

Planning and Designing in Architecture: Behavioral Concerns

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Abstract: *Space in architecture is made to fulfill the need of people to cope with its functional, social, cultural, technical and climate anticipations. Space and Behavior relationships have been proven through various researches. Research conducted by Post Occupancy Evaluations was applied for the research assessments of Physical & Psychological Space Performance, Coping Strategies and Room Satisfactions. Most research results' have confirmed the theory of human behavior impact the space and the space design impact behavior (Indriyati, 2009; 2013; 2016). One case study taken place was aimed to assess relationships between each Spatial Performances (Physical and Psychological) and further to be assessed for their impacts toward their satisfaction to the classrooms available for students and finally assessing its impacts on student academic achievement. The results have statistically shown and confirmed that all hypotheses with its significances of each impacted variables. The Spatial Performance has an influence toward the Students' Satisfaction to their classrooms and its facilities provided within their classrooms; The spatial performance's assessments have also shown its positive impact to student academic achievement. Based on that reason, architects by their roles, must therefore create the space which leads to the positive impact to the users' instead of negative ones which will lead to the failure of architecture. Having obtained the positive impacts of the users, people will then use the space appropriately and the architects are then succeeded to further leads the users to well-behaved through the effective of space they are using. It is ensured that the results have shown the users will only need a little coping strategies to the space. To achieve appropriate space design - architecture planning and designing, concerning the behavioral items - is then required and conceptual framework produced should be initiated by defining how perceptions of users related to coping behavior. Design methodology with concerns to the behavioral concepts is also proposed based on various studies have been done. It proceeds with data collection, programming and specification, conception, design, construction, evaluations and recommendations.*

Keywords: Planning, Designing, Space, Behavior, Methodology, Behavioral Concepts, Architecture

1. Introduction

Human dimension in architecture and People as the End Users must be taking an important role in every work of architecture and should not be left in the creation of works of architecture to avoid the Failure of Architecture.

Izumi's diagram is explaining Phenomenon Psychology in relation to the design of the building. Izumi expressed understanding the meshing between the architecture of human and non-human. "The buildings containing both people and objects need to be more humanized". Izumi showed that the buildings which contain a human with a dominant type of activities would require a greater degree of human design (Holahan, 1978, p.3), such as residential buildings, hospitals and prisons. This suggests that human behavior as a factor that plays an important role and architectural features and patterns of human behavior is a strong mutual relation to the types of the building.

2. Theories: Interrelationships between Space and Behavior

Architecture is a work of art and is made to fit the needs of functional, social, cultural, technical and climate. Its existence is closely related to the daily rhythm of human life (Sidharta, 1983, p.13). Philip R. Harris, a psychologist argues that the "humanization of space means creating not just the novelty of space technology, transportation, and habitat, but also a lifestyle that is totally new and developing appropriate ways of thinking. Even more, the structure of economy, the legal system and politics, art are leading those to be suitable/appropriate for human" (Philip R. Harris, 1992, p.58).

Human behavior is defined as a person's internal stimulation results followed by an attempt to meet their needs. Cultural, social, physical and geographic environment contribute to the process of formation of behavior (molding behavior). On the other hand, the built-environment in particular, has a strong relationship with behavior. Behavioral approach emphasizes the dialectical relationship between humans and space, particularly with those people using or occupying the space. This approach emphasizes the need to understand Human Behavior or society those are diversified and specific in each location. In other words, the aspect of norms, culture and psychology of different people will produce the concept and form a different room (Nuraini C., 2010).

Several research conducted can be concluded that there is a relationship between Space and Behavior - Human Behavior impact the Space Design & The Space Design Impact Behavior or human behavior affects space design and vice versa (Indriyati, 2009; 2013; 2016). With the influence between Space and Behavior, therefore architects are demanded its role in order to create space that is "good and proper". It is done to ensure that Space Design will provide a positive influence for the users of the Space or the users buildings. On the other hands, architects are also able to "steer" the user to behave better through the effective use of space with its creation and creativity. Open behavior so called "Overt Behavior" in the form of human action is a continuation of the Closed behaviors called "Covert Behavior", including these are attitudes and perceptions. Architect needs to understand "Overt Behavior" which then become a benchmark of design. However, architects should also be sensitive to "Covert Behavior" of each individuals or groups in order to obtain Basic Behavioral Covert Data (e.g. Perception) that will be used in the design concept. In

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various previous studies have also been obtained the findings in regards to relationships between the perception of an object (in this case the architectural space) with the attitude of individual or group and subsequent association with human's Overt Behavior. With an excess of rationality, people tend to understand the environment and adapt to certain situations. Again, it has proven how the importance of theory on "Space Design Impact Behavior" and also "Behavior and the Space Interrelationships".

