別紙第 1 号様式　　　　　　　　No.1

博　士　論　文　の　要　旨

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氏　名（本籍）　　○○○○○（○○）　印

博士論文題名

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　　余白，2 段組の書式は，理工学部集報に掲載される学位論文審査報告用原稿の書式と同じです。

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　用紙は，A4 サイズとし，左右余白 20mm，上余白 35mm，下余白 25mm とし，2 段組としてください。

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　和文形式：1 行約 23 文字×約 52 行×2 段

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博　士　論　文　の　要　旨
専攻名　システム創成科学専攻
氏　名（本籍）　Wantana Prapaporn（タイ）　印
博士論文題名

THE APPLICATIONS AND ALTERNATIVE APPROACH OF ACCESSIBILITY MEASUREMENT BY THE PUBLIC TRANSPORT NETWORK INTEGRATION BASED ON URBAN RAIL TRANSIT

（都市軌道交通を基盤とした公共交通網の統合によるアクセシビリティ計測の適用と新たなアプローチ）

要旨

　　　　The developing countries are suffering from the urban sprawling that the decline of accessible. The inaccessibility is challenging for the stakeholder to enhance the effective urban public transit implementations. Various modes of public transportation have been employed for urban travel such as Bus, TRAM, Bus rapid transit: BRT, Light rail transit: LRT, Monorail and Metropolitan rapid transit: MRT. The mobility with highly effective is the goal of public transport network. The critical issue focusing on the Accessibility based on the Costs/Revenues of transport mode, also an efficient and competitive will become crucial in the implementation stage. Research analysis presented by Public Transport Accessibility Index (PTAI). The analysis utilizes the time base consideration while using ArcGIS and the Building Informatics Technology: BIM. The accessibility index represented the definition of network performances based accessibility measure. KhonKaen prefecture, Thailand is the 1 of 6 prefectures to plan the investment of urban rail. The area covers 10,890 km2 with 17 Sub-Districts. KhonKaen found the transport demand forecast had rapidly increased from a total of 656,500 trips per day to 1,146,400 trips per day during a period of 2018 to 2036 A.D. The 4 types of vehicles transport shared including: 1) Minibus; 2) Bus; 3) Taxi; and 4) Motorcycle. In analysis case, the transport-mode share is recently dominated by motorcycles (53.6%), private cars (32.1%) and public transport (14.3%) of trips. The conventional bus network consists of 19 routes that linked based on the 12 Sub-Districts. KhonKaen's public rail investment plan fully covered the 5 main routes (Called Red, Pink, Yellow, Green and Blue line, respectively). The routing construction plan is being expected to be completed in 2036 A.D. This public rail investment plan totally a length of 124 kilometers with 31 stop points. The research model development presents clearly understood of urban perception based public transport network in the future scenario plan. The research contribution demonstrated the comparison on current public transit and 3-time frame of urban rail future plan (2021 – 2036 A.D.). In this regard, the three timeframes were considered consisting of a short period (1-5 years), a medium period (5-10 years), and a long period (10-20 years) as mentioned in the Thailand's 12th National Economic and Social Development Plan.

　　　　The research utilized an accessibility index while focusing between the travel times and different modes of public transport network. The residential buildings are represented the Origin (persons' unit) that perceived by Densely Inhabited Districts (DID). The network would connect a variety of activities existing in the Destination by building functional unit (square meter units). The building use in research scope that grouped into 3 building modes including 1. Commercial Use, 2. Mixed Use and 3. Public Facility. The Unimodal assessment presents the capability of access in those networks, compared to Bus and Urban rail network separately. The Multimodal transport model were presented to combine more than two modes of transportation in the start to end of destination designated. The research presented by 6 accessibility parameters by 1. Walk mode 2. Walk and Bus mode 3. Walk and Bus (Reform) mode 4. Train mode 5. Walk,

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Bus and Train mode and 6. Walk, Bus (Reform) and Train mode which the definition was the competency of accessible through different proposes and the cumulative opportunities of trip available on network up to time limit. The accessibility measured definition notions generally of graph theory and spatial separation of travel time to all the zone's consideration. As the result, the cities proposing the urban rail system will be suffering the closely related service level between the rail network and conventional bus network layouts called redundancy. The notion of a secondary layer of urban rail by bus feeder was revealed. The characteristics of the bus feeder reformation by demand responsive connection (DRC) concept was studied. The feeder reform adopted by condition with the conventional bus routes attracted by track perpendicular within 300-meter rail of rail stations buffer. Moreover, the Transit-Oriented Development: TOD and optimization model (GRG model) was gathered to contribute to the grid promotion within the 800-meter station buffer plan. Additionally, the new knowledge of bus corridor territory between the demand-responsive area along with the rail line attractiveness and bus feeder improvement was pioneered

Unimodal transport assessment model by 60 – 95 minutes' times use explains the character of urban growth closely with the current bus route. The unimodal assessment aspect, the conventional bus route confirms the explicitly effective accessibility than the rail transit plan without the urban plan initiative. An ideal concept for those urban rail public transport plans was well explained by Multimodal transport assessment. The primary transport mode represented by the urban rail and bus network was secondary mode as a feeder. The changes of accessibility observed in 2 different urban phenomena (Promote the Low density and Medium density of DID in urbanized zone). The result reveals the strategy that was required to concentrate on the regional and corridor levels significantly. The research explored the comparison of the conventional bus route and route reform by demand responsive connection (DRC). The comparative result explained on the possible oversight from the new feeder demand by bus feeder position. The route reform impact result, the time usage for an enlarged route had been extended by around 11% of the average for the entire trip within 12 of 19 route reform. The accessibility had increased by approximately 67.75%, 47.9%, and 43.68% for the entire Multimodal transport network in analysis case. However, the effective feeder encourages the urban accessibility for the whole network. The understanding of the relationship between the city plan and public infrastructure networks was revealed. These notions found is alternative approach of innovative policies to complementarily support an effective feeder-bus network. Both of the fundamental concepts of 1. The compact city as the high-density zone and vertical urban development and 2. The feeder performance as the feeder transformation was a critical issue for the city. The development of a public transit network secondary layer such as DRC adoption is increasingly becoming crucial, especially within the sprawling residential areas. These analyses greatly contributed the understanding toward the future transformation and creative of urban innovation policies.

The research models represented the urban mobility assessment based on the urban rail transportation investment plan. The analysis disclosed the mechanics insight of public transportation network (Bus and Urban rail). The developed models elaborately describe the relationships between the land use in the city scale and the public transport networks. The models effectively provided support for the evaluation of the universal case of the urban plan guidelines.