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Designing an Inclusive City with Chrono-Urbanism Principles

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ABSTRACT

A study was conducted in Tallasa District, the newly developing district in Makassar, Indonesia, to examine all public facilities accessible in the Chrono-Urbanism timeframe and promote social inclusion and equal participation. The study found that while the concept may not be sustainable in the long term, potential development could be achieved through adjustments in spatial planning connections and involving a wide range of age groups in neighborhood designs. The study used the principles of proximity, diversity, density, and digitalization to analyze the concept. The results showed that only the diversity criteria almost met the accessibility and inclusiveness aspects. Applying the Chrono-Urbanism theory may encounter difficulties in regions with large populations and distinctive geographical features such as Indonesia's archipelago. Diverse demographic characteristics, various transportation needs between different areas, and differences in economic and educational strata pose specific challenges. The complexities in managing urban spaces and ensuring proximity and accessibility become more pronounced in densely populated areas and require considerations to accommodate the unique circumstances of each region like Tallasa District in Makassar.

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1. Introduction

The emergence of global issues has given rise to the concept of Chrono-urbanism, which aims to simplify city functions, reduce car use, and prioritize human-oriented development. This approach aligns with the recommendations of C40 Cities on climate change and sustainability, and it is exemplified by the "15-20-minute city" concept. The Covid-19 pandemic has further highlighted the importance of this concept particularly in promoting social distancing and teleworking. The pandemic has led to hybrid lifestyles, emphasizing remote work and reshaping urban life with new temporal dimensions as referred to chrono-urbanism [1-4]. Chrono-Urbanism can be united with *Chronotope* and *Topophilia*. Chrono-Urbanism is what the city of the population offers in terms of the use of lifetime. *Chronotope* is a close relationship between space and time, while *Topophilia* is a sense of attachment to a place. This principle is similar to the concept of New Urbanism Planning "Neighborhood Unit" in the 1900s when all services are accessed on foot and the development of Garden City which is an urban design that aims to improve the quality of life [3]. Both of the concepts share some casual goals. New Urbanism is concerned more with the physical designs and neighborhood layouts, while Chrono-Urbanism emphasizes the accessibility of city facilities. The residential unit is organically connected to the functional core and is characterized by a variety of uses and densities reached in a few minutes on foot [2, 5]. Society should accept a city controlled by technology. Anne Hidalgo emphasized the role of Chrono-Urbanism in the processes of territorial intelligence, governance, and real-time sustainable development, which is a declaration that played a significant role in her successful re-election as the mayor of Paris for the second time [6]. Combining Chrono-urbanism with mathematical models, a spatial analysis of urban structures, and organizations of activities allows for the integration of additional traffic simulations and pedestrian flows. This approach aids in understanding movement within the environment and provides valuable information for decision-makers.

The notion of an inclusive city and chrono-urbanism has become parallel with post-pandemic. This issue has been echoed in Indonesia, but in its application, it is not as negative as the right of physical issues [7]. To make a city inclusive, an urban planning process must include a more holistic city planning approach and multi-sector comprehensive policies such as improving health facilities and providing feasible housing, work, education, and clean water [8]. Bridging the concept of chrono-urbanism, many inhabitants in cities such as Krakow, Palermo, and Barcelona live in areas that are close to important services and facilities classified as a 15-minute city [9-11]. However, there are some parts of the cities where people do not have easy access to these services [9]. According to the World Bank, inclusive cities include spatial access, social inclusion, and economic access. "A society for all" is the goal of development where all individuals with rights and responsibilities play an active role in carrying out the government and community functions. If the service can only be accessed by certain community groups, then social problems such as handling slums, crime, health, and transportation will arise [12]. The only feasible route for achieving inclusion appears to be through the joint utilization of public and private resources in a coordinated and planned manner, involving the local public entities such as regional and municipal governments and enforcing other urban areas that aim to meet the requirements of short distances and be universally adaptable [11, 13, 14]. By prioritizing community-based organizations, citizens can foster and uphold their community-oriented outlooks. The government's commitment allows organizations to maintain their autonomy and mission for advocating social changes while collaborating with local state actors and institutions [15]. In response to the post-pandemic COVID-19, the development of accessible facilities and the government's commitment to the scope of the chrono-urbanism approach has been a top priority in the Tallasa District Area, a newly developing area in Makassar, Indonesia. Tallasa District has evolved into an urban area for residences situated on the outskirts of the central business district. It has also become a supporting area that is connected to the Mamminasata Metropolitan area in South Sulawesi. This district is expected to set a precedent for implementing a new concept adaptable to updated situations. In addition, it serves as a simulation project to determine whether this concept is suitable for Makassar, the 5th biggest city in Indonesia.