As mentioned earlier, Perception - as one of the examples of the "Covert Behavior Basic Data" (Data Base which was obtained of Conduct Closed only be assessed by an instrument (eq. Perception) - occurs when humans and the environment into contact with each other (Bell, Fisher Ross & Loomis, 1978, p.89). People look at their surroundings through the medium of the senses (the sense). Contact with the environment through our senses followed by cognitive and then back again to the human senses which produces the perception or mental response (Purwanto 1999, p.37; Widayatun, 1999, p.111). The individual's perception is influenced by past experience, where the experience is also determined by cultural norms and values, including the daily behavior. The human's habits are also influenced by factors Age, religion and ethnicity (Sarwono 1995, p.50).

Therefore, it is important to understand that measuring and collecting the behavioral data and user perception as well as receiving feedback from architectural works by Post Occupancy Evaluation (POE) is crucial before any decision making process for the future design. This data is essential to meet user needs, user behavior patterns, standard Physical and Psychological, Perception and social welfare. Although the Physical aspects of the space runs its significant toward the perceptions and satisfactions of the user, Psychological aspects are also crucial and required to be assessed. One research conducted by Sundstrom (1982a) reported that Privacy is a key requirement of workplace. The research has found that office workers moving from enclosed to open-plan office perceived a reduction in privacy - including these for their conversational and visual privacy (Sundstrom, 1982b). Peach and Slade (2006) in their research found that distraction will impact the workers. The Case of workspace is similar to the classroom where students spend much time to use the room. Goodrich (1982) points out that many design solutions might unintentionally reduce perceived privacy, particularly in the case of noises and movements outside which are sudden and unanticipated as well as making them feels distracted. The high partitions provide only visual privacy, but they may fail to block noise from outside (Maher & Von Hippel, 2005). Therefore, it is noted that effective use of space will ultimately depend on how much of human behavior as an important factor taken into account in a process of building design.

Environment all of which contribute to the process of the emerging of Space Impact Behavior. Thus, the spatial conditions affect the behavior of individuals in their daily lives. The effective use of space will depend on how the behavior has been considered and accommodated in the design of the Built Environment. An understanding of the concept of behavioral molding is greatly contributing to the

creation of the built-environment that is close to ideal to live happily ever now and in the future.

3. Case Study: Post Occupancy Evaluation toward Classroom Design Evaluation

Having understood that the importance of space and behavior interrelationships, several research have been taken place. Past research has shown that the presence of the Built Environment has a strong impact on human behavior. Various studies have been conducted to clarify the relationship between various typical buildings. This paper describes one of the supporting research. The methodology used for the research has met a standard to conclude a well-represented research. Post Occupancy Evaluation (POE) was employed, defined as a process of interviews with the students as a classrooms' users and observation to the spatial conditions as well. The use POE due to the increasing needs of architects to receive feedbacks how users perceived toward its current typical university design - particularly for the classroom design. By using this POE, it was done to assess what the greatest and poor perceptions of users toward the space provided for them.

The 2 (two) variables of research models used in order to assess relationships between Physical Spatial Performance and Psychological Spatial Performance. They both were employed firstly to see its relationships. These 2 (two) variables were also each and both to be assessed for their impacts toward their satisfaction to the classrooms available for them and further to assess how its impacts on student academic achievement. Method of data processing with SPSS Software. Mixed Analysis Method was used. Correlations and Regression were used for analysis. The research models made as seen in this figure 1 below.

