ICRP 2019

4th International Conference on Rebuilding Place

DEVELOPING EFFECTIVE RESILIENT ARCHITECTURE BASED ON PSYCHOLOGYCAL ENVIRONMENT AND LOCAL BEHAVIOUR

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Abstract

This paper view psychological environment and local behavior as elements to develop effective resilient architecture. It based its understanding that resilience or generally considered as a "positive adaptation" after an unpleasant occurrence and the community undergoes a poor metal condition. Cities like Bandar Lampung are high complex living organism and   has a heterogeneous community composition with a composition of the local population of less than 17% where can be used as examples to explain this phenomenon. The composition of the population as such makes the community individualist so that it becomes one of the factors why Bandar Lampung is ranked 24th (56.4%) in the Indonesia Most Livable City 2017 poll. This paper studies how the ability of Lampung people to image their senses into emotional perceptions. When it is able to map the results of the sensing, then the perception is engineered and directed to be able to encourage the social capacity of community resilience in Bandar Lampung. To overcome this shortage, we need understanding resilience   as a process of factors affecting issue, including understanding concepts and direction psychological environment's procedures that have connection with architecture design. Architectural design relies on visual imaging as the main factor to direct human behavior. Through this research, the awareness of architects and designers in designing can be improved by providing knowledge of environmental--based design and psychological environment.

1. Introduction

There is some truth to the stereotype that architecture designs are not associated with human need problems. This happens because of the limitations of architects in completing human needs in the modern era. Most of architects and designers are have lees special attention to psychological understanding and behavior science. Moreover, they also have a lack of further exploration socio--ecological in architecture design. Cause, they busy to explore nature, which has always been unknown and mystery to them. They think these behaviors are not closely related with physical environment. All the architect who have studied the principles of design have been manipulated with tool such as economy and technology, where most architectural project have been planned to serve human, without this respect to psychological need, or in general, the modern architecture have been promoting the environment without respect to psychological needs in today's world, such as socio--cultural aspect (Akbari & Sattarisarbangholi, 2016). However, the preliminary problem of developing effective resilience architecture is related to existing social condition of modern society, which threaten the existence of the social community. It happened because these processes often mistakenly assumed to be a trait of individual's ide, more typically referred to as "resiliency".

To overcome this shortage, we need understanding resilience as a process of factors affecting issue, including understanding the concepts and direction psychological environment's procedures that have link with architecture design. Environmental psychology from other branches of psychology will be exams correlation between human behavior and physical environment. By accepting the existence of human needs hierarchy, A new road can revive the environment as a proper response to the fulfillment of human needs and can complement the lack of rational thought processes in modern architecture (Charehjoo, Etesam, & Rasaulpour, 2018). Psychological environment analysis of community environment relationships is effective way to understand density and resiliency of community in area unit. In addition, these analyses can develop more accurate assessment of urban design and has high influences to promote effective resilient architecture in city. Global change, climate change, social and culture, natural disasters, industry, economy can affect local communities' condition. Resilience as a form of planning strategy can overcome these problems (Hardilla, 2018 as cited in Ozel, Dipasquale, & Mecca, 2015). Therefore, it is very important to understand the resilience cycle by conducting psychological mapping on environmental elements, so that we can imagine ecological social design solutions as a form of future architectural resilience. In addition, mapping also functions as a way to protect, adapt and preserve the knowledge of local communities, which is the cultural identity of the community in the future.

Architectural design relies on visual imaging as the main factor to direct human behavior. Basically, humans have 5 senses with 4 senses capable of capturing sensors related to the surrounding environment, the result of that sensing ability that produces experience; experience is closely related to emotions and perception. According to environmental behavior theory proposed by Barkel and Bell ecological psychology studies the relationship between the environment and behavior is ecologically interdependent so that the stimulus given will affect the resulting response. The main objective is to map every possible response that arises but is limited to factors that strengthen the social capacity of resilience.

Changes in social conditions in the village have an impact on changing the behavior of society as a whole. The process of transition of traditional society towards modern society erodes social values. The cause of this condition is created is the level of environmental conditions in many factors emphasizing the behavior of society to be individualistic and socially behaving only in small spaces.

Through this research, the awareness of architects and designers in designing can be improved by providing knowledge of environmental--based design and psychological environment. Since it is thought resilient architecture design should be based on psychological need and behavior science, so those environments can maintain their dynamic overtime.

In this paper, we attempt to find element of psychological environment and human in creating socio--ecological design.