2. Methods

To evaluate the application of chrono-urbanism in Makassar, South Sulawesi Province, the study focuses on Tallasa District, a newly established satellite city situated on the border of Makassar and Maros. This research is a case study methodology, extending its application beyond the realms of social sciences to include practical fields

and to prove invaluable in addressing questions that involve the interplay of design and policy, practice, and design particularly through participatory planning, culturally sensitive design, and endeavors that aim to formulate concepts and ideas [16, 17]. The chosen case study methodology serves the purpose of delving deeply into specific cases and highlighting the significance of contextual factors. Case studies are deemed appropriate as they enable a meticulous examination of data at the micro-scale, particularly within the integrated field of social science and planning [17].

This research fully employs a qualitative approach with literature reviews and interviews involving a total of 5 participants including architects, urban planners, residents, and FKS Land Company staff, serving as the area managers. Sketch illustrations, pictures, and videos are utilized to create visual representations of data, making them easier to analyze. From the results of the case study method, the applications of concepts from other regions will be obtained, and they can be compared based on indicators from chrono-urbanism. The literature reviews conducted can serve as a reference to formulating the suitability of indicators in the case study. In this regard, the geographical scope is limited to Tallasa District, and the key criteria focus on the internal area and guarantee efficient users' mobility within 20 minutes. The evaluation process begins with identifying the achievements in terms of pedestrian accessibility and transportation modes required to access the FKS Land company complex area in the Tallasa District. The 15-minute city is characterized by ten key elements: closeness, population density, diversity, mixed-use spaces, modularity, adaptability, flexibility, human-scale design, connectivity, and digitalization [18]. However, this study focuses on four pillars based on Moreno's formulation. The first stage is to explore the spatial area of land use and configuration as well as their respective interactions based on four pillars: proximity, diversity, density, and digitalization [2, 11, 19, 20].

3. Chrono-Urbanism: Innovation Approach in Urban Design

Chrono-urbanism holds an implementation prospect in Makassar, the largest metropolitan city in Eastern Indonesia, aligning with the city's spatial planning and the government's vision for an inclusive and high-quality urban environment. This approach can potentially benefit all the members of society particularly those with disabilities, the elderly, and the immigrants by providing them access to vital services. Makassar City Government has already expressed its commitment to social inclusion through its vision and mission for the period of 2018-2023. The concept of Chrono-urbanism also aligns with Indonesia's vision for 2045 for an inclusive society by decreasing social inequality but increasing policy-making participation. For the Makassar City Government, the results of this study can provide a more comprehensive map to implement social inclusions for infrastructure designs and important facilities in the city center area that support the Sustainable Development Goals (SDGs) programs, including those from the Ministry of Public Works and Public Housing and the Vision-Mission of Makassar City¹. By identifying social inclusion elements in the city area, an inventory can be created as a reference to evaluating and developing social inclusion materials that can later be pioneered by the city government in collaboration with the Quadruple Helix, which includes the government, the community, academicians, and the industrial sectors.

3.1. Proximity

Proximity, in the context of the 15-minute city, is described through temporal and spatial dimensions. It enables individuals to optimize their access to public spaces, green areas, and other infrastructures within a 15-minute radius [2,10, 20]. Hence, proximity can improve access to essential amenities in a neighborhood and encourage flexible use of basic urban facilities regarding both space and time dimensions. The emphasis on proximity in the context of Makassar begins with the zero point of the city center located in Karebosi Square [21, 22]. In the early 1990s, this city witnessed a dramatic urban sprawl, and the primary urban area was shifted from a strategic Old City and its surroundings to a secondary area, which is currently situated along AP. Pettarani Road corridor is the main area. Most housing developers such as Tallasa District groups introduce a marketing term that all facilities can be reached in 20 minutes. They assume that the airport and the city center can generally be

¹RPJMD 2021-2026. Available online: <https://makassarkota.go.id/rpjmd-2021-2026/>. (Accessed on 7 May 2023).

accessed in a normal traffic simulation, but this statement requires to be re-examined in terms of land use configuration. As can be seen in Fig. (1) and Table 1, Tallasa District has a strategic location that can connect to other important nodes in Makassar.

