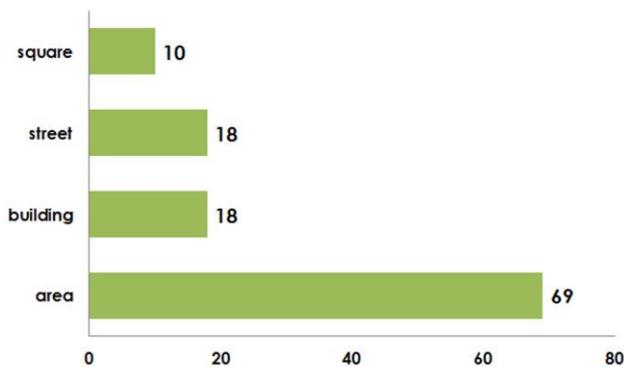
### 1. Areas of Thessaloniki with distinctive architectural identity



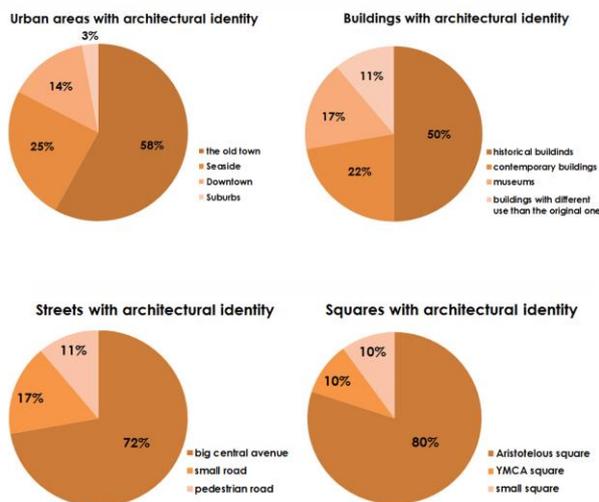
seaside came second and third in preference, while eastern suburbs were fourth and western suburbs were last. It was very interesting that the participants acknowledged the architectural identity of these five regions even if they were not first in preference. Especially in the case of western region, the majority of the participants did not like the ambience of this area in contrast to the four other regions which were more likeable.

Picture 2: Charts presenting the data of the first question.

### 2a. Places of Thessaloniki with architectural character

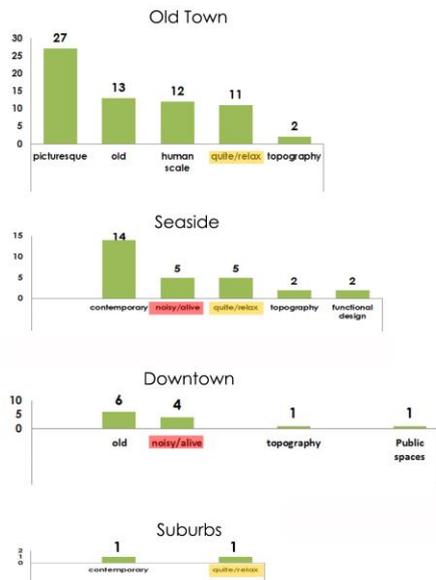


The second question was an open one and had its aim was to find out which elements constitute the architectural identity of a place, whether it was a building, an area, a street or a square. This question was composed of two parts. Firstly, the participants were asked to name a place with an architectural character, and secondly they were asked to describe it. According to students, places with distinctive architectural identity were large urban areas, especially the old town. Moreover they thought that roads, specifically central avenues and historical buildings were also architectural interesting. Lastly, some students preferred squares, particularly Aristotelous square, the biggest and central square of Thessaloniki.

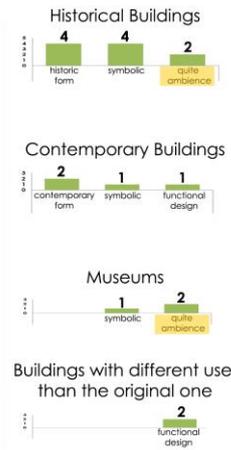


Picture 3: Charts presenting the data of the second question, first part.