2. Problem Statement

The goals of creating a paradigm in psychological environment and local behavior's mapping, is to provide the knowledge to enable architect and urban designer to better understand existing social condition of modern society and the whole design process, including how to analyses and implement it. In addition, an increase in the capacity of socio--ecological systems can be obtained through knowledge of the psychological environment and local behavior, so as to be able to provide guidance on building designs that have high complexity (Hardilla & Nugroho, 2018). The psychological environment approach can be regarded as a theory that can help designers and architects analyze environmental conditions by looking at a rich and varied series of psychological reactions, including people's orientation and disorientation, people's knowledge, secrecy and social relations, and aesthetic value (Akbari, as cited in Kolb 2016). However, most of architect or urban designer often work with incompleteness of human life information and uncertainty environmental design, because they often deal with future agenda (Charehjoo et al., 2018). We need to understand the whole design process, so we can imagine the original condition of the social community. This activity is needed to detect architectural objects, which later the object will inform about themselves and convey important information as part of the learning process of a building design. This can generally be regarded as resilience or "positive adaptation" and is a form of response from stressful or adverse circumstances. Therefore, in this research, there will be a clear and structured idea about contextual theory for professional designers. Be concluded that in developing effective resilient architecture design required two key keys, i.e. psychological environment and local behavior. The condition of the Bandar Lampung city community, which is dominated by migrants, makes the social conditions of the community more individualistic. This aspect is one of the reasons why Lampung received a low index in the poll of "most livable cities" at number 25 of all cities in Indonesia. Making society more social by suppressing individual attributes is a way to improve social resilience. Through ways to improve the social context discussed by (Levine, 2003) in the form of close relationships, emotions, boundaries, rules, laws and consequences, stimulation, peers, models and mentors, space, respect, responsibility, consistency, security, opportunities, traditions, social soul and value by translating them into social factors? To realize this, we first discuss about psychological environment and local behavior that can be used in future resilient architecture.

3. Research Questions

In context of architecture design and urban resilient, it is important to learn about the process of interacting both between local communities, and between communities and their environment, which then produces local culture. There are several questions related with this research, that are:

- Whether urban architects and designs are able to develop effective resilient architecture design that is effective as a guideline to help promote creativity, reduce social problems both internal and external, so as to increase effectiveness and efficiency in the environment?
- How is psychological environment analysis able to improve quality of live and to develop effective resilient architecture design by using psychological perform mapping on element of psychological environment?
- Which are characteristic of psychological that are related architecture design?

- How does the influence of environmental psychology on the social conditions of Bandar Lampung people affect social resilience capacity, this study only applies in Bandar Lampung because it has the characteristic conditions of Lampung society?

4. Purpose of the Study

The paper conceptualization of resilient in social ecological system incorporates a number of core principle emphasized in architecture and urban design research:

First, this paper considers many disciplines e.g. psychology, sociology, architecture, urban planning, interior design that has contribute in architecture and urban study, we emphasize psychological environment and social community research related to the problem of resilient architecture.

Second, psychology can play a key role in furthering understanding of naturalistic intervention (Wandersman & Nation, 1998). Psychological variable was associated with various indicator of community development at both individual and the block level. The main branch of psychology has focus on daily physical environment, which can help us to better understand the interaction between human and the environment. By studying social behavior, we are able to control behavior in accordance with indicators of increasing resilience social quality.

Third, the social ecology of resilient has suggested new ways to develop effective resilience architecture design. The role of a science behavior approach in the Environmental design process is a problem solving solution in the utilization and use of space. Architects' understanding of design patterns can provide solutions to complex design problems and can reduce uncertainty. These patterns can be realized by studying the identity of people's lives, which then becomes their needs.

5. Research Methods

In general, resilience is a key indicator of building and developing community life capacity. This capacity is built on a development plan, both positive and negative, aimed at integrating economic and social objectives, as well as creating connections across various group boundaries. The selection of indicators used is influenced by several factors, where the main factor is the identification of the work guide map model. Therefore, to provide coherent judgments to the community, integrative approaches can be used as a way of understanding the choices and desires that can make a healthy and strong society. In addition, for the fulfillment of future conditions, this research need method to identify and analyses characteristic of psychological environment and local behavior of community on developing effective resilient architecture design solution.

The research method uses quantitative sampling methods by reviewing 13 aspects related to the ability to increase social resilience abilities. Aspects of assessment include 4 aspects of sensing humans outside the sense of taste. Sampling was carried out on 40 people with problems that were reviewed according to aspects and needs that affect the psychological aspects.

