

The Emergence of the 15-Minute City Framework from Problem-Based Learning in the Regional/Urban Planning Studio

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Abstract. The 15-minute city concept emphasizes proximity to daily needs through accessibility, mobility, connectivity, and diverse spatial functions. This study uses a qualitative reflective case study design to examine how Problem-Based Learning (PBL) characteristics embedded in a Regional/Urban Planning Studio workflow can generate a 15-minute city framework. The framework is reconstructed through problem orientation, identification, analysis, formulation of alternatives, and evaluation, using studio documents, observations, secondary data, and reflective notes. As complementary empirical evidence, scalogram and Weighted Centrality Index (WCI) data covering 23 subdistricts in Bekasi Regency were examined. The analysis recorded 332 facility occurrences and 24 errors, producing a Coefficient of Reproducibility (COR) of 0.92. Among the five contextual subdistricts, Tambun Selatan had the highest facility weight (157.82; Hierarchy I). The findings indicate that PBL can generate a conceptual framework linking daily needs, facilities, accessibility, mobility, networks, spatial structure, environmental quality, and equitable service distribution.

Keywords: Problem-Based Learning; 15-Minute City; Conceptual Framework; Critical Thinking; Planning Education.

1. Introduction

Regional and Urban Planning Education is required to produce graduates who are not only technically competent but also able to think critically in addressing urban problems that are complex, dynamic, and context-specific. Facione (1990) asserts that critical thinking is an essential capability in higher education. This skill enables students to interpret data, evaluate evidence, analyze cause-and-effect relationships, draw logical conclusions, and explain the reasoning behind their decisions. It is increasingly crucial in planning education because spatial problems are complex and rarely have a single absolute solution, requiring comprehensive analysis that integrates spatial, social, economic, ecological, and mobility dimensions. Recent research has shown that problem-based and collaborative learning methods are effective in stimulating higher-order thinking skills, particularly critical thinking (Liu & Pásztor, 2022; Loyens et al., 2023). Studies across various educational contexts similarly report that Problem-Based Learning (PBL) has a positive and consistent impact on critical thinking skills (Fadilla et al., 2021; Nisa et al., 2021; Uliyandari et al., 2021; Mutiara et al., 2024; Post et al., 2025; Sormin et al., 2025; Kriki et al., 2025).

One contextual entry point for bridging contemporary planning theory and practice is the concept of the 15-minute city. Moreno et al. (2021) describe it as a proximity-based approach that places daily needs within a short travel time from one's place of residence. Subsequent literature

relates the concept to access to services, active mobility, diversity of functions, connectivity, and urban environmental quality (Allam et al., 2022; Pozoukidou & Angelidou, 2022). However, its implementation needs to be adapted to the characteristics of each area because demographic conditions, density, spatial structure, walkability, and transportation availability differ across contexts (Khavarian-Garmsir et al., 2023; Teixeira et al., 2024). Studies on accessibility further emphasize that the “15-minute” concept should be understood according to regional context, as accessibility varies by location, population characteristics, and travel mode (Hosford et al., 2022; Vale & Lopes, 2023). Accordingly, the concept provides an authentic and open-ended problem that can encourage students to interpret, analyze, evaluate, and formulate planning alternatives.

Problem-Based Learning (PBL) is a student-centered approach in which learning begins with an authentic, ill-structured problem. Students work together to identify learning needs, analyze problems, seek relevant information, and formulate solutions (Barrows, 1996). Recent empirical and systematic review findings indicate that PBL can improve critical thinking, particularly when problems are based on real contexts, and students are given opportunities to discuss and explain the reasoning behind their solutions (Liu & Pásztor, 2022; Yu & Zin, 2023; Mutiara et al., 2024). This characteristic gives PBL the potential to function not only as a teaching method but also as a generative mechanism for developing a conceptual framework for planning issues. However, research specifically examining how PBL characteristics can generate a 15-minute city framework in Regional and Urban Planning education remains limited. This gap provides the basis for the contribution of this article.