**2b.** Elements that constitute the architectural identity of an **urban area** in Thessaloniki

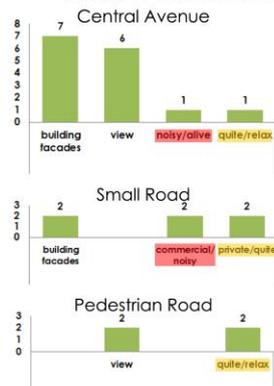


Elements that constitute the architectural identity of a **building** in Thessaloniki

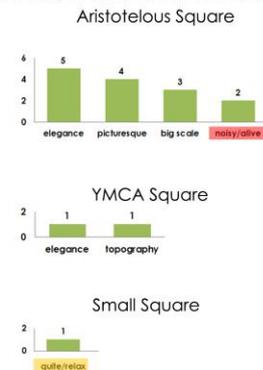


Regarding the second part of the question, the answers of the participants were organized in a few basic categories which constituted the elements of the architectural identity of an area, street, building and square respectively. In every one of the forth previous categories, students took into consideration the local sonic environment but their answers were a bit controversial. The same place considered by some noisy and alive while it was considered by others calm and quiet.

Elements that constitute the architectural identity of a **street** in Thessaloniki

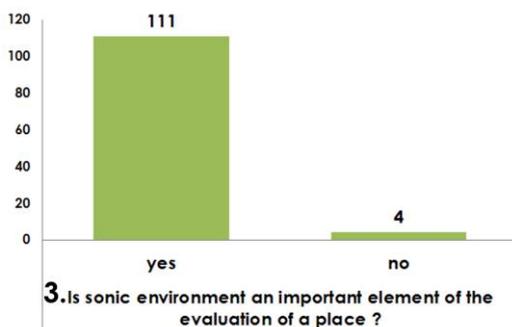


Elements that constitute the architectural identity of a **square** in Thessaloniki



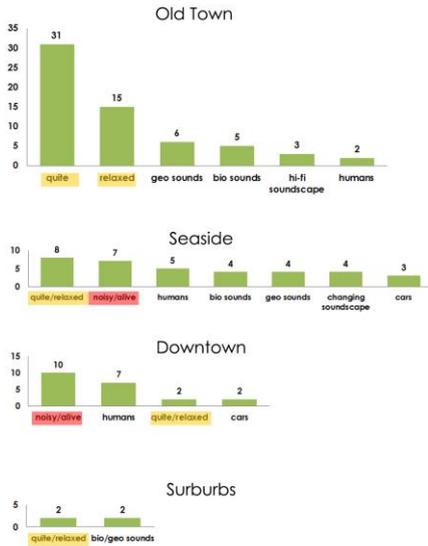
Picture 4: Charts presenting the data of the second question, second part.

Needless to say, the third question which was a closed one, yes or no type, asked directly the students whether the sonic environment of a place constituted a basic element of its overall architectural evaluation or not. The vast majority of the participants answered positively.

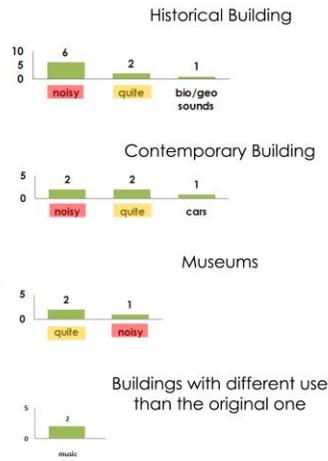


Picture 5: Charts presenting the data of the third question.