Changes in the perception of city centers should be re-explored in terms of housing marketing, both for vertical land-like apartments and for vertical residences-like housing areas with low, medium, and upper-income segments. Affordable access from several roads such as Sutami Toll Highway, Kapasa Raya Road, and Perintis Kemerdekaan Road is not a guarantee of fulfilling the 15-20-minute mobility achievement based on private vehicle access. Furthermore, in case of unforeseeable occurrences such as demonstrations, floods, road construction, or any other incidents, the accessibility duration from Tallasa District to other areas may be delayed no matter what the gate is through, either the East or the West Gate.

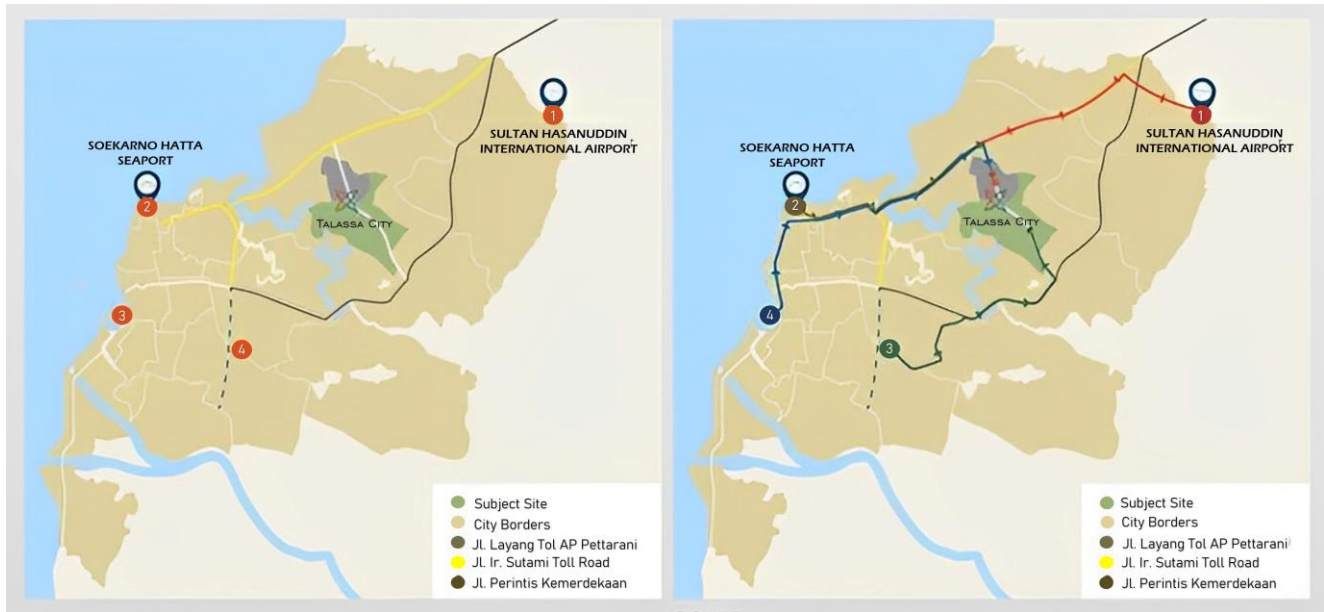


Figure 1: Tallasa District in Strategic Nodes in Makassar.

Table 1: Projected timeframe of access to public facilities in Tallasa District.

Nodes	Distance (km)	Accessibility Estimation (minutes)	Route
Sultan Hasanuddin International Airport (SHIA)	12	20	SHIA – Poros Bandara Baru Road – Tol Sutami Highway– Tallasa District
Soekarno Hatta Seaport	10	15	Soekarno Hatta Seaport – Nusantara Street – Tol Reformasi Highway – Tol Sutami Highway – Exit 5 – Kapasa Raya Road – Tallasa District
City Center 1 (Old city district, Karebosi Square and its linkages)	10	17	Karebosi Square - Mesjid Raya Street – Gunung Bawakaraeng Street – Urip Soemaharjo Street – Jl. Tol Reformasi – Tol Sutami Highway – Exit 5 – Kapasa Raya Road – Tallasa District
City Center 2 (Panakukang and its linkage)	20	20	Panakukang – Adyaksa Street – Pengayoman Street – Perintis Kemerdekaan Road – Lingkar Barat Road – Tallasa District
Losari Beach	17	18	Losari Beach – Nusantara Street – Tol Reformasi Highway – Tol Sutami Highway – – Exit 5 – Kapasa Raya Road – Tallasa District