Based on this gap, this article explains how a 15-minute city framework emerges from PBL characteristics, with the Regional/Urban Planning Studio serving as the context in which these characteristics are observed. The emphasis is not on narrating the studio experience, but on examining how PBL stages—problem orientation, identification, analysis, formulation of alternatives, and evaluation—embedded in the studio workflow progressively produce a conceptual framework for understanding the 15-minute city. Bekasi Regency, specifically the five subdistricts of Tambun Selatan, Tambun Utara, Cibitung, Cikarang Barat, and Cikarang Utara, provides the context for this generative process rather than serving as an area for testing the concept. As a complement, the article examines inter-subdistrict facility hierarchy data to identify which subdistrict most closely approaches the 15-minute city criteria based on available evidence. Thus, the framework is supported by both conceptual reasoning and empirical evidence.

Three research questions guide this study. The first question asks how the characteristics of PBL embedded in the workflow of the Regional/Urban Planning Studio can give rise to a framework for understanding the 15-minute city concept. The second question examines how the stages of PBL, from problem orientation through to evaluation, can be formulated into a coherent 15-minute city framework. The third question seeks to identify which subdistrict among the study areas most closely approaches the 15-minute city criteria based on facility hierarchy data.

In line with these questions, this study pursues three objectives. The first objective is to explain how the characteristics of PBL in the workflow of the Regional/Urban Planning Studio give rise to a 15-minute city framework. The second objective is to formulate a 15-minute city framework based on these stages of PBL. The third objective is to identify the subdistrict that most closely approaches the 15-minute city criteria based on facility hierarchy data, specifically through scalogram and WCI analysis.

2. Method

This study uses a qualitative approach with a reflective case study design to examine how Problem-Based Learning (PBL) characteristics embedded in the Regional/Urban Planning Studio workflow can function as a generative mechanism for a 15-minute city framework. The studio workflow is not positioned as an experiment to measure improvements in critical thinking, but as the context in which PBL characteristics—problem orientation, problem identification, analysis, formulation of alternatives, and evaluation—are observed and used to construct the conceptual framework. PBL and the 15-minute city are the substantive focus, while the studio workflow provides the context for the framework's emergence. To complement the conceptual framework with empirical evidence, the study also examines scalogram analysis and the Weighted Centrality Index (WCI) of inter-subdistrict facilities in Bekasi Regency to identify the subdistrict that most closely approaches the 15-minute city criteria based on available data.

The context of this study is the Regional/Urban Planning Studio workflow in the Regional and Urban Planning Study Program at Universitas Terbuka in 2026, which the author followed as a student. The workflow includes determining the study area, preparing and revising proposals, conducting surveys and data collection, identifying and analyzing regional aspects, determining facts, potentials, and problems, formulating strategic issues, developing concepts and strategies, preparing spatial plans, and completing the final product. Bekasi Regency forms part of the regional context, specifically five interconnected subdistricts: Tambun Selatan, Tambun Utara, Cibitung, Cikarang Barat, and Cikarang Utara. These areas face urbanization and high population density associated with industrial and residential growth along the Jakarta–Bekasi–Cikarang corridor. According to Kabupaten Bekasi Dalam Angka 2024, Tambun Selatan had the largest population among the five subdistricts in 2023 (approximately 431,000), followed by Cibitung ($\pm 251,000$), Cikarang Utara ($\pm 233,000$), Tambun Utara ($\pm 212,000$), and Cikarang Barat ($\pm 202,000$) (BPS Kabupaten Bekasi, 2024). The five subdistricts provide a relevant context for examining daily facility accessibility because of their dense urban characteristics and diverse residential, industrial, and commercial functions. They are not treated as units for testing the attainment of the 15-minute city concept; rather, the context supports construction of the framework, while data-based assessment is presented separately in the Results section.

