

Nawasona

Publication of Research, Community Services, and Innovation (P3MI)
Program for Research Groups in 2020
School of Architecture, Planning, and Policy Development
Institut Teknologi Bandung

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P3MI Committee of SAPPD ITB



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Nawasona
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Institut Teknologi Bandung

Compiled by P3MI Committee of SAPPD, ITB

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Foreword

The Nawasona book is a publication for the Program Penelitian (Research), Pengabdian kepada Masyarakat (Community Service), dan Inovasi (Innovation) ITB (P3MI-ITB) held in SAPPD in 2020. The book's title, 'Nawasona', is derived from Sanskrit and can be roughly interpreted as nine souls, nine directions, nine strengths, or nine life supports that represent the nine scientific / expertise groups at SAPPD.

The purpose of publishing this P3MI SAPPD 2020 book is to introduce research results from SAPPD to the public, especially to the larger academic community. The use of English as the working language of this book is expected to help the book reach a wider audience and spread its positive impacts, which are fuelled by SAPPD ITB's vision in conducting research, teaching, community service, and innovation.

Through the publication of the 2020 P3MI book, it is hoped that research activities can be intensified. Moreover, the synergies between study areas in SAPPD are highly expected to construct joint road maps and generate new topics. We expect students to become more familiar with research topics and study areas that are being explored by SAPPD ITB lecturers so that they can synergize their thesis and dissertation topics with the lecturers' research road map.

In addition to research and teaching activities, research results of SAPPD ITB lecturers are oriented towards community service activities. Innovation activities led to discoveries and registration of patents; fostering of start-ups and new businesses were also a part of the activities in P3MI SAPPD. The potential for innovation and intellectual property claims such as patents is quite vast on P3MI products, which range from policies, models, and designs. Establishment of P3MI 2020 activities are intended as a service to the community so that it can utilize the results directly through previously designed research, service, and innovation activities.

The P3MI SAPPD 2020 thanks the entire academic community of SAPPD for their valuable contributions to this publication. Hopefully, this book will benefit the nation as well as the state.

Bandung, December 15, 2020
P3MI Committee of SAPPD
Institut Teknologi Bandung

Message from the Dean

Greetings from SAPPD.

NAWASONA 2020 consists of the results of research and community services by faculty members at the School of Architecture, Planning and Policy Development (SAPPD), Institut Teknologi Bandung in FY 2020. The research and community services in P3MI 2020 are classified based on research groups. There are nine research groups in SAPPD.

Historically, it was back in the 2017, as ITB special grant for research, community service and innovation (*P3MI-Program Penelitian, Pengabdian kepada Masyarakat dan Inovasi*) was launched, that gains attention and appreciation in the faculty. Along with other research funding scheme, the P3MI grant basically serves as an opportunity for faculty members from different research groups within our faculty to stimulate research-based teaching and foster interdisciplinary research collaboration with different research groups in the same school and/or other faculties within ITB.

The topics of research and community services of P3MI 2020 vary widely, however, all of them can be classified into policy, planning, and design of the built environment theme. The topics of resilience, sustainability, and equity are topics that are widely discussed in P3MI 2020. Topics related to data and information are also starting to receive attention. The Covid 19 Pandemic, which began in early 2020, caused several research topics to be diverted to topics related to the Covid 19 Pandemic.

Hopefully this book could provide benefits to the development of education, research, and community welfare in the fields of policy, planning and design of the built environment.

Bandung, December 15, 2020

Dr. Sri Maryati, ST, MIP

Table of Content

- 1. Regional and City Infrastructure System Research Group..... 1**
 - 1.1 Understanding Airport Leakage at Multi Airport in West Java through Accessibility Characteristics to the Airport3
 - 1.2 Analysis of the Zoning Policy Impacts on High School Students in Bandung City6
 - 1.3 Feasibility Study of Bus Campus for Movement of Students in Coblong Sub- District Using Cost Analysis Method.....9
 - 1.4 Partnership Scheme for BIJB Kertajati International Airport in West Java 11
 - 1.5 Access to Clean Water in Urban Settlement: The Role and Challenges of Informal Water Supply System14
 - 1.6 Built Environment and Parking Pricing: Probability on Changing Mode Choice in Bandung Urban Area17
 - 1.7 Toll Road Development Impact on Tourism Sector: Macro and Micro Analyses.....20
 - 1.8 The Use of Big Data to Measures the Impact of COVID- 19 Pandemic Towards People’s Movement Pattern in Central Jakarta.....23
- 2 Urban Planning and Design Research Group25**
 - 2.1 Land Consolidation of Urban Settlement Using Government Cooperation Schemes Public, Private, People Partnerships (PPPPs) in Cibangkong, Bandung City27
 - 2.2 Place Branding as Thematic Cities Developement (Case Study: Bandung).....30
 - 2.3 The Effect of Urban Spatial Structure and Patterns on The Spread of Coronavirus COVID-19, before and after Large-Scale Social Restrictions (Case study: Bandung City).....33
 - 2.4 The Vulnerability of COVID-19 Pandemic Based on Urban Density (A Case Study of the Core Urban Area in Cirebon City, West Java).....36
 - 2.5 Lifestyle Behavior of Indonesian Youth during Covid-19 Pandemic39
 - 2.6 Identifying Land Subdivision Practice, Case Study of Subang42
 - 2.7 Identification the Potential and Opportunities to Develop Non-Motorized Transportation Modes using Crowdsourcing.....45
 - 2.8 The Principle of Conservation based on Cultural Significance in Urban Areas (Case study: Old Downtown Bandung).....48
- 3 Development Management and Policy Planning Research Group..... 51**
 - 3.1 Transboundary River Management in Jakarta Metropolitan Area: Case Study Ciliwung River Basin53
 - 3.2 Governance of DKI Jakarta Province After Capital City Movement.57

3.3	SDGs and Tourism Development Practice: COVID-19 Impacts on Bali Tourism (Case Study: Bali, Indonesia)	65
3.4	The Use of Big Data Analytics in Public Sector Responding to COVID-19 Pandemic: Case Study of Indonesia's Health and Transportation Sectors	71
4	Regional and Rural Planning Research Group	77
4.1	Urbanization and Urban Development Patterns in Indonesia 2005 – 2015	79
4.2	The Maritime Silk Road Policy Potential Effect Towards The Outer Island Development	92
4.3	Social Transformation of the Outer Islands Region Due to Infrastructure Development	96
4.4	Community Oriented Marine Spatial Planning	103
4.5	Development of Tourism Village Innovation	109
4.6	Informal Economy and Creative Industry Strategies	112
4.7	Rural Community Development Through Revitalization of Perpustakaan Desa and Taman Bacaan Masyarakat	119
4.8	Disaster Risk Reduction of Tsunami in Tourism Area Development ...	122
4.9	Digitalization and Rural Entrepreneurship	128
5	Architectural Design Research Group	150
5.1	Investigasi Metode Pencarian Bentuk (<i>Form Finding</i>) Berbasis Prinsip Homeostasis dan Optimasi Multi Obyektif	152
5.2	Budaya Kreatif dan Produksi Ruang dalam Inovasi Berbasis Lokalitas	167
5.3	Heritage area for citizens' wellbeing and healthy urban space	175
5.4	Study of the Use of Open Space in Riverside Settlement. Case: Kota Muara Muntai District	185
6	Housing and Settlement Research Group	191
6.1	Study of Data / Information Quality Improvement for supporting KoTaKu program in the city of Cimahi	193
6.2	The Urban Growth and Neighborhood Changes in Indonesian Urban settlement	196
6.3	Real-time User-Based Housing Data and Information Quality Improvement as Housing Provision Management for Low-income group: Student Rental Housing Rating App	200
6.4	Preference of High-density Housing Typology and The Implications for Settlement Redevelopment Processes Pre and During Pandemic Covid-19 ...	203
6.5	Sustainable Built Environment Development: Training Materials in the Regional Government of the Greater Bandung Metropolitan Area	207
6.6	Participatory Design of Settlement Open Space in Bandung. Case Study: Kangkung Kaler/Kidul Park, Lingkar Selatan Subdistrict, Lengkung District, in Bandung City	209

6.7	Physical Impact of Theme Parks On Settlement Morphology In Lembang Sub-District, West Bandung.....	216
7	Building Technology Research Group	221
7.1	Bamboo Space Frame.....	223
7.2	Sistem Prefabrikasi Elemen Struktur dan Kinerja pada Bangunan Tradisional di Sumba dan Ternate.....	226
7.3	Development Of Green – Low Energy Apartment Building Criteria 231	
7.4	Disaster Evacuation Strategy in Urban Kampong. Case Study: Kampong Taman Sari, Bandung.....	235
7.5	Application Development for Communities in Designing Modular Wooden Block Buildings.....	239
8	History, Theory, and Architectural Criticism Research Group	244
8.1	The Influence of Architecture and Spatial Order Development of Siti Inggil in Keraton Kasepuhan Cirebon on Traditional Ritual Activities	246
8.2	Comparative Study of Timorese Architecture in Indonesia and Timor-Leste Post-referendum	250
8.3	The Making of Place by Pilgrim’s Movement	256
8.4	Study of settlement gender construction and architecture of matrilineal kinship in Tetun Society, Timor, East Nusa Tenggara	260
9	Economic System and Modelling	269
9.1	The Effect Of Toll Road Development On Agricultural Land Conversion 271	
9.2	Tourism Destination Management Strategy Based on Adaptation of Abrasion and Extreme Waves Disaster	274
9.3	The effect of Technology Implementation on Middle-Term Economic Growth of Indonesia (Dynamic Modelling based on Input-Output Table Approach)	279
9.4	The Effect Of Spatial Variables On The Online Shopping Channel Choices During The Covid-19 Pandemic: An Evidence From Jabodetabek, Indonesia. 283	
9.5	Train connectivity Impact on West java Regional Economic Development	287
9.6	Development and Capacity Building for Rural Productive Economic Business Groups and Village-Owned Enterprises during the Covid-19 Pandemic	290



Regional Urban & Infrastructure System

Those who interested in transportation and infrastructure planning,
also its implication on urban development.

Regional and City Infrastructure System Research Group

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Regional and Urban Infrastructure System is one of the research groups in School of Architecture, Planning, and Policy Development that consists of professors and researchers that interested in transportation and infrastructure planning, also its implications on urban development

Alongside other research groups in SAPPD, we support academic activities in the Urban and Regional Development Program, as well as Transportation Postgraduate Program. Students interested in topics related to infrastructure and transportation planning, policies, and management are supported to do their activities under our supervision.

With all due respect, we invite you to collaborate with us, mainly in research, seminar, or exchange programs related to transportation and infrastructure planning, policy and management. We offer collaborative activities based on mutual benefit.

1.1 Understanding Airport Leakage at Multi Airport in West Java through Accessibility Characteristics to the Airport

1. Head of Team : Dr. Ir. Heru Purboyo Hidayat Putro, DEA
2. Team Members : Achmad Fauzan Iscahyono, S.T., M.P.W.K.

Introduction

West Java Province is an area that has an air traffic growth of up to 11% in 2016 2018. However, Husein Sastranegara Airport in West Java Province cannot accommodate the increase due to development constraints. Thus, the Kertajati Airport was built which hopes to become the main airport of West Java Province that accommodates the growth of the Province's air traffic and supports the increase in visitors to the West Java Province.

One effort to maximize the function of Kertajati Airport is diverted 8 flight routes from Husein Airport to Kertajati Airport. However, flight route changes carried out in July 2019 get a negative response. According to the General Chairperson of the Indonesian Tourism Travel Association As-sociation, Budijanto Ardiansjah, quoted from *ikiran-rakyat.com* said that diverting the flight route to Kertajati Airport is not an optimal solution for airport performance. According to him, the acceleration of the development of accessibility to and from Kertajati Airport is a solution to improve the performance of Kertajati Airport. This is due to Kertajati Airport which is located 177 Km from Husein Airport. It is feared that a change of route will occur without an increase in accessibility, which will make passengers move to Soekarno-Hatta Airport or Halim Perdana Kusuma. So, to determine whether there is a possibility of airport leakage at Multi-Airport West Java, it is done by comparing accessibility from Bandung to Kertajati Airport and surrounding airports which have a distance of 240 Km from Multi-Airport West Java which consists of Soekarno-Hatta Airport and Airport Halim Perdanakusuma. Passengers from the city of Bandung were chosen to find out the accessibility comparison. This is because the city of Bandung is the region that is most affected by the policy of moving flight routes. Prior to this policy, Bandung City passengers must be able to access flight routes through Husein Airport only 5 Km from Bandung City Center.

Based on the explanation above, this study aims to determine whether there is a possibility of the phenomenon of airport leakage, especially for passengers coming from the city of Bandung, based on accessibility to the West Java Multi-airport departure airport or surrounding airports.

Research Methodology

This research uses quantitative methods. The use of quantitative methods is carried out to compare accessibility to airport of departure in quantity and not to see the quality of access. This re-search also uses spatial analysis method and description analysis method with quantitative approach. Spatial analysis is carried out by network analysis. The assumption used in this study is that it does

not consider road capacity and congestion levels. Furthermore, the descriptive analysis method through a quantitative approach is conducted by measuring the indicators of research variables so that an overview of these variables is obtained.

Results and Discussion

Based on the results of spatial analysis, Kertajati Airport can only cover 78% of the total area of West Java Province. Soekarno-Hatta Airport can reach 65% of the total area of West Java Province while Halim Airport can reach 70% of the total area of West Java Province. This allows overlapping catchment areas between the three airports because of passengers who can choose another airport to be a departure airport because it sacrifices relatively similar travel times.

The distance from Bandung to Kertajati Airport via the toll road is 178 Km, which is twice the actual distance due to lack of access roads. While the city of Bandung has a distance to Soekarno-Hatta Airport is 175 Km and the distance to Halim Airport is 143 Km. This allows overlapping catchment areas between the three airports because of passengers who can choose another airport to be a departure airport because it sacrifices relatively similar travel times. It concludes that access time to the airport is a significant factor that affecting the selection of airports used.

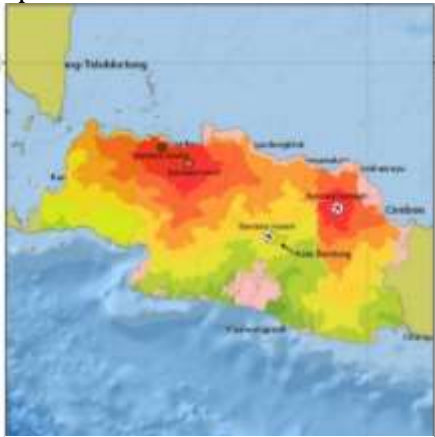


Figure 1. Airport Service Coverage based on Travel Time

Furthermore, the accessibility comparison will be reviewed through the type of transportation component offered, the capacity of each transportation, the frequency of transportation trips per day, and the average cost that must be incurred to the airport of departure. Based on the ease of access component from Bandung to Kertajati Airport and surrounding airports, it shows that Kertajati Airport is only superior in terms of travel costs. Passengers from the city of Bandung with the aim of traveling will prefer to use the Kertajati departure airport. However, when viewed from other

factors Kertajati Airport is still not superior compared to the surrounding airports (Soekarno-Hatta Airport and Halim Airport). The main competitor of Kertajati Airport is Soekarno-Hatta Airport which is the largest airport in Indonesia. Meanwhile, Halim Perdanakusuma Airport is a supporting airport for Soekarno-Hatta Airport, whose position is equivalent to Husein Airport, which supports Kertajati Airport. Passengers who can be interested in using the Soekarno-Hatta departure airport are passengers with business destinations that

are more sensitive to travel time and have the flexibility to choose travel times higher than the costs incurred.

Table 1. Comparison of Accessibility

Component	Kertajati Airport	Soekarno Hatta Airport	Halim Perdanakusuma Airport
Type of Transportation	Travel & Bus	Travel, Bus, dan Train - Bus, Train-Airport Train	Travel
Number of Capacity	114	148	85
Frequency of Departure per day	38	128	46
Average Cost	Rp95.556	Rp132.796	Rp184.286

The reduced number of passengers after the change of route policy from Husein Sastranegara Airport to Kertajati Airport shows that accessibility to Kertajati Airport is not good enough compared to the surrounding airports, triggering airport leakage. It can be concluded that airport infrastructure development must pay attention to intermodal integration around it.

Conclusion

Based on the results of the analysis, accessibility from the city of Bandung to Kertajati Airport is only superior in the average cost that must be incurred by passengers. The average cost can attract passengers with destinations that are more sensitive to the costs incurred. Meanwhile, the airport that can become the main competitor triggering the occurrence of the airport leakage phenomenon is Soekarno-Hatta Airport. Soekarno-Hatta Airport offers the flexibility to choose travel hours and other components that are superior to Kertajati Airport. In addition, the airport also offers good intermodal integration by train. This caused a decrease in the number of passengers in 2019 after the policy of moving the route to Kertajati Airport due to an airport leakage.

1.2 Analysis of the Zoning Policy Impacts on High School Students in Bandung City

- 1. **HEAD OF TEAM** : Ir. Miming Miharja, M.Eng., Ph.D
- 2. **TEAM MEMBERS** : Renny Desiana, S.T., M.P.W.K ; Anindita Putri Dewanti, S.T

Introduction

One of the government's efforts in realizing a new education system is the issuance of new rules regarding the zoning system for New Student Admissions (PPDB) through the Regulation of the Minister of Education and Culture (Number 14 of 2018) concerning the Admission of New Students. Based on this, schools under the authority of local government are required to accept prospective students who are domiciled in the radius of the closest zone from the school with a percentage of at least 90% of the total number of students accepted.

The impact of the zoning system by prioritizing students who are closer to the school will affect the schooling trips that occurs. This is certainly a positive potential from the zoning policy from a transportation perspective. With the change in distribution and length of trips, it will have implications for improving transportation performance, one of which is in the city of Bandung.

To see how the impact resulted from implementing the PPDB zoning system policy from a transportation perspective, and study needs to be performed by comparing the distribution and duration of the trips before and after the introduction of the policy. This study aims to examine the effect of the transport policy of the PPDB zoning system on improvements in the distribution pattern of the trips of high school students in the town of Bandung.

Research Methodology

The selection of respondents was carried out by random sampling using the Slovin formula to obtain a sample of 200 people for each active student and alumni respondent. The method of analysis uses descriptive statistics to determine changes and student distances.

Analysis and Discussion

The Effect of Zoning Policy on Distance

Table 1. The Effect of Zoning Policy on Distance

	Average Trip Length (km)	Frequency	Total Average Trip Length (km)	Average Person Trips (km)
Before the Zoning Policy is Implemented	594	206	932,159	4,53
After the Zoning Policy has been implemented	251	206	444,29	2,16

Based on the table above, it is found that the total average length of school trips for high school students in Bandung City before and after the implementation of the zoning policy has decreased by 35%.

The Effect of Zoning Policy on Travel Time

In line with changes in mileage, travel time has also decreased. After the implementation of the zoning policy, trips to school that take less than 15 minutes have increased by 28%, followed by a decrease in the category of longer travel times.

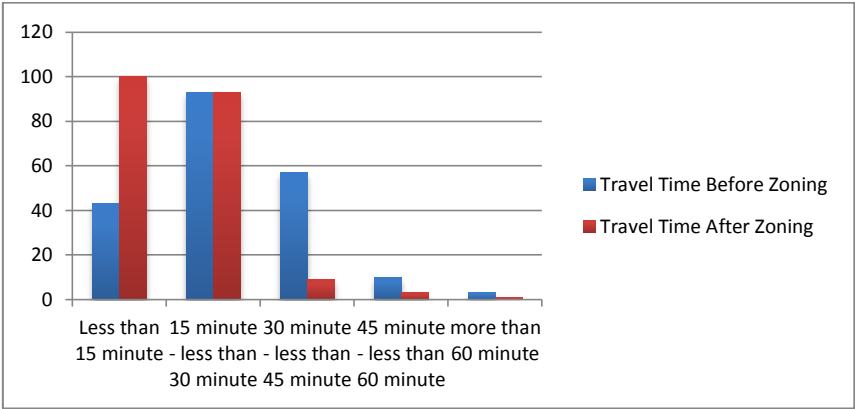


Figure 1. The Effect of Zoning Policy on Travel Time

SWOT Analysis Results

The findings were grouped based on strength, weakness, opportunity, and threat (SWOT) which were used to formulate strategies that could increase the effectiveness of high school zoning policies in Bandung City, as follows:

Table 1. SWOT Analysis

<i>Strength - Opportunity</i>	<i>Strength - Threat</i>
Utilization of school bus facilities to improve the image of Bandung City as a representation of West Java Province	Increase the number of students walking to school to reduce traffic jams in Bandung Use of school buses to reduce traffic jams
<i>Weakness - Opportunity</i>	<i>Weakness - Threat</i>
Make use of the zoning policy as a legal to improve educational facilities and transportation facilities for school children Take advantage of the special PPDB zoning budget to improve the quality	Improve the quality of education to eliminate the views of the community that compartmentalize favorite and non-favorite schools and eliminate any indications of fraud such as forgery of domiliation letters, fictitious work

of education facilities that are not evenly distributed	transfer letters, and the practice of buying and selling chairs Improve public transportation services to reduce traffic jams
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It is understood from the SWOT matrix above that the zoning policy has had a positive impact from a transport point of view with a more even distribution of trips that has an impact on the reduction of trips length, but the resulting effect would be even more optimal if further growth is carried out both in terms of transport and from its own educational facilities.

Conclusion

Based on the results of the research, in answering the objectives of this study, namely analyzing the impact of the PPDB policy on the zoning system of Bandung City Senior High School on the distribution patterns of school trips, the study concluded that changes in distribution and length of trips occurred because of the implementation of zoning policies that need to be evaluated for improving the performance of city transportation. Bandung. Travel lengths to school were reduced by 35% and student trips to schools with travel times less than 15 minutes increased by 28%.

1.3 Feasibility Study of Bus Campus for Movement of Students in Coblong Sub- District Using Cost Analysis Method

- 1. HEAD OF TEAM** : Ibnu Syabri, B.Sc., M.Sc., Ph.D.
- 2. TEAM MEMBERS** : Faizah Khairunnisa, S.T.; Ulfah Aliifah Rahmah, S.T., M.T.

Approximately 67,971 prospective students choose to study at PTN and PTS clustered in Coblong District and surrounding Districts (Bandung Wetan and Cidadap). The existence of these campuses has had a significant influence on the development of Bandung, especially in the Coblong area. The influence is especially felt by the high mobility in the campus area. (Tamin, 2000) states that the campus is the center of educational activities that cause movement attraction. The congestion phenomenon is one of the problems resulting from the ineffective and inefficient transportation system to serve student movements on campuses in the Coblong District and surrounding areas. The student movement identified through its distinctive characteristics, which is closely related to the center of activities and daily needs in the campus environment, is an opportunity to produce transportation service products that can better manage demand. Seeing the opportunities that exist, there is a need for a system that can regulate and serve population movements in the area around the campus, which are considered more productive and efficient for serving high student movements in the campus area. The purpose of this research is to design and test the feasibility of inter-campus buses as an alternative mode in serving student movements in the Coblong District and surrounding areas.

Data collection methods used in this study consisted of a literature study and also a primary survey using a questionnaire. A literature study is used to find data related to the number of students through the website. Primary data collection was carried out using questionnaires with student respondents around the study area. The sampling technique used is probability sampling using proportionate stratified random sampling. Simultaneously, the analysis method consists of the Net Present Value Method (NPV), Pay-back Period Method, BCR (Benefit Cost Ratio), and Internal Rate of Return Method.

A Monte Carlo simulation is a tool or tool for making statistical forecasting by inputting probabilistic variables or variables that contain uncertainty. Any elements of the uncertainty will be explained further through the simulation stage carried out. This simulation aims to predict the value of incoming and outgoing cash from inter-campus bus services in each scenario.

This monte Carlo simulation model takes at least one probabilistic variable or variable value that contains an element of uncertainty. Then there is also a deterministic variable whose value already exists and does not contain an element of uncertainty.

The monte Carlo simulation results and the financial feasibility test for the scenario A have NPV values > 0 , BCR > 1 , PP < 1 year, and assumed IRR $> r$. The scenario A or the bus cluster service has the highest NPV and the most significant profit value in 10 years of operation compared to other scenarios. In comparison, the scenario B has a BCR $>$ scenario A, and PP $<$ scenario A. Thus, these two scenarios are considered superior in terms of the benefits that will be obtained. Nevertheless, if in terms of capital and cost, the scenario B requires relatively less capital for project implementation than the scenario A.

1.4 Partnership Scheme for BIJB Kertajati International Airport in West Java

- 1. HEAD OF TEAM** : Dr. Ir. Binsar Naipospos MSP
- 2. TEAM MEMBERS** : Ulfah Aliifah Rahmah, S.T., M.T.; Aulia Muthia, S.T.

Background

It was predicted that in the next decade, the number of passengers served by SHIA (Soekarno-Hatta International Airport) will be 36 million passengers per year, which already exceeds the capacity of 26 million passengers per year. The high growth air traffic demand in SHIA exaggerated by the accumulation demand of other surroundings cities such as Banten (40 million population) and Jakarta (12 million population). Jakarta as the capital city of Indonesia specifically has an exceptional demand for the government administration movement. Conflicting the extension needs of land use for another purposes (for residential, amusement, industry, trade and business, etc) in the close area of Jakarta and surroundings area of Tangerang intermittently exaggerated to limit the possibility to expand. SHIA was also surrounded by intricately crowded vulnerable environment with slum residential areas that is impossible to be extended for the future.

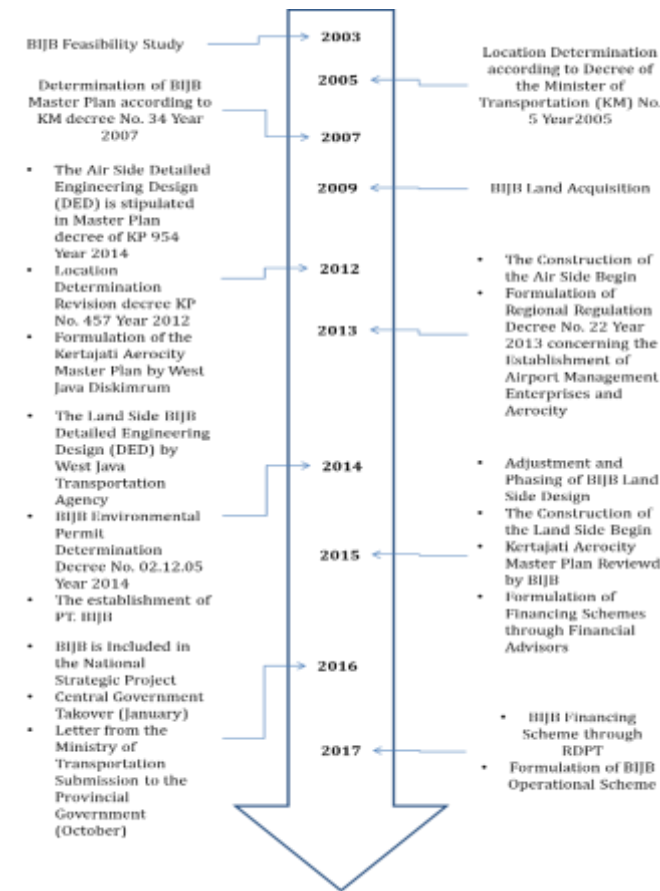
During the peak flight season specially during Ramadhan, holiday and haj pilgrimage season, the congestion happen unavoidably in SHIA. Consequently, the traffic jam happened between Jakarta to SHIA and it cause the crowd traffic within the western area of Jakarta and surrounding cities of Tangerang and Southern Tangerang. Unpredicted delay of air transport passenger caused by traffic jams through toll road to airport was usually happened which make the authority nowadays activate the airport train as an alternative mode. Uncertain arrival times for passenger travelling via toll road to the SHIA especially from eastern part of West Java such as from Bekasi, Karawang, Purwakarta, Bandung, Garut, Tasikmalaya, Cianjur, Majalengka, Indramayu concluded the need of how to develop the new international airport in eastern part of West Java Province.

With some considerations and studies, since 2005 the central government through the Ministry of Transportation's policy agreed to launch a plan to the construction of West Java International Airport in Kertajati, Majalengka Regency. The proposal submitted to central government and replied by the Decree of Transportation Ministry No. 5 Year 2005. Jawa Barat Provincial Government Authority continued the approval by starting the action through committing land acquisition phase one program since 2009. The initial problem come up from the main issue : who or which person and institution to be the PJPK or GCA (Government Contracting Agency) for this project.

This research was conducted over a period of 3 years between 2017 and 2020. The study of infrastructure partnerships in Indonesia was usually conducted for only a certain kind of infrastructure such a drinking water, toll road, water resources, solid waste, urban economic facilities, telecommunication and

informatics, energy and electricity. Kertajati Airport Infrastructure are the first successful infrastructure scheme program developed through public private partnership mechanism in Indonesia. The way of how to explore the airport partnerships research in West Java, we use a semi-structured interviews, media archives and analysis of policy documents. In order to grasp data of transportation and public policy to decision making, we gathered data from news media archives and from semi-structured interviews with policy maker, scholars, activists and other observers of air transport demand. Grasping discursive partnership, we required meeting with key participants of these ventures as well as following developments reported in the media and in scholarly journals.

The weakness in data collection for this methodology were found on the way of how liable and viable were the data fit in giving information by the respondent about what their opinion on communication perspectives. Communication data is about of what of their experiences exist come up during proceed a dialogue in finding solution when the split decision among actors come up. The practitioners in communication data collection tend to selectively adopt data based on a match with their ‘own view and interest’ as perceived through their ‘own senses’. The involvement of actors and stakeholders in the discovery process should therefore be central when identifying barriers.



Based on the studies, there are still many vacancies and overlapping roles of actors and institutions involved in the process of how to initiate the development of Kertajati International Airport. The invisible power interact among actors and institution are inevitably played an important role during preparing the significant public-private investment infrastructure planning such as BIJB International airport in Kertajati. Extensive communication among actors and institution should be carried out

Figure 1. Timeline of BIJB Project

vertically (among local district or kabupaten, provincial and central authority) and horizontally (among central government or coordination among inter-ministry such as ministry of transportation, ministry of finance, ministry of home affairs, coordinating ministry of finance (Menko-Perekonomian), National Planning Board BAPPENAS, etc ; among provincial government authority such as BAPPEDA, DISPERUM, DISTARCIP, BPN, BKPM. ; and among local kabupaten government authority, social organization, political party and cultural and environmental community). All the interaction to prepare the planning stage of airport infrastructure need an authentic dialogue to communicate. Communication within infrastructure planning require a lengthy and high endurance energy to prepare where in case of BIJB airport because it consumes a significant number of investment the communication should be established prudently.

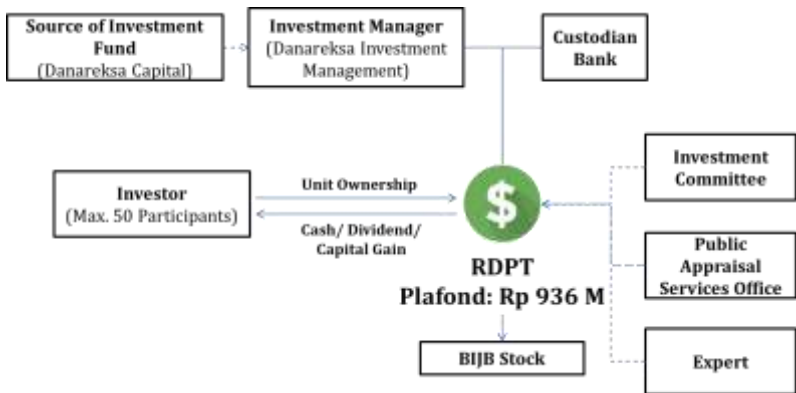


Figure 2. RDPT for BIJB Project

The prudent communication shows that all the step and stage should be under the rule and regulation process and procedure. No actors and institutions willing to passing by the procedure where the power of institution still prevail intact to its role under the regulation. Communication among actors and institution were also become more complicated because the financing scheme propose to BIJB through the mechanism of public private partnership scheme where the institution outside the government authority being involved caused by the limitation of government budget.

1.5 Access to Clean Water in Urban Settlement: The Role and Challenges of Informal Water Supply System

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MPWK.

Introduction

Access to clean water is one of the goals in the Sustainable Development Goals (SDGs). Access to clean water in urban informal settlements needs attention because most of the population will live in cities in the next decade and most will live in informal settlements. One of the characteristics of informal settlement is low access to infrastructure, including clean water. Although in Indonesia, government efforts to eradicating slums have initiated since 1960s, current program (KOTAKU) mainly focuses in upgrading local roads while provision of clean water remains the responsibility of state-owned companies. The purpose of this paper is to assess the access to clean water in informal settlements using a bottom-up and top-down approach based on people's perceptions of access. The stages included in this study are 1) formulating access criteria considering local conditions, 2) evaluating access conditions using study case. Besides the availability of improved water source, there are five accessibility criteria that are used in this research, namely proximity, sufficiency, safety or water quality, reliability or continuity, and affordability.

Methodology

Data were collected through interviews, observations, and questionnaires distribution. Statistic descriptive analysis was carried out to identify the condition of accessibility indicator in the cases. In this research, two informal settlement in Bandung City were explored, namely Lebak Siliwangi in Coblong sub-district and Tamansari in Bandung Wetan sub-district.

Results and Discussion

Both Lebak Siliwangi and Tamansari have been confirmed for having an enormous number of populations with diverse social conditions. Most of the household heads from each household work in informal sector. Accumulated, the average family income per month is IDR 3,432,813, slightly below the average minimum wage of Bandung City in 2020. Results of analysis show that residents in Lebak Siliwangi and Tamansari access clean water from 5 main types water sources: communal piped water, communal waterpoints (communal wells), individual wells, formal water service (PDAM), and bottled water. Majority (46.4%) of households have connected their houses to PDAM. Around 32% of surveyed households have their own dug wells and utilize ground water. Community-built informal water services, comprises of communal pipeline and waterpoints, are the least main water sources used for domestic matters. In

terms of variety of access, approximately 73,6% of respondents obtain water from more than one water sources, with the most common combination of water usage is public water supply (PDAM) and purchased bottled water (28%). Informal water systems including all communal water pipelines in Lebak Siliwangi and Tamansari comply with improved water sources criteria as it is distributed via piped household water connections. Majority of households own unprotected dug-wells without covers, thus are categorized as unimproved water sources. Similarly, unprotected dug wells and water spring were developed in 3 RWs of Lebak Siliwangi as well as 2 RWs of Tamansari and used as public well. Meanwhile, several communal waterpoints in Lebak Siliwangi and Tamansari that were built as protected wells and comply with criteria of improved water sources.



Figure 1. Examples of Improved and Unimproved Water Sources Utilized by Households (Source: Observations, 2020)

For proximity criteria, surveys show that majority of households own their own individual well or connect their houses either by formal water service or communal water pipeline. Every communal waterpoint in both settlements fulfill the requirement of basic proximity by WHO/UNICEF (2017) with the furthest distance of 700 meters and longest collection time of 15 minutes. For sufficiency criteria, daily water usage sourced from communal wells, private wells and public water supply in most households surveyed (58.64% in average) do not comply with national standard on daily consumption of 60 lcpd. However, 92.8% of total respondents perceives that this amount of daily water consumption sourced from communal and private wells is sufficient to fulfill their needs. Hence, survey results show that there is no correlation between national standard and resident’s perception. For water quality criteria, measurement was done using lab water tests, where 17 of 22 water samples do not fulfill at least 1 quality indicators including total coliform or E-Coli contained. In contrast, majority of households surveyed perceive that water sources they utilize are safe

for drinking. Based on community's perception, PDAM provides the least safe water in quality, where concern regarding the existence of color is the most noticeable concern (12,40%).

Continuity criteria is not an issue, where approximately 91.5% respondents expressed that they have 24-hours access to water. However, 31.1% of public water supply users and 38.5% of communal pipeline users do not have clean water 24 hours a day. Continuity issues found including limited operational hours for communal services, while for PDAM, the limitation lies on its scheduled distribution. Regarding level of affordability, by calculating the standard (approximately 4% of average income), the average water fees should be spent by residents in Bandung City are approximately IDR 137,312.52 per month. Based on the result, individual well is the most expensive water source, taking up to 4.4% of monthly income while communal well is the cheapest water source, only taking up to 0.7% of monthly income. This may have been caused by the purchase of pumping equipment and electricity and electricity cost on water pumps.

Conclusion

If based on established standards, the clean water provision in both settlements does not fully comply with the minimum requirements of sufficiency, water quality, continuity, and affordability criteria. However, community perceptions may differ with access perceived from established standards, especially on sufficiency and water quality criteria. In addition, the community assessed the availability of water as the most important thing related to access to clean water.

1.6 Built Environment and Parking Pricing: Probability on Changing Mode Choice in Bandung Urban Area

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Introduction

Bandung as an urban area in the centre of Metropolitan Bandung Raya and the centre of various activities generate high movement of trips, especially the movement from commuters. The more trips use the motorized vehicles, the more people need parking lots. In consequences, the massive movement using private vehicle and the use of on-street parking causes congestion in Bandung Urban Area because of the increasing of road capacity. This paper surveyed 200 commuters through revealed and stated preference in Bandung Centre Area. The best model is the model with the highest significance number shown from the Neglekerke R square number. The response keep using private vehicle and parking in the existing area has the highest significance number which is 0,59. The model from the response is $\ln P/1-P = 4.356 -1,550 (X1.1) - 1,279 (X1.2) - 0,01 (X2)$. The variables in this model are medium compact area (X1.1), compact area (X1.2) and parking pricing strategy (X2). The result can assist decision-makers on all levels to wisely allocate resources to public transportation improvement, and optimization of parking pricing strategy especially in Bandung Urban Area.

Methodology

Methodology in this article follows these sequence steps. First, the sample of areas was chosen based on their calculation of built environment variables. The built environment variables adapt to the 5D analysis introduced by Ewing and Cervero (2010) The 5Ds indicators used in this articles are:

- a. *Density* : Indicator for density's analysis is using the number of populations in each urban village in Bandung Urban Area. Then, the number of each urban village population classified into 5 levels by the natural break tool in ArcGIS
- b. *Diversity* : indicator of diversity's analysis is using the number of various landuse in each urban village in Bandung Urban Area. The more diverse the landuse, the more compact the urban village. Then, after we got the exact number of each urban village, the number classified into 5 levels by the natural break tool in ArcGIS.
- c. *Design* : indicator of design's analysis is the number of street intersection in each urban village. Then, the number of each street intersection classified into 5 levels by the natural break in ArcGIS.
- d. *Destination Accessibility* : indicator for destination accessibility's analysis is using the classification of urban village city structure based on planning document in Bandung city. The data classified into 3 levels by the natural break tool in ArcGIS.

e. *Distance to Transit* : indicator for distance to transit's analysis is using the number of public transportations serving each urban village in radius 500 m from the street. Then, the data classified into 5 levels by using the natural break tool in ArcGIS.

Each indicator is calculated using quantitative analysis and is got the weight. After each of urban village has its total calculation, then each urban village will classify into 3 compact classifications which are compact, medium compact and not compact. The resulting map of 5D's analysis can be seen in

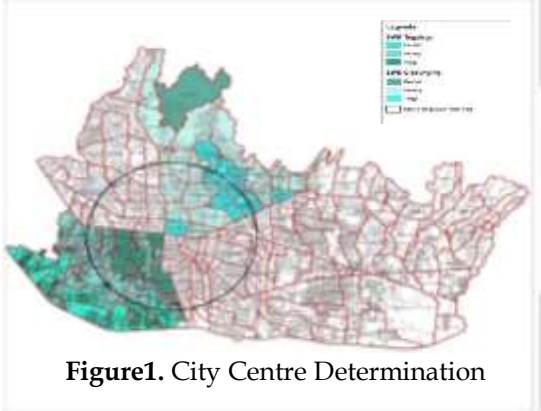


Figure1. City Centre Determination

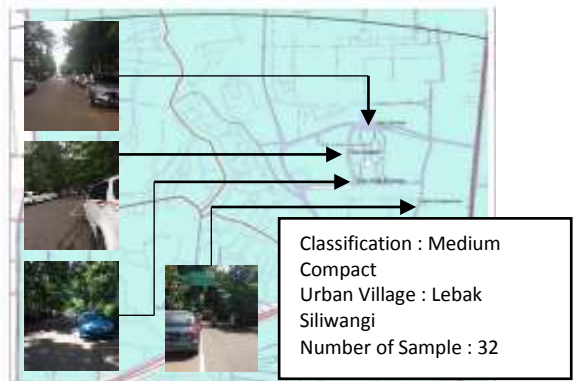


Figure2. Sample Distribution for Medium

Conclusion

Onstreet parking in Bandung city has a lot of problems there are the legality of the on-street parking area, an existing condition that doesn't comply with existing regulations and parking pricing. According to the related study, parking pricing for on-street parking is cheap. That condition becomes the reason for citizen to park in on-street parking rather than an off-street parking area. Other than that, parking pricing strategy have not implemented yet because there is no study about parking pricing strategy in Bandung Centre area yet. There are 4 models determined in this study. That 4 models are determined from 4 responses. That 4 responses are kept using private vehicle and parking in the

existing area, switch to public transportation, switch to online transportation and change parking area. The highest Neglekerke R square is the first model. The comparison between each model can be seen in the following table:

Tabel 1. Binary Logit Model Comparison

Dependent Variable	Private Vehicle	Public Transportation	Online Transportation	Parking Area Changes
Medium Compact Area	-1.550	.816	1.410	-.207
Compact Area	-1.279	-.610	-.630	1.569
Not Compact Area				
Parking Pricing Strategy Implementation	-.001	.000	.000	.000

The highest Neglekerke R square score is model 1 (keep using private vehicle and parking in the existing area which is 0,485 or 48%). Thus, the first model is the most significant. Base on binary logit analysis from the first response, there is the relation between parking pricing strategy implementation, built environment classification and commuter’s travel behaviour changes. The model shows from the analysis is : $\ln P/1-P = 4.356 - 1,550 (X1.1) - 1,279 (X1.2) - 0,01 (X2)$. The significance dependent variable are medium compact area, compact area and parking pricing strategy implementation. the highest coefficient is the medium compact area, it means that every changes of -0,01 (X2) will affect 4,356 – 1,550 (X1.1) the use of non-private vehicle. The increasing of parking pricing will increase the use of non-private vehicles in medium compact area. the fact that there is free parking regulation in compact area affects the commuter’s travel behaviour changes. Thus, parking area movement in a compact area will be more effective to decrease the use of private vehicles in a compact area.

1.7 Toll Road Development Impact on Tourism Sector: Macro and Micro Analyses

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INTRODUCTION

Construction of the toll road is intended to foster local development and fairness in civic welfare. However, not all regions have benefited from the presence of toll roads in the tourism sector, for example, Bandung Regency. One of Bandung Regency's challenges is the poor average tourist length of stay at Bandung Regency. If viewed based on tourism potential, Bandung Regency has many leading tourism destinations. BPS data in 2018 revealed that, with 867 thousand international tourists and 5.5 million domestic tourists, the number of foreign and domestic tourist arrivals in Bandung Regency was the largest in West Java province. However, the latest trend shows that most visitors to Bandung Regency are thought to tend to stay at Bandung City Hotels. The situation is believed that Bandung Regency has not been a major tourism destination compared to Bandung City at this time. Therefore, this study investigated the impact of the introduction of the toll road on the development of the tourism sector in terms of national economic indicators and global and individual domestic tourism travel patterns.

RESEARCH METHODOLOGY

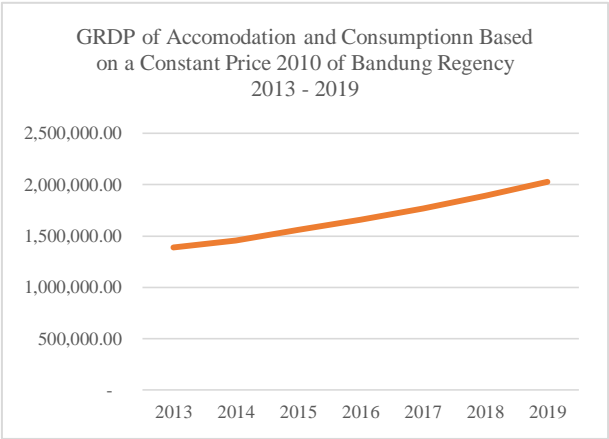
To identify the impact of toll road development on the economic growth of the tourism sector in the area around the toll road, this research uses the association and inferential analysis methods, as well as quantitative descriptive methods. For the dependent variable, this study uses GRDP data, while to determine the independent variables in this study use the 3A approach (attractions, amenities, and accessibility) as an attribute in assessing a tourism destination [6] consisting of data number of tourist destinations, hotels, restaurants, distance from centroids to the nearest toll gate, estimated average travel time, road density, and total road length. Secondary data collection becomes a data collection method used to support this analysis.

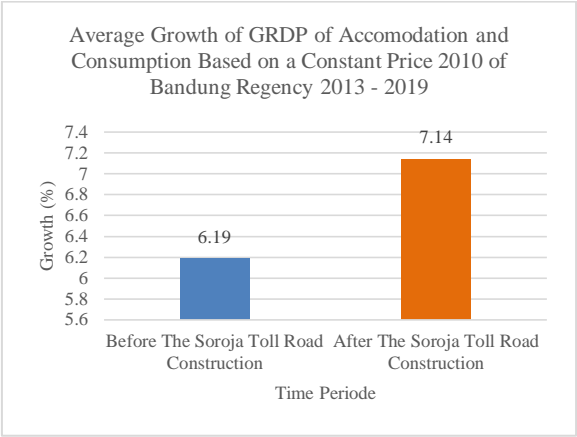
ANALYSIS AND DISCUSSION

To ensure that the improvement of the GRDP of trading, hotels, and restaurants in the BMA correlates with the increasing number of tourist visits to the attraction, the Pearson test correlation was applied. By using data after the development of the Cipularang Toll Road from 2005 to 2009, it is identified that there is a significant correlation between GRDP of a trading, hotel, and restaurant with some tourist in the Bandung Metropolitan Area with the value of Pearson correlation is close to 1 ie of 0,949. This indicates a very strong correlation between the increased number of tourists visiting the BMA and the increase of

GRDP of trading, hotels, and restaurants. Even though it cannot directly say that the GRDP enhancement is caused by an increase in the number of tourists, it needs further analysis of the factors that affect the GRDP because it is very possible that this increasing the GRDP of the trading, hotels, and restaurants is also influenced by other variables such as the number visitors to the BMA for work or business purposes. However, it is sufficing to say that there is a very strong correlation between the increase of tourist visited the Bandung Metropolitan Area with the increase of GRDP of a trading, hotel, and restaurant which might an indication that the higher the number of tourists the higher the value of GRDP of trading, hotel, and restaurant in the BMA.

Another toll road currently developed in the BMA is the Soroja Toll Road. Start operating in December 2017, this toll road has a strategic function to connect Bandung City and Bandung Regency. High potential tourism objects in both areas are expected to increase the potential movement of tourists in the form of trip chaining between these areas. To identify the impact of the development of this road, the time series analysis was carried out to analyze the value of the GRDP of accommodation and consumption between before with the development of Soroja toll road. The results of the analysis showed considerable growth between the before and after the construction of the Soroja Toll Road. In the span period of 2013 – 2017, the average growth in the GRDP of accommodation and consumption of Bandung Regency is 6.19% per year. As for after the construction of the road toll Soroja, the average growth increased to 7.14% per year.





This increase has enough to provide an overview of how toll road development has been able to improve regional tourism development. From the two cases that have been identified above, it can be concluded that the Cipularang and the Soroja Toll Road development have enhanced the increase of GRDP of accommodation and consumption which is a key indicator of the growth of the tourism sector. Based on the analysis above, it can be concluded that the analysis result of these two case studies is in line with the previous studies from Banister and Berechman, 2000 and Ivanova and Masarova, 2013, this result indicates empirically prove that there is a strong correlation between road construction and economic development of a region.

CONCLUSION

Based on the analysis that had been done, several findings were found. First, the number of tourist arrivals in Metropolitan Bandung Raya has increased, both to tourist attractions and hotel accommodations located at BMA. This number is enough to represent how attractive the tourism sector is in generating traffic in the BMA. Then, there was a significant increase in the value of trading, hotels, and restaurants in several districts/cities in the BMA, especially from 2005 to the year 2006. The growth of GRDP of trading, hotels, and restaurants in all cities and regencies in the BMA experienced positive growth, with the highest growth is in the Bandung City, then followed by Cimahi, Bandung Regency, and West Bandung Regency and Sumedang Regency. In contrast to growth in the BMA, Purwakarta Regency although the value of the GRDP is improving, in terms of its growth after the construction of the Cipularang Toll Road tends to experience a negative trend. Based on the analysis, it can be concluded that the Cipularang and the Soroja Toll Road development have enhanced the increase of GRDP of accommodation and consumption which is a key indicator of the growth of the tourism sector.

1.8 The Use of Big Data to Measures the Impact of COVID- 19 Pandemic Towards People’s Movement Pattern in Central Jakarta

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Central Jakarta City is one of the major cities in Indonesia with a population that continue to increase every year. The city has a fairly high level of movement, this can be seen from variety of choices for modes of mass transportation, ranging from road-based to railroad. All the transportation infrastructure is provided to meet the needs of people moving from one sub-district to another. At the end of 2019, a disease called Corona or COVID-19 was discovered. The presence of an outbreak of COVID-19 that spread rapidly throughout the world has affected all cities including Jakarta. The virus that transmit though physical contact and air requires the limitation of interaction between people. So that in its efforts to overcome the spread of COVID, the government in various cities, including in DKI Jakarta has implemented the Large-Scale Social Restrictions (PSBB) in Jakarta since 10 April 2020. This PSBB is done so that people do not move or limit its movement so that the virus does not spread easily. However, as of April 17, 2020, based on data recorded by the Jakarta Metropolitan Police, there were at least 12,066 violations. This shows that the existence of PSBB and other policies that have been implemented are not a guarantee for reducing the movement of the people. Big data was used on this study because it can provide the data easier, faster with a high accuracy. In addition to that, this pandemy limit the researcher’s options on how the data can be collected. Nowadays, conventional ways such as traffic counting, direct observation and interview are not possible for data collection process. Making the use of big data become one of the best ways to do the research. Considering how the movement is restricted and how dangerous it is if the people’s movement continues to be carried out, then a study is needed to see the differences in movements that occurred in Central Jakarta City before and after the COVID-19 in Indonesia by utilizing big data that are sourced from Twitter database.

This research tries to understand the transportation phenomenon that is happening today by keep following and adapt to existing technology. in this research, people’s movement data is no longer taken conventionally. The data is obtained through big data from Twitter’s database. This research tries to see the movement of people through their activities on social media which is get affected by pandemic conditions.

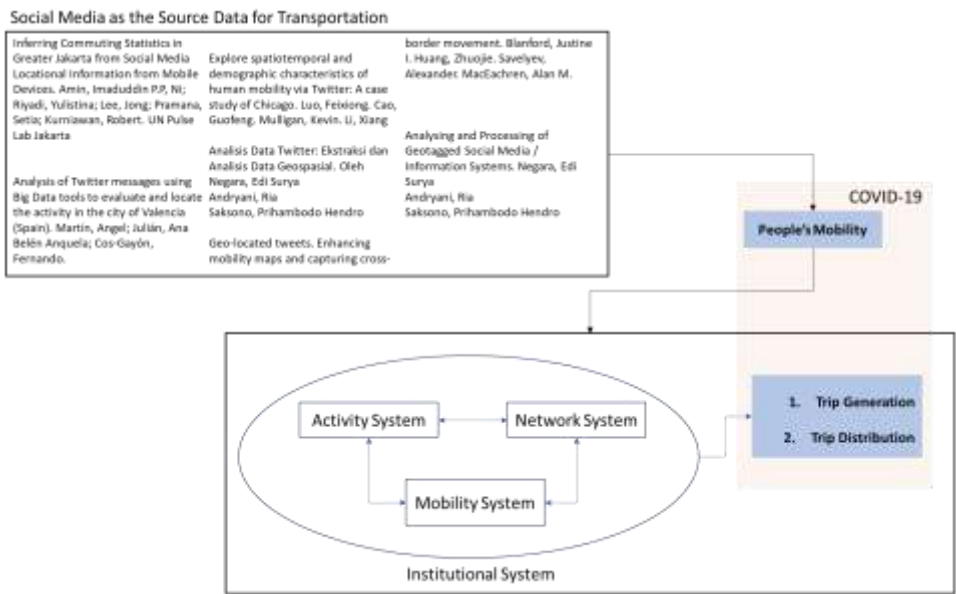


Figure 1. Research's Position

The results of this study will provide an overview of the impact of Covid 19 on traffic conditions in Jakarta. Through this research it is proven that for data collection process, it does not have to be done through conventional surveys.

The required data for this research were obtained by using data crawling method on the Twitter database, using the Application Programming Interface (API). The data intake is done twice, namely before the presence of COVID-19 (February to March 2020) and after the COVID-19 (June to July 2020). The data then will be analyzed quantitatively and spatially.

Based on the analysis that has been conducted before, it is found that there are no significant changes in trip patterns in Central Jakarta before and after the COVID-19. Judging from the internal trips, commercial area is still the location where most Central Jakarta's twitter users spent their time. The changes that happen during this COVID-19 pandemic is the number of people who spent their time in their home during the mid-day is higher than before. Meanwhile, when viewed from its external trips, it is known that there has been a change in the number of trips during the weekday or the weekend. However, when viewed from the origin and destination zones, the community trip pattern tends to remain the same for both before and after the COVID-19, and Gambir District remains the zone with the highest trip value.



Urban Planning & Design

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Urban Planning and Design is one of the research groups in the School of Architecture, Planning, and Policy Development that focuses on urban planning and design research and practices.

Activities of this group are intended to promote more humane and sustainable urban development, understanding rapid urbanization and encourage innovation in response to policies, planning, and management of economics development, also improvement of social and environmental aspects of urban and regional areas in Indonesia. The main purpose of the Urban Planning and Design research group is to disseminate accumulated knowledge from applying advice and policies to government and private sector, into academics and teaching activities in the Urban and Regional Planning Department.

2.1 Land Consolidation of Urban Settlement Using Government Cooperation Schemes Public, Private, People Partnerships (PPPPs) in Cibangkong, Bandung City

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- 2. TEAM MEMBERS** : Fadila Septiandiani, S.Ars., M.P.W.K;
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According to SDGs Report, more than 1 billion people, or 24 percent of the world population, live in slums. The number rose 1 percent in 4 years due to the increase in Northern Africa, Western Asia, and Sub-Saharan Africa. Meanwhile, with all of their capacity, the private sector cleverly uses the condition to capture land value by converting land to commercial purposes, which can be seen by the development of office, retail, and medium-high apartment in the city center. This issue has been brought globally in the United Nations Conference on Housing and Sustainable Urban Development in 2016, highlighting equal rights and means to obtain opportunities in the city.

Several efforts have been made to resolve the issue, starting from the international commitment to national and local programs. UN habitat program on Participatory Slum Upgrading Program (PSUP) has transformed 1 billion slum dwellers, and by 2030 it is projected that the project will degrade the number of slums by 50% around the world. At the national level, there have been Kampung Improvement Program (KIP) and City without slums (Kota Tanpa Kumuh) and Livable Housing/ Housing, which have been conducted to help slum dwellers ending their earning incapacity by engaging participatory planning. The first approach is focused on physical improvement and the second has utilized social knowledge and capacity. Little concern has been directed to the economic aspect and continuity of the program. This article proposes a concept of Vertical Land Consolidation that enables joint land ownership among shareholders to empower economic/ earning capacity to ensure the program's sustainability in the long run. It is argued that the proposed scheme will enable the existing resident to still own the land and have a more decent quality of life, which is indicated by having a portion of the land share.

In this paper, we chose Cibangkong as a case study for land vertical consolidation development using the PPPP approach. Cibangkong offers distinguishing qualities that are highly potential for land development. It is one of the strategic areas within Bandung City that is dominated by high-density housing and trade/services land use. However, despite its strong potential for land development, Cibangkong still cannot eliminate its slum areas. Several RWs have been indicated as a slum area based on the Decree of Mayor Bandung City No. 648/Kep.286Distarcip/2015 on the Determination of the Slum Areas in Bandung. One of them is RW 11 that located near The Trans Studio Mall, a renowned commercial area that attracts visitors from inside and outside

Bandung. Thus, we decided to choose RT 3, 4, 6, 8, 9, and 10 within RW 11 to be the delineation of this study. The total population is approximately 422 households and 1.688 people. It has a 2.84 hectares area with boundaries described as follows, North: RT 7 and RT 5; West: RT 1 and RT 2; East: Cibangkong Lor Road; South: Anak Kali Cikapundung Road.

The data used in this paper are the primary and secondary data. We conducted a field survey for primary data and a literature review for secondary data. Methods used for field surveys are questionnaire distribution, housing and facilities observation, and land parcel mapping. The primary data gave a detailed description of the land condition in the study area, while the secondary data offered land development consideration compiled from government regulations and reputable publications. Below is the list of the data collected from the field survey, divided into land and building, landowners, and renters. The data is collected based on the parcel area conditions of each landowner.

The distinctive characteristic that makes the PPPP approach unique compared to the PPP scheme is the people's more involvement. In the conventional land consolidation that either uses PPP or is initiated by some agencies, the community does not have much chance to receive more benefits from the project. They cannot invest in the project and gain long-term profits. This section will discuss the difference between vertical land consolidation that uses the PPPP approach and other land consolidation types that use the PPP approach. In this context, both horizontal and vertical land consolidation assumed to applied the PPP approach.

Starting with the apparent difference between horizontal and vertical land consolidation is the orientation of the areas and the building. In horizontal land consolidation, the building and the area are developed horizontally, while in the VLC built vertically. As a consequence, the structure of land rights between horizontal and vertical land consolidation became different. Furthermore, the PPPP approach of VLC makes the structure of land rights somewhat a bit different. The figure below illustrates the land rights in VLC with the PPPP approach.

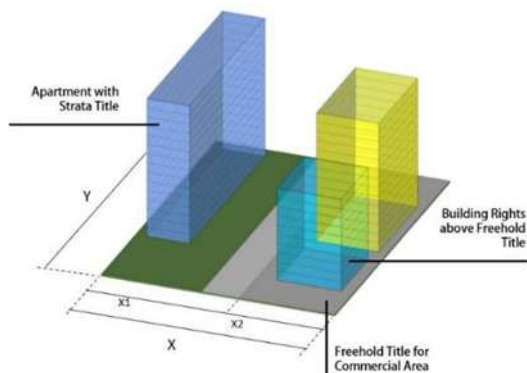


Figure 1. Land Rights in Vertical Land Consolidation with PPPP Approach

The case study results in an empirical output on enhancing the significance of urban slum upgrading in Bandung, Indonesia, based on the economic and institutional aspects. This paper demonstrates the journey of the slum upgrading program undertaken in Indonesia by reviewing the impact and related policies from the 1960s to the present. Thus, it describes a distinct emphasis in each generation and points out that the new approach may fill the gap. The substantial result of vertical land consolidation program with PPPPs approach can benefit the related stakeholder, due to (1) equity sharing in the commercial area, (2) higher land value, (3) improved housing and facilities, (4) long-term profit, (5) free from eviction. The foremost development strategy is begun with the re-checking of parcel land status and estimation of land and building value. It is mandatory to confirm those data as the project was perceived as business production by the private sector. Without clear land ownership and reasonable land/ building price, a further development stage unlikely to occur smoothly. After the land attribute is attained, the process is continued with calculating the compensation and distributing it to the people.

As the assessment on land and building development has been undertaken, the project may gain more attention because of existing dwellers' involvement through the Public, Private, People Partnerships (PPPPs) scheme. Not only benefitting the people with the implementation of development without eviction, but this scheme also enables the occupiers (people who rent the land) to gain advantages. More interestingly, PPPPs provides a reserve land which is used as an investment. From the perspective of economic, this benefit may stimulate a better earning capacity for the people as aimed in the project that eventually supports the project's continuity.

2.2 Place Branding as Thematic Cities Development (Case Study: Bandung)

- | | |
|------------------------|--|
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| 2. TEAM MEMBERS | : Ismail Rashad, S.T.
Afrizal Ramadhan, S.T., M.P.W.K |

Place Branding is an instrument or action to increase the competitive advantage of a place. It could create a profile, or an identity based on something intangible and represents goals from stakeholders. Place branding could be used as an instrument of investing. One interesting aspect of place branding is it requires the roles of different stakeholders to run it. Stakeholders that involve in place branding vary from the public, private sector, and the residents of the place itself. These stakeholders need to have values, goals so they need to have a consensus between themselves. Bandung is a city that adopts place branding as a strategy to develop the city and is known as a creative city. Bandung's creativeness was acknowledged by UNESCO in 2015. The aim of this research is to identify the application of sustainable place branding concept in Bandung. The study area is limited to several places labeled as major innovation studies in Bandung and identifying the place branding management will be done by interviewing stakeholders involved in each place.

Stakeholders are one of the important aspects of place branding. Place branding is complex and involves multi-stakeholders in the practice. Stakeholder participation in the place branding process has been recognized (Kavaratzis, 2012; Klijn et al., 2012; Kasabov and Sundaram, 2013; Stubbs and Warnaby, 2015). Place branding practice involves several stakeholders involved such as the public sector, private sector, and the place's residents itself (Anholt, 2004). The se stakeholders are involved in policymaking until the management of the place branding. Kavaratzis and Ashworth (2005) stated that it is important to involve stakeholders in place branding practice so the place branding created by the stakeholders can be accepted by different groups. It is important to identify what are the linkages between stakeholders, roles, and key stakeholders in place branding practice. (Maheshwari et al., 2014). Place branding sustainability is closely related to how the image is perceived by the visitor and back to the point where the meaning of the message is conveyed through the brand. A place is promoted to generate tourists, migrants, business, and economic growth. If the effort from place branding is not sustainable, it is possible that the competitive advantage that was tried to be generated will not succeed, as well as the tourist, investment, and many other aspects. Thus, it is important for stakeholders to produce strategies to create sustainable place branding.

The purpose of this research is to understand and evaluate the place branding practice of Bandung with the following objectives:

1. To understand the formulation of Bandung Place Branding.
2. To understand current action done to maintain the image created by the place branding.

3. To evaluate the current place branding practice through a conceptual framework.

The methodology used in this research is exploratory qualitative with descriptive analysis. The approach relies on policy content analysis about Bandung's place branding concept and interviews with the government. Primary data is obtained through an interview. Secondary data is obtained from various resources to create a conceptual framework used to evaluate Bandung's current place branding practice. The first stage of this research is to understand the formulation of Bandung's place branding, understand what image the government wants to create for the visitors, and the strategies for the implementation. The second stage is to understand the action done by the stakeholders to main the image created. The third stage is to evaluate the current place branding practice and the conceptual framework to identify the gap between them, whether in the place branding strategy, performance, or satisfaction.

There are several place and concept that is being used to understand Bandung place branding practice. In several years before, Bandung created a building that has been used as a creative hub; this building aims to enhance the creative activity in Bandung. Another example is a tourism concept, namely Bandung innovative belts, where it is a tourism destination with a creativeness concept. This research uses Bandung Creative Hub and The Creative Belt as an example of smaller-scale place branding used for city-scale place branding. Another example being used is the place branding practice implementation in another city as a benchmark or comparison for Bandung's place branding practice. The result can be seen in the table below:

Table 1. Place Branding Gap Model Components and Current Practice in Bandung

Place Branding Gap Model Components	Bandung Place Branding Practice
Strategy	<ul style="list-style-type: none">- Bandung place branding practice could be categorized successful at some point since it was legitimized by UNESCO- Bandung long term and short-term plan includes building competitive economy which includes creative sectors- Bandung shows its commitment towards place branding by creating a creative hub and creative tourism belt.
Performance	<ul style="list-style-type: none">- Bandung creative hub which aims to be the hub for creative activity does not have event that is being held regularly. This could affect the image that is being projected. Visitor might not feel the hub as a creative hub if the event or the activities is not held regularly.- Some of the Cigadung Creative Belt tourism destination offers workshops and education for the product that they are selling. This could bring meaningful experience for the visitor, which

Place Branding Gap Model Components	Bandung Place Branding Practice
	could attract the visitor to visit the place again.
Satisfactory	- The satisfaction of the visitor could not be identified in current pandemic situation

This research can broaden the knowledge about place branding practice where the goal of place branding itself to create a competitive advantage in a city. The Bandung case study results could be useful as a benchmark for other cities if they want to implement a place branding concept for their city. This study would help the city government, investors, or even a place with a smaller scale that wants to implement a place branding concept.

2.3 The Effect of Urban Spatial Structure and Patterns on The Spread of Coronavirus COVID-19, before and after Large-Scale Social Restrictions (Case study: Bandung City)

- 1. HEAD OF TEAM** : Dr. Ir. Iwan Kustiwan, MT.
- 2. TEAM MEMBERS** : Ervan Sugiana, S.T.

Introduction

Covid cases in Indonesia have continued to increase, and a significant amount of them are in urban areas. Bandung as a metropolitan city is a connected place for millions of people who work, do activities, interact, have a high risk of the Covid-19 spread. As an emergency measure, the local government has implemented large-scale social restrictions. In the long term, to support a pandemic response strategy and strengthen city resilience, we would like to identify the relationship between the structure and pattern of urban space on the spread of COVID in Bandung and what can be applied in urban planning after understanding the correlation results. This study aims to determine whether the number of people who have been confirmed positive for Covid-19 is clustered based on their location. Therefore, we calculated the value of spatial autocorrelation in ArcGIS software with the moran index tool.

Method

Moran's index is a statistical test value used to test the value of spatial autocorrelation. The Moran's Index value is between -1 and 1 (-1 indicates perfect negative autocorrelation, and 1 indicates ideal positive autocorrelation). The process of spatial autocorrelation analysis is carried out in ArcMap software with the Morans I Spatial Autocorrelation analysis tool. The spatial autocorrelation analysis provides an overview of whether the pattern formed is clustered or random.

Still, to further determine the clusters' location, a local moran's I analysis was carried out. The LISA (Local Indicator of Spatial Autocorrelation) Index value is a local indicator value of spatial association. This value is useful for detecting hotspots or cold spots in area data.

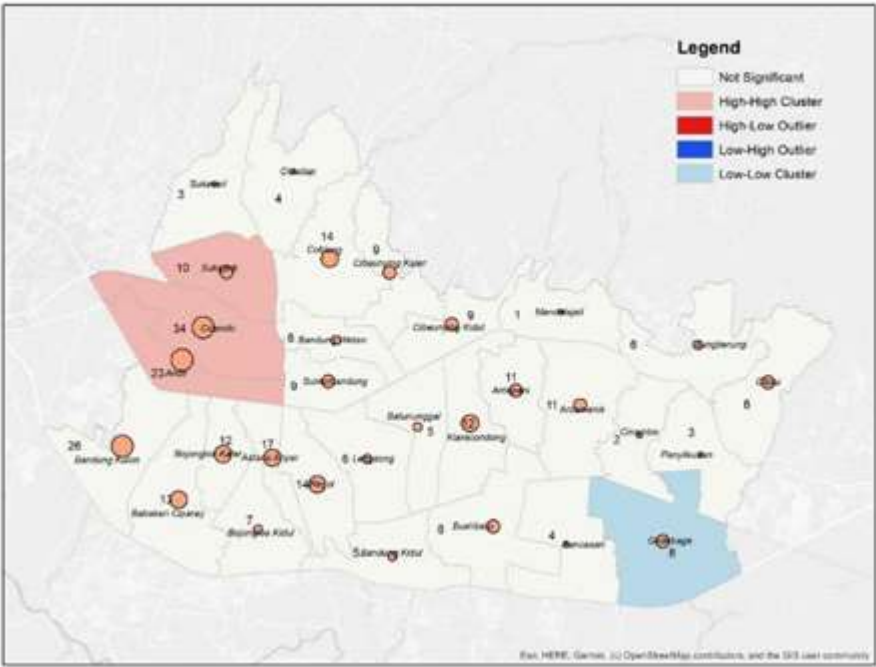


Figure 1 Map of Spatial Relationship of Positive Spatial Confirmed Cases Based on Moran's Local Test

In positive confirmed cases of Covid, three districts have become Hot Spots, namely Andir, Cicendo, and Sukajadi districts, which have high-high clusters. Hot Spots, High – high (H-H) are an area that has a high-high (H-H) spatial relationship with the surrounding area if it has the same high and significant LISA value. This means that areas with a high number of confirmed positive patients are close to areas with a high number of confirmed positive patients.

The sub-district has a high observation value surrounded by sub-districts that have a high observation value. There is also a low-low cluster pattern (Cold Spots) in Gedebage District.

Cold Spots, low-low (L-L) are an area that has a low-low (L-L) spatial relationship with the surrounding area if it has the same low and significant LISA value. This means that areas with low numbers of confirmed positive patients are close to areas with low numbers of confirmed positive patients as well. This shows that Gedebage District has a low observation value, surrounded by sub-districts that have low observation values as well.

Conclusion

Based on this spatial relationship, the initial estimate of the presence of hotspot sub- districts in the western part of Bandung is an air transportation land use. The spread is supposed to be in the network node area. In this case, the western

part of Bandung City has wider access than the eastern region. Besides, in the west part, there is also a large land-use transportation and a relatively higher population density than the east part of the city of Bandung.

2.4 The Vulnerability of COVID-19 Pandemic Based on Urban Density (A Case Study of the Core Urban Area in Cirebon City, West Java)

- 1. HEAD OF TEAM** : Farida Khuril Maula, ST., M.Sc.
- 2. TEAM MEMBERS** : Diary Nurwidya Choerunnisa, ST., M.P.W.K.

COVID-19 has become a global concern due to its outbreak in early 2020. Not much is known yet about this disease so the only viable acts against it is prevention. Lall and Wahba (2020) exclaimed that prevention acts need to be done to slow the transmission and avoid the use of any limited health resources. The disease spread prevention can also be done by limiting mass activities and congested use of public spaces. Distancing acts and mass activities are closely linked to the internal condition of a city. This situation closely related to the internal density of an area on a close scope (Pafka, 2020).

This research aims to measure the level of COVID-19 spread susceptibility based on the urban density variables. There are four urban density variables used in this research namely density, intensity, built-up area, and mass activity or public facilities. Three steps have taken to achieve this objective, are: (i) formulating variables and criteria of an urban density; (ii) measuring the level of COVID-19 spread susceptibility based on the criterion in every variable; and (iii) measuring the level of COVID-19 spread susceptibility in an urban area. An urban density observation can help the local government to determine focused priority areas based on the highest exposure and contagion risk, along with what actions are taken (Lall & Wahba, 2020).

This research takes Cirebon City core urban area for the case study, which located in SWK II Cirebon City. Cirebon City become activities and services center for PKN Cirebon Raya Metropolitan Area and Ciayumajakuning developmental area. While SWK II is defined as the main urban area in Cirebon. This main urban area has the role of Urban Services Core (locally called PPK) with the primary function of trade and services that caters to a city-wide scale. Aside from being a PPK of Cirebon City, SWK II represents Cirebon in portraying its role as the core of WP Ciayumajakuning.

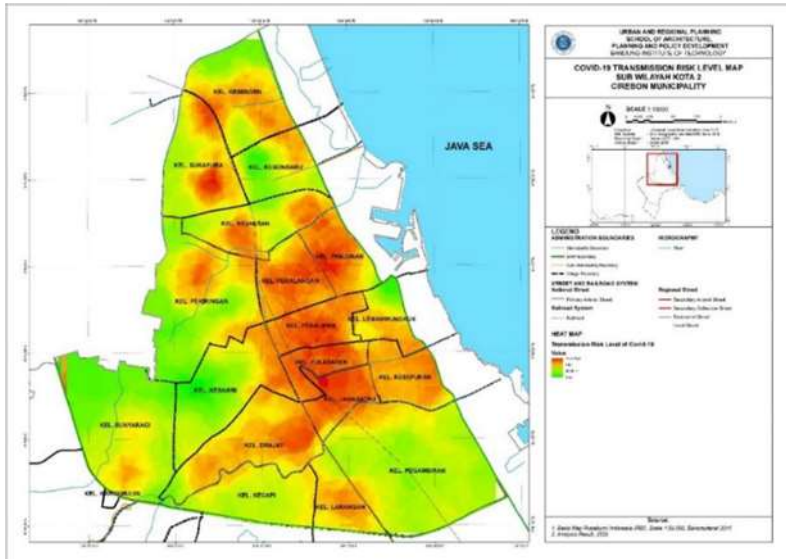
Data for this research was collected through primary observation and secondary data collection. The primary analysis method of this research is spatial analysis. The smallest data scale for this spatial analysis is information regarding blocks. This research uses four variables: density, intensity, built-up area, and mass activity/facilities, that illustrate the dense area. Each variable has criterion. All of them are measured in accordance with the existing conditions within every block. The following table shows the variables, criteria and stipulation used for this research.

Table 1 Level of Susceptibility Stipulation based on Variables

Variables	Criteria	Stipulation
Density	<ul style="list-style-type: none"> • Building density • Population density 	The denser the area, the more susceptible it is to COVID-19
Intensity	<ul style="list-style-type: none"> • Floor Area Ratio (FAR) • Building height • Number of storeys 	The higher intensity that the area has, the more susceptible it is to COVID-19
Built up Area	<ul style="list-style-type: none"> • Built-area percentage • Road geometry 	The higher built-area percentage and smaller the roads are, the more susceptible it is to COVID-19
Mass Activity/ Public Facilities	<ul style="list-style-type: none"> • Distribution of core areas • Distribution of facilities 	The more core areas and facilities are distributed in the location, the more susceptible it is to COVID-19

Five types of analysis were employed to answer the research objective namely density analysis, intensity analysis, built-area analysis, mass attraction or public facilities analysis and COVID-19 spread susceptibility analysis. Each analysis shows the level of susceptibility in every variable.

COVID-19 Spread Susceptibility Analysis based on Urban Density Area



The COVID-19 susceptibility level map shown above is an overlay of the four previous urban dense area variable maps—high level of susceptibility results when every variable shows a high

level of susceptibility. The table below shows categories of urban dense area susceptibility based on the number of high-level susceptibilities from the previous analysis.

Table 2 Level of Susceptibility Categories

Susceptibility Category	Number of High Susceptibility Level from Previous Analysis
Very High	4 high susceptibility from 4 analysis
High	3 high susceptibility from 4 analysis
Mid	2 high susceptibility from 4 analysis
Low	1 high susceptibility from 4 analysis or 0 high susceptibility from 4 analysis

After overlaying and classifying the analysis based on each variable, the results show that generally the Core Urban Area of Cirebon is highly susceptible to COVID-19 spread. Areas with very high susceptibility rate are Pekalangan Village, Panjunan Village, Pekalipan Village, Pulasaren Village, Jagasatru Village, and Kesepuhan Village when compared to other areas surrounding them. Those areas are included to the ‘Very High’ category because they have high density, high intensity, large built-area percentage, and many activities and facilities resulting in a very high level of susceptibility to the spread. Areas, such as Sukapura Village, Kesenden Village, Kebonbaru Village, Drajat Village, and Larangan Village, are identified as high susceptibility areas. As observed on the Urban Dense Area map, areas with a high level of susceptibility of the COVID-19 spread agglomerates. Currently, that area is where the core activity of Cirebon City happens, centered in Pulasaren Village and linked to surrounding villages. Aside from having activity centre, the agglomerated high susceptibility area also has slums within its boundaries. Slums in SWK II of Cirebon City have high density, both building density and population density. The roads here are narrow, and there are many community activities and facilities here, making these slums highly susceptible to the COVID-19 spread. Another area identified as highly susceptible is trade and service center that acts as activity hubs for Cirebon City.

Based on analyses, some actions need to be taken, and policies need to be implemented to decrease the susceptibility rate of the COVID-19 spread linked with urban dense areas as a preventive measure. Some actions and policies such as quality and comprehensiveness increase essential services and public facilities that serve locally or on a neighborhood level, supporting infrastructures of urban hubs need to adjust more to the COVID-19 conditions to facilitate physical distancing and other preventive actions, distributing urban hubs and service facilities more evenly to avoid agglomerations, increasing order and surveillance of supporting infrastructures, especially in high-density areas, to avoid overuse and close contact and better handling of slums and squatter issues from the city government to decrease the susceptibility level of COVID-19.

2.5 Lifestyle Behavior of Indonesian Youth during Covid-19 Pandemic

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2. TEAM MEMBERS : Lanthika Atianta, S.T., M.Sc
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Introduction

On the 30th January 2020 the World Health Organization (WHO) declared COVID-19 as a global health pandemic (WHO, 2020). Suddenly the lives of millions of people in the world are exposed to this virus, and as of 5th June 2020 there have been more than 6 million cases with 11% death rates (Worldometers, 2020). In Indonesian context, the rapid spread of COVID-19 has brought a detrimental impact where people's livelihood and everyday lives has been severely disrupted, and the new normal has been the way of life ever since.

As the largest demographic group in Indonesia, youth are the future and driving forces of the country (Indonesia, B. P. S. ,2013). Their presence needs to be acknowledged and looked after, due to their role in the nation building process. Through this research, the researcher tries to understand the behavior of Indonesian urban youth during COVID-19 pandemic, and its ramification to public health and spatial planning. Research findings could help for future pandemic situations to improve the urban facilities and promote a more neighborhood-oriented development specially in Indonesia.

Methods

This research uses a mixed-method approach. The data used in this study are urban youth activities. These activities are divided into three categories, namely (1) mandatory, (2) maintenance and (3) leisure (Reichman,1976). The respondents are Indonesian urban youth aged 18-30 years old. Data collection is carried out using online questionnaires which are distributed for a month. The target sample in this study is 400 respondents. The respondents are asked about their activities based on the three categories in two different periods, before the COVID-19 outbreak and during the pandemic. In general, the framework for this research is depicted in figure 1. This study uses inferential analysis to determine changes in urban youth activities before and during the pandemic. Furthermore, hypothesis testing is performed to determine the tendency of sample findings to conditions in the population. This analysis is carried out with a 5% confidence level. The initial hypothesis (H1) of this study is there are differences between urban youth activities before and during the pandemic. Text mining analysis is an additional analysis to find the forms of urban youth adaptation during the pandemic.

Results

From all the respondents who meet the criterion, 348 respondents (96%) believe that Covid-19 is real, only 4% assume that it is not real. Out of the 348, 88% believe that it is a threat to their and their family's lives. So, most of the respondents believe that the pandemic is real, and most of them believe that they are at risk of getting infected.

During the pandemic, 68% of the respondents are working/studying from home. 25% of them have mixed routines of working/studying from home and working from workplace/studying from school. Only 7% of them are working/studying fully from workplace/school. The pattern for male and female workers/students are similar. The intensity of going out for work/school is also similar for male and female workers/students. During the pandemic, almost half of the respondents (47%) only go out 1-2 times a week. 21% go out 3-4 times a week, and 18% of them work fully from home.

Almost all respondents have adopted preventive actions by following health protocols (social distancing, wearing a mask, avoiding crowd, wearing face shield, wearing cover-ups, and carrying hand sanitizer). Out of 363 respondents, only two people do none of the protocols (both are male). The rest of the respondents adopt at least one of the protocols.

	SOCIAL DISTANCING	WEARING A MASK	AVOIDING CROWD	WEARING FACESHIELD	WEARING COVER- UPS	CARRYING HAND SANITIZER	NONE
Male	93%	97%	88%	43%	60%	87%	1.4%
Female	96%	99%	89%	38%	80%	95%	0%
Total	95%	98%	89%	40%	72%	92%	0.6%

In advance, for Jabodetabek Metropolitan Area, more than 70% respondents already comply to the new adaptation protocols. However, the study shows that there are number of violations for each activity. The leisure activity has the highest number of violations even when the number of activities outside house is less than other activity.

Discussions

Most of the respondents, state that they have changed their lifestyle and daily routines following the pandemic outbreak. Even though there might be other factors affecting their behavioral shift (such as the government's social distancing and lockdown policy, or the company's work from home policy), it is likely that they change their routines as preventive measures to avoid getting infected.

There are still barriers in adopting the preventive behaviors. It is shown by how the respondents only go out for essential activities such as working, going to school, and getting groceries. It shows that they go out only because that have to, and that they prefer to stay home while they could. However, they still must go to work at least every once a week so they can still earn money to live (financial barrier). The respondents also still need to go out for getting groceries, which shows a physical barrier. Technology might have made grocery shopping easier for some of the respondents (online shopping), however, most of the respondents still prefer to get their groceries directly from traditional markets or supermarkets. Beside the violations of the new adaptation protocols. This condition might happen due to no regulation specially in leisure area like green open space.

Conclusions

- Urban youth in cities of Indonesia is aware that Covid-19 is a serious threat to their health, and therefore they take actions to minimize the risk of getting infected. These actions include going out only for essentials (going to work/school) and adopting health protocol (mask, social distance, etc)
- There are barriers in adopting the behaviors, mainly financial. Young people are still obliged to go to work, even though most of them do it less than 3 times a week. They also need to go out for grocery shopping. Most of them prefer to maintain these routines during new normal era
- Gender do not significantly influence the preventive behavior.

2.6 Identifying Land Subdivision Practice, Case Study of Subang

1. **HEAD OF TEAM** : Ir. Sugiyantoro, MIP.
2. **TEAM MEMBERS** : Eka Darma Kusuma, ST., MT.
Wahyu Gede Sadewo

In the last two decades, Subang Regency experienced a drastic economical and physical transformation under the increase of industrial activity. Boosted by the increasing minimum wage demand and the land price hike in Karawang and Jabodetabek, big industrial companies are slowly moving away from the old industrial area towards regencies and cities with affordable minimum wages. The national government responded by pushing forward the plans for better supporting infrastructures in such areas. Designated industrial areas in Subang Regency include 30 villages in 7 sub-districts. Among others, they are in the Districts of Cipendeuy, Pabuaran, Kalijati, Purwadadi, Cibogo, Pagaden, and Cipunagara. These districts are complemented by the plan to build a new cargo port named Patimban Port that further strengthen the strategic value of Subang as a new investment hub for manufacturing industries. In the effort of realizing these, some of the investors practice a land banking approach in the land acquisition process. They sold back the land to the developers through land subdivision, with most of it were agricultural fields. In the future, these industrial developments aimed to shape a new strategic economic region called Kawasan Segitiga Rebana (Rebana Triangle Region), synergized with Cirebon City as the main commercial hub and Majalengka Regency as the primary international gateway through its new international airport.

The purpose of this new region is to further diversify the economic development throughout entire West Java Province and away from both the Bodebekkarpur and Greater Bandung region. Furthermore, national government projects this region to be the new economic powerhouse in whole Indonesia and Southeast Asia. The initial results of this development are considered promising, indicated with an increase in export rate and growing minimum wage. But these results are paid with the shift of agricultural land use coverage towards industrial at an alarming rate. During the development process, 30% of the allocated land has changed use and another 30% is in the buying and selling process. This resulted in reduced food supply production and threatened Subang's role as one of West Java's rice supplier. This research aims to understand the scheme used for land use change in the development of industrial estates in Subang Regency. This research used an exploratory approach that aims to understand what the land use change phenomenon is like and how it relates to financial and institutional management in Subang Regency.

As one of the national rice suppliers, non-agricultural land use in Subang Regency is considered much smaller compared for agricultural land. In 2019, it was recorded that non-agricultural uses covered about 42,096 hectares, while the use of agricultural land was at 163,080 hectares. Throughout a 10-year period from 2010 to 2019, agricultural land use coverage had shrunk for 6.57% from 174.553 to 163.080 hectares, while non-agricultural land use rises 37.47% from 30.623 to 42.096 hectares. The most impacted agricultural land use is non-paddy agricultural land, which decreased by 12.4%, and between 2013 and 2014 decreased in a steep 8.63%. Yet from the 95 industries that established in the same decade, only 37 of them were in the industry-designated sub -districts. 54 (56.7%) of them are located near the collector road, 8 (8.4%) near the artery, and the rest are in local street. These industries generally clustered in the midwestern region of Subang Regency, near Cipeundeuy.

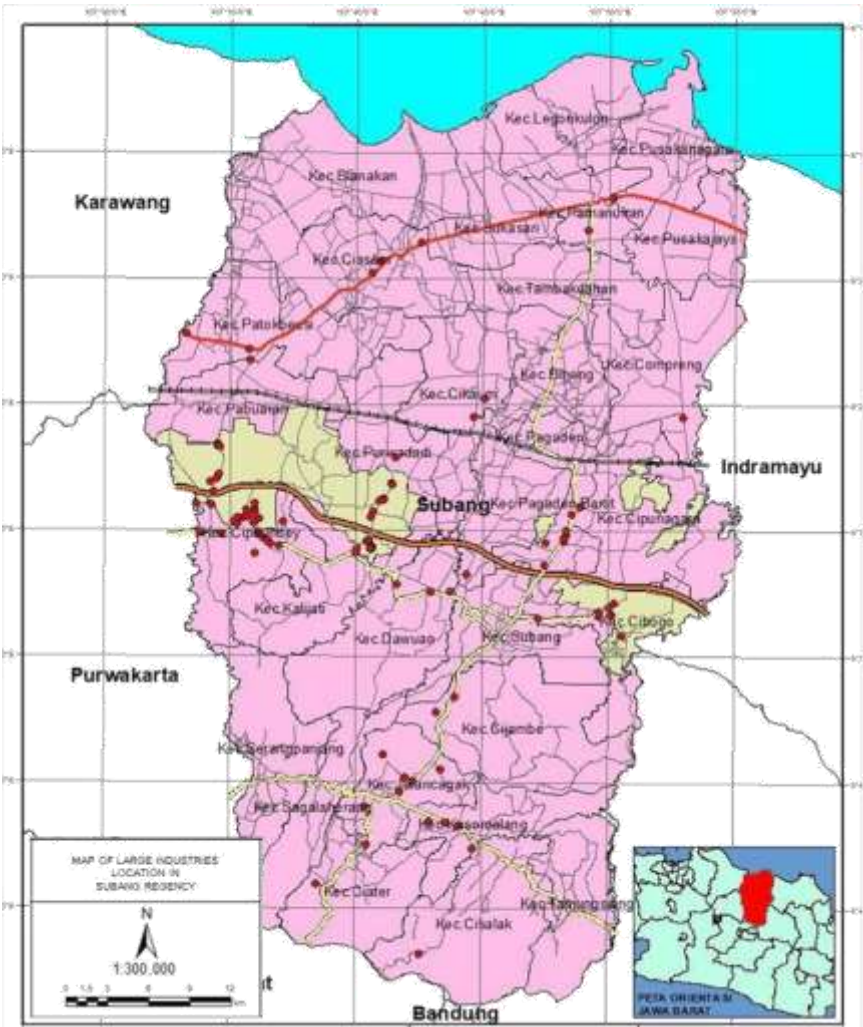


Figure 1 Map of Large Industries Location in Subang Regency

The relatively proximity to the Karawang and Purwakarta Regency where there are a high number of older and more established industries might influence this pattern. Other subdistricts that house several industries are Purwadadi, Kalijati, and Cibogo. The latter two are possibly influenced by the proximity with Cipali Highway Toll Gate. Interviews with local authority confirms that since the opening of the toll gate, there are an increasing pattern of industries trying to acquire land near the toll gate location. before 2010, the development of industrial sites in Subang Regency largely revolves near the Texmaco industrial land. Texmaco allegedly had acquired 1000 hectares of land for further expansion and improved the quality of infrastructure support in their surrounding area. This attracts other investors, to the extent that other industries were growing around them benefiting from the improved infrastructures laid by them.

After the company folded, the Purwadadi Industrial Regency was opened and followed by the Cipali Highway plan shifted the growth towards a more scattered industrial plot. Yet the local authority claims that this was an unexpected development, implying that the growing of new industrial land is not planned and was initiated by the private sector themselves. Based on the compiled accounts, it is indicated that the growth of new industrial sites is demand-driven by the investors and private companies. The new industrial sites are mostly developed ahead of the local governments' knowledge or plan and appears to be in response of strategic infrastructure projects built around the regency. Low land price, cheap labor, proximity to the market, and the support of strategic transportation infrastructures were touted to be the driving factors.

2.7 Identification the Potential and Opportunities to Develop Non-Motorized Transportation Modes using Crowdsourcing

1. **HEAD OF TEAM** : Dr. RM. Petrus Natalivan Indradjati, ST., MT.
2. **TEAM MEMBERS** : Sri Utami Purwaningati, ST.

United Nations (UN) predicts in 2050 the world's population will live in urban areas by 68%. UN data projection shows that urbanisation and overall growth of the world's population could increase by more 2.5 billion people to urban areas in 2050. In addition, almost 90% of the increasing number will take place in Asia and Africa. According to it, the upcoming problems and challenges in urban areas will be more complex. More specifically, the upcoming challenges in meeting the needs of growing urban populations including transportation, energy system, housing and the other infrastructure. Developing sustainable transportation in urban areas may be one of the keys to answering those challenges.

In 2020, the world is attacked by the global pandemic COVID-19 which lead countries to enact several policies related to prevention of the spread of the virus. In the case of Indonesia, a large-scale social restriction is imposed where people are encouraged to carry out activities from home and only leave their home for very important occasions. This large-scale social restriction policy turned out to be quite a positive impact on the environment, especially associated with improving air quality. This is caused by a significant decrease in the utilization of motorised transportation – which usually causes air pollution and traffic congestion.

The use of non-motorized transportation mode such as bicycles and walking during the pandemic also occurred in developed countries such as Belgium, France and the United Kingdom carried out with a reason to avoid the use of public transportation (Aulia, 2020). A previous study in Malaysia (Salleh et al., 2014) stated that the use of non-motorized modes of transportation can be applied as an environmentally sustainable feeder mode for public transport. However, in Indonesia, the use of non-motorized transportation mode particularly bicycles are still used for sports or recreational purposes. Apart from the various reasons for the usage of non-motorized transportation mode, the use itself has been proven to improve the quality of the urban environment in terms of air quality. According to it, the operation of non-motorized transportation mode needs to be supported by the non-motorized transportation mode planning policy. This is to ensure that the safety and security of the non-motorized transportation mode users are guaranteed.

Research Problems and Methodology

Until recently, the transportation planning policy which specifically regulates the non-motorized transportation modes for cities in Indonesia has never been created in particular. The main problem in developing a non-motorized

transportation policy is the limited data and information that illustrates the patterns and problems of using non-motorized transportation modes because it is generally not recorded in official institutions. Nevertheless, one of the nine commonly considered options for sustainable urban transport in cities in developing countries is supporting the non-motorized travel modes (Pojani, 2015). Therefore, a study about the non-motorized transportation planning policy in Indonesia using crowd-sourced data is necessary to be conducted. This research aims to structure the literature related to non-motorized transportation modes and crowdsourcing methods to identify the potential and opportunities to develop non-motorized transportation mode using the crowdsourcing method.

This research will use an exploratory methods and secondary data survey. Then, the qualitative analysis will be used to structure the literature related to non-motorized transportation modes and crowdsourcing methods.

Results and Discussion

The development of people's lifestyles and the presence of technology makes it easy for agencies that need access to data needs for planning purposes easily and cheaply, by recording open and unlimited patterns of usage behavior and mobile devices. Non-motorized activities are currently becoming a trend for people to travel or have recreation, this behavior uses cellular use to record the progress of activities carried out for personal gain. From the perspective of the researcher, the data records can be used for planning purposes by looking at travel destinations, travel activities and routes, both through the behavior of cellular usage and GPS devices. Several studies in developed countries have reviewed the use of crowdsourcing data for non-motorized planning needs in the country such as Planning of the Manukau road corridor, Auckland (Norman, 2015) and Monitoring pedestrian and cyclist data (Lee & Sener, 2020). Urban development that directs activities closer to each other will encourage close-distance movement by people using non-motorized modes. Movement using non-motorized modes will emerge as an alternative to efficient movement in urban areas, so planning is needed that takes into account the provision of adequate facilities for non-motorized mode users in the future. Advances in technology help researchers to be able to get data in the form of accessibility, the types of data available and the level of participant activity in providing data. One of the uses of the application to enrich data for non-motorized mode planning needs is Strava, there are at least four reasons that make this application a recommendation:

1. This application is an application that is well known to many people, showing complete data records so that planning needs can save time and resources to be able to process data across GPS.
2. With the recognition of this application by many people in the world, it describes the contribution to the accumulated database well and has an increasing amount of data.

3. It has easy data management formats in the form of geometry data (points, segments and OD Polygons), shapefile data to suit analysis in GIS tools and better spatial/temporal resolution, all of these data forms can be used widely ranging from small scale to large scale and compatible with other data.
4. Offers broad data coverage in time and space.

The advantages of providing crowdsourcing data have helped research efforts and analytical methodologies while diversifying existing scenarios over the past five years. The development of data provision to show the tendency of people to move in a non-motorized mode continues to develop so that they can show the destination and route of travel and the user.

2.8 The Principle of Conservation based on Cultural Significance in Urban Areas (Case study: Old Dntown Bandung)

1. **HEAD OF TEAM** : Dr.Ir.Denny Zulkaidi, MUP
2. **TEAM MEMBERS** : Prof.Dr.Ing.Ir.Widjaja Martokusumo
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The preservation of cultural heritage is increasingly being hit by natural destruction and as a result of social and economic conditions (UNESCO, 1972). The preservation of cultural heritage must pay attention to the cultural significance because practically preservation objects are the objects that have values. In fact, the treatment of each heritage are different based on their cultural significance. Along with the development of science, the object of cultural heritage shift from a single building to area based (The Venice Charter, 1964). Cultural significance is sometimes recognized, but it is not inte-grated into the conservation management process (Charter & Bramley, 2002). In conservation man-agement, conservation principles must consider cultural significance, so that the boundaries in de-velopment are clear based on cultural significance. This study took a case in the Old Dntown Area, Bandung City and deepened in Braga Street. Therefore, there are two problems in this study, first, the cultural significance of Bandung City has not been identified and secondly, there is no principle of preserving cultural heritage districts by considering the cultural significance in Bandung. This study aims to formulate conservation principles based on the cultural significance in urban areas (Case study: Old Dntown Area, Bandung City).

This research is an explorative research. The purpose of exploratory research is to explore deeper understanding of the object of research, explore possibilities for conducting more specific research, and develop methods that can be used in further research (Babbie, 2007). This research will explore understanding related to the preservation of cultural heritage, cultural significance, and principles of conservation. The approach used in this research is deductive-qualitative with a multiple case study as strategy. Data collection in this study is divided into two, namely primary data and secondary data collection. Secondary data is data that comes from other research or other sources that are not conducted by researchers (Marzuki, 2001). Secondary data collection was carried out by studying the literature. Then, primary data is data obtained directly from the subject or object of research, both individual and communal. Primary data collection is done by means of interviews, observations, and mapping. The data were then analyzed by content analysis and qualitative descriptive analysis.

The results showed that cultural significance played a role in the preparation of the preservation principles. Cultural significance is formulated into components of cultural heritage areas (layout, use and function, circulation, streetscape, and

landscape). These components are then crossed with uniqueness and harmony criteria to create principles. Then this principle is formulated into the principle of preservation based on existing values. The most important value in cultural significance is the Socio-Cultural Value. The results showed that the case study namely Alun-alun and Braga areas had high significance values because they had three values, such as socio-cultural values, experience values, and economic values. The principle is then developed based on the value of cultural significance that has been analyzed by dividing it based on conservation efforts according to Law No. 11 of 2010 concerning Cultural Heritage, namely protection, development and utilization. The protection principle considers the uniqueness that can be applied in the area. The principle of development considers harmony within the area, so that the principle is the result of modification. The principle of use has the same considerations as the principle of development, but in the context of land use and function. The principle of protection is used when the area is relatively new to be explored, while the principle of development and utilization is used when development in the Cultural Conservation Area has taken place and requires looser regulations.

On the one hand, the similarity of the Alun-alun area and the Braga area can be seen from the principles used in the building demarcation line components with the following conditions:

1. The development along the main road has a GSB of 0m.
2. Development if the building's GSB is irregular or not 0m, the distance between the front boundary of the building lot and the main road is 0m by making a fence (wall, pole, or plant) or an overhang.
3. The area between the frontier of the building and the building's facade functions as an open space.

On the other hand, the difference between the Alun-alun area and the Braga area is in terms of the typology of the area where the Alun-alun is an area while the Braga is a corridor. In terms of layout, the Alun-alun area has a *catur gatra* concept and an imaginary axis from the Pendopo to Mount Tangkuban Perahu, while the Braga area connects North Bandung and South Bandung in the form of a commercial corridor. In terms of use and function, the Alun-alun area consists of several uses and functions, namely North and East in the form of trade and services, West in the form of worship, South Government, and in the middle in the form of green space, while the Braga area is only there is one use and function, namely trade and services. In terms of circulation, the Alun-alun area uses a grid concept, while the Braga area is a corridor. In terms of the streetscape, the Alun-alun area is a combination of European and Indonesian architectural styles with a relatively large and single building mass, while the Braga area has an Art Deco architectural style with relatively small building masses and in the form of row buildings. In terms of the landscape, the Alun-alun

area has an green space in the form of a square, while the Braga area has trees along the road.

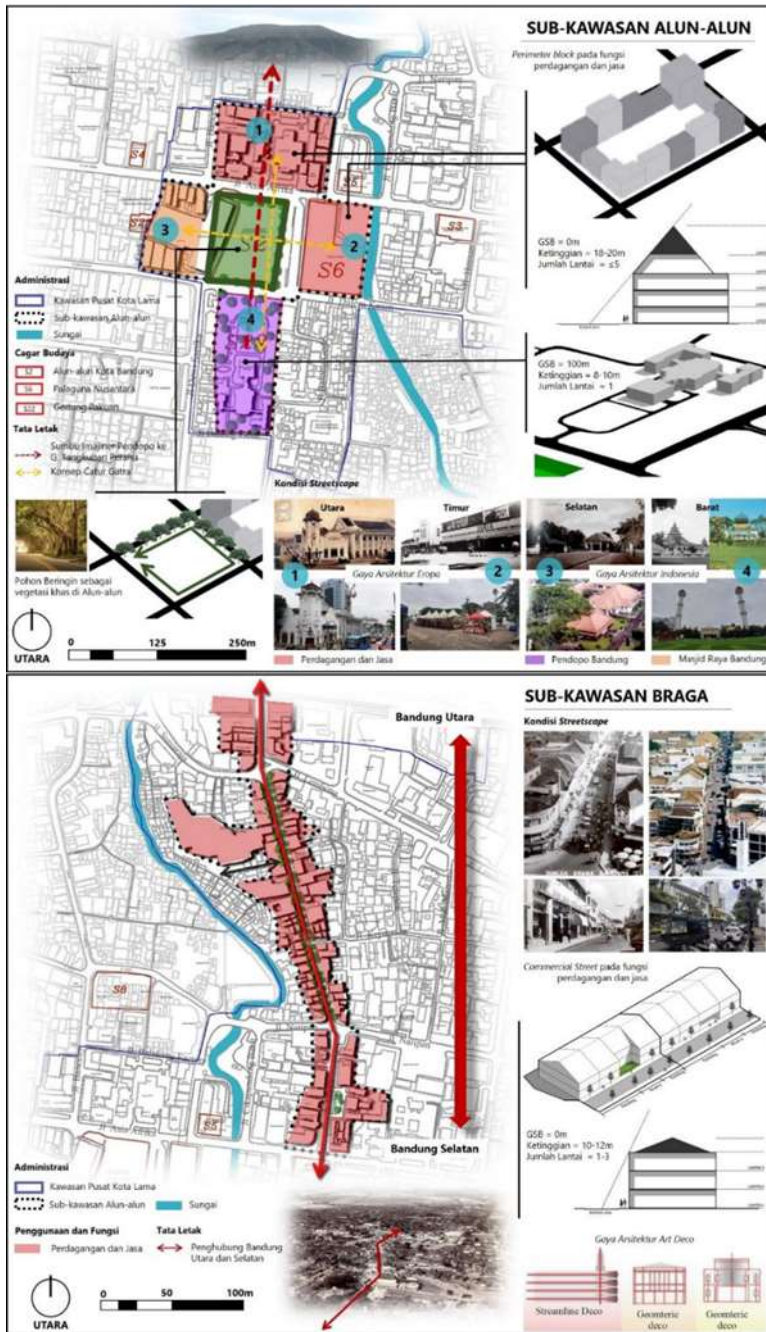


Figure 1. Character in Alun-alun and Braga Area



Development Management & Policy Planning

Those who contribute to the theoretical and practical knowledge of policy planning and development management of urban areas.

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Development Management and Policy Planning is a research group founded to accommodate faculty member with experience and research interest to development and management of urban areas and regions, and also policy planning.

Founded in 2005, this research group intend to contribute to the theoretical and practical knowledge of policy planning and development management. This group has continually improved, manage, and distribute knowledge, relevant skill sets, outlook to policy, and relevant plan to respond to current issues and local, regional, and national problems. Supported with competent human resources, this group attempt to broaden society's horizon to realize prosperity, modernity, and sustainability.

Keywords: Metropolitan Governance, Urban Management, Development Management, Urban Public Finance, Development Finance, Planning Evaluation, Smart City Development, Urban Government Institution, Public-Private Partnership, Fiscal Impact Analysis, Local Preferences Analysis, Urban Politics, Policy Analysis, Disaster Mitigation.

3.1 Transboundary River Management in Jakarta Metropolitan Area: Case Study Ciliwung River Basin

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Introduction

From the perspective of integrated river management, rivers are best if managed at the watershed level, thus cross-border cooperation is a consequence that needs to be realized [1]. However, transboundary river management can present a complex set of governance problems [2], mainly due to differences in development priorities in upstream and downstream river basin areas [3]. This study aims to examine cross-border institutional governance for the management of the Ciliwung River Basin in the context of flood risk reduction. The results of this study are expected to become the basis for recommendations for comprehensive flood risk reduction initiatives in the Ciliwung River Basin.

Methodology

This research use several methods:

- Literature study on the concept of disaster risk reduction, urban flood management, and adaptive governance to develop flood risk reduction indicators.
- Identification of key stakeholders' roles and responsibilities based on programs related with structural mitigation, non-structural mitigation, awareness, and preparedness, as part of flood risk reduction in the Ciliwung River Basin.
- Content analysis of spatial and development plans (RTRW and RPJMD) and Institutions'
- Accountability and Performance Report (Laporan Akuntabilitas Kinerja Instansi Pemerintah - LAKIP) at the national, provincial, and city/district levels related with the Ciliwung River Basin.
- Discourse network analysis (DNA) to modeling the relationship between programs related to structural mitigation, non-structural mitigation, awareness, and preparedness, as part of flood risk reduction in the Ciliwung River Basin.

- Gap analysis between the institutions' roles and responsibilities (under spatial and development plans) and their implementation performance.

Results and Discussion

This research's initial stage identifies structural mitigation, non-structural mitigation, awareness, and preparedness, as part of flood risk reduction indicators through literature studies related to the disaster risk reduction concept, urban flood management, and adaptive governance. Flood risk reduction indicators are classified into four main variables with 11 indicators, and two supporting variables with 5 indicators. The main variables are structural mitigation, non-structural mitigation, preparedness, and awareness variables. These indicators are then used as the keywords in conducting a content analysis.

Stakeholder identification is conducted by reviewing agencies' main roles and responsibilities based on policy documents at the national, provincial (Jakarta and West Java), and city/district levels (Depok City, Bogor City, and Bogor District). Result of this stakeholder identification shows that there are 37 institutions responsible for structural mitigation, non-structural mitigation, awareness, and preparedness, as part of flood risk reduction in the Ciliwung River Basin, which is 10 from the national level and 27 from the local level.

The 10 national institution consist of: Ministry of Public Works (Kementerian PUPR), Ministry of National Development Planning/National Development Planning Agency (Kementerian PPN/BAPPENAS), Ministry of Environment and Forestry (KLHK), Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Kementerian ATR/BPN), Ministry of Education and Culture (Kemendikbud), Ministry of Research Technology / National Agency for Research and Innovation (Kemenristek/BRIN), Ministry of Communication and Informatics (Kemenkominfo), National Disaster Management Agency (BNPB), Meteorology, Climatology, and Geophysics Agency (BMKG) and the Geospatial Information Agency (BIG). Meanwhile, the 27 local level institution shows in Table 1.

National	Jakarta Province	West Java Province	Bogor District	Bogor City	Depok City
1. Ministry of Public Works and Public Housing	1. Local Disaster Management Office	1. Local Disaster Management Office	1. Local Disaster Management Office	1. Local Disaster Management Office	1. Local Planning Agency
2. Ministry of National Development Planning/National Development Planning Agency	2. Local Planning Agency	2. Local Planning Agency	2. Local Planning Agency	2. Local Planning Agency	2. Local Environmental Office
3. Ministry of Environment and Forestry	3. Local Office of Public Works - Human Settlements and Spatial Planning	3. Local Environmental Office	3. Local Office of Public Works and Spatial Planning	3. Local Office of Public Works - Human Settlements and Spatial Planning	3. Local Office of Public Works and Spatial Planning
4. Ministry of Agrarian Affairs and Spatial Planning/National Land Agency	4. Local Environmental Agency	4. Local Housing and Settlement Agency	4. Local Housing and Settlement Agency	4. Local Communication and Informatics Office	4. Local Housing and Settlement Office
5. Ministry of Research Technology / National Agency for Research and Innovation	5. Dinas Sumberdaya Air Provinsi DKI Jakarta	5. Local Water Resources Office	5. Local Communication and Informatics Office		5. Local Communication and Informatics Office
6. Ministry of Education and Culture	6. Local Communication, Informatics, and Statistics Office	6. Local Forestry Office			
7. Ministry of Communication and Informatics		7. Local Communication and Informatics Office			
8. National Disaster Management Agency					
9. Meteorology, Climatology, Geophysics Agency					
10. Geospatial Information Agency					

Table 1. Key Stakeholder in structural mitigation, non-structural mitigation, awareness, and preparedness, as part of flood risk reduction in the Ciliwung River Basin

Based on the identified 11 indicators above, a content analysis was conducted on the spatial and development plans and Institutions’ Accountability and Performance Report at the provincial and city/region levels in the Ciliwung River Basin. The content analysis results was used to observe the relationship between agencies and programs listed in the document using DNA.

DNA modelling produces two outputs, a network model and a degree of centrality. The network that developed through DNA analysis in this study describe the linkages between institution and the flood risk reduction program, based on the roles and responsibilities and based on the plans and implementation listed in the documents. The degree of centrality is used to compare the activities conducted with each agency's responsibilities and analyzing the gap.

From the results of DNA modeling, it was found that there were several key actors at the national and local levels for each variable. These key actors are the institutions that play the important roles in structural mitigation, non-structural mitigation, awareness, and preparedness, as part of flood risk reduction in the Ciliwung River Basin according to the indicators that have been developed.

For disaster risk assessment variables, the key actors are BAPPEDA Jakarta, DLH Depok City, and Dinas PUPR Depok City. For structural mitigation, the key actors are BAPPEDA Jakarta, DLH Jakarta, DLH West Java Province and West Java Provincial Forest Agency. For non-structural mitigation, the key actors are the Kementerian ATR / BPN, BAPPEDA Jakarta, BAPPEDA West Java, and BAPPEDA

Bogor City. For the preparedness variable, the key actors who play an important role are BNPB, BAPPEDA Jakarta, Diskominfo Jakarta, BPBD Bogor District, BPBD Bogor City, and BAPPEDA Bogor City. For awareness, the key actor is BAPPEDA Jakarta.

From the result of DNA model and degree of centrality, both central and regional agencies have the same focus: data availability related to capacity. Several indicators need more attention at the national level and become a priority in reducing flood risk in the Ciliwung River Basin, include media use to increase flood awareness, flood early warning system, disaster education curriculum, and flood signs. In the local level, programs that need to be prioritized are flood signs, application of technology to reduce flood risk, spatial plans based on flood disaster risk reduction, flood disaster modeling, media use to increase flood awareness, and flood early warning system.

Conclusion

Government from national to local levels takes the initiatives to reduce flood risk in the CRB. These initiatives should be supported with good inter-governmental coordination, considering that the CRB crosses 2 Provinces. There are already programs from each institution with roles and responsibilities related to flood risk reduction in CRB. However, there is still needed to improve the performance of program implementation.

Acknowledgment

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3.2 Governance of DKI Jakarta Province After Capital City Movement

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Introduction

DKI Jakarta Province as the nation's capital has an administrative and diplomatic role, in which central government affairs and international affairs are carried out. On the other hand, DKI Jakarta Province is also part of the Jakarta Metropolitan Area, which acts as a national center for industry and services. Problems arise in the urban areas of Jakarta because of the inadequate capacity of the city to serve multifunctionalities in the city of Jakarta. So that the transfer of state capital is carried out not only as one solution to the problem, but also as an effort to reduce inequalities and equitable development outside of Java.

The relocation of the country's capital still needs regulatory support as a legal support/protection before the program can be implemented. The relocation of IKN will have implications for the current status and form of DKI Jakarta Province, which has been stipulated by Law UU No.29 2007 concerning the specificity of DKI Jakarta as IKN. However, there is currently no clear institutional or status design for DKI Jakarta Province after the transfer of the capital of the country, although discussions on this matter are currently being held at the central government level.

Therefore, this research was conducted with the aim of formulating an alternative form of DKI Jakarta Province institutional form after the relocation of the country's capital. In achieving these research objectives, a precedent study is needed related to the institutional form in the context of the transfer of state capital that has been applied by other countries in the world. This study will also attempt to identify the roles and functions of DKI Jakarta Province after the relocation of the national capital.

Methodology

This research was conducted with a descriptive qualitative study approach. Data was collected through literature review and regulation, stakeholder interviews, and questionnaires. The data is then processed using the analysis method as follows:

(a) Qualitative Descriptive Analysis

This method is used to manage and interpret the data obtained from interviews with stakeholders and discussions between stakeholders in order to produce an overview of the current institutional formulation process of DKI Jakarta Province and the expected institutional forms

(b) Stakeholder Analysis

Stakeholder analysis in this study was conducted to identify key stakeholders in answering this research question.

(c) Qualitative Content Analysis

In this study, content analysis was carried out to obtain patterns in each narrative obtained from each stakeholder, making it easier to achieve understanding and draw conclusions on the conditions that occur.

Result

1. Precedent Study

The precedent study was carried out on various changes in the status of the country's capitals in the world and the influence on their institutional forms. The institutional form of the regions undergoing a change in the status of the nation's capital is influenced by political conditions, the country's governance system, and the role of the city in the national and global context. The precedent study was conducted to get an overview of alternative forms of institutions in regions that have changed the status of the country's capital.

There are several types of state capitals based on their characteristics (Campbell, 2014), including Administrative-oriented capitals and relocated capitals. Relocated capitals itself consists