3.2. Diversity

The fundamental principle of chrono-urbanism is to establish an efficient and effective connection between the diversity of facilities and infrastructure that can easily be accessed by all citizens. In a 15-minute city, diversity

means a neighborhood that can mix various types of activities to create a vibrant economic benefit. It also involves diverse populations and cultures as an additional value of urban landscapes [10, 19]. It is important to question whether all facilities and infrastructures can be generalized in every area of the city. To analyze the diversity of infrastructure, an alternative route to Tallasa District is evaluated in fifteen-minute intervals using indicators from several nodes and benchmarks with a strong identity and image in the city's development. Most of these benchmarks are service and government facilities followed by commercial or retail areas, industrial areas, and similar residential areas (Fig. 2).

Chrono-urbanism emphasizes the importance of generalizing all land use functions to enforce diversity in the Tallasa District area. Many public facilities do not allocate open spaces, and this is often ignored by the government, developers, and even residents themselves. Unfortunately, the smaller number of open spaces in Makassar is also ignored in the regional planning process. In fact, the Chrono-Urbanism concept in terms of diversity aspect encompasses the availability of public transportation that can cover the entire city area. However, the current situation in Tallasa District shows a heavy reliance on private or online transportation without any connection to the network or mass transportation modes. These days, there are no well-connected pedestrian paths within the scope of the area. Integrated planning of pedestrian and bicycle paths should be accessible in order to minimize the use of vehicles that can contribute to congestion.