Because this study is conceptual-reflective rather than experimental, critical thinking skills were not measured through standardized pretest-posttest tests. Evidence was drawn from logbooks, technical proposals, presentation materials, survey and observation results, secondary data, processing and analysis results, maps, discussion notes, presentation feedback, the final report, and the author's reflective notes. To supplement the assessment of subdistrict suitability against the 15-minute city criteria, the study also uses scalogram analysis and the Weighted Centrality Index (WCI) of facilities across 23 subdistricts in Bekasi Regency, documented in the population, facilities and infrastructure, and economic analysis report prepared during the same studio process (UPBJJ-UT Jakarta, 2024). Activities conducted with other students are treated as learning and idea-exchange contexts rather than sources of measured respondent data. These sources were used to reconstruct PBL characteristics from problem orientation through the evaluation of planning decisions.

The research procedure follows the Studio's workflow, which is then read through the characteristics of PBL to see how the 15-minute city framework was formed progressively.

- a) Following the pre-studio stage and the process of aligning perceptions to understand the rules, activity flow, division of tasks, coordination, logbook, and work schedule.
- b) Determining the study area and understanding the area's initial context as a planning arena.

- c) Preparing a technical proposal based on an initial understanding of the area, data needs, objectives, scope, methodology, and survey plan, then presenting and revising it based on feedback.
- d) Conducting primary and secondary data collection surveys through observation, documentation, interviews, or questionnaires where relevant, and tracing agency data.
- e) Compiling, processing, and analyzing data according to demographic, physical and environmental, economic, socio-cultural, facility and infrastructure, and financing and institutional aspects to find relationships between aspects.
- f) Deriving facts, potentials, problems, and strategic issues from the analysis results, then formulating a development concept, objectives, policies, strategies, and planning alternatives.
- g) Translating the concept and strategy into a spatial structure, spatial pattern, strategic areas, and directives for spatial utilization and control, then presenting the results and receiving evaluation.
- h) Making revisions based on feedback and completing the final report, map album, posters, presentation materials, logbook, and final product.
- i) Reading the characteristics of PBL throughout the entire workflow to construct a 15-minute city framework, then examining inter-subdistrict facility hierarchy data to identify the subdistrict that most closely approaches the 15-minute city criteria.

The analysis traced the sequence of initial condition → data → facts → analysis → potentials/problems → strategic issues → concept → strategy → plan → evaluation and revision. This sequence was interpreted through PBL characteristics—problem orientation, problem identification, analysis, formulation of alternatives, and evaluation—to examine how the 15-minute city framework progressively emerged. The framework connects daily needs, accessibility, facilities, mobility, networks, spatial structure, environmental quality, and equitable service distribution. As a complement, scalogram and WCI data on inter-subdistrict facilities were processed into a hierarchy ranking to identify the subdistrict that, based on the data, most closely approaches the 15-minute city criteria.

3. Result

This section presents how the characteristics of PBL embedded in the Studio's workflow progressively gave rise to a 15-minute city framework. The presentation is focused on the process of forming this framework, not on a narrative of the experience of undergoing the studio. As a complement, the final part presents inter-subdistrict facility hierarchy data to identify the subdistrict that most closely approaches the 15-minute city criteria.

Problem Orientation as the Starting Point for the Emergence of the 15-Minute City Framework

The early studio workflow emphasizes understanding the regional context, objectives, data needs, and issues before formulating solutions. From a PBL perspective, this reflects problem orientation, where a real, ill-structured problem becomes the starting point for learning. This characteristic initiates the 15-minute city framework by shifting the question from whether an area meets a specific time threshold to what daily needs must be fulfilled, what facilities are required, who the users are, and how those needs can be accessed. Thus, PBL problem orientation frames the 15-minute city primarily as an issue of needs and accessibility rather than merely a travel-time target.

