



## **Apply urban morphology to study Tainan commercial district fabrics**

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### **Abstract**

The city is a continuous process that constantly changes and evolves. The process leads to changes in urban fabric, street blocks, the building size, etc. Therefore, the study in the vicissitude of urban fabric can allow better understanding of the developing contexts of a place. Tainan City was the political and economic center of Taiwan. The axis of the old town used to be the major port for old river transportation. However; the transportation methods and the city itself changed throughout time, and commercial businesses had to relocated. Today, the focus of the axis area is on cultural preservation. Traditional urban morphology focus on the spatial characteristics composed of different levels. However, this method lacked driving force for the evolution of the structure and the operational relationship in space. In this study, urban morphology will be used to observe settlement and essential space patterns of business. In addition, the study will go deep into investigating about the process of conformation, the space network hidden behind the fabrics and how urban context could be influenced. This study will investigate the structural transformation of Tainan's urban developmental process. The investigation will sort out the foundational background of the city from 17th century to the 21st century and analyze the context of the era. This study will investigate the urban fabric at different levels, and come up with strategies on how the structure of commercial aspects could be effectively modified.

*Keywords: urban morphology, commercial, urban fabric.*



# 1 Introduction

The city is a continuous process which constantly changes and evolves that can be identified by regions, channels, nodes, landmarks, boundaries, and thus develop a complete form [1]. The process makes urban fabrics, street blocks and buildings change over time. The city must be divide the districts of the different types of morphological regions such as residential area, commercial area, industrial area if a city region wants to grow successfully. The varying morphological regions will bring about the evolution of urban and urban space allowing one to observe a developing context of urban region. Thus, understanding the sequence relationship of past, present, future through time axis provides the framework and requirements for promoting urban sustainable development [2].

In the early twentieth century, a group consisting of several urban ecologists from the Chicago Sociology School of Thought which consisted of key figures such as Robert Park, had used the web of life concept from Charles Darwin and advocated so-called symbiotic societies, was not an unorganized group which was just living in the same habitat for plants and animals. On the contrary, they were using the most subtle and complex ways to maintain each other because through individuals or groups within the urban environment, and the city within, the organic ecological processes are mutually related [3].

The city is not simply a gathering of urban residents, social facilities and man-made structures – the city is a constantly renewing organism which create law and order in the disorder spontaneously. Moreover, the different categories of land use affect law and order. The commerce influence context can result in entire city development in various types of land use. Commerce leads urban direction and directly reacts structural characteristics to urban space. This study will interpret urban commercial district through these concepts. It will use urban morphology to study different kinds of business and types of operation in the commercial district and space structure in these formed district to classify the type of urban commercial landscape.

The urban commercial district is a complex organization that consist of different types of business and operations. The types of business refer to trading patterns, such as wholesale, retail and etc., and types of operations pertains to the various form of department store or boutique street and etc. The partial interaction form entire organizations and patterns and whole structures may also affect partial behavior to further develop new properties or interactions [3]. These relationships support the commercial district advancing it towards stable development. The order of commercialism naturally follows the survival of the fittest. Even though there are external factors of force majeure, such as policy that get involved in commercial district development, it still remains a suitable business. Urban structure of historical evolution can be analyzed through types even through different scales of commercial district, we are still able to find the consequent law of transformation process [2]. However, the prosperity and decline of commercial district largely depends on the change of urban fabric. The individual buildings must be compatible with the overall urban fabric. Therefore,

we must interpret the combined mode of urban space initially while probing urban fabric [4].

This study uses urban morphology to analyze urban space combination. Urban form consists of three basic elements: the relationship between buildings and their associated external space and lots, the transition from one era to another era, and emphasizing the importance of using the physical environment – urban master planning, architectural form and insubstantial environment – land use mode in change research in order to clearly understand the environmental trends [5]. However, traditional urban morphology focuses on space feature in different scales, but this research method lacked driving force for the evolution of the structure and the operational relationship in space. The various driving forces and events is an important force for forming change and replacement of various basic elements in the transformation process of urban form.

Conzon considers the relationship between buildings, lots and streets will influence urban form, but ignored that the real impact of urban form comes from types of business and operation inside building. Effective variety of businesses and types of operations will definitely make commercial district development stable. These businesses and products of commercial district may change, but types of operation may not change. However, the businesses are able to exist due to the existing relationship with original street. It will be able to change its use if commercial district can accommodate original types of operation and the form of commercial district will be retained. From the Conzon principle, if the various businesses and types of operations are not changed, then the commercial district will steady decline.