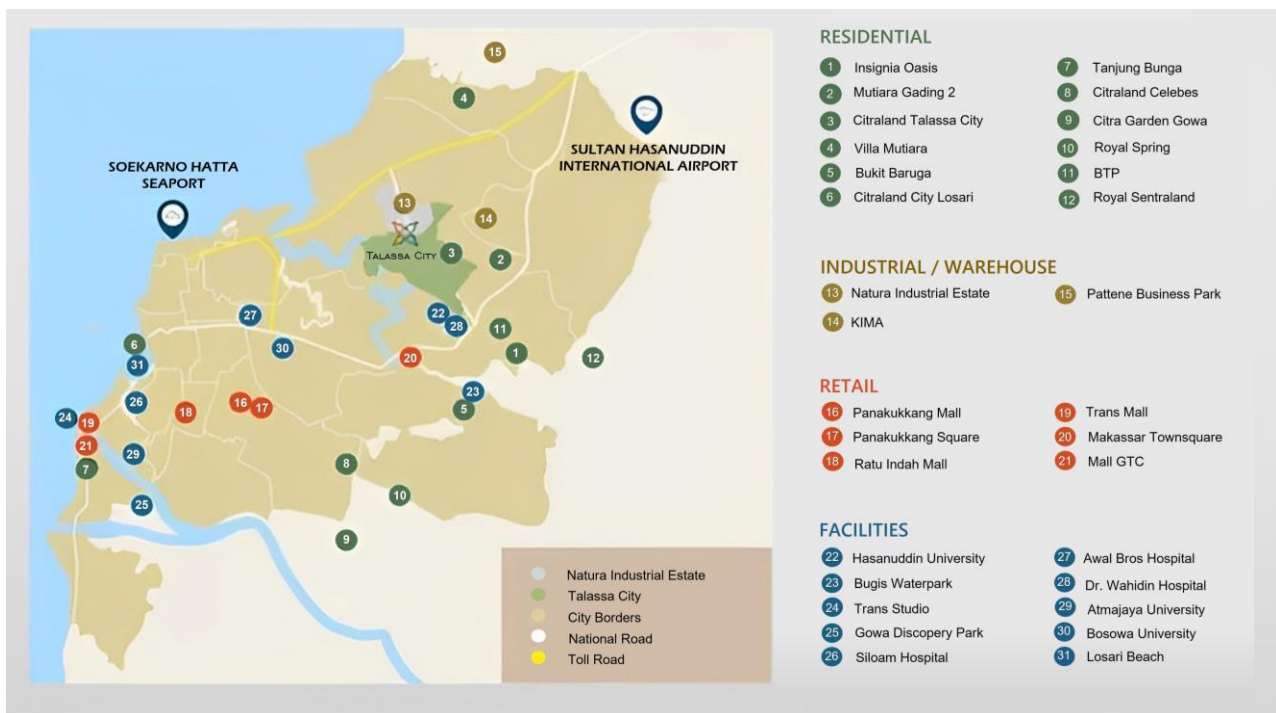


Figure 2: The diversity of land-use areas in the linkage of Tallasa District.

3.3. Density

Density in chrono-urbanism does not refer to tall buildings but to the number of people per square kilometer. It includes finding the right balance in a given area, ensuring that it can efficiently support urban services and manage resources without becoming overcrowded as well as finding the right number of residents a district can support for effective service delivery and resource use. Compact and dense urban structures create efficiencies, ensuring that there is a strong demand for various services. This supports active mobility, reduces reliance on cars, and enhances access to services that contribute to urban vibrancy [2,10, 20]. The Chrono-Urbanism concept is based on estimating population mobilization within low to medium-traffic distances. However, this estimation is not applied to temporary users or those who are unfamiliar with traffic density mapping. The concept aims to achieve residents' 15–20-minute travel time to the city center and other strategic facilities such as hospitals, campuses, recreational areas, government offices, and public services. There are two alternative ways to access

Tallasa District from the city center, but both have their limitations. The first requires commuters to access Tol Sutami Highway, yet this will be expensive due to retribution and fuel costs, making it non-inclusive. The second alternative requires residents to access the edge of the toll road, which can have medium to high traffic, especially during peak hours.

One limitation of the Chrono-Urbanism theory is its implication to consider areas with large populations and an archipelago country like Indonesia. This concept is actually a benchmark of city design in an area with a decent standard of living where the government is not too concerned about large residential building densities. However, in Indonesia, even if the government and private developers have implemented this concept, it cannot be generally effective in integrating new areas. The Tallasa District area, as a new area in Makassar, still requires conditional studies to apply this concept, particularly regarding the density. Tallasa District as a case study does not represent the dominant population of Makassar even on a larger scale like Indonesia. As a significant area within an urban scope, predominantly inhabited by productive age groups living in post-pandemic and predicted to become a new Central Business District (CBD) in Makassar, Tallasa District faces limitations to accommodate homogeneous density aspects within an upper-middle-class residential complex. Finally, prior to density as an essential factor in chrono-urbanism, this elaboration does not make significant contributions.

3.4. Digitalization

The final aspect of implementing Chrono-Urbanism is digitalization. The use of technology to access locations is crucial to achieving the 15–20-minute goal. Makassar is the largest city in Eastern Indonesia, and the advancement of Makassar's progression toward industrialization and urban modernization is characterized by a substantial economic expansion of 10.2% [23], which means that Makassar should provide adequate digitalization for commuters from Tallasa District to other areas. However, simply owning a smartphone and having internet access is not enough. Users must possess intellectual, emotional, and social intelligence to respond to the spatial aspects of traveling. While the targeted number of digitalization users has been met, there is still a need for further education about how Tallasa District will be integrated into other areas.

The digitalization indicators may be applicable in developed countries where internet access is widespread across regions and communities. However, in an archipelago country like Indonesia which has over 17,000 islands in remote areas including outer islands and border districts, it poses a challenge. Makassar with a population of 1.7 million (2023), smartphone users are not evenly distributed. Based on the data, the number of smartphone users in Indonesia was more than 100 million people and is predicted to hit 89.86 million in 2024 [24]. Indonesia which has become the fourth-largest smartphone user country in the world should consider enhancing the alert and awareness [25]. There is a gap in implementing this concept, so it is still premature to be applied in all regions. To implement the chrono-urbanism approach in digitalization, it is suggested to initiate the process with a metropolitan city such as the development of a new satellite city like Tallasa. This can be followed by exploring additional methods to connect individuals who experience instabilities for both economic and social issues. Tallasa District can serve as a model area for implementing digitalization, and it can be followed by housing development in Makassar.