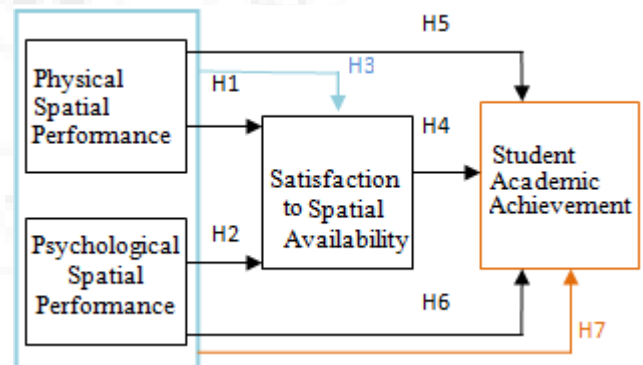


Figure 1: Research Models

One example can be used as a reference POE (Post Occupancy Evaluation) is the assessment indicators space or spatial used by Indriyati (2013). The indicators used in the study are to assess the Physical Performance of Spatial such as: (1) Availability of floor space; (2) Flexibility of the space functions; (3) Form of space or rooms for use. Similarly, a number of indicators that can be used to assess the Performance of Psychological Spatial such as: (1) The Glare; (2) Heating conditions; (3) Room's air freshness/stuffiness; (4) Air and water circulation system at the Children's Room; (5) Room's level of humidity; (6) Visual privacy; (7) Conversational privacy; (8) Availability of locked room.

The role of architecture behavior in School Planning and Design is important to see how the performance of physical and psychological space, in particular its impact on students' satisfaction and academic achievement. The model of the research is to assess the relationship between Spatial Performance Physical and Psychological. Both variables are assessed the impact on the users' satisfaction toward the classroom space available and further the impact on students' academic achievement.

The findings present brief student characteristics. The respondent's majority characteristic has shown considerably appropriate or meeting its representativeness as those sitting

in the appropriate semester in terms of length of study and also within the mature age, therefore they can provide true facts for this assessment process. The students' response was also mostly given by those occupying the middle classroom size (not the smallest classroom size).

The results reported is significant for Architects and Designers as well as Institutional Managements to provide a proper classroom design in the future and later getting a better students' and graduates' qualities as well as increase the university values, credibility and reputation. The statistical results as presented in Table 1 below.

Table 1: Results of the Partial and Simultaneous Assessments

	Hypotheses	Influenced /R2 (%)	R Linier Coeeficient	P Value	Statistical Conclusions
H1	There is an impact of Physical Spatial Performance on the Students' Satisfaction to Spatial Availability	36.7	0.605	0.006	Significant
H2	There is an impact of Psychological Spatial Performance on Students' Satisfaction to Spatial Availability of the students	54.1	0.736	0.000	Significant
H3	There is an impact of both Physical and Psychological Performance on Students' Satisfaction to Spatial Availability of the students	65.2	0.807	0.000	Significant
H4	There is an impact of Student's Satisfaction to Spatial Availability on the Students' Academic Achievements	33.0	0.575	0.000	Significant
H5	There is an impact of Physical Spatial Performance on the Students' Academic Achievements	34.7	0.589	0.010	Significant
H6	There is an impact of Psychological Spatial Performance on the Students' Academic Achievements	40.4	0.636	0.006	Significant
H7	There is an impact of both Physical and Psychological Performance on the Students' Academic Achievements	50.8	0.713	0.019	Significant

Results of Research have stated that:

- (1) The Spatial Performance - both Physical and Psychological Performance - has an influenced toward the Students' Satisfaction to their classrooms and its facilities provided within their classrooms;
- (2) The Physical and Psychological Spatial Performance indicate significantly influencing the students' satisfactions (0.006 for physical performance & 0.000 for psychological performance), It is to confirm that people absolutely needs to have a sufficient quality of both physical setting for them to study effectively and psychologically acceptable;
- (3) The two spatial assesments - physical and psychological spatial performance - have shown its positive impact to student academic achievement (0.000);
- (4) The Satisfaction of the students toward their quality of classrooms available for them has also highly-influenced by both Physical and Psychological Spatial Performance which is reaching the 36.7% for the Physical and 54.1% for the Psychological Space Performance and reaching 65.2% for both Physical and Psychological Performance. This result has indicated that students' satisfaction of classrooms are strongly influenced by Psychological aspects compared to physical ones. It is to conclude that people like to have their classrooms psychologically accepted more rather than physical one. Students are happy as long as psychologically conditions are accepted for them, such as the requirements on controlling the glare, heating conditions, freshness and air circulations and humidity within the rooms;

- (5) The Student Academic Achievement are significantly influenced by the satisfactions of students toward their classrooms (33.0% of respondents). The Student Academic Achievement are high-influenced by the Spatial Performance - each Physical or Psychological performance and both Physical and Psychological performances. The Psychological performance alone are taking more influenced compared with the Physical Spatial Performance (40.4% compared to 34.7%). The psychological aspects found significant is glare effects (0.043).