Therefore, this study will investigate commercial district of Tainan city by observing commercial settlement and real space patterns. This study will take old town axis in Tainan city as study site (i.e. Chung Cheng Road and Zhon-shan Road). The axis of the old town used to be the major port for old river transportation, combining shipping with business activities, the node was an important area. However, the city and its form of transportation changed throughout time, and the residential communities and commercial businesses had to relocate as a result of these changes. Today, the focus of the old town axis area is on cultural preservation. The investigation will sort out the base background of the city from 17th century to 21st century, and analyze the context of the era, such as the streets planned during the Dutch colonial period; the evolution in ocean commercial activities during Ming-Zheng government; the flourishing of trade in the Qing dynasty; the advocacy of modernizing the city during Japanese colonial period; the shift of focus to industrialization during the second post-war period in order to study urban fabric in different levels that influence commercial district structure. In addition, this study will investigate the formation process, causes of change, and space network hidden behind urban form that influence urban fabric.



## 2 Existing research

### 2.1 Urban commercial studies

The urban commercial district leads the entire urban direction, and directly reacts structural characteristics of urban space. In addition, it correlates with the prosperity and decline of whole social and economic activities. In recent years, the rise of convenient stores and 3C shops has resulted in a change in the urban commercial structure. Moreover, the distribution of commercial activities also affects commercial structure, and the main cause of the distribution influence is “push” and “pull”. McQuaid (cited in [6]) said that location theory is a thinking tool where “pull” can refer to the places with potential for new markets. Relocation theory considers the “push”, and for example, refers to the places which are already saturated and lack space. Among lots of theories, Central place theory is most commonly used to analyze the space relationship of commercial structure. It uses “hierarchy” and “centrality” to explain urban spatial structure, but this theory is not related to consumer activities, thus making a comprehensive interpretation will be difficult.

Investigating commercial patterns should consider whole and partial concept simultaneously, due to urban structure guide the distribution of various land use, for example, land property with demanding for higher density of pedestrians, such as businesses; while other types such as residential dwelling will avoid those places. From these ideas, the reaction to spatial structure when the process become intense make lots smaller. The enhanced accessibility between small lots result in the phenomenon of increased density and pathways in the network. Thus, the whole formation makes them easy to reach in a larger city, and the individual characteristics make their network more congregated and become mutual accessibility internally [6].

Therefore, the impact of urban commercial district development is quite complex, including population structure, industrial distribution and socio-economic environment, transportation construction and land use. The interaction of human, space and life experiences produce abundant cultural context and demonstrate a cumulative form of urban growth process. This form of the essence is the presentation and continuity of the order. Table 1 shows urban commercial district development context of six indicative cities in the world and this study will use these as reference. The study site was an important central commercial district of Tainan city in the past, but it declined gradually because of the historical and social change. Commercial activities are no longer prosperous and government merely focus on the preservation of cultural assets, where, sustainable strategies to revive urban commercial district should be of focus.

Table 1: Urban commercial district developing content [7].

City	Urban commercial district developing content
London	Industrial revolution caused the capital and population to concentrate in the city. They reformed urban structure by the provision of satellite towns due to the idea of garden city.
Paris	Establish new road network as spindle of new town public construction in Paris reconstruction project and successfully create “new urban development” model.
Moscow	Urban form was controlled growth by transform single core to multi-core with use of vertical partition to improve efficiency in addition to use dispersed land development mode due to development dilemma of central commercial district.
Tokyo	The feature of spatial structure is the metropolitan area of internal transportation ring line with external connection in the form of radial connections extending out from the ring.
Boston	Maritime trade promoted urban development and coupled with lots of immigrants results in intense urban growth. Retainment and coexistence of old and new culture due to the birthplace of American history.
Taipei	Urban activities evolved by the surrounding, and there is emerging corridor form of new town along with outer road development after the expansion and further form multi-core metropolitan area.

## 2.2 Urban morphology

Urban morphology is derived from the study for biological factors first focused on the human form. From the Ancient Greek's that first explored this study, urban morphology required a long-term evolutionary process for understanding. Apart from analysis of urban form from biological point of view, the following explain urban morphology concept in the form of geography and architecture.

Table 2: Two views of urban morphology.

	The time view of urban morphology	The space view of urban morphology
School	Geography	Architecture
View basis	Time as absolute standard of observing city	Space as absolute standard of observing city
Representatives	Michael Robert Gunter (M.R.G) Conzon, Jeremy Whitehand	Saverio Muratori, Aldo Rossi, Gianfranco Caniggia
Main thought	City accumulation of materialistic form over time	Man-made artifacts express artificial facts of urban

Aldo Rossi said type is not made by the shape or function to classify. He thought any architectural art are from existing life experiences. Everything has a precedent and must have origin and rules to follow. The value of urban structure can be understood through observation and description the city represented as an artifacts and artwork [5].