4. Spatial Efficiency and Internal Inclusiveness

4.1. Housing Units

In general, the housing units in Tallasa District target the productive age group in urban areas born from the 1980s to the 2000s. However, it is essential to consider the needs of other generations including the elderly and the "sandwich generation.". The inclusivity criteria must be considered in the planning process to accommodate physical, intellectual, mental, and sensory limitations. For instance, the elderly can be spanning the age of 50 to 80 and are prone to experiencing negative emotions such as loneliness, anxiety, and depression due to declining physiological functions and lack of social activity involvement [26].

The concept of housing flexibility for various ages is to achieve residents' diverse requirements by allowing them to alter the layout and purpose of their living spaces [de Paris]. The priority for design concepts in Tallasa

District is inclusivity with socially inclusive spaces distributed across various clusters in each of the city's master plans. This is mandatory for developers to comply with government standards. In 2022 approximately 40% of the 700-hectare land area was developed, and the master plans included schools, universities, a mall, a water park, and a hardware store. Currently, there are already facilities such as a public park, market, and eye hospital. The main road is the West Ring Road, a provincial road that connects Sutami Toll Road and that has branches to the neighborhood roads. The Akasia, Alamanda, and Utopia Clusters have already been built or are in the process of being built by FKS Land Company. Akasia Cluster has 573 units built on 11.3 hectares and 516 units on 71 hectares, while Alamanda Cluster has 468 units on 8.4 hectares. FKS Land has also built Bandaraya Apartments with 425 units and planned to build 250 units in the Utopia cluster since 2021 Fig. (3). Fig. (4) represents the milestones of Tallasa City District and its segmented development clusters.



a) Cluster Akasia



b) Cluster Alamanda



c) Cluster Utopia

Figure 3: Some cluster of housing units occupied by the productive age group and the upper-middle class in Tallasa District (Source: FKS Land Company archive, 2022).



Figure 4: Milestone Tallasa City District.

In terms of spatial measures, it is considered satisfactory to allocate at least 40% of the total area for open spaces. However, considering the population growth in Makassar and the frequency of floods each year, it is recommended that the percentage of open spaces be increased by more than 40%. Additionally, Tallasa District's location is near a delta and swamp area, making it vulnerable to flooding and other environmental issues in the future.

4.2. Public Facilities

In a 15-Minute City, everyone can quickly get what they need locally like groceries and healthcare. There are diverse and affordable housing options, clean air, and green spaces. People can work nearby or remotely with smaller offices and co-working spaces [1]. In chrono-urbanism, the critical factor is to ensure that essential services are not far or reachable daily by walking, biking, or public transportation, and they can serve people of all ages in spatial networks [27-29]. The public spaces in Tallasa District aim to align with the principles of proximity and efficiency in chrono-urbanism. The masterplan in Fig. (5) reveals a thoughtful distribution of public facilities, making it convenient for both residents and visitors to engage in activities. Public facilities that have been identified are based on their functions such as the Eye Hospital of South Sulawesi Provincial Government, shopping centers, and integrated warehousing areas. The warehousing complex consists of three types: 21 units of Home Improvement Center Shop houses, 104 units of Business Loft, and Eight Avenue with 40 units.

