

EXPLORING THE CHARACTERISTICS OF THE N-MINUTE CITY FOR HEALTHY COMMUNITY-CENTRIC PLANNING: A CASE OF SOUTH KOREA'S CITY

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ABSTRACT

Urban growth and planning have developed automobiles, contributing to urban sprawl and suburbanization. In response, the n-minute city model has emerged as a strategic framework to enhance both quality of life and urban sustainability. In South Korea, the urban planning concepts such as 10-minute city and 20-minute city have been proposed; however, they often overlook socio-demographic diversity in urban planning and landscape architecture research. This research addresses these gaps by exploring urban service facilities required to implement an n-minute city framework for urban planning of Gwangju, one of South Korea's cities. Using a mixed-methods approach including literature reviews, surveys, and data analysis, we identified essential urban amenities to achieve the '15-minute city' model. A resident survey (n=126) measured the importance of various amenities using Likert scales. Additionally, the Analytic Hierarchy Process (AHP) was conducted with experts to prioritize the importance of facilities. The survey identified nine key categories of urban amenities (e.g., education, healthcare, entertainment) and 30 facilities (e.g., parks, library, museum, hospital). Notably, the study found disparities between residents' and experts' preferences, highlighting the need for more flexible planning approaches. The study suggests that travel times should vary by amenity type and consider the role of green spaces and landscape architecture in enhancing urban health and wellbeing. This research provides valuable insights for policymakers, urban planners, and landscape architects by emphasizing the importance of resident-inclusive planning that considers not only spatial accessibility but also the socio-cultural characteristics and community elements of the area. Prioritizing essential services within a walkable urban framework can promote pedestrian-oriented walkability, reduce car dependency.

Keywords

N-Minute City, Chrono-Urbanism, Community Plan, Urban Planning, Walkability

1 INTRODUCTION

1.1 Background

Traditional car-centric urban planning has compromised quality of life, contributed to spatial and economic inefficiencies, and exacerbated the environmental impact of climate change. The onset of the COVID-19 pandemic, which brought about widespread lockdowns and social disconnection in major cities, revealed the inherent vulnerabilities of contemporary urban planning approaches. This global disruption prompted a critical validity of car-dependent development models and their capacity to support resilient urban living. In 2020, the mayor of Paris officially adopted the '15-minute city' as an urban agenda. One emerging concept is the 'n-minute city', designed to ensure the essential services-living, working, commerce, healthcare, education, and entertainment are accessible within a specific time frame. The fundamental principle underlying this proposal is developed to reduce reliance on private cars by ensuring that essential services and amenities are located within walking or cycling distance from residents' homes. The 15-minute model became more interesting (Abdelfattah et al., 2022) as a possible way of optimizing travel, reducing pollution, enhancing the economy, and transforming urban space to prioritize sustainability and giving new value to time (Moreno et al., 2021; Pozoukidou, G., & Chatziyiannaki, Z., 2021; Beatrice Olivari et al., 2023). The term 'n-minute' is rooted in the chrono-urbanism framework, which refers to an approach that restructures urban environments to ensure equitable access to essential daily services for all residents within the n-minute (Liu, D. et al., 2024). The concept emerged as a critical response to car-oriented urban structures, particularly addressing environmental degradation and reduced quality of life caused by time lost in traffic. In this context, Carlos Moreno proposed four key principles to support health-enhancing urban environments: proximity, density, diversity, and digitalization. However, there is a lack of clear evaluation criteria for what constitutes essential urban amenities, and the concept is inconsistently defined across different local contexts. In particular, most studies have not focused on analyzing distinct categories of amenities, nor have it integrated empirical assessment of residents' actual needs. This gap is especially evident for emerging concepts like the n-minute city, which are spreading rapidly but still lack a clearly defined theoretical foundation. In South Korea, variations like the 10-minute city and 20-minute city have been proposed, but often follow top-down, policy-driven approaches that do not sufficiently consider socio-demographic diversity, creating a research gap in urban planning and landscape architecture research. First of all, n-minute city plans in South Korea are developed based on administratively defined regional boundaries; however, actual spatial activity of residents transcends these artificial areas. This misalignment between administrative boundaries and living area may hinder residents' access to amenities they actually need and reveals the limitations of n-minute city planning in reflecting local characteristics. To address these challenges, n-minute city planning should be informed by an empirically grounded understanding of residents' perceived amenities needs.