**4. Elements that constitute the sonic identity of an urban area in Thessaloniki**



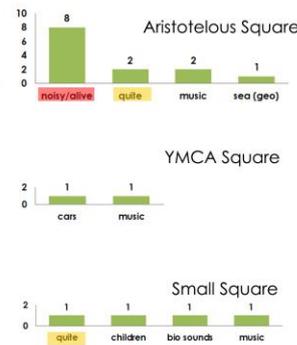
**Elements that constitute the sonic identity of a building in Thessaloniki**



**Elements that constitute the sonic identity of a street in Thessaloniki**



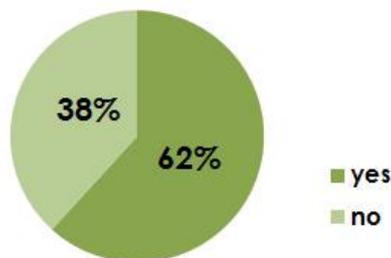
**Elements that constitute the sonic identity of a square in Thessaloniki**



The fourth question, an open one, asked directly the participants to describe the sonic environment of their favorite place. It was difficult to decode a certain sonic identity which considered being the most likable by the majority of the participants. For example, some preferred a quiet and calm soundscape while others a noisy one. Nevertheless, the descriptions of the most soundscapes were mainly poor with no reference to sound sources or acoustics of the place.

Picture 6: Charts presenting the data of the fourth question.

**5a. Do you combine your intimate place with a sound?**

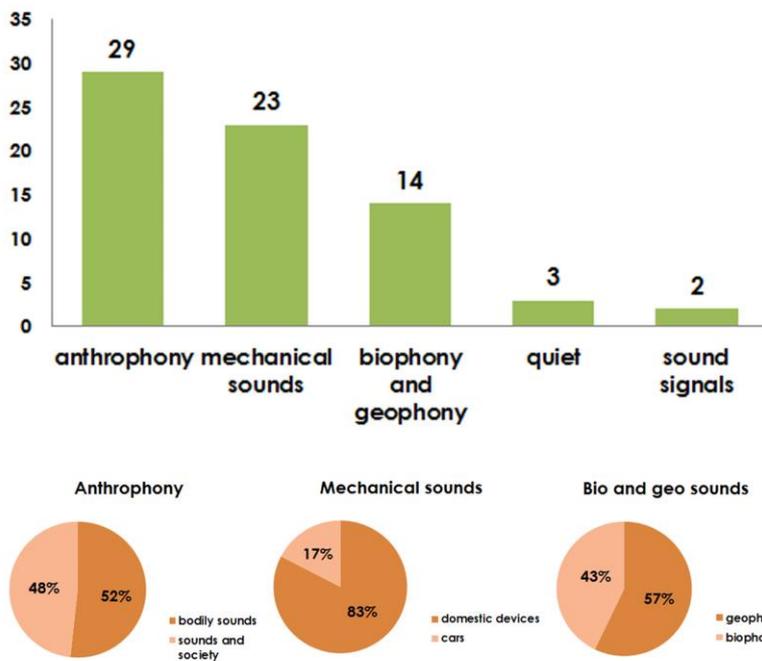


The fifth question was consisted of two parts. Firstly participants were asked whether or not, there was a connection between their home and a certain sound. The majority answered positively.

Picture 7: Charts presenting the data of the fifth question, first part.

The second part of the question asked the participants to describe this

## 5b. Describe this sound



particular sound. Most of the students answered that the sound connected to their home was a human sound, according to M. Schafer classification of sounds [18]. The next preferred category was mechanical sounds, biophony and geophony, quiet and lastly sound signals. Overall, participants related their home with sounds affiliated to human presence. In the case of the second category, mechanical sounds, they chose sounds of domestic devices that stated the existence of a person to control them.

Picture 8: Charts presenting the data of the fifth question, second part.

## 4. Relationships formed by the research - Conclusions

The basic relationships formed by the present correlation research are the following;

- Firstly, participants unintentionally used words that have to do with sound when they described an area with architectural character. So there is a strong two-way relationship between sonic environment and place.
- Secondly, the vast majority of the participants agreed that sound is a critical element regarding architectural identity.
- Thirdly, there was not a common framework to characterize the most likable soundscape. There was also a poor description of soundscape which punctuated that participants have not listened their favorite place but just heard it [19].
- Lastly, participants combined their most intimate spaces with sounds, even mechanical ones, which indicate human presence.