4. Implication for Planning & Designing in Architecture

From the study conducted, it leads to create the framework how importance behavioral aspects to take into account in planning and designing the space. This research has justified that Spatial Performance consists of Physical and Psychological Performance influence the students' satisfaction toward their classrooms. Psychological Performance one has done and shown strongly influences the student satisfaction of classrooms. It indicates that students tend to have a well-psychological conditioned room and less concerned to what physical aspects. Satisfaction of the students to their quality of classrooms has also highly-influenced by both Physical and Psychological Spatial Performance. Student Academic Achievement was also found influenced significantly by satisfaction perceived by the students. Similar to this, the spatial performance both physical and psychological performance have influenced to the student academic outcomes. However, it was indicated

that spatial performance underlining the Psychological aspects tend to be dominantly expected by the students in relations to their academic achievement. This students' academic achievements are strongly influenced by Psychological aspects compared to physical ones. Therefore, students tend to have their classrooms psychologically acceptable rather than physical ones.

This research has confirmed the previous other researches results which was saying that in general classroom physical comfort is important and classroom climate (psychological aspects) are key variables for student academic achievement. However, this research was more extensive compared to prior ones since the results have proven in detail in which spatial performance has been seen from both physical and psychological aspects, where as others only combined all aspects. This research has justified that both physical and psychological performance impact on students' satisfaction toward their classroom and student academic achievement. It even clarifies in detail that psychological aspects of classrooms' performance more likely to be concerned by the students for their satisfaction and study achievement.

Implication for Planning and Designing in Architecture is therefore one needed to produce "Behavior Design Approach as a Basic Concepts of Architectural Design". Having considered the issues come up with various problems arising from the studies - due to the lack of sufficient approach to the broader human aspect - it is necessary to develop methods of planning and design concerning aspects of human beings, especially human behavior. Understanding the importance of the concept of behavior in planning and architectural design has been started long ago. In his book Wahid and Alam (2013, p.34-35) noted that the Theory of Architecture: A Study of Understanding Differences Eastern and Western theories have stated that the behavior architecture has been taken place within the concept, design and aesthetics at every Langgam Architecture since a period of architecture style so called Modern and Post Modern.

Humanist architecture with architectural approach behavior is required as Concept Planning and Architectural Design of the Future. It should be underlined that the Planning and Design Architecture defined as humanistically in how the architect should be made aware of the needs of users to develop design alternatives. No single idea occurred without linking environmental design and behavioral sciences with the concept of user needs. The active role of users in the design process should be emphasized.

Planning and Design of the building must absolutely consider aspects of Human Behavior in the design process, so the humane architectural design will be well-perceived and the failure of architecture can be avoided. Architecture perceived humanistically does not mean "poor of things" and will ignore the used of latest technology and cultural or aesthetic expression, it is in contrast this Humanist architecture will enrich and enhance the success of architectural work. As an important note that the priority should be noted in particular for the planning and design of a typical mass building where End Users do not have a chance to say what their needs and wants. For the case of Typical Mass Public housings for instance, the behavioral aspects of the user are mostly neglected and the project will focus and run even binded in parallel to the efficiency of fund development and social and technical regulations. In many cases, Building Design is typical financed with priority the efficiency of development. Hence, due to that reason, the work of architecture found "less successful" (failure). Feedback on Evaluation of Post Occupancy which based on their perception towards the space will determine the future success of the architectural work and minimizing the impact of excessive Coping Behavior.

The Relationships between the Perception and Coping Behavior Concepts

Here is how the concept of relationships between Perception and Coping Behavior as developed from earlier major theories as seen in the figure 2 below.