Problem Identification: The Empirical Basis of the 15-Minute City Framework

The PBL characteristic of self-directed learning, in which students formulate their own questions and data needs, is evident at the identification stage, where initial information is refined into specific facts and issues. Data on population, land use, facilities, transportation networks,

environmental conditions, the economy, and social aspects are used not only for inventory but also to identify patterns and gaps. In the five study subdistricts, identification focused on six groups: (1) educational facilities, including school distribution and availability relative to the school-age population, based on Kemendikdasmen and BPS Kabupaten Bekasi data; (2) health facilities, including puskesmas, clinics, and hospitals, based on the Bekasi Regency Health Office; (3) market and trade facilities serving daily needs; (4) open spaces, including neighborhood parks and public green space; (5) public service facilities, including village and subdistrict government offices, based on relevant local government data; and (6) accessibility and affordability, concerning the ability to reach facilities through available road networks and transportation modes within a reasonable travel time. These data form the empirical basis of the 15-minute city framework, linking facility availability with population location, travel time, travel mode, connectivity, and spatial characteristics. Thus, the focus shifts from asking "is the facility available?" to "can daily needs be adequately reached by the population?"

Analysis: Shaping a Way of Reading Accessibility

The PBL characteristic of cross-topic knowledge integration and evidence-based reasoning is evident at the analysis stage, when compiled data are connected across aspects to explain conditions and their planning implications. This stage shapes how accessibility is understood within the 15-minute city framework: not merely as a radius or 15-minute threshold, but as the interaction of facility locations, road networks, transportation modes, mobility capacity, density, spatial functions, and community needs. Thus, PBL's analytical character adds a relational dimension to the framework, distinguishing it from a simple measure of distance or travel time.

Formulation of Alternatives: From a Proven Problem to an Intervention Framework

The PBL characteristic of divergent thinking and the weighing of various criteria is evident at the stage when analysis results are translated into potentials and problems, then into strategic issues, a development concept, objectives, policies, strategies, and plan alternatives. This pattern shows that planning solutions must be derived from problems that have been proven through analysis, rather than being determined beforehand. This is the character that gives rise to the intervention component of the 15-minute city framework: daily needs are placed as the starting point, then linked to the provision of facilities, networks and mobility, spatial structure, and access-improvement strategies. Accordingly, the 15-minute city is treated as a framework that can be translated into planning problems and actions, rather than merely a travel-time target.

Evaluation and Recommendations: Testing the Robustness of the Framework

The PBL characteristic of evidence-based decision-making and metacognitive reflection is evident at the evaluation, presentation, and revision stage, when the analysis results and the alternatives that have been developed are reviewed again through critique and feedback that tests the fit between the problem, the data, the concept, and the recommendation. This evaluative character is what tests the robustness of the 15-minute city framework: an area cannot simply be considered to meet the 15-minute city principle just because facilities are located within a certain distance. Consideration must also be given to the quality of access, mode choice, network connectivity, different user groups, and the fit between the solution and the character of the area, a principle of caution that is then tested further with data in the following subsection.

Synthesis of the 15-Minute City Framework

The five PBL characteristics described above problem orientation, problem identification, analysis, formulation of alternatives, and evaluation cumulatively give rise to a 15-minute city framework that moves from "understanding needs" to "explaining relationships and formulating actions." The framework begins with daily activity needs, followed by the identification of facilities

and services, assessment of accessibility, analysis of mobility and networks, interpretation of spatial structure, identification of service gaps, formulation of intervention alternatives, and evaluation. The PBL characteristics embedded in the studio workflow therefore function as a mechanism for translating the 15-minute city concept into a more operational planning mindset.

Table 1 summarizes the relationship between PBL stages, their characteristics, and their contribution to the emergence of the 15-minute city framework. PBL is positioned as the generative mechanism, the 15-minute city as the resulting conceptual substance, and the studio workflow as the context in which the process is observed.