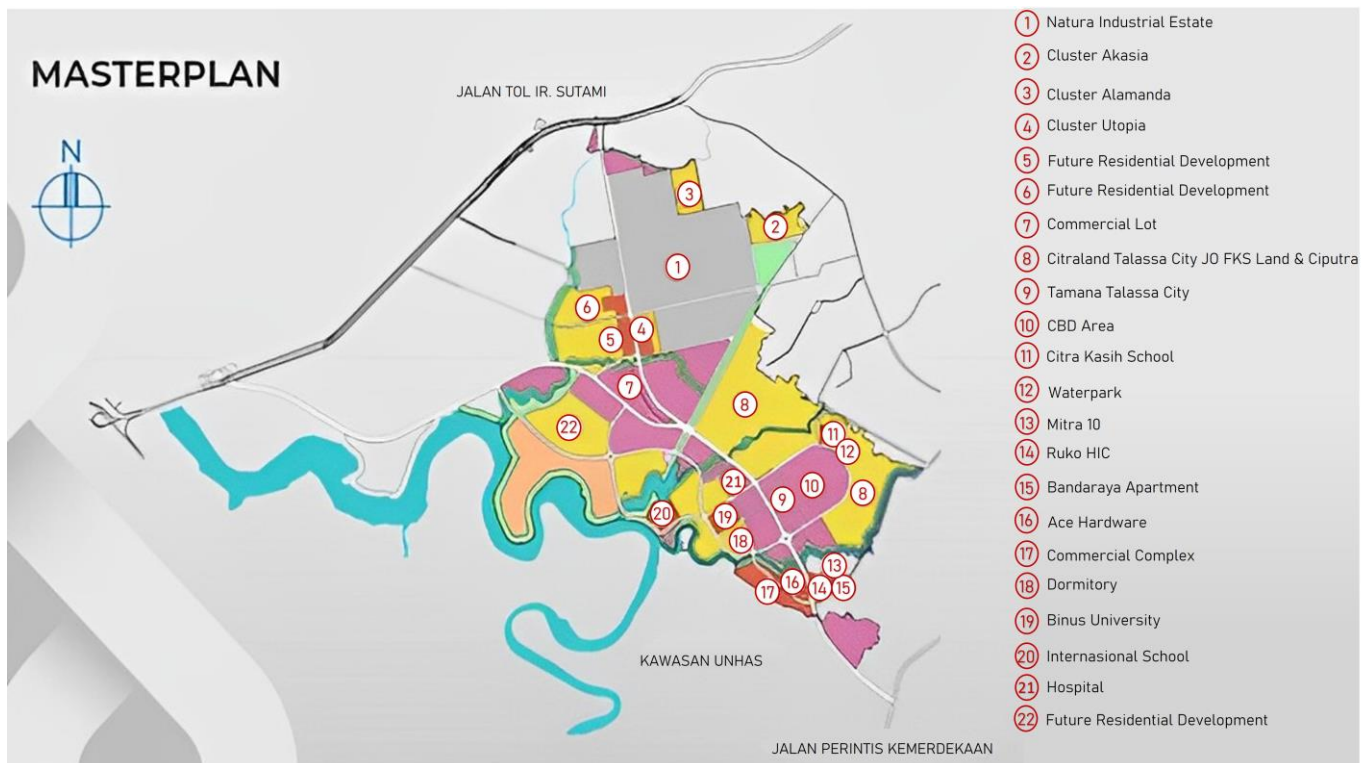


Figure 5: Land Use of Tallasa District, Makassar (Source: FKS Land Company archive, 2022).



Figure 6: Application of child inclusiveness in open spaces in Tallasa District, Makassar.

The policy for designing and constructing shopping and commercial areas is generally left to the tenants or third parties. One example is Mitra 10, a material shopping center with a uniform design for all the buildings in Indonesia. Although there are some inclusive elements in these spaces like children's playing areas shown in Fig. (6), the other needs of women and elderly people have not been fully addressed. Apparently, the elderly may not be as frequent users of these spaces as those in their productive age, but compared to other countries inclusivity for all groups of people is a requirement in the development of public facilities (Fig. 7). Regarding physical features, ramps or wider stairs could be implemented to promote tolerance and inclusivity for elderly. All types of spaces and land uses, especially commercial facilities should aim to provide comfort and relaxation to the users.

However, there is currently a lack of consideration for equality and accessibility for persons with disabilities in the Tallasa District since the relevant indicators and guidelines are not well-established. The government facilities are insufficient in this regard, and even housing developers like FKS Land have only gone through several permit stages from the City Government. To promote inclusivity for all, a more comprehensive approach and multi-sector policies should be developed through coordination between the government and the planners. The concept of Chrono Urbanism could be applied if the area's orientation can copy the examples from some developed countries that have already implemented this approach.



Figure 7: Public Facilities in Tallasa District, Makassar.

The success of the Chrono-Urbanism concept in the Tallasa District can be measured by the accessibility of internal facilities such as the typology of urban green space (UGS). The implication of UGS is not simply limited to recreational areas like public parks, but other types of informal green spaces like street trees and roof gardens need significant attention [30]. The complexity of outdoor spaces as outlined in the master plan like amphitheatres, thematic gardens, walking paths, and thinking pods can be considered as iconic benchmarks in Tallasa District. Those elements are crucially required in a neighborhood of urban areas especially 'thinking pods',

a type of workspace design that provides interactions for private or small groups to think, focus, concentrate, brainstorm, and work on their tasks. This type of concept has been implemented in several open spaces such as environmental and recreational parks which serve as urban communities in the Tallasa District area. The planning of open spaces in each housing cluster as displayed in Table 2, for instance, appears to be very comprehensive in terms of material selection as it includes public spaces, semi-public zones, transitional areas, and private spaces. This is evident in the use of various hardscape, softscape, and waterscape elements that add both aesthetic and functional values as well as the application of biophilic design. Biophilic design can have a favorable impact on individuals' emotional well-being and aid in the development of a human-centered environment that offers numerous health benefits by integrating natural elements [31, 32].

