Patterns of Sustainable Shophouse Development for Transit-Oriented Areas

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Abstract. Shophouse is a combination between commercial and residential functions in one building that commonly found in numerous cities in Indonesia. In the development of TOD area, shophouses become one of the TOD developers’ marketing strategy in attracting more potential consumers, due to its economic value. Apparently, in its development and utilization, the existence of shophouses is causing several problem that related to environmental sustainability. This paper describe two sustainability problems that occur in the development of shop houses. Firstly, the ineffective utilization of living spaces in shophouses, which is the main focus of the discussion in this paper. Secondly, the shophouse facades were frequently changed by the shopkeepers or tenants to adjust their business representation, in which opposing the principle of sustainability. These two phenomena describe the inconsistency in sustainability principle of the shophouses in a transit-oriented development. Thus, the development of shophouses in transit-oriented area need to acquire a different pattern from the current pattern of shophouses. The residential function in a shophouses in a transit-oriented area should be vertically separated from the business function, or to be part of the Mixed-Use Concept. Therefore, hopefully the development of shophouses could support the sustainability principle of transit-oriented areas in the future.

1. Introduction

A good city transportation system provides many benefits for the development of the city, because it offers more choices in the mobility of city residents. It also supports the principle of sustainability by reducing the environmental impact that comes from the city activities. Nowadays, this principle is adopted in the transit-oriented area concept or acknowledged as the Transit-Oriented Development (TOD) area. Theoretically, TOD is a high-density mixed-use development within walking distance from the transit stations. TOD area is designed to maximize the feasible accessibility to the public transport, and often integrates with another features to encourage transit ridership.

Nowadays, Indonesia begin to implement the development of transit-oriented areas, including Bandung as one of its big city. In this development, the Government usually cooperates with numerous private developers. As easily found in the advertisements by the developer, it shows that TOD concept often becomes the main concept to attract the consumers. Following this TOD concept, shophouses also become one of their marketing strategy to attract more potential consumers, due to its economic value. Generally, developers provides the shophouses with common physical patterns that built in many big cities in Indonesia, specifically, a storeyed building with business space in the ground floor and other space for dwelling area on the upstairs. The building consists of 3 to 4 floors with the private stairs access from the inside. The terminology of shophouse still applies, even though the businesses on the
ground floor are no longer for buying and selling activities or the second and upper levels of the shophouses are no longer functioned as a dwelling. In fact, in the downtown area, most of the upper rooms of shophouses are left empty, functioned as storeroom, or sometimes occupied by workers rather than being vacant.

These issues indicate that the utilization of shophouses are not in line with the principle of sustainability, because it shows the ineffective use of the city spaces. Furthermore, the frequent alterations of shophouses’ facades by the shopkeepers or tenants also becomes an issue in the principle of environmental sustainability. The biggest concern in this problem is that these façade alterations occurred immediately after the shophouse buildings are purchased by consumers. Some of the owners or shopkeepers did the adjustment for the business representation through the facades. Previous study in 2017 shows that the level of change occurs from the level minor, medium to major, and the major is the most unsustainable one.

These two phenomena have a significant impact to the inconsistency in implementing the sustainability principle for the shophouses that carried by that transit-oriented area development. Consequently, the development of shophouses in transit-oriented area need to be improved through a different pattern from the recent common shophouses. This paper will proposed the patterns of shophouses that are in line with the principle of sustainability. Hopefully, these new patterns can support the development’s goal of the transit-oriented area properly.

2. Sustainable Cities and Transit-Oriented Development
According to Brundtland [1], sustainable development defines as a development that meet the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development aims to create an urban environment with maximum economic development and social equity, whilst minimising negative externalities upon the natural environment [2]. None of these three “pillars of sustainability” are easy to accomplish, and to integrates all three together require further thinking and across-fields collaborations [1]. If cities are expected to absorb an increasing proportion of the global population while keeping these three pillars balanced, it is imperative to start developing strategies now, to design the cities of tomorrow. One such strategy is Transit-Oriented Development (TOD), the practice of consolidating development around mass transit routes [1].

Transit-Oriented Development (TOD) is the concept of planning density, walkable neighbourhoods around existing or future transit lines, usually within a half-mile radius, or ten-minute walk from the station. Transit-Oriented Development has several different yet related goals [1]. At its core, it aims to reduce car use. This strategy in turn reduces household transportation costs, as well as environmental impact. Through the creation of mixed-use neighbourhoods, TOD also intends to improve overall quality of life for residents. Rather than creates car-centric cities, TOD prioritizes walking and biking by implementing high quality infrastructure to facilitate these different forms of mobility [1].