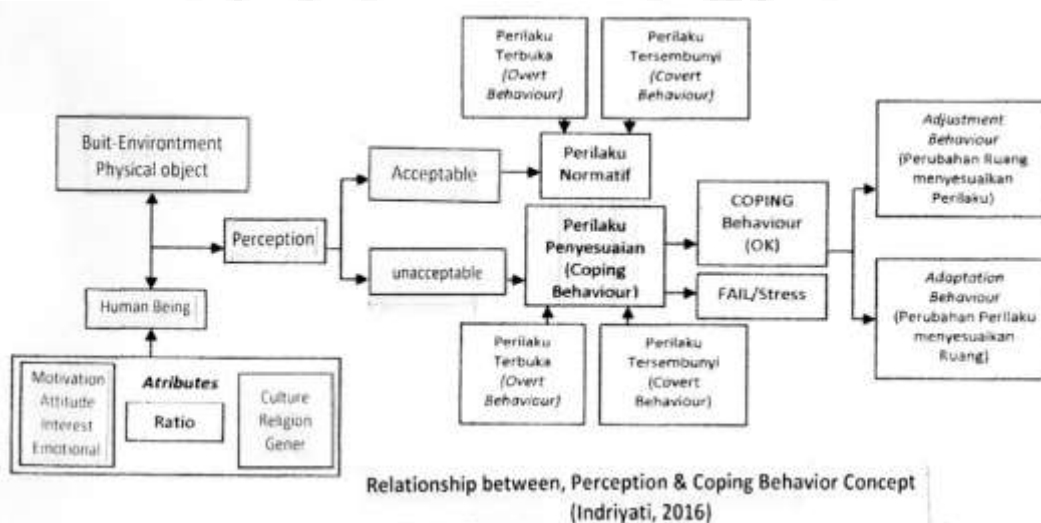


Figure 2: Concept of Relationships between Perception and Coping Behavior (Indriyati, 2016)

5. Concept of Behavioral Architecture Design Methodology

Physical Design produced not only to meet the major needs

of users, but also targeted to meet and expand freedom of choice activities of occupants to other needs (Prohansky, Ittelson & Rivlin, 1976, p.172). Complex built-in environment has a lot of problems. There are 3 (Three)

'Important Concepts of Environmental Design' is defined by Bell et al. (1978, p.315) as follows: Feasible-occupancy, Alternative Design and Process Design.

Techniques for measuring available behavior data can be utilized by Heimsath (1977, p.148) as follows:

- a) Collection of behavioral data before making a decision.
- b) Communicating behavioral data in a visual format that is compatible with the graphic language of architecture.
- c) Designers and evaluators are responsible for their decisions. This technique is part of the overall design process that concentrates attention in the early stages of design or programming phase.
- d) One of the factors that affect the design environment is the need to understand the criteria that must be met to build the built environment. These criteria include:
 - To meet the needs of the user's behavior as expressed through the function and floor space requirements in a given building;
 - To meet welfare standards and specific physiological conditions;
 - Perception data obtained is expected to meet certain standards; including this and setting up standards for what community needs (Sarwono, 1995, p.116).
- e) In addition to the criteria to meet the needs of users, Zeisel claimed that, when combining the needs of users in the design process, it is required to distinguish the "User Needs" and "User Wants". "User Needs" is the basic functions involved in any environment. For example, a family who lives in the physical environment should be provided with a minimum of space and facilities to meet the primary needs. However, "the user desires or wants" are more likely centered around the physical attributes, the "outside" the basic environmental requirements (Zeisel, 1975, p.321).

A New Guidelines for Planning and Architectural Design Method for Planning and Design Architecture with Behavior concerns can be proposed like Planning & Design Process below (Indriyati 2016). Behavioral Design Methodology can be conducted with 7 (seven) stages as defined by Indriyati (2016) and can be seen on the diagram at figure 3 below.