Table 2: Distribution of public open spaces in Tallasa District as of 2023.

Cluster	Number of House Units	Number of Public Open Spaces
Akasia (2017)	573	4
Alamanda (2019)	516	4
Utopia (2021)	250	2
Bandaraya (2021)	425	4

The different hardscape elements are also distinguished by colors which effectively guide the movement of users and contribute to the safety and comfort of open space. The playground facilities provided for children and kids in the area meet the standards set by Chrono-Urbanism for distance, but there is still a need to further explore the segmentation of space for other user groups besides children.

The Tamana public recreation space located in the Western Ring Road corridor is a promising area for the application of inclusivity and chrono-urbanism, but it is currently limited to residents in the Tallasa District area. Commercial zones and shopping centers follow a uniform design policy for all the buildings in Indonesia where the tenants or third parties are responsible for the design and construction. However, there is still room for improvement to accommodate women, elderly, and persons with disabilities.

Finally, the government from the city council to the ministry level must coordinate with planners to initiate more holistic and multi-sector comprehensive policies in terms of creating more inclusive areas in the city. The Chrono-Urbanism concept, particularly with inclusivity criteria, must be customized in the targeted areas and should follow the guidelines of developed countries as the pioneers in this field. For the long term, the "20-minute city" idea suggests that a city should prioritize livability and be capable of regenerating the environment.

5. Conclusion

Tallasa District in Makassar has been transformed into a residential urban zone which is located in the peripheral district and emerges as a supporting hub connected to the Mamminasata Metropolitan area in South Sulawesi. This district is introduced to establish an adaptable concept that aligns with current circumstances. Furthermore, it functions as a simulation project to assess whether this concept is suitable with Makassar as the fifth-largest city in Indonesia. Tallasa District in Makassar can be a reference to the feasibility of implementing Chrono-urbanism in order to anticipate population growth and land-use density, promote healthy and productive human mobility during and after the pandemic, and reconsider a city planning model that is inclusive and sustainable. By prioritizing the "20-minute city" concept, a city can create livable spaces that also contribute to regenerating both the natural and social environment. Based on the case study, out of the four criteria of the chrono-urbanism approach, diversity is the only indicator that is adequate for the 20-minute concept. However, the proximity and density indicators still need to be optimized to meet the achievement standards for city residents. These indicators have been experienced by the internal residents of the Tallasa District. An inherent limitation of the Chrono-Urbanism theory in the density aspect arises when the theory is applied in the regions characterized by large populations and unique geographical features of an archipelago country like Indonesia. Lastly, regarding the aspect of digitalization, it may need to be reassessed because technological accessibility is

not enough to determine distance, but it should also consider the unforeseen circumstances that aim to achieve inclusivity as the main goal for all the groups. In Tallasa District, inclusivity has been successfully implemented for children through playground parks and gardens in each housing cluster. Although the study has successfully implemented inclusivity measures for children, extending these considerations to the elderly and people with disabilities in public space design is highly recommended.

Future research endeavors should encompass generalization studies conducted across diverse regions to authenticate the applicability and adaptability of the chrono-urbanism concept so that it will enrich our understanding of its efficacy in various urban contexts. Additional studies are guaranteed to fine-tune and optimize proximity and density indicators along with the established standards for city residents and the full realization of the "20-minute city" concept. In the domain of digitalization, forthcoming investigations can probe deeper into technology accessibility and contribute to the evolution of more comprehensive and inclusive models of urban planning. Furthermore, there is a pressing need for research and implementation of design strategies that extend the inclusivity measures so that the necessities of the elderly and individuals with disabilities in public spaces can be accommodated. At last, it will foster a more universally accessible and inclusive urban environment for all the residents in a quantitative approach.

Conflict of Interest

The author declared no conflict of interest.

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