5.1. Social resilient characteristic identification

Local behavioral parameters are indicators in architectural design, which serve as a first step in determining effective social ecological scenarios through identification of characteristics of social resilience in unit area. In this step, we perform questioner survey to collect attributes of local community behavior. Data from the current social conditions of the community is an important element for survey activities. It

serves as a basis for mapping factors that threaten society, including physical, mental and spiritual aspects, whether in good condition or not, that can help the development of live sustainably and normatively.
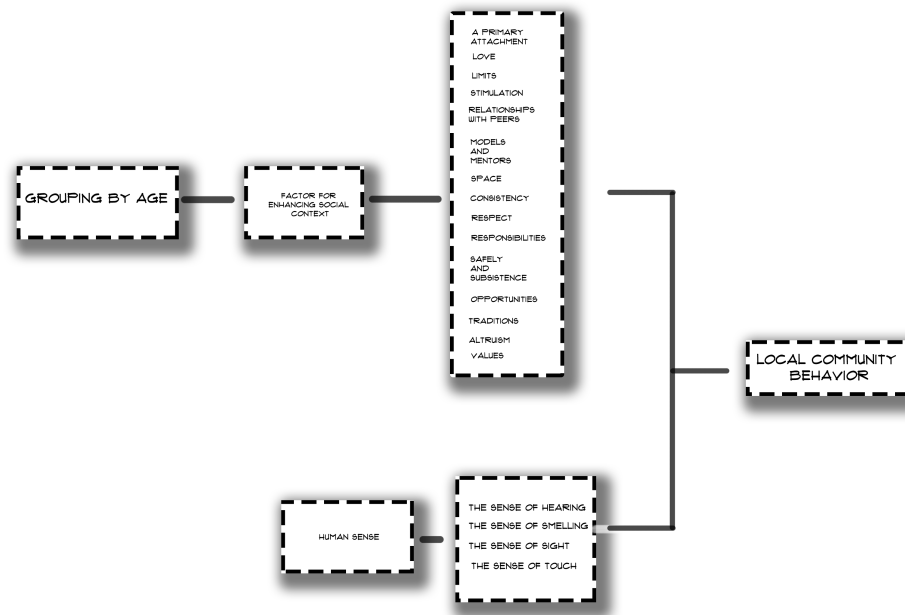

Figure 1.   Social resilient characteristic identification

5.2. Psychological environment perspective methods

In this step, we perform study literature, which generally focus on studies of psychological environment theory and characteristic where analyze daily physical environment. The analyses include question and comparison scientific study and contextual theories on human life. This analysis does not use general psychology theory, but rather emphasize the exploratory and descriptive aspect of psychological environment in context of everyday life, So that it can provide comprehensive information and can implement it in an architectural design, urban design and interior design. Through this research, the evaluation process of human and environmental interactions, which are regarded as the best approach for professional designers and architects, can produce a design and development.
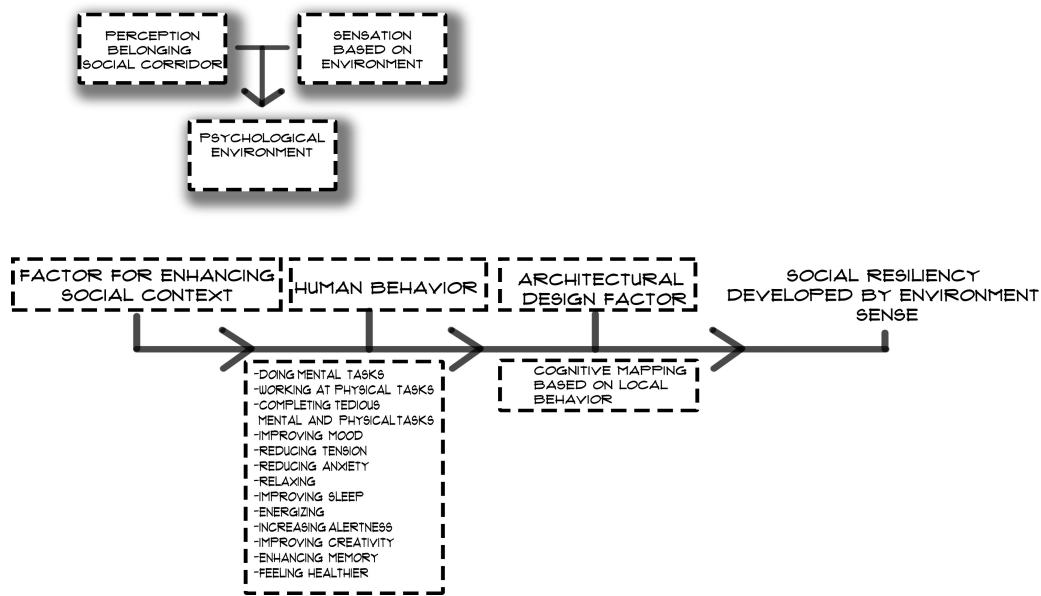
Figure 2.   Psychological environment perspective