As a result, this research highlighted the inextricable relationship between sonic environment and architectural space. An architect, according to this research, should take under consideration the fact that architectural space and sonic environment share a strong relationship. So, when she designs her architectural space she should have in mind that she designs its soundscape as well. So by using certain materials, different sound sources and different shapes an architect can manipulate the soundscape of a certain space in favor of architectural space.

A musician or a sound artist should also take under consideration the same relationship. When somebody experiences their artistic work, except from sound, she experiences the build environment as well. So, they should treat space as an extra layer of their artwork and try to manipulate it in order to have the desired

effect regarding their art work.

## 5. References

- [1] Linda Groat & David Wang: *Architectural research methods*, (Canada: John Wiley & Sons, Inc. 2002) pp. 206.
- [2] Νικόλαος – Ίων Τερζόγλου: *Ιδέες του χώρου στον εικοστό αιώνα*, (Αθήνα: νήσος 2009) σελ. 32-33.
- [3] Stuart Sim eds.: *The Routledge Companion to Postmodernism*, (London and New York: Rutledge Taylor and Francis Group, 1998, 2001) pp. 83.
- [4] Stanford Encyclopedia of Philosophy: Phenomenology (on line): <http://plato.stanford.edu/entries/phenomenology/> (visited 15 May 2013)
- [5] Jorge Otero – Pailos: *Architecture's Historical Turn. Phenomenology and the Rise of Postmodern*, (Minneapolis: University of Minnesota Press, 2010) pp. xi.
- [6] Kenneth Frampton: *Modern Architecture. A critical History*, (London: Thames and Hudson Ltd, 1981, 1985) pp. 277.
- [7] Άρης Κωνσταντινίδης : *Η Αρχιτεκτονική της Αρχιτεκτονικής ημερολογιακά σημειώματα*, (Αθήνα: Εκδόσεις Άγρα, 1992) σελ. 190.
- [8] Steen Eiler Rasmussen : *Experiencing Architecture*, (Cambridge: The Massachusetts Institute of Technology Press, 1959) pp. 224.
- [9] Peter Zumthor : *Atmospheres. Architectural Environments. Surrounding Objects*, (Basel: Birkhäuser, 2006,2010) pp. 29-31.
- [10] Juhani Pallasmaa : *The Eyes of the Skin. Architecture and the Senses*, (Great Britain: John Willey and Sons Ltd, 2005, 2007) pp. 49-51.
- [11] Michael Forsyth : *Buildings for Music. Architect, the Musician, and the Listener from the Seventeen Century to the Present Day*, (Cambridge: The Massachusetts Institute of Technology Press, 1985) pp. 3.
- [12] Emily Thompson: *The Soundscape of Modernity. Architectural Acoustics and the Culture of Listening in America, 1900-1933*, (Cambridge: The Massachusetts Institute of Technology Press, 2002) pp. 6.
- [13] Μάκης Σολωμός: *Ιάννης Ξενάκης. Το σύμπαν ενός ιδιότυπου δημιουργού*, (Αθήνα: Εκδόσεις Αλεξάνδρεια, 2008) σελ. 259-260, 305.
- [14] Barry Blesser and Linda-Ruth Salter: *Spaces speak, are you listening? Experiencing aural architecture*, (Cambridge: The Massachusetts Institute of Technology Press, 2007) pp. 175-176.
- [15] Brandon LaBelle and Steve Roden eds.: *Site of Sound: of Architecture and the Ear*, (Los Angeles: Errant Bodies Press in association with Smart Art Press, 2002) pp. 1.
- [16] Hatje Cantz: *Bernhard Leitner .P.U.L.S.E./Spaces In Time*, (Austria: ZKM | Zentrum fur Kunst und Medientechnologie Karlsruhe, 2008) pp. 7-13.
- [17] Linda Groat & David Wang: *Architectural research methods*, (Canada: John Wiley & Sons, Inc. 2002) pp. 206.
- [18] R. Murray Schafer: *The Soundscape. Our Sonic Environment and the Tuning of the World*, (Rochester: Destiny Books, 197, 1994) pp. 139-144.
- [19] Ibid. pp. 208.