Recalling the development of urban morphology, the following table is urban morphology of thought for many schools, and it affects many urban planning practices.

Table 3: Urban morphology content of three schools.

School	Content
Italian school	The earliest development school which aimed to generalize urban street patterns and provide new planning as reference.
French school	Built space is important for social culture and will shape the influential relationship between landscape and building.
British school	Think that urban planning and urban space organization are linked from street system, land distinguishing patterns and building these three-dimensional structural forms.

The British school of thought Conzon has the most influence in planning concepts among these schools. He has made the following contributions of urban studies: (1) set up the basic analysis system of town planning (2) establish independent lots for the research (3) use the detailed historical map with fieldwork and literature analysis as research methods (4) develop the concept of the urban landscape [8].

The principles and subsequent development of the theory is mainly based on take urban structure and historical development change as important and study driving force of influencing urban structure. All of these spirits will be followed by this study.

The important core of urban morphology is to study the forming and changing process of human settlement or urban, and intend to find out the presented forms and component elements of metropolitan areas, cities, towns and settlements. Generally, there are many dependencies between building form and function and the contemporary structure contains state of the past. Therefore, urban commercial district fabric is understood through time axis and commercial change will reflect the deep mechanism change of human social life.

### 3 Methodology and study site

In this study, the urban morphology is chosen as the selected study for commercial district. This study merely takes one block of Chung Cheng Road as a study site due to time consideration.



### 3.1 Site background

Tainan city is the earliest development city of Taiwan. In past period, the main commercial core is based on Min-quan Road, and Zhong-yi Road. The Japanese used radial planning method during Japanese colonial period and deliberately transferred commercial core to Zhong-zheng Road. Zhong-zheng Road was active central commercial district, but it gradually declined after the saturation of old city center development and the change of consumption patterns.

### 3.2 Site range

The street block is enclosed by Yong-fu Road, Min-sheng Road, Zhong-zheng Road, Zhong-yi Road.



Figure 1: Study site map.

### 3.3 Study procedures

The study procedures are shown in figure 2.

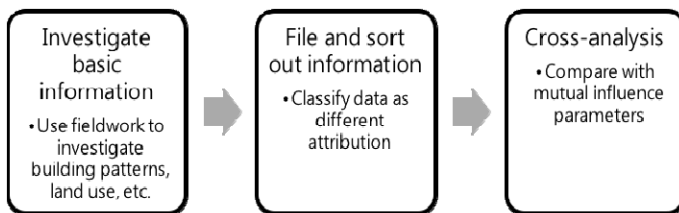


Figure 2: Study procedures.

## 4 Results

This study investigates present use of the site and the commercial district's diverse portfolio of business and types of operations.