6.   Findings

Communities are vibrant, ever changing, and challenging social worlds, a thoughtfully crafted comprehensive community index can inform us about the direction, negative or positive, of growth and change in community (Zautra et al., 2008). All indicators that are owned should be able to outline the Phenomenon, specific objectives, and desired results. The selection of indicators depends on the environmental conditions of the community, which are later identified based on the work guide map model, so that it can provide a coherent community assessment through an integrative approach to understanding any psychological environment that needs to be selected.
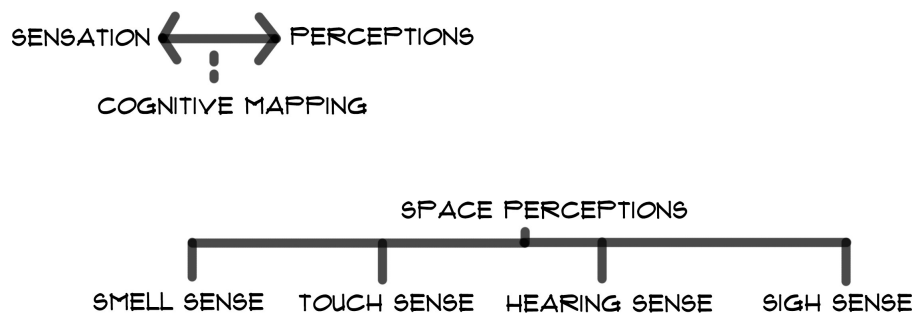

Figure 3.   Psychological environment perceptions

After reviewing studies of psychological environment and social resilient, we identified characteristic guiding current research on how psychological environment and local behavior that can be used in future resilient architecture. Both paradigms are key in finding architectural design solutions to create an artificial environment suited to human needs without damaging nature. It can be hypnotized that all characteristic based on expressed theories and concept of psychological environment and social resilient factor in this regard.

All of factors including cultures, meaning, and social characteristic would be achieved according to the table below.

Table 1.   Review of the characteristic of psychological environment and social resilient factor

Human sense	Enhancing social factor	The results
Smelling sense	Doing mental tasks	Jasmine, cedar, lemon, brewing coffee, chamomile
	Working at physical tasks	Peppermint, lemon
	Completing tedious mental and physical tasks	Peppermint, natural scent
	Improving mood	Lemon, cinnamon, vanilla
	Reducing tension	Lavender
	Reducing anxiety	Lavender, jasmine, floral scent, vanilla, hyacinth, marjoram, rose, bergamot, cypress
	Relaxing	Lavender, vanilla, cedar, rose, bergamot, almond, heliotrope, sandalwood, muguet, ylang--ylang
	Improving sleep	Jasmine
	Energizing	Jasmine, natural scent, basil, neroli, cloves, patchouli, grapefruit, rosemary
	Increasing alertness	Natural scent, lemon, peppermint
	Improving creativity	Floral scent, cinnamon, vanilla, cedar, almond, brewing coffee
	Enhancing memory	Cedar, sandalwood, rosemary
	Feeling healthier	Peppermint, cinnamon patchouli
Hearing sense	Doing mental tasks	70db, white noise, classical music, pop music 8D
	Working at physical tasks	Simple rhythm, complex rhythm, 50--70bpm, 70db, 85db, music pop, 8D, 3D sound
	Completing tedious mental and physical tasks	Simple rhythm, 50--70bpm, 70db, white noise, music pop, 8D
	Improving mood	Simple rhythm, 50--70bpm, 70db, music pop, surrounding sound
	Reducing tension	Simple rhythm, 30--50 bpm, 50db, white noise, music classic, flat sound
	Reducing anxiety	Simple rhythm, 50--70 bpm, 70db, 85db, white noise, music classic, music pop, 3D
	Relaxing	Simple rhythm, 30--50 bpm, white noise, music classic, music pop, music traditional, flat sound, 8D
	Improving sleep	Simple rhythm, 30--50 bpm, 50db, white noise, music classic, music traditional, 8D
	Energizing	Complex rhythm, 50--70 bpm, 70db, 85db, music pop, 3D
	Increasing alertness	Complex rhythm, 50--70 bpm, 85db, music pop, 8D
	Improving creativity	Simple rhythm, complex rhythm, 50--70 bpm, 70db, 85db, music pop, 8D
	Enhancing memory	Simple rhythm, 30--50bpm, 50db, white noise, music classic, flat sound, 8D
	Feeling healthier	Complex rhythm, 50--70bpm, 70db, 85db, music pop, 8D, 3D
Visual sense	Doing mental tasks	Neutral tone, warm tone, combine 2 tone, combine 3 tone, simple pattern, reference colour, simple texture, brightness, smooth texture, line and form, visual quality, proportion, light
	Working at physical tasks	Warm tone, com. 3 tone, com. 5 tone, complex pattern, cultural colour, brightness, colour and weight, simple texture, bold texture, visual quality, proportion, light
	Completing tedious	Neutral tone, warm tone, combine 3 tone, simple pattern, colour