Table 1. The Relationship between the Stages of PBL and the Emergence of the 15-Minute City Framework

PBL Stage	PBL Characteristic Involved	Contribution to the Emergence of the 15-Minute City Framework
Problem Orientation	Presenting a real, ill-structured problem as the starting point for learning	Establishes 15-minute accessibility as a contextual spatial issue.
Problem Identification	Encouraging self-directed learning through the formulation of questions and data needs	Provides an empirical basis by identifying facilities, population needs, and accessibility conditions.
Analysis	Integrating knowledge across topics and connecting evidence across aspects	Shapes accessibility as a relational pattern involving facilities, mobility, connectivity, spatial functions, and community needs.
Formulation of Alternatives	Encouraging divergent thinking and consideration of alternative solutions and trade-offs	Translates identified needs and problems into spatial and service-accessibility strategies consistent with 15-minute city principles.
Evaluation and Recommendations	Supporting evidence-based decision-making and reflection on planning alternatives	Strengthens the framework by linking recommendations to evidence, service accessibility, and equitable distribution of facilities.

Source: prepared by the author based on a reading of the characteristics of PBL in the workflow of the Regional/Urban Planning Studio, 2026.

Table 1 shows that each PBL stage contributes to the emergence of the 15-minute city framework. The framework does not arise from a single stage but from the cumulative PBL process throughout the studio workflow.

Table 2. Demographic Characteristics of the Five Study Subdistricts in Bekasi Regency

Subdistrict	Population 2023 (people)	Main Characteristics
Tambun Selatan	± 431,500	Most populous; high density; predominantly residential
Cibitung	± 251,600	Mixed industrial area; dense residential settlement
Cikarang Utara	± 233,150	Government center; residential area; growing commercial activities
Tambun Utara	± 212,200	Developing residential area; access to major transportation routes
Cikarang Barat	± 202,500	Industrial area; growing supporting residential settlement

Source: BPS Kabupaten Bekasi, Kabupaten Bekasi Dalam Angka 2024 (data 2023).

Table 2 shows that the five study subdistricts are among the subdistricts with the largest populations in Bekasi Regency, with Tambun Selatan as the most densely populated. This condition reinforces the relevance of the question of daily facility accessibility within the 15-minute city

framework, since the high population pressure on areas with mixed industrial and residential functions has implications for the need for a more equitable distribution of education, health, and trade facilities.

Subdistricts Approaching the 15-Minute City Criteria Based on Data.

The 15-minute city framework that emerged from the characteristics of PBL in the previous section is conceptual in nature. To set it alongside empirical evidence, this section examines the results of a scalogram analysis and the Weighted Centrality Index (WCI) of facilities in 23 subdistricts of Bekasi Regency, as documented in the report on population, facilities and infrastructure, and economic analysis of Bekasi Regency (UPBJJ-UT Jakarta, 2024). This analysis produced a total facility frequency value of 332 with an error value of 24, yielding a Coefficient of Reproducibility (COR) of 0.92, a value considered acceptable for use in further stages of analysis. Based on the total facility weight, all subdistricts in Bekasi Regency were grouped into six hierarchy levels, from Hierarchy I (weight 150.69–172.12, the highest facility completeness) to Hierarchy VI (weight 43.48–64.92, the lowest facility completeness). Babelan Subdistrict occupies Hierarchy I with the highest weight in the whole of Bekasi Regency (172.11), followed by Tambun Selatan (157.82), which is also in Hierarchy I.

Table 3 presents the results of this analysis specifically for the five subdistricts that form the context of this study.

Table 3. Results of the Scalogram Analysis and Weighted Centrality Index (WCI) for the Five Study Subdistricts

Subdistrict	Total Weight	Hierarchy	Description
Tambun Selatan	157.82	I	The highest facility completeness and hierarchy among the five study subdistricts; the closest to meeting the 15-minute city criteria
Cikarang Utara	92.94	IV	Facilities are reasonably available, but their distribution and service hierarchy are still below Tambun Selatan's
Cikarang Barat	91.15	IV	Facilities are reasonably available, dominated by industrial functions with supporting residential services.
Cibitung	67.54	V	Facilities are limited; service gaps are relatively higher compared with the Hierarchy IV subdistricts.
Tambun Utara	58.45	VI	The lowest facility completeness among the five study subdistricts

Source: processed from the results of the scalogram and WCI analysis, Report on Population, Facilities and Infrastructure, and Economic Analysis in Bekasi Regency.

