

## THE ROLE OF STRUCTURALISM IN TOWN PLANNING RESEARCH IN THE DIGITAL ARCHITECTURE ERA

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**Abstrak:** Strukturalisme pada mulanya berkembang pesat di Prancis, tetapi strukturalisme belum dikenal di Indonesia; bahkan pada awal 1990-an, strukturalisme Lévi-Strauss tidak bergema di kalangan ilmuwan sosial budaya Indonesia. Pada tahun 1966 penerbitan buku *The Architecture of the City* yang ditulis oleh Aldo Rossi memberikan masukan tentang penelitian arsitektur dan perkotaan berdasarkan strukturalisme; Buku ini mengajarkan Tipomorfologi. Tujuan dari penelitian ini adalah untuk memberikan penjelasan tentang bagaimana strukturalisme digunakan sebagai metode pendekatan dalam penelitian perencanaan kota. Ada dua metode penelitian yang digunakan, yang pertama adalah metode literature review untuk mendapatkan pemahaman strukturalisme dan penggunaan strukturalisme di lapangan dalam konteks perencanaan kota yaitu pendekatan tipomorfologi. Setelah pemahaman tersebut, dilanjutkan dengan metode penelitian kedua yaitu metode studi kasus, yaitu menjelaskan penggunaan metode strukturalisme dalam studi kasus di Kota Semarang. Penelitian ini memberikan pemahaman tentang strukturalisme, dan pemahaman tentang penggunaan strukturalisme dalam lingkup arsitektur, khususnya dalam penelitian tata kota. Di era arsitektur digital saat ini, hasil penelitian ini memberikan gambaran tentang peran penting strukturalisme dalam memberikan kontribusi terhadap fakta segala aspek yang membentuk kota; dan ini menjadi dasar penelitian pembangunan perkotaan dengan menggunakan teknologi arsitektur digital.

**Kata Kunci:** Levi-Strauss Structuralism, Tipomorfologi, Penelitian Perencanaan kota, Arsitektur Digital

**Abstract:** *At first, Structuralism developed rapidly in France, but structuralism was not yet known in Indonesia; even in the early 1990s, Lévi-Strauss' structuralism did not resonate with Indonesian socio-cultural scientists. In 1966 the publication of the book *The Architecture of the City*, authored by Aldo Rossi, provided input on architectural and urban research based on structuralism; This book teaches Typomorphology. The purpose of this study is to provide an explanation of how structuralism is used as an approach method in town planning research. There are two research methods used, the first is a literature review method to gain an understanding of structuralism and the use of structuralism in the field in the context of town planning, namely the typomorphology approach. After this understanding, followed by the second research method, namely the case study method, which is to explain the use of the structuralism method in case studies in Semarang City. The research provides an understanding of structuralism, and an understanding of the use of structuralism in the scope of architecture, particularly in town planning research. In the current era of digital architecture, the results of this study provide an overview of the important role of structuralism in contributing to the facts of all aspects that make up the city; and this is the basis for research on urban development using digital architectural technology.*

**Keywords:** *Levi-Strauss Structuralism, Typomorphology, Town Planning Research, Digital Architecture*

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## 1. Introduction

The discussion on Structuralism cannot be separated from the figure of Claude Lévi-Strauss (1908-2009). He is a prominent structuralism expert who believes that the structure of ancient human thought (savage mind) is the same as the structure of modern human thought (civilized mind) because human nature is actually the same. Oral traditions, especially myths, have a logical rather than aesthetic, psychological, or religious quality. A contradictory world can give an idea, what is a myth. It is as if there is no logic and no continuity in myth. The essence of myth is a logical tool as an attempt to find a solution to the empirical contradictions faced by society and which are not understood by human reason. By understanding narrative units (mytheme), division of story scenes, and identification of story episodes, Levi-Strauss structuralism analysis can find the 'logic' behind certain myths. For this reason, for Levi-Strauss, oral literature and myth have cultural messages for members of society [1].