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	mental and physical tasks	reference, cultural colour, brightness, colour and weight, simple texture, smooth texture, line and form, visual quality, proportion
	Improving mood	Neutral tone, warm tone, combine 2 tone, 3 tone, simple pattern, brightness, simple texture, visual quality
	Reducing tension	Neutral tone, warm tone, cold tone, combine 2 tone, simple pattern, brightness, simple texture, light
	Reducing anxiety	Neutral tone, warm tone, combine 2 tone, simple pattern, colour and weight, simple texture, light
	Relaxing	Neutral tone, warm tone, 2 tone, simple pattern, colour reference, brightness, simple texture, visual quality, light
	Improving sleep	Neutral tone, cold tone, 2 tone, simple pattern, colour reference, brightness, simple texture, smooth texture, visual proportion, light
	Energising	Warm tone, more than 5 tone, complex pattern, cultural colour, complex texture, bold texture, line and form, proportion, light
	Increasing alertness	Warm tone, combine 3 tone, combine more than 5 tone, complex pattern, colour reference, brightness, colour and light, complex texture, bold texture, line and form, visual proportion, light
	Improving creativity	Neutral tone, warm tone, combine 2 tone, simple pattern, brightness, colour and weight, simple texture, smooth texture, bold texture, line and form, visual quality, proportion, light
	Enhancing memory	Neutral tone, warm tone, combine 2 tone, simple pattern, brightness, simple texture, smooth texture, line and form, visual quality, light