3. Shophouse Typologies in Cities Today
The term of shophouse is originated from the culture of the Chinese community in China, where all households and economic activities are aimed in increasing family income, were performed at home. These conditions also meet the principle of production, storage and sales activities, which are effectively carried out in one place. This principle allows the economic activities to run in a long enough time by family members. In Bandung, the earlier types of shophouses still can be found in a numerous areas that dominated by old and heritage buildings, such as shophouses in Jl. Otista, Jl. ABC, Jl. Suniaraja, and other areas of the city.

Accordingly, the pattern of combining business space and living space in one building that occurs in the Chinatown shophouses are subsequently imitated by individual land owners and developers, especially in inner city, due to the land limitation factors in the cities. The developers usually built the pattern with a simpler shape and a number of additional supporting functions, such as parking areas. The building consists of 3 to 4 floors with the private stairs access from the inside.
This pattern is considered effective because of the closeness between the place for business and owner’s residence; thereby reducing transportation costs, and resulted in the ease of supervision of the goods (especially at night), and make it easy to get help from other family members to run the business. As a result, this vertical shophouse design pattern becomes a common development pattern that can be found in all cities in Indonesia, including in Bandung. Furthermore, besides shops, the other types of businesses that developed on the ground floor of shophouses are restaurants, pharmacies, tutoring places, production businesses and so on. In Bahasa, a combination of production businesses and shops, and offices or commonly referred as “rumah kantor” or “rukan”.

In spite of the inexistence of buying and selling activities businesses on the ground floor, the terminology of shophouse is still applied. Likewise, this term is still employed even though the majority of the second and third floor of the particular shophouse building is unoccupied, especially those shophouses that located in the downtown area. The majority of shophouses with functioned second third upper floors for dwelling area are mostly located in residential areas. In Local Government regulation, shophouses are classified into the category of commercial buildings, despite its mixed-used function in common condition.

4. Learning from Experience: Ineffective Development and Management of The Shophouse

In TOD area development, the Government accustomed to cooperate with the private developers. It could be found easily through the advertisement by numerous developers. The TOD concept often becomes the main strategy to attract the potential consumers. In addition, TOD developer often offers shophouses as one of the main product of the development as their marketing strategy due the prospective acquisition of economic value that will be obtain by the consumers. However, the development and operationalization of the shophouses apparently raise the issues related to sustainability. The results of studies that have been conducted are discussed in the following paragraph.

The data for the analysis in business and dwelling activities in shophouses in Bandung City had been collected through the interviews and observations of approximately 110 samples of shophouses from over 5 (five) sub-regions (SWK) of Bandung city. Among the 110 total samples, 40 samples are obtained from the downtown area of Bandung, 30 samples from the centre of the sub-regions (SWK) and its surroundings, while the other 30 samples are obtained from the residential area. Data were analysed with combining qualitative and quantitative methods of data analysis (mixed method).

4.1. Shophouse and Its Location: type of business activities and the impacts

In accordance with the theory, there are 4 types of goods or consumer products that are classified based on how consumers desire about buying them [3]. Consumer products include convenience products, shopping products, specialty products, and unsought products [4].
• Convenience Goods: Commonly available, generally affordable, and often prone to rapid consumption and re-buy, for instance, toothpaste, soups, etc.
• Shopping Goods: A category of consumer goods that are purchased after the buyer has spent some time and effort comparing the price, quality, style and other attributes of the product in several stores, such as buying a Nike shirt or Adidas shirt.
• Specialty Goods: A category of consumer goods in which the consumers have a strong brand preference and are willing to spend substantial time, effort and money for acquiring the desired brand, for example Buying Rolex watch, BMW car, etc.

In the second year of Research Report [5] about shophouses, one of the recommendation is determining the location for the shophouses, so that the construction of shophouses can contribute to the achievement of SDG’s goals. The agglomeration of new shophouses should be limited in number and location, and need to be regulated by the type of business to minimize consumers’ mobility. Currently, there is no regulation for the location of each type of business that related to consumer mobility. The following graphs in Figure 2 describe the type of goods that sold at the shophouses in the downtown areas, sub-city centre, and settlement areas.

![Figure 2. Types of goods sold at shophouses in Bandung [5]](image)

The usage period and service distance of each product will affect the level of consumer mobility to and from the shop where the product is sold. One of the main indirect impacts is the increasing in traffic loads, while the direct impact is an increase in the number of parking. The limited of parking space-especially for the row shophouses that are located on the side of the road - will increase the amount of parking space along the side of the road. As a result, road congestion is unavoidable. In addition, if the business of the shophouse has improved and the number of consumers increase, the requirement for additional parking space also increase.