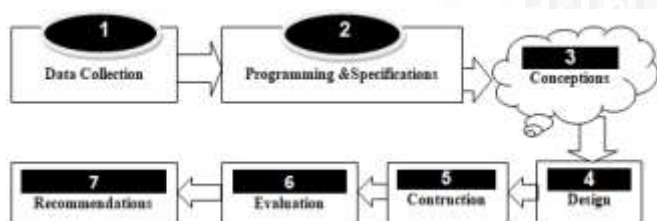


Figure 3: 7 Stages of Behavioral Design Methodology (Indriyati, 2016)

The 7 (seven) stages of each stage are described, containing as follows:

- 1) Data Collection
 Planning/Design Building begins Research with stages:
 - a) Demographic data;
 - b) Behavioral mapping;
 - c) Preparation/distribute the questionnaires;
 - d) Consulting/Interview with User (called Process of Participation);
 - e) Conclusion (Ronald W. Patersen, 1978, p.172-178)

- 2) Programming and Specifications
Alternative 01. In the Planning and Design of Buildings, several important things to note (Charles J. Holahan, 1978, p.29-45)
 - a) Identify the characteristics of the community in each built Environment;
 - b) Perform Behavior Mapping;
 - c) Identification of Outdoor Social Activity (by ages across various study research);
 - d) Identify the Behavior of each category of each age group;
 - e) Reclaiming Social Space and the use of outdoor space;
 - f) Reclaiming Functional Space;
 - g) Identification of Social Coping;
 - h) Identification of Community SatisfactionAlternative 02.5 (five) building functions to answer the concept in the 20th century Architectural development (Julaihi Wahid & Bhakti Alamsyah, 2013, p.51)
 - a) Structural Articulation;
 - b) Physical Function;
 - c) Psychological Function;
 - d) Social Function;
 - e) Cultural Existential Function
- 3) Conceptions of Architecture Program
- 4) Design
- 5) Constructions
- 6) Evaluation
 - a) Architectural Program:
 To do comparison between old Design & New Design Evaluations, such as types of space; number of space, space relation, space size, privacy, social interaction, image, design details like furniture, ventilation, lighting, color, room temperature) (Arnold Friedmann; Craig Zimring; Ervin Zube, 1978, p.64-70)
 - b) Judgment of Environmental Quality:
 Scale based on perceptions (closed/open, colored/colorless, exciting/boring, small/large, interesting/unattractive, pressing/comfortable, uncomfortable/depressing/cheerful; motivated/unmotivated; fun/unpleasant); Using scale 7 (seven) for assessment (Jeffrey D. Fisher; Paul A. Bell; Andrew Baum, 1978)
 - c) Classification of Coping Behaviors:
 Adaptive dan Maladaptive (LaRetta M. Garland, R.N., Ed.D. & Carol T. Bush, R.N, Ph.D, 1982, p..115):
 - Actual & Abstract Environment (Physical, administrative & behavioral); People's responses (seeing, feeling, doing in, doing to, knowing); Linking and Using the categories; The question matrix; Environment Physical (Objects, places, relations between places, qualities); Administrative (Formal rules, informal rules); Behavioral (Characteristic of people, activities, relationships between people)
 - People's Responses to Environment (What they see in the environments (Perceptions, meaning); What they feel in about environments (Opinion, value); What they do in environments (Place, path, relation); What they do to environments

(Adaptations, displays, messages); What they know about environment (Knowledge, data) (John Zeisel, 1984 & Environment Behavior Research (p.178)

7) Recommendation

Tabulation Design can be made by doing Post-Behavioral Evaluation first and then can be done with stages, as follows:

- a) Recommendations, User Benefits & Performance Objectives for Building Physical Design Recommendations (walls, floors, ceilings, furnishings, other equipment such as clocks etc / hour orientation etc.) (Environment Behavior Research, p.178)
- b) Three Dimensional Design Process (Proposed by Altman): 5 Phase Design Process (Privacy, personal space, territory, other processes); Unit of study (Places) started from Rooms, Homes, Hospital/Schools/Prisons, Neighborhoods, Communities, Cities, Geographical Regions (Ronald W. Patersen, 1978, p.152-162)
- c) Considerations of Behavioral Patterns in design are not always related to Culture or custom. User Behavior Patterns to be identified in relation to Standard and Formal Behavior for an organization/institution with a leadership organizational structure that affects the organization of space and even the building as a whole (BoedhiLaksito, 2014, p.142)

6. Conclusion

With a good understanding of the "Concept of Relationships between Perception and Behavioral Coping" and conducted Post Occupancy Evaluation (POE) as a first step of any process of Planning and Architectural Design that uses the formulated "Criteria Perception Space and Environment" and also further understanding the "Behavioral Design Methodology" as presented in this paper, then the architectural work based on humanities architecture concept with underlining behavioral approach will be a successful in the future.

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