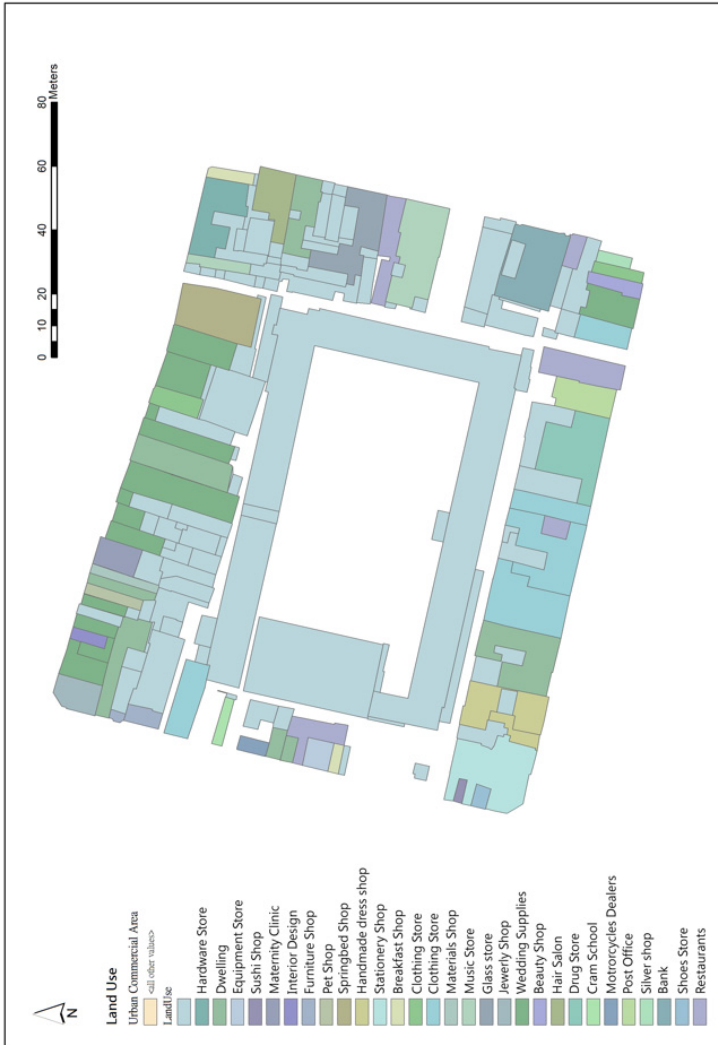


Figure 3: Different types of business and operations of the study site.



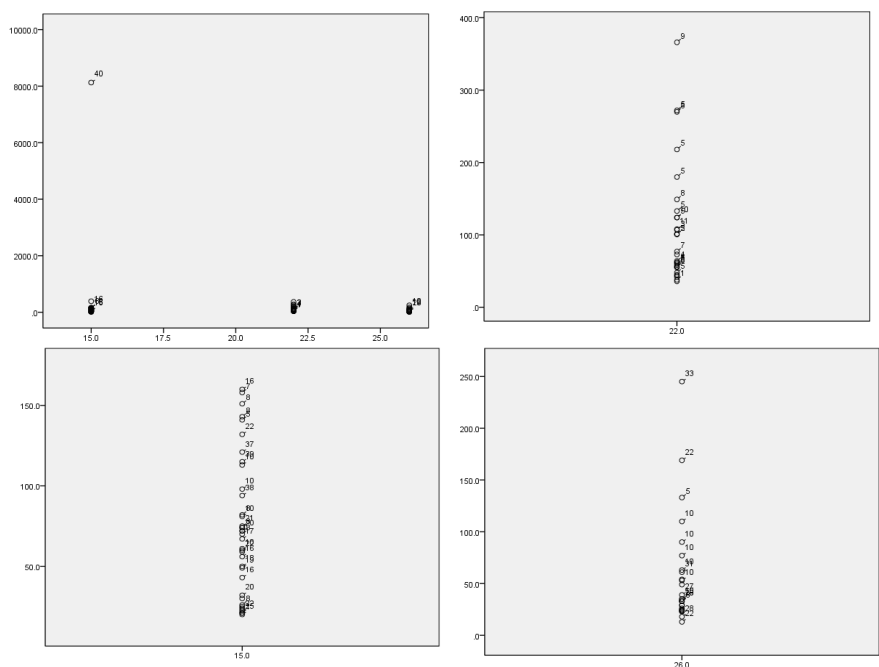


Figure 4: Scatter diagram (x-axis: adjacent road width; y-axis: land subdivision).

Utilizing  $y = f(x)$  as a formula, the adjacent road width and land subdivision as variables for cross-analysis. From the scatter diagram above, the separation of the adjacent road width of 15 meters, 22 meters, 26 meters, form three groups against different subdivision of land area. As can be seen building patterns affected by different conditions produce different forms for commercial use.

Table 4: Cross-analysis.

Commercial use patterns (independent variable)	Adjacent road width (dependent variable)	Subdivision area (dependent variable)
Furniture store, music store, restaurants, hair salon, clothing stores, wedding supplies, printing shop, motorcycles dealers, beauty shop, equipment shop	15 meters	50–150 cm <sup>2</sup>
Furniture store, wedding supplies, clothing stores, clinic, music store, art, paint shop	22 meters	10–400 cm <sup>2</sup>
Post office, restaurants, wedding supplies, clothing stores, watches store, hand-made dress shop	26 meters	10–250 cm <sup>2</sup>



## 5 Summary and following research

From the data analysis, the building, transportation network, and land use patterns affect urban form immensely. Moreover, the street width, the street size, the land subdivision area and building form will decide the kinds of business and types of operation of commercial district. Different kinds of business and types of operation can lead the development of the urban commercial district. This study took the urban commercial district of Tainan city as study target and used urban morphology to analyze urban fabric and commercial structure. The study added the evolutionary process of time axis, such as historical map as comparative data and used space syntax to solve regional problems. This study will continue to collect data and add additional parameters that may affect kinds of business and types of operation for a more complete analysis.

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