	Feeling healthier	Neutral tone, warm tone, combine 2 tone, simple pattern, colour reference, brightness, colour and light, simple texture, smooth texture, visual quality
Touching sense	Doing mental tasks	Long, continuous, slow stroke, smooth texture, soft texture, warm
	Working at physical tasks	Short, abrupt, rapid stroke, hard texture, smooth texture, warm, hot
	Completing tedious mental and physical tasks	Short, abrupt, rapid stroke, smooth texture, soft texture, warm
	Improving mood	Long, continuous, slow stroke, soft texture, smooth texture, warm
	Reducing tension	Long, continuous, slow stroke, soft texture, smooth texture, warm
	Reducing anxiety	Long, continuous, slow stroke, soft texture, smooth texture, warm
	Relaxing	Long, continuous, slow stroke, smooth texture, soft texture, warm
	Improving sleep	Long, continuous, slow stroke, soft texture, smooth texture, warm
	Energizing	Short, abrupt, rapid stroke, hard texture, rough texture, warm
	Increasing alertness	Short, abrupt, rapid stroke, hard texture, rough texture, cold
	Improving creativity	Short, abrupt, rapid stroke, smooth texture, soft texture, cold and warm
	Enhancing memory	Short, abrupt, rapid stroke, soft texture, rough texture, warm
	Feeling healthier	Short, abrupt, rapid stroke, soft texture, rough texture, warm
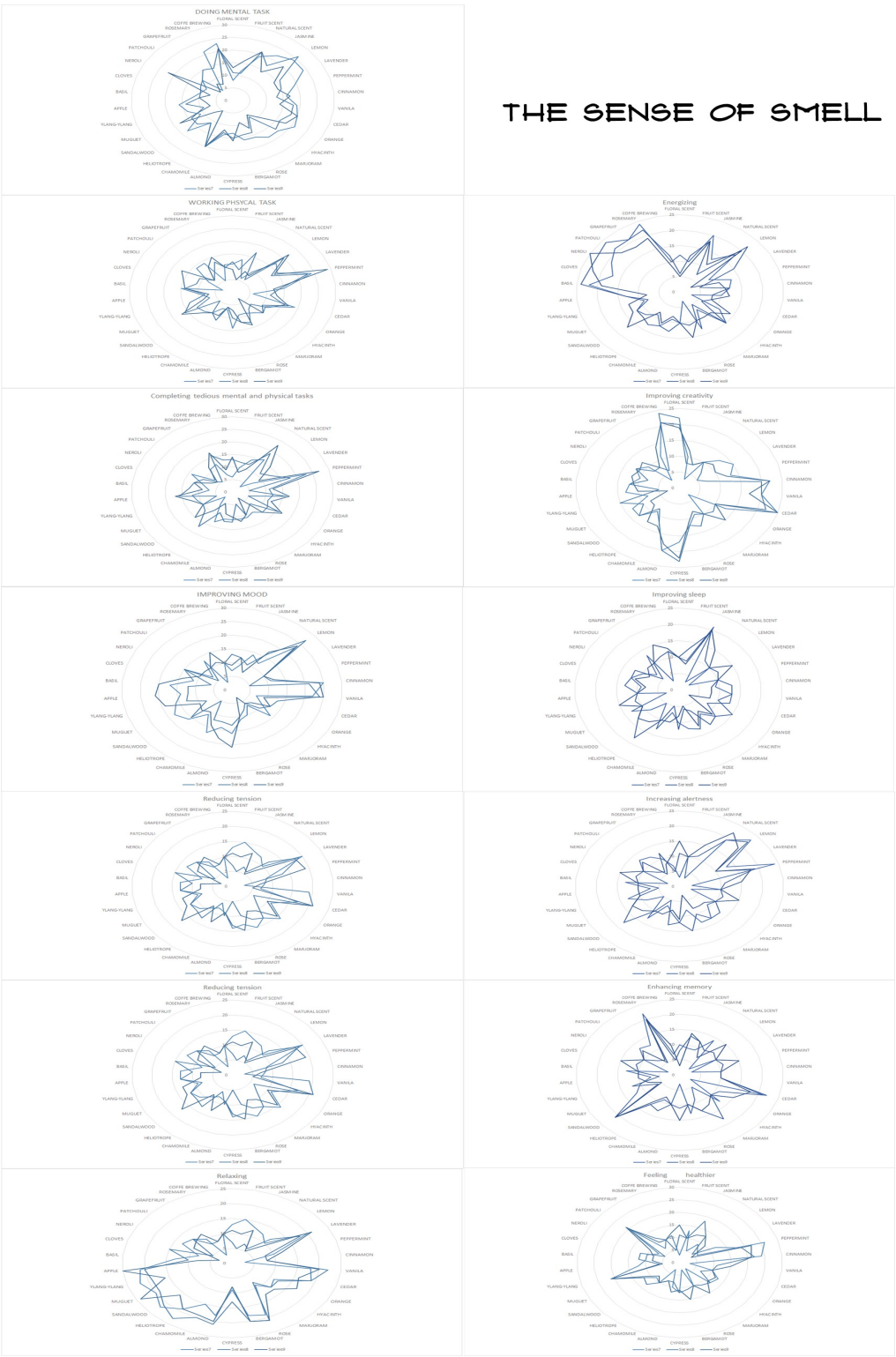
Figure 4. The sense of smell
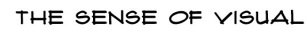
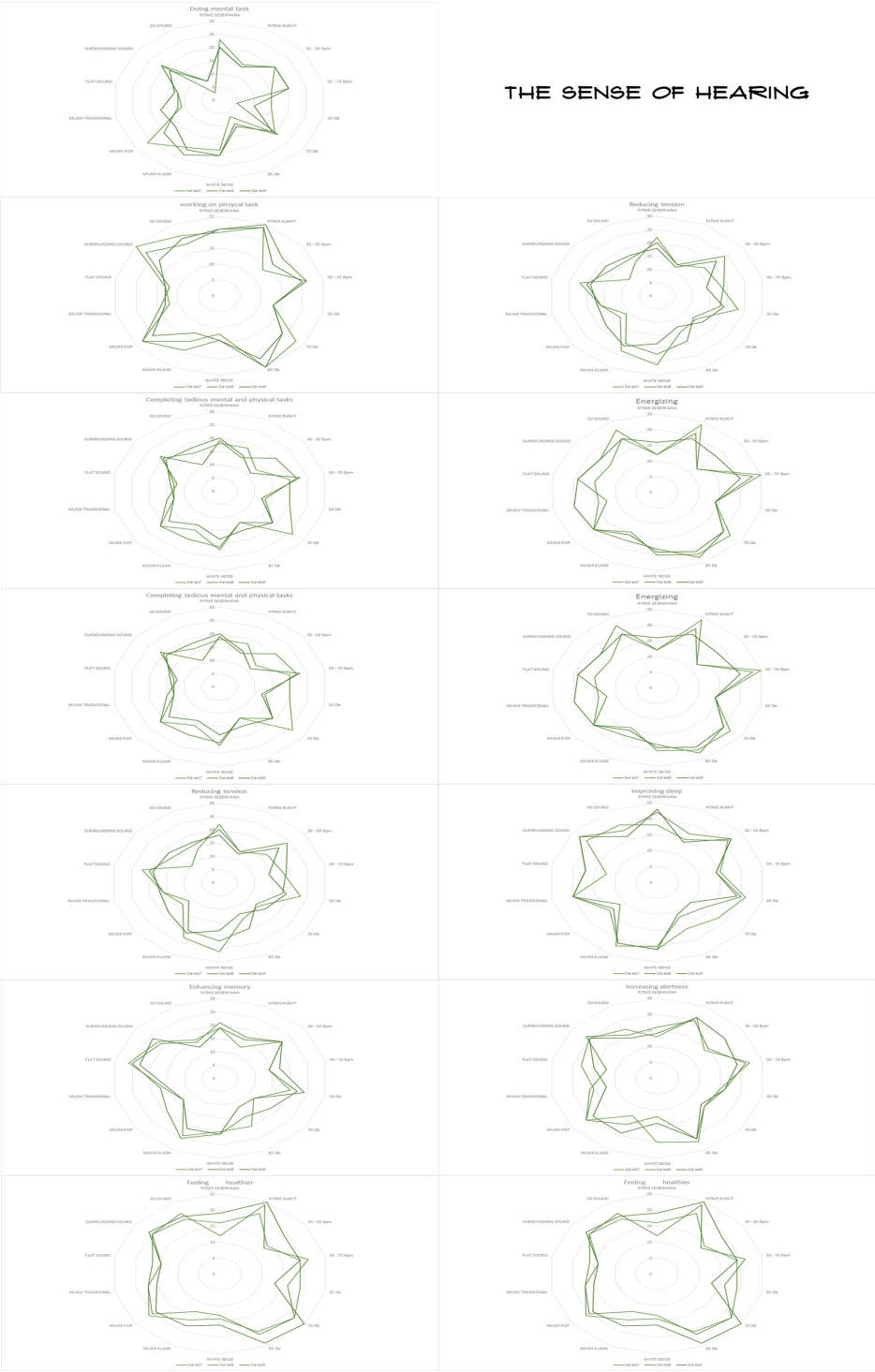**Figure 5.** The sense of visual