1.2 Aims

This research aims to identify the essential urban amenities to realizing the n-minute city model. Through an empirical evaluation involving both residents and experts, this research investigates which essential urban amenities are considered critical for implementing the n-minute city. The integration of these perspectives contributes to an inclusive proximity-based planning model that enhances public health and promotes landscape design.

2 METHODS

Using a mixed-methods approach including literature reviews, surveys, and data analysis, we identify essential urban amenities for a '15-minute city' model. First, key urban amenities were identified through reviews of neighborhood planning literature and prior research. Second, 1st survey (n=126) collected data on which facilities are most valued for achieving the 15-minute city model, and 2nd survey (n=121) with responses measured using Likert scales on which importance of facilities in n-minute city. Third, an Analytic Hierarchy Process (AHP) was conducted with experts (n=23) to prioritize the importance of specific amenities. Last, Statistical analysis using SPSS was employed to analyze landscape features conducive to public health.

3 RESULTS

The survey results identified eight facility categories: enjoying, public transportation, entertainment, sport, welfare, healthcare, education, commercial, and public services. Thirteen specific facilities were recognized with hospital, pharmacy, emergency room, public transportation station, parking lot, park, cultural facility, library, mart, administrative welfare center, supermarket, restaurant, and public sports facility ranked in order of importance.

3.1 Facility Collection by Reviewing Related Research

Relevant studies on the n-minute city and living service facilities were reviewed, and the types of facilities used in previous research with similar objectives were identified and categorized for this study. In order to examine the research on the n-minute city concept, both in South Korea and internationally, a literature search was conducted using Google Scholar. The search terms ‘n-minute city’, ‘n-minute city’, ‘15 minute city’, and ‘15-minute city’ were used to identify articles with these terms in their titles or keywords, resulting in a collection of 91 sources. Five publications dated prior to 2019 were excluded, as the n-minute city concept only began to emerge in academic discussions from 2019. From the remaining works published between 2019 and 2024, 22 sources categorized as books, reports, or conference proceedings were also excluded, focusing the scope of analysis to peer-reviewed academic research. In conclusion, a total of 64 journal articles were reviewed. A total of 20 journal articles were selected for clear identification of facility indicators used to define or evaluate the n-minute city. Moreover, two foundational concepts—Howard’s garden city and Perry’s neighborhood unit theory—were included for their conceptual relevance, particularly with regard to the types of facilities proposed in early models of community-centric urban planning (Table 1). As a results, eight categories (enjoying, public transport, entertainment, sport, welfare, healthcare, education, commercial) and 20 facilities (park, parking lots, public transportation station, library, museum, theater, cultural facility, public sports facility, day-care center, youth child welfare facility, elderly welfare facility, administrative welfare center, hospital, pharmacy, emergency room, kinder garden, elementary school, middle/high school, mart, retail store) were identified.

Table 1. Facility collection by reviewing related research

	Enjoying		Public transport		Entertainment			Sport			Welfare			Healthcare			Education			Commercial	
	Park	Parking lots	Public transportation station	Library	Museum	Theater	Cultural facility	Public sports facility	Day-care center	Youth child welfare facility	Elderly welfare facility	Administrative welfare center	Hospital	Pharmacy	Emergency room	Kinder garden	Elementary school	Middle/High school	Mart	Retail store	
Count	15	8	3	15	3	2	6	11	11	4	12	2	13	7	2	8	9	3	4	5	
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① Park (2010), ② Hong et al. (2015), ③ Lim (2018), ④ 2030 Living Area Plan in Seoul (2018), ⑤ Kim (2020), ⑥ Lee (2020), ⑦ Jang (2021), ⑧ Kim (2021), ⑨ Sung et al. (2021), ⑩ Hosford, K (2022),

⑪ Logan, TM et al. (2022), ⑫ Lee et al. (2022), ⑬ Busan Development Institute (2022), ⑭ 2040 Urban Master Plan in Gwangju (2023), ⑮ XU YU et al. (2023), ⑯ Lee (2023), ⑰ Jeong et al. (2023),

⑱ Park et al. (2023), ⑲ Park (2024), ⑳ Korea Research Institute for Human Settlements (2024), ㉑ Garden City Movement by E. Howard,