What is the history of using structuralism as a research method in Indonesia? In the early 1990s, Lévi-Strauss' structuralism was not heard among Indonesian socio-cultural scientists. In fact, in the reading of social-cultural science journals and books in the West in the 1970s, even up to the 1980s, structuralism was still a popular paradigm and felt strong in its influence. The orientation of the education of Indonesian socio-cultural scientists at that time was the United States, because in the 1950s and 1960s Indonesia was one of the countries that was widely studied and discussed by American social scientists. The name of a French scientist who researched Indonesia but whose name is hardly heard in Indonesia is Christian Pelras (researching Indonesian history). Lévi-Strauss' name as a theorist is almost unknown. Lévi-Strauss, known at that time, was a brand of jeans. The influence of Lévi-Strauss' structuralism in Indonesia began to be seen in the 1980s. The Lévi-Strauss structuralism paradigm became more well known after the publication of the book *Lévi-Strauss Structuralism, Myths and Literary Works*. With the publication of this book, Lévi-Strauss' structuralism began to be recognized outside of anthropological circles. Structuralism is a new way of looking at socio-cultural phenomena. Through this paradigm, there are other aspects of socio-cultural phenomena that can be

expressed, which cannot be revealed through other paradigms. One can judge the efficacy of the structural paradigm to understand socio-cultural phenomena from a different perspective. Since then, Lévi-Strauss structuralism has become increasingly recognized in Indonesia, and is not limited to anthropology students [2].

In relation to design, the main attraction of the structuralist approach seems to lie in its ability to discuss design as a cultural phenomenon that is meaningful to its users, like the language that is the center of the study of semiology, structuralism and post-structuralism. Levi-Strauss structuralism, is a sophisticated theoretical synthesis of Saussurean semiology, positivistic Durkheim sociology, Freudian psychoanalysis, and Marxism into a new anthropology that the character claims is a more scientific anthropology [3].

Structuralism in Europe developed in the early 1900s. In the 1960s, structuralism became fashionable for architects, anthropologists, sociologists. So it must be interpreted structuralism in the field of architecture and urban development. If we are to understand verbal expression and architectural expression, we must consider a much broader context than individual backgrounds and characteristics. Discourse on architecture and urban planning was influenced by talks about politics, scientific progress, and ideas that were dominant in society at a certain time at that time [4].

Structuralism, which became fashionable for architects in Europe in the 1960s, was in the era of modern architecture. What should be known, in the context of architectural development, the era before modern architecture to the era of modern architecture is an era of responding to new needs, and this cannot be separated from the development of social, political, and cultural situations during this era. In subsequent developments, the era of modern architecture up to the era of post-modern architecture, is an era of evaluating the failures that occurred in the previous era; It was during this period that two important books appeared that shook the world of architecture, namely *Complexity and Contradiction in Architecture* (by Robert Ventury in 1966), and *The Architecture of the City* (by Aldo Rossi in 1966). In addition, there was also another book that in the 1960s was very famous, namely *The Image of the City* (by Kevin

Lynch). These books are another expression of the spread of structuralism in the field.

This study focuses on the linkage of structuralism as a town planning research method. The purpose of this study is to explain the application of the structuralism method to town planning, and how to analyze it. This research is positioned to fill the scarcity of research methodology related to the structuralism method approach in town planning. In the next stage, this research provides an overview of the role of structuralism in urban development research in the context of digital architecture.

## 2. Materials and Methods

This study intends to obtain the final result in the form of theoretical insight into structuralism, and how to use the structuralism method in town planning research. Thus, this research will use the method of studying literature related to structuralism, based on several authoritative sources of reference. In the next stage, a case study method is carried out which is analyzed with a structuralism approach.

This study raises structuralism as an architectural research method that can be used to read town planning. The literature used was determined purposively based on the following criteria: First, the literature that focuses on structuralism. Second, the literature focuses on the analysis of practice in the field of modern town planning which is based on structuralism.

Based on this theoretical study, methodological steps can be made that can be operationalized to describe, analyze case studies of modern town planning. In the context of digital architecture, structuralism makes an important contribution to urban development research.

## 3. Result and Discussion

### Claude Lévi-Strauss's Philosophy of Structuralism

People's understanding of the world is the most important part of structuralism. Everything that is final is refuted by structuralism. The signs of humans and their environment are an understandable truth, and this is a reality. If this reality cannot be achieved, then the truth of this reality cannot be evaluated. This reality must be perceived, and this is done by understanding the existing data. Understanding this data is to be able to recognize the differences between units in the data, so that it can be understood thoroughly. This reality is a social condition that can be constructed [5].