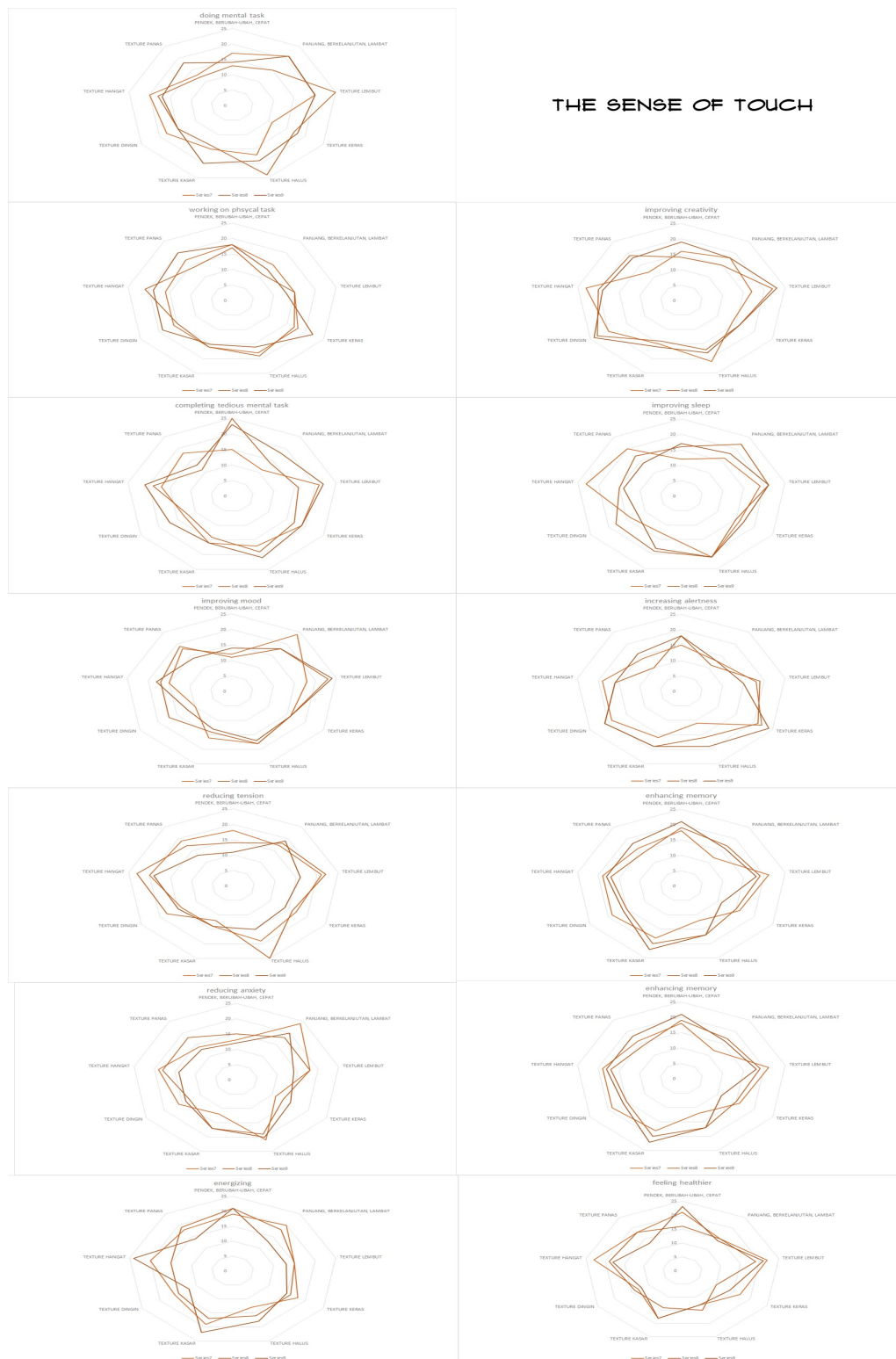**Figure 6.**   The sense of hearing

Figure 7. The sense of touch

The purpose of the social resilient and environmental design compilation process in this review is to provide knowledge for the whole designer on how to understand, analyze and use nature in the built process Environment. This occurs due to the obscurity, self-ego, and motifs owned by a designer in the environmental design process, thus creating problems in linking natural patterns, which then produces a

form and design Overall. This obscurity can be resolved through implementation of social resilient attribute. Some of architects or designer begin the design process with coziest element of problem. In general, it can be concluded that the implementation of an appropriate solution in resolving a problem, can sometimes solve all the problems that exist in it (Charehjoo et al., 2018). To solve this problem, some of architects or designer just consider attribute of social resilient. Decision stage are not just reflected in designer's solution, but also how human interaction and behavior in their daily life. Negative and positive attribute could be implementing space organization including materials, colors, which develop effective way to change human affection and their quality of life.

7. Conclusion

In conclusion, psychological environment and characteristic of local behavior could improve knowledge of building resilience and urban design paradigm. However, because of the limited time, this paper only discusses some of the implementation of the social environment characteristics, which is part of the concept of psychological environment. This research shown that local community behavior characteristics are related to resilience architecture outcome, and social environment interventions that have a psychological orientation can have positive effects. According to the mapping of psychological and local behavior characteristics, enabling social resilient including people's orientation and disorientation, people's knowledge, secrecy and social relations, and aesthetic value in building design process.