4.2. Ineffective Utilization of the Dwelling Space in The Shophouse
The result of quantitative analysis shows that majority of the shopkeepers or tenants of the shophouses who still occupy the second and third floor as dwellings space are located in residential area. Meanwhile, in downtown area, the number of the occupancy in second and third floors are getting smaller. As illustrated in Figure 3, only 50% of respondents use their second or third floor as a dwelling space. Among those 50% of respondents, 55% are occupying their second or third floor of the shophouse as their own dwelling, and the 45% of the rest are utilizing the second and third floors as a temporary shelter for the employees. Based on the interviews with business owners, the utilization of the second floor as an employee's temporary shelter was not planned from the beginning, business owner allowed the employees to stay there temporarily instead rather than leaving the floor empty.
In summary, it can be concluded that the dwelling function in the shophouse in the downtown area is no longer viewed as dwellings space, despite of its initial purpose in Chinese's shophouse concept. It happened because most of the owners or tenants of the shophouse only occupy the ground floor of the shophouse for the business area, while living in the other residential place for daily life.

4.3. High Level of Facade Transformation After the Utilization of The Shophouse

In the first year of research, high level of facade change that have been conducted by the shopkeepers or tenants had been identified. Based on previous study [6] [7], from the ‘level’ of transformation, the façade changes can be classified into three types, which are minor, medium, and major transformations. Firstly, a minor façade transformation is distinguished by a minor changes of façade elements, such as canopy addition, business identity board, etc. Secondly, medium façade transformation is identified with slight changes, including changes of doors, windows, billboard and secondary skin installation, and roof and stairs addition. Lastly, the highest level of façade changes, or the major transformation, had observed through the alteration in the construction of additional building floors, railing, wall and façade elements. The transformations in the shophouse facades that occur from time to time certainly has its own impact, not only in terms of urban visual quality, but also related to the principle of sustainability. Addressing the aspect of sustainability, the transformation of the shophouse facade has an impact in energy waste, especially in the usage of the building materials.
5. Recommendations of Shophouse Development Pattern that Proposed for Transit-Oriented Areas

Based on the data analysis on the pattern of facade transformation and on the preferences of the shopkeepers and tenants, there are some physical patterns that can be proposed for the shophouse development concepts in the sustainable transit-oriented development areas.

5.1. Patterns of Shophouses Placement in the Transit Oriented Areas: Integration with Pedestrian Paths and Centralized Parking Area

The placement of shophouses in the structure of the region should consider two main principles that appropriate for transit-oriented area concept, namely: (1) develop the area by encouraging sustainable mobility through the intensification of mass public transportation system; and (2) develop environmental friendly transportation facilities for non-motorized modes of transportation and pedestrian with integration to the transit node. Referring to these two principles, the development of shophouses should be integrated with existing public facilities, such as pedestrian paths. Moreover, the development of shophouses should also consider the limited provision of parking space, by providing the centralized parking zone to serve various functions within the transit-oriented area.

5.2. Layout Patterns of Business and Residential Spaces of The Shophouse in Transit Oriented Areas

As stated in the definition of a transit-oriented area, the preferred development in TOD should support mixed-use and high density purposes, with middle to high intensity of space utilization. However, the common pattern of the shophouse has developed nowadays, with 2-3 storey that integrated the business and dwelling functions in one mass of building, is not suitable with the concept of TOD areas. This study propose the higher intensity in building development and the separation of the ownership between business space and dwelling space to obtain sustainability. The concept is addressing the existing condition, in which the second and third floor of shophouses in the downtown area are mostly unoccupied by shopkeepers or tenants. In addition, some of the shopkeepers and tenants had already expressed their preferences.
According to the Figure 6, there are 3 (three) proposal for shophouse typologies, which emphasizing the circulation patterns and the placement of stairs as a vertical connection element between business functions and dwelling area. Based on the survey results, 35.71% of respondents prefer to choose type 1, because it sufficiently accommodates the current needs and reduces the rental prices. In this type, shophouse is divided into two blocks (left and right wings) and connected via vertical circulation (stairs) between two blocks. Thus, there are no stairs inside each unit in the ground floor of the shophouses; the only access to second floor is using the stairs in the middle of the blocks. While on the second floor, beside the stairs for semi-public circulation in the middle of the blocks, there are also stairs for private circulation that can be accessed from inside of each unit to the third floor. The illustration of Type 1 is described in Figure 7.