Levi Strauss' structuralism is closely related to the problem of cultural anthropology which is used to understand and explain phenomena in culture. In structural analysis, the structure is divided into two types, namely the external structure or external structure (surface structure) and the inner structure or deep structure. Surface structure is a structure that appears and is aware of its existence. Deep structure is a structure that is behind the visible structure and is not aware of its existence. One of Ferdinand de Saussure's thoughts was taken by Levi Strauss, namely Synchronic and Diachronic. On the other hand, adherents of structuralism argue that at a certain point in time there are phenomena that have a relationship with cultural phenomena; it must be understood that these relation determines the meaning of this phenomenon. Furthermore, all the existing relations in the inner structure can be simplified again into binary oppositions [6].

Thus, it can be concluded that the main ideas of Lévi-Strauss Structuralism, namely: Structure, Transformation, Deep Structure-Surface Structure, Meaning, Relation, Synchronic-Diachronic, Binnary Opposition.

### The Study of Typomorphology in relation to Structuralism in Architecture

As mentioned above, there are books which are another expression of the spread of structuralism in the field, related to architecture and town planning. Rossi in his book, namely *The Architecture of the City*, and Robert Ventury in the book *Complexity and Contradiction in Architecture*, teach a structuralism approach in reading the city. Rossi puts emphasis on Form (Meaning), Typhomorphology. While Ventury emphasizes the importance of Meaning (Form), Complexity and Contradiction. Through analogy, culture can be analogized with architecture and artifacts. Typhomorphology will always be related to Combining built-structure and open spaces, Connecting the scale of buildings and the scale of cities with land, and the built landscape is morphogenetic rather than morphological because it is determined by time. Typomorphology is always related to the physical city, urban space, and the whole city itself. So, typomorphology is related to urban form (morphology), and Grouping and classifying buildings and open spaces according to their type (typology). So, typomorphology is the study of the form of a city which is derived from the study of distinctive spaces and structures. Typomorphology is claimed as the architectural approach to read the cities, operationally as well as critically. It must always be realized, Typomorphology is always related to typology, link between, urban tissue, transformation (related to the periodization of urban development),

urban growth and change, element (type) of urban form. Thus, it can be concluded that the main ideas of typomorphology according to Rossi are: transformation, propelling-pathologist, meaning of form, scales, relation at one time-transformation, individual-communal [7].

**Comparison Between Structuralism and Typhomorphology**

An analogy step is taken to compare Structuralism and Typhomorphology. In structuralism there is structure as a system, as an analogy, in typomorphology there is tissue in the city. In structuralism there is structure in architecture, and in typomorphology there are types. On the other hand, in structuralism and typomorphology, both of them have transformation. In structuralism there is deep structure, and in typomorphology there is propelling. In structuralism there is a surface structure, and in typomorphology there is a pathologist. In structuralism there are relations, and in typomorphology there are whole-parts. In structuralism there is synchronic, and in typomorphology relations at one time. In structuralism there is diachronic, and in typomorphology there is transformation. In structuralism there are binary oppositions, and in typomorphology there are individual communal. See Figure 1.

Structuralism	Typomorphology
Structure/system	Tissue
Structure of Arch	Type
Transformation	Transformation
Deep-structure	Propelling
Surface-structure	Pathologist
Relation	Whole-parts
Synchronic	Relation at 1 time
Diachronic	Transformation
Binnary-opposition	Individual-communal

Figure 1: Comparison of Structuralism and Typomorphology [7].

The background of the emergence of the theory of typomorphology is to evaluate modernism, and the Finding Architectural approach for reading the City. On the other hand, Rossi posited three arguments relating to the city is an object made by man - as a total product of architecture [8]. There are three arguments put forward by Rossi, namely: The first is the development of a city has a temporary dimension, that this city has an era before and after. This shows that we are attributing comparable phenomena that are not homogeneous along the temporal coordinates. The idea of immortality comes from this proposition. The second proposition

concerns the sustainability of urban space (spatial continuity). Accepting this continuity means assuming that all the elements we find in certain territories and areas of the city are homogeneous artifacts, without discontinuities. Finally, as the third proposition is that some of the major elements in urban structures have the power to obstruct or accelerate urban processes [9].