This prompted various side of social community and help in analyzing and mapping social environmental elements, so that it can be develop effective some recommendation and plans toward resilient architecture design in everyday life. Through the process of understanding the psychological environment and behavioral science approaches, architects can understand the relationship between human behavior and its environment, including how the environment's ability to meet the differences in human needs. So, through this research, we can implement the concept of psychological environment and behavior science into the design.

Acknowledgments [if any]

References

Akbari, P. & Sattarisarbangholi, H. (2016). Architectural design based on environmental psychology perspectives. *The Turkish Online Journal of Design, Art and Communication.* TOJDAC July 2016 Special Edition.

Bonnes, M., Bonaiuto, M., Fornara, F., & Bilotta, E. (2009). Environmental psychology and architecture for health care design. *Proceeding of 28th International Public Health Seminar. TESIS InterUniversity Research Center – Systems and Technologies in Healthcare Buildings,* 1--7.

Charehjoo, F., Etesam, I., & Rasaulpour, H. (2018). The roll of environmental psychology in architecture and urban design. *Journal of Architecture and Construction,* 1, 11--15.

Gomez--Baggethun, E., Corbera, E., & Reyes--Garcia, V. (2013). Traditional ecological knowledge and global environmental change: Research findings and policy implications. *Ecology and Society,* 18, 72.

Hardilla, D., & Nugroho, A.C. (2018). The role of IoT to support cultural heritage inventory in urban resiliency approach: Traditional house in Bandar Lampung city. *ICITSI, Bandung,* 193.

Levine, S. (2003). Psychological and social aspects of resilience: A synthesis of risks and resources. *Dialogues Clin Neurosci,* 5, 273--280.

Ozel, B., Dipasquale, L., & Mecca, S. (2015). Resilience and intangible heritage of vernacular architecture. *University of Florence, DIDA Department of Architecture, INN--LINKS Research Unit, Florence, Italy,* 1--6.

Stolols, D., Lejano, R.P., & Hipp, J. (2013). Enhancing the resilience of human--environment systems: A social ecological perspective. *Ecology and Society,* 18, 7.

The Joint Committee of Indonesia and Japan on Disaster Reduction. (2006). *Building resilience of Indonesia and its communities to disaster for the next generation.*

Wandersman, A., & Nation, M. (1998). Urban neighborhoods and mental health. Psychological contributions to understanding toxicity, resilience, and interventions. *The American Psychological Association. Inc,* 53, 647--656.