Table 3 shows that among the five study subdistricts, Tambun Selatan has the highest total weight and facility hierarchy (Hierarchy I), consistent with its position as the most populous subdistrict (Table 2). Its higher hierarchy indicates relatively greater completeness and diversity of education, health, trade, and public service facilities compared with the other four subdistricts. This condition makes Tambun Selatan relatively more supportive of the 15-minute city principle in terms of facility availability and proximity to daily needs (Moreno et al., 2021; Pozoukidou & Angelidou, 2022). Tambun Utara and Cibitung have lower facility hierarchies (V and VI), while Cikarang Utara and Cikarang Barat are at an intermediate level (Hierarchy IV).

However, the scalogram and WCI analysis measure facility completeness and hierarchy, not actual travel time. Therefore, Tambun Selatan is considered to most closely approach the 15-minute

city criteria only indicatively, based on facility availability. Further road-network-based accessibility analysis, such as isochrone analysis, is needed to assess actual accessibility.

4. Discussion

The results show that PBL characteristics embedded in the Studio's workflow can function as a generative mechanism for a 15-minute city framework. This does not mean that the 15-minute city concept was formally applied in the studio or that Bekasi Regency was tested as a 15-minute city. Rather, the PBL stages problem orientation, problem identification, analysis, formulation of alternatives, and evaluation embedded in the studio workflow form the framework: understanding needs, gathering evidence, identifying facts, analyzing relationships, finding potentials and problems, formulating strategic issues, developing a concept and strategy, translating the results into a plan, and evaluating and revising the results.

This pattern aligns with PBL, in which a problem becomes the starting point of learning. The identified problem drives students to determine information needs, search for and process relevant information, analyze the problem, formulate a solution, and evaluate its fit and effectiveness (Barrows, 1996; Liu & Pásztor, 2022; Yu & Zin, 2023). In this study, PBL is treated as a generative framework, not as a formally designed PBL process or an experimental study. The framework was reconstructed retrospectively from the Regional/Urban Planning Studio workflow: understanding the area, identifying the problem, collecting data, establishing facts, analyzing, finding potentials and problems, evaluating, formulating recommendations, and reflecting on the process as a PBL framework. Analysis and evaluation-recommendation appear to play the greatest role in developing critical thinking, as students interpret incomplete data, connect information, consider field-data limitations, weigh evidence, and make planning decisions involving competing interests. This aligns with Facione (1990), Ennis (1985), and Schön (1983), who emphasize interpretation, evaluation of evidence, inference, and reflection in critical thinking and professional learning.

The 15-minute city concept provides substance that fits this generative mechanism. Moreno et al. (2021) explain that proximity to daily needs is its main basis, while later studies relate it to accessibility, active mobility, diversity of functions, connectivity, and environmental quality (Allam et al., 2022; Pozoukidou & Angelidou, 2022). However, implementation cannot be standardized across areas because density, spatial structure, transportation modes, and population characteristics differ, requiring contextual adaptation (Khavarian-Garmsir et al., 2023; Teixeira et al., 2024). Based on the PBL characteristics within the studio workflow, the 15-minute city framework can be structured as a process: understanding context and daily needs; identifying required facilities and services; collecting data on population, facilities, land use, networks, mobility, and environmental conditions; analyzing accessibility and relationships; identifying gaps, potentials, and access problems; formulating strategic issues; developing spatial and mobility intervention alternatives; and evaluating alternatives based on accessibility, equity, connectivity, feasibility, and user characteristics. The framework brings the 15-minute city concept closer to regional and urban planning by translating it beyond a time measure into planning questions and decisions.

The data-based findings in Table 3 reinforce this conceptual framework. Tambun Selatan occupies Hierarchy I, while Tambun Utara and Cibitung fall into Hierarchy V–VI, supporting the view that the fit with the 15-minute city principle should be understood according to local context, particularly facility availability and hierarchy (Khavarian-Garmsir et al., 2023; Teixeira et al., 2024). This is consistent with studies assessing the fit of an area with the 15-minute city principle through facility availability and distribution (Papadopoulos et al., 2023; Caselli et al., 2022). Facility

conditions and hierarchy therefore provide a basis for assessing proximity to daily needs and identifying areas that are empirically closer to the principle.