There are hypotheses according to Rossi, namely: The city as an object made by man, the city as an overarching manifestation of architecture, and City as a collective work. Thus, there are several things that must be done, namely: To discover stable underlying features that constitutes a type, To define typological belonging of urban artifacts, To identify the structural relations between urban artifacts, and To study transformation of urban type and structure. So, the steps that must be carried out methodologically are: Start from empirical phenomena, Make an analogy and classification of empirical data, Discover the types, Define the propelling elements, Describe the transformation of power behind the form, Elaborated with/non physical city approach, Derive conclusions from dominant issues.

**The Use of Structuralism as a Reading Tool in Town Planning Case Studies**

To use Structuralism as a reading tool in town planning, a city must be selected as a case study. In this case, the city of Semarang was chosen as a case study because the planning of Semarang City in 1910-1946 had a unique and extraordinary beauty as a result of city development based on the application of modern town planning which made it the New Semarang City. The architect who applied this modern town planning was Ir. Herman Thomas Karsten.

To read the modern town planning of Semarang City, a qualitative method is used which is based on Hermeneutic Structuralism [10]; it is intended, the use of Structuralism must be accompanied by interpretive steps to read every event that occurred at each period in the case study at the specified time. Related to structuralism, Synchronic and Diachronic methods are used to understand the development of Semarang City from the early embryo of the formation of the city to Semarang City in 1941. In the operational method of this research, the diachronic method is used to trace the study of Karsten and his work, and to find out events. and the development of the city from 1900 to 1941; even the historical events of world architecture that occurred in this era. While the Synchronic method is to find out the events that occur in the observed part of the time/year [11] see figure 2

Data Analysis Method.



Diachronic idea/thought/the work of other architects in the same period of work

\* = the period of development of the architecture's work / thought

Figure 2: Diachronic and Synchronic Methods.

Thus, the selection and determination of empirical data is the most important part in the initial steps of this research. Empirical data includes all initial maps, and maps planned by Karsten in planning the expansion of Semarang City to a modern city (1916 – 1941).

From all the important maps used, it can be seen that the planning of the City of Semarang from the beginning of planning in 1910 to 1924 (see figures 3, 4, and 5).



Figure 3: Initial map of Candi Baru, 1910  
Source: Toekomstig Semarang [12].



Figure 4: Map of Expansion Plans Semarang by Karsten, 1922  
Source: A.Plate, NION, Zesde Jaargang, 1921/1922:148 [13].

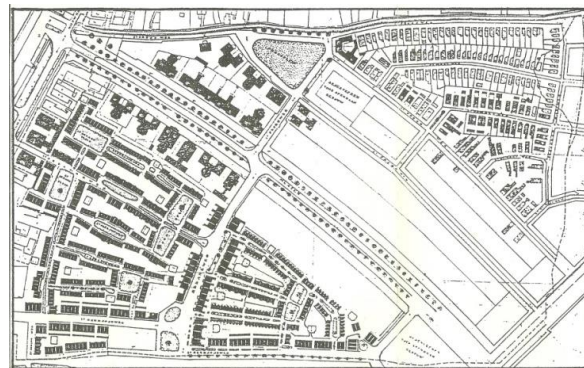


Figure 5: Map of Mlaten Settlement 1924 by Karsten  
Source: Locale Techniek, No.1/2, Jan./April 1932:11 [14].

These maps are part of the important data to read the city of Semarang from the beginning it was planned to be a new city until the realization of its construction. Departing from this stage, you can read the architecture of the city.

**What is the Role and Use of Structuralism in Digital Architecture?**

From the description above and the town planning case study review, structuralism is very useful in getting the reality that occurs when planning is made and the

realization of its construction. All events can be explored in depth, covering social, political, cultural and economic aspects. This is in accordance with the opinion of Söderqvist, that structuralism aims to express social patterns and relationships and this is understood as something permanent and definitely impossible to change. Transportation routes, roads, and squares, form the basis for architects and urban planners in organizing buildings and cities. This is what according to structuralist analysis is the structure of the city that has not changed [4].