㉒ Neighborhood Unit by C.A. Perry

3.2 Survey Design and Facility Selection Process

To identify the types of facilities to be considered in n-minute city planning, a two-stage survey was conducted. The first survey presented participants with a list of facilities identified from previous studies and asked an open-ended question: “What types of amenities do you think are necessary for the n-minute city?” This survey was conducted both in-person and online from April 8 to 22, 2024. Designed to capture participants’ subjective perceptions, the question was open-ended to allow for a short-answer question. A total of 126 individuals participated, and 88 valid responses were collected. The second

survey asked participants to evaluate the importance of each amenity in contributing to the n-minute city model using a five-point Likert scale (1=Strongly Unnecessary, 2=Unnecessary, 3=Neutral, 4=Necessary, 5=Strongly Necessary). This survey was also conducted both in-person and online, from April 25 to May 22, 2024. A total of 121 participants completed the survey, yielding 162 valid responses.

As a result of the first survey, a total of 53 facility types were identified. These were categorized as follows: enjoying, public transport, entertainment, sport, welfare, healthcare, education, and commercial. After calculating the average, the number of responses for each amenity, amenities with an average of five or fewer responses, those that were not considered urban essential amenities or were conceptually unrelated to the n-minute city framework, as well as 27 responses that did not correspond to any type of amenity, were excluded from the analysis. Several amenities that closely aligned with existing categories in prior studies were merged into broader items: for example, parks were grouped under “green and open spaces”, and terminals under “public transportation stations”. Additionally, “office”, which reflects the n-minute city principle of job-housing proximity, was retained. The results of the first survey with facility categories identified in relevant studies, organized into 9 categories comprising 30 facility types (Table 2). All remaining amenities with scores above the average were included in the second survey.

The demographic characteristic of the second survey respondents are as follows. In terms of gender, 69 participants were female (57%), and 52 were male (43%). By age group, 66 respondents were in their 20s (54.5%), 17 in their 30s (14%), 16 in their 40s (13.2%), and 22 in their 50s (18.2%). Regarding housing type, 90 participants (74.4%) lived in apartments, while 31 (25.6%) resided in other housing types such as detached houses, multi-family units, or townhouses.

To evaluate the consistency and stability of the results from the second survey, an analysis was conducted using SPSS (Statistical Package for the Social Sciences). This analysis primarily employed Cronbach's alpha, which is widely recognized as a measure of internal consistency among survey items. A Cronbach's alpha value of 0.7 or higher is generally considered to indicate good reliability, suggesting that the survey items demonstrate a satisfactory level of internal consistency (Nunnally & Bernstein, 1994). In this study, the scale demonstrated a relatively high level of internal consistency, with a Cronbach's alpha value of 0.904. Although items with corrected item-total correlation coefficients below 0.3 are typically considered detrimental to reliability, the item “public transportation station” showed a coefficient of 0.255. However, even after removing this item, the Cronbach's alpha remained high, indicating that the overall reliability of the instrument was not compromised by its inclusion. Given that “transportation” is a key component of the n-minute city framework, the item was retained in the analysis. As a result, all items were included in the subsequent descriptive statistical analysis to ensure comprehensive coverage of essential elements within the study's conceptual framework.

Table 2. Results of reliability analysis and descriptive statistics

1st survey result	Cronbach's alpha	Minimum	Maximum	Variance	Ranking	1st survey result	Cronbach's alpha	Minimum	Maximum	Variance	Ranking
Park	0.903	2	5	0.375	4	Pharmacy	0.902	3	5	0.302	1
Open space	0.903	1	5	0.876	24	Emergency room	0.902	2	5	0.511	5
Religion facility	0.905	1	5	0.988	30	Mart	0.902	5	5	0.692	9
Library	0.9	1	5	0.628	15	Retail store	0.903	5	5	0.652	7
Sports field	0.901	2	5	0.607	25	Café	0.903	5	5	0.906	21
Convention center	0.902	1	5	1.177	28	Restaurant	0.901	2	5	0.728	10
Concert hall	0.901	1	5	0.979	27	Office complex	0.901	1	5	0.856	29
Cultural facility	0.902	2	5	0.675	16	City hall	0.899	2	5	1.011	26
Public sports facility	0.901	2	5	0.491	8	Police office	0.9	2	5	0.599	19
Day-care center	0.9	2	5	0.87	12	Financial facility	0.899	1	5	0.8	18
Elderly welfare center	0.899	1	5	0.869	20	Public restroom	0.901	1	5	0.964	23
Kindergarten	0.899	1	5	0.915	14	Fire station	0.899	2	5	0.807	11
Elementary school	0.899	1	5	0.92	13	Parking lots	0.902	2	5	0.702	6
Middle/High school	0.899	1	5	0.971	17	Shared mobility hub	0.903	1	5	0.898	22
Hospital	0.901	2	5	0.355	2	Public transportation station	0.904	2	5	0.466	3
Total							0.904	1.6	5	0.75	

Descriptive statistical analysis was conducted to examine the distribution characteristics of the data. In this study, the reliability of the 30 items was assessed by analyzing the minimum and maximum values for each item. The mean was calculated to determine the general level at which the data were distributed, while the variance was examined to assess the extent of dispersion from the mean. To identify facilities considered universally important, the following selection criteria were applied: (1) the mean value for each

facility had to exceed the overall average, and (2) the variance had to be equal to or lower than the total variance. Facilities that met both criteria were considered representative of commonly prioritized services.

As a result, the following facilities were selected: “parks and green spaces” under the category of rest; “library” and “cultural facility” under leisure; “public sports facility” under sports; “hospital”, “pharmacy” and “emergency room” under healthcare; “mart”, “retail shop” and “restaurant” under commerce; and “parking lots” and “public transportation station” under transportation. Subsequently, given that the n-minute city concept originates from the 15-minute city introduced in Paris, this study reviewed the six core urban social functions identified in France’s 15-minute city white paper to inform the categorization of essential amenities. Amenities identified in the white paper that did not represent physical facilities and those already identified in the second survey were excluded. Among the remaining facilities, the “public service office” (e.g., administrative and welfare services), which was considered essential for the n-minute city, was reclassified as an “Administrative welfare center” and added under the category of public facilities.

3.3 Analytic Hierarchy Process (AHP) Method

In this study, daily service facilities were classified into major categories-enjoying, entertainment, sport, healthcare, commercial, public transport, public service-and further subdivided into specific facility types, including park, cultural facility, library, public sports facility, hospital, emergency room, pharmacy, mart, retail store, restaurant, public transportation station, parking lots and administrative welfare center (Figure 1). To evaluate the relative importance of these amenity types, the survey was designed using the Analytic Hierarchy Process(AHP), which employs a 9-point scale for pairwise comparisons. The AHP survey was conducted online from July 18 to August 10, 2024, targeting professionals in urban and regional planning, landscape architecture, and related fields, including professors, researchers, public officials, and employees of public institutions. A total of 23 completed survey responses were collected. To ensure the consistency of the responses, the consistency ratio(CR) was calculated for each questionnaire. The CR is used to measure the degree of inconsistency in the pairwise comparisons, thereby assessing the reliability of the survey data. According to established criteria, a CR of 0.1 or lower is considered to indicate a reasonable level of consistency, while a value of 0.2 or lower is generally regarded as acceptable(Saaty, 1980). Given that the survey addressed social indicators, this study accepted a threshold of $CR \leq 0.2$ for valid responses. As a result, all 23 responses met the consistency requirement and were included in the final analysis, ensuring the reliability and validity of the survey results.

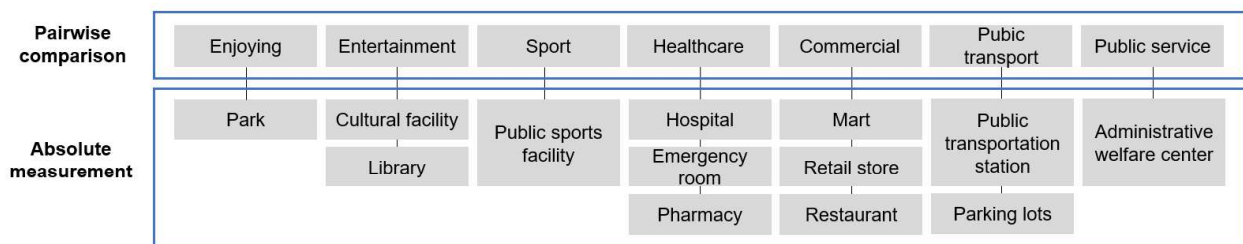


Figure 1. Analytic Hierarchy Process(AHP) hierarchy structure (2024). Diagram by the authors.

Based on the analysis, hospital emerged as the most critical amenity, accounting for 2.8%, followed by emergency room(2.8%), pharmacy(2.7%), public transportation station(1.9%), parking lots(1.6%), park(1.0%), administrative welfare center(0.8%), mart(0.8%), retail store(0.7%), restaurant(0.7%), cultural facility(0.7%), library(0.6%), and public sports facility(0.4%)(Table 3). There was a clear discrepancy between the public and experts in how they prioritized essential urban amenities. According to the results of the public survey, the most important amenities were, in order: pharmacy, hospitals, public transportation station, park, emergency room, parking lots, retail store, public sports facility, marts, restaurant, library, and cultural facility. In contrast, experts derived from AHP analysis revealed a different priority order: hospital, emergency room, pharmacy, public transportation station, parking lots, park, administrative welfare center, mart, retail store, restaurant, cultural facility, library, and public sports facility. Moreover, the analysis also revealed notable differences between female and male respondents. Female respondents rated elementary schools, hospitals, and pharmacies as the most important facilities, in that order. In contrast, male respondents prioritized fire stations, parks and green spaces, and

pharmacies. These findings highlight differences in emphasis, with the public favoring neighborhood-level urban amenities, while experts placed higher value on health-related and administrative infrastructure.

Table 3. Evaluation of Living Service Facilities Importance

Living Service Facility Category			Living Service Facility			Total Weight Calculation Result	Total Ranking
Category	Weight	Ranking	Facility	Weight	Ranking		
Healthcare	0.303	1	Hospital	0.093	1	0.028	1
			Emergency room	0.091	2	0.028	2
			Pharmacy	0.090	3	0.027	3
Public transport	0.220	2	Public transportation station	0.086	5	0.019	4
			Parking lots	0.0717	7	0.016	5
Public service	0.114	3	Administrative welfare center	0.069	10	0.008	7
Commercial	0.111	4	Mart	0.070	8	0.008	8
			Retail store	0.064	12	0.007	9
			Restaurant	0.059	13	0.007	10
Enjoying	0.107	5	Park	0.089	4	0.010	6
Entertainment	0.088	6	Cultural facility	0.082	6	0.007	11
			Library	0.070	9	0.006	12
Sport	0.067	7	Public sports facility	0.067	11	0.004	13

4 DISCUSSION

Redefining the concept of essential urban amenities is crucial for implementing the n-minute city model. This study identified 13 essential urban amenity types that support daily life within walking or bicycle distance: parks, library, cultural facility, public sports facility, hospital, pharmacy, emergency room, mart, retail store, restaurant, parking lots, public transportation station, and administrative welfare center. The findings suggest that urban planning should prioritize optimizing and integrating existing infrastructure rather than expanding new facilities. This approach not only conserves urban resources but also aligns better with the actual needs and usage patterns of residents, especially in densely populated or developed areas.

The analysis also highlighted significant differences in amenity prioritization across stakeholder groups and demographic segments. There was a notable divergence between public and expert perspectives, with experts placing more emphasis on emergency services and governance-related facilities, while citizens prioritized amenities related to daily convenience and healthcare. In addition, gender and age differences emerged in the survey responses, suggesting that urban planning should be sensitive to the sociocultural and demographic characteristics of local populations. Incorporating such variations into planning decisions can contribute to more inclusive and responsive urban environments. From a methodological perspective, this study combined qualitative and quantitative approaches to examine facility priorities within the context of the n-minute city.

5 CONCLUSION

This study critically examined proximity-based urban models by referencing international case studies, including the 15-minute city in Paris and the 20-minute neighborhood in Melbourne, to establish a theoretical framework. The research employed a mixed-method design, combining a two-stage empirical investigation-comprising a citizen survey and an Analytic Hierarchy Process(AHP)-based expert evaluation to elucidate the perceived significance of essential urban amenities and to capture the heterogeneity of stakeholders' priorities. The integrated methodology advanced in this study offers a replicable framework for proximity-oriented urban planning and research, supporting both theoretical advancement and practical application. The findings highlight the need for policy strategies in response to

evolving urban challenges, such as those exemplified by the COVID-19 pandemic. Furthermore, the methodologies and insights developed are broadly applicable and contribute to global discourse on healthy and inclusive urban development.

Effective n-minute city planning requires a holistic approach that accounts for both physical accessibility and the socio-cultural characteristics of local communities to foster environments conducive to health and well-being. This study shows that a data-driven approach, which prioritizes essential urban amenities based on local needs, can help cities use limited resources efficiently and sustainably. Instead of simply expanding new infrastructure through a top-down approach, urban planners should focus on optimizing existing amenities that have the greatest impact on daily life and community health.

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