Research also shows that access to daily needs within a 15-minute city framework varies by location, transportation mode, and population characteristics (Hosford et al., 2022; Vale & Lopes, 2023). Therefore, the 15-minute figure should be positioned as an accessibility principle rather than the sole indicator of success. The finding that Tambun Selatan “most closely approaches” the criteria is indicative, based on facility completeness, and not a definitive conclusion about actual travel time. Assessment should also consider vulnerable groups, physical barriers, public transportation, and environmental quality (Mouratidis, 2024; Buliung, 2025).

The main contribution of this study lies in positioning PBL as a generative mechanism for understanding the 15-minute city, supported by facility hierarchy data. The PBL characteristics show that a planning concept can develop through a systematic process from real conditions to facts, analysis, potentials and problems, issues, concept, strategy, plan, and evaluation. This framework can help students and prospective planners understand the 15-minute city more critically and based on evidence rather than simply as a planning slogan.

This study also relates to broader planning education literature, where the planning studio is regarded as experiential learning that connects theoretical knowledge with real conditions. Through area-based projects, students learn to understand regional conditions, process information, analyze problems, and formulate planning decisions (Tyson & Low, 1987; Kotval, 2003; Senbel, 2012). Recent studies show that experiential learning benefits students when accompanied by structured reflection and evaluation, enabling them to connect experience with knowledge and develop planning decision-making abilities (Baldwin & Rosier, 2017; Rosier et al., 2016). Multidisciplinary studios using real-world scenarios can encourage reflective and critical thinking (Sedrez et al., 2024), while mentoring and interdisciplinary learning can strengthen students' ability to connect data, analysis, and planning decisions (Wagner & du Toit, 2024). Compared with these studies, this article positions PBL characteristics not as an object for evaluating a learning program, but as a generative mechanism for constructing the 15-minute city framework and indicatively assessing it against facility hierarchy data. The study therefore suggests that contemporary planning concepts can be explored through PBL characteristics within the studio process. At the same time, lecturers and coordinators can encourage students to interpret studio stages through a PBL lens to strengthen critical thinking and develop applicable, data-based frameworks.

A limitation of this study is its conceptual-reflective nature, centered on a single studio context. The resulting framework is therefore a conceptual interpretation. At the same time, the identification of the subdistrict approaching the 15-minute city criteria is based only on facility completeness and hierarchy data (scalogram/WCI), not actual travel time. Further research could test the framework through road-network-based spatial accessibility analysis (isochrone), user perception surveys, or comparative studies across several areas.

5. Conclusion

This study shows that the characteristics of Problem-Based Learning (PBL) embedded in the Regional/Urban Planning Studio workflow can function as a generative mechanism for constructing a 15-minute city framework. The framework develops progressively from problem orientation and identification through analysis, formulation of alternatives, and evaluation, connecting daily needs with facilities, accessibility, mobility, networks, spatial structure, environmental quality, and equitable service distribution. As complementary empirical evidence, the scalogram and Weighted Centrality Index (WCI) analysis of facilities across 23 subdistricts produced a Coefficient of

Reproducibility (COR) of 0.92. Among the five contextual subdistricts, Tambun Selatan had the highest facility weight (157.82; Hierarchy I), indicating the greatest facility completeness among the study areas. However, this finding is indicative because the analysis measures facility hierarchy rather than actual travel time.

The study implies that PBL-based studio workflows can support evidence-based and reflective understanding of contemporary planning concepts such as the 15-minute city. For planning education, the framework can encourage students to connect real problems, data, analysis, and planning decisions rather than treating the 15-minute city solely as a travel-time target. Future research should test the framework through road-network-based accessibility analysis, such as isochrone analysis, user perception surveys, and comparative studies across different areas. Further research may also examine the framework using validated critical-thinking instruments and longitudinal designs.

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