In architecture, space is an important concept. Since the internet exists in the digital world, the understanding of space has changed, and a new concept of space has emerged. On the other hand, there are developments in the form of architecture. With this phenomenon, it is very necessary to explore and discuss new concepts about space, especially those related to cyberspace, and how the implications for physical space are known so far. In the context of physical space, every person and architect experiences physical space cognitively through sensory perception. The absorption by humans of various aspects in their environment is determined by codification, which includes visual and verbal aspects. In this all-digital era, questions arise related to various aspects that occur in everyday life that are individual (social, cultural, economic, etc.). These things determine human character in dealing with their community. In relation to developments in this digital era, in order for there to be adjustments to these various limitations, architects must make various compromises in their work with their abstract vision. [15].

What is the impact of the development of digital architecture on town planning today? As is known, because there has been no separation of disciplines between architecture and town planning in the 19th century to the 20th century, the object of architecture is the city itself [16]. The result of the follow-up to town planning is the realization of the built environment. Thus, a lot of data is needed from various disciplines and knowledge. With all this up to date data, the built environment will be shaped and reorganized in the form of a spatial scale for the community. In recent years, town planners have used a lot of Geographic Information Systems (GIS). With GIS, all data that is capable of being visualized, can be presented, analyzed, and modeled. Planning, visualization, and Internet models, which are integrated are a major attraction for GIS developers and efforts to integrate BIM and GIS are happening recently [17].

On the other hand, in today's era, sustainable urban development has become a very important issue. Thus, research and development of the physical form of the city related to resources becomes very important. This also happens to cities that have a city historiography since the beginning of their urban planning until now.

Thus, research on the form of the city that has an impact on the efficient use of energy can provide a vision for future urban development. The pattern of movement within the city will affect energy needs. This is related to the pattern of the form of the city. In this context, the pattern of movement within the city is horizontal mobility. On the other hand, the pattern of urban forms with high-rise buildings demands the use of energy consumption for vertical mobility. Until 2019, this has never been investigated. In this regard, a 3D city morphology model was built to examine the shape of the city with energy consumption on vertical mobility [18]. In addition, it must be realized that only the configuration of the urban network can affect the pattern of movement and distribution of buildings [19], this is related to the development of social, political, and economic factors.

We all realize that very complex geometries and topologies must be applied in architectural design and building expression in digital architecture, which has undergone a fundamental change in the direction of future architectural styles. The design process and architectural concepts have been completely transformed by increasingly sophisticated computers and digital equipment; and new forms of innovative architecture emerged. This new form of architecture influenced the visual, physical and morphological features of the city. Digital architecture has an impact on the landscape of cities that have a periodization in the formation of the city. So, by using the sophistication of these digital tools, the landscapes of historic ancient cities that are damaged today, can be revitalized [20]. If in a historic city urban conservation is carried out, and research related to this conservation involves the sophistication of digital architecture, then there can be a rebranding / changing of the character of the city through cultural means. This is in line with Miles' statement, that culture reproduces the city [21].

A city that has a long history of city historiography, especially historical cities in Indonesia, must experience urban development due to the growth of social, political and economic aspects. Many research topics about cities can be done using the sophistication of digital architecture. However, cities that have a very long history of the city, it must be realized that these cities fulfill the three propositions put forward by Rossi as mentioned

above. Thus, extracting city data cannot be separated from the research approach with the structuralism method. So structuralism is used to get the full potential of the city as optimally as possible which is related to the historiography of the city. Furthermore, in the context of the conservation and preservation of a city or urban area, the role of digital architecture is very important.

#### 4. Conclusion

Structuralism has very important potential to be used to read/analyze a city. Furthermore, with the development and innovation of excellent and sophisticated digital architecture software products, this has become a positive contribution in research that utilizes Geographic Information Systems (GIS) which have the ability to present, analyze, and model spatial data. In addition to research on sustainable urban development, research on the physical form of the city and its impact on resource efficiency, research on urban conservation, and others, which use digital architecture. The use of the structuralism method is very important to know all important aspects of the city related to the history of the formation of the city. This forms the basis for urban development research. So, a substantive understanding of structuralism in architecture, becomes very important. However, unfortunately, architectural research using the structuralism method has not received much attention.

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