32.14% of total respondents prefer to select the type 2 because of its simpler form. As mention before, one of the problem in shophouse tenancy is the high rental price, especially concerning the
unoccupied second and third floors. In contrast with type 1, each floor of the row does not have stairs access (private circulation) from the inside of the units. This allows each floor to be owned by different tenants with different functions. On the other hand, this type of shophouses allows tenants to rent the spaces according to their individual purposes. The illustration for type 2 is shown in Figure 8.

![Figure 8. Circulation Pattern of Shophouse Type 2 [5]](image)

Lastly, type 3 was chosen by 21.42% of respondents, because its circulation creates more protection and privacy. This type has a different form with shophouses in type 1, since the semi-public circulation is divided per 3 units at the left and right ends of the row of shophouses. This circulation design aims to avoid the circulation that accumulates in one pathway. In this type, each unit of the first floor does not have private stairs to access the second floor. The access to the second floor provided by the stairs on the left and right row of the shophouses, as described in Figure 9.

![Figure 9. Circulation Pattern of Shophouse Type 3 [5]](image)

### 5.3. Proposed Form of Shophouse in TOD Area
Currently, the development of TOD areas in Bandung city are still in the stage of studying and planning. The location of the study cases in this research are much related to several areas which are potentially
planned to be developed as TOD Area in Bandung City, such as Stasiun Hall, Tegalega station, and Ciroyom station.

Shophouses, as a part of the commercial facilities, need to be designed in accordance with the following existing characteristic in TOD Zone. According to the study by Dittmar and Ohland [8], there are five typologies of TOD area, namely 1) Regional Urban Core, 2) Urban Center, 3) Urban Neighbourhood; as urban typology, 4) Sub-urban Centers, and 5) Sub-urban Neighbourhood; as Sub-urban typology. Based on these typologies, Shophouses in the TOD area, specifically in the regional urban core and urban center, could be considered as commercial core area. In this area, each floor of the shop can be occupied by different owners and fully functioned as commercial retail as proposed shop in type 2. In Contrast, shophouses in the city centre that located in the urban neighbourhood and sub urban center, may apply the typology with a combination of residential and commercial functions, where the ground floor and second floor units designed as retail, and the third floor and above become a residential purpose. While, in the TOD with sub-urban neighbourhood characteristics, considering that the land use is dominated by housing settlement, so the ground floor of shophouse in the type 1 can be functioned as a retail and the upper floor can be designed as a residential unit.

5.4. Shophouse Facade Patterns in Transit Oriented Areas
The separation of business space and dwelling space in one mass of building vertically, which allows the difference in ownership between the business space and the dwelling space above, is expected to have a very significant impact in the frequent transformation of shophouse façade. The analysis shows that the individual ownership of a whole shophouse building might be the reason of high level transformation of shophouse façade. This condition allows the shopkeepers or tenants in changing their shophouse facades according to their individual business needs. Throughout the separation between the ownership of business units on the ground floor and dwelling units on the upper floor, the change on the facade of the entire building could be minimized, as well as the waste of material and energy used for the construction of shophouses. A significant attention is needed in providing the space for advertisement panels and business identity representation. These attempts could encourage the owners and tenants to avoid the change of the window pane in the façade, which usually happened because of the lack of space to install advertisement panels and business identity.

Figure 10. Visually active frontage building in Guangzhou, China [9]

In order to minimize the parking space in front of shophouse, this concept promotes the integration with the surrounding pedestrian path, through the front façade that directly facing the pedestrian path. This design is already stated in the TOD guidelines related to pedestrian infrastructure, in which the face of the building that bordering the pedestrian path must be visually active; in this case the length of the ground floor of the building bordering the pedestrian path can be visually penetrated [9]. In addition, building facade should be varied and articulated to provide visual interest to pedestrians [9]. Particularly in the core commercial area, street level windows and numerous building entries are required [9].
Shophouses in TOD, as part of commercial area, should implement those guidelines. In addition, the shophouse facade, specifically in the ground floor (street level area), must be visually active with the application of transparent façade materials to expose building activity from the inside to the outside, furthermore, other facade elements such as arcades, porches, bays, and balconies are encouraged (Figure 10).

6. Conclusion
In line with the concept of development that encourages the efficiency of spatial structure and sustainable city development, the development of shophouses in transit-oriented areas needs to be designed and constructed in a different pattern of the common shophouses. The dwelling function in a shophouse in a TOD area should be vertically separated from the business function, or to be part of the Mixed-Use Concept. By separating the ownership between business units on the ground floor and dwelling units on the upper floor, the change on the facade of the entire building could be reduced, as well as the waste of material and energy used for the construction of shophouses. Thus, with this recommendation, hopefully the development of shophouses could support the sustainable principle in transit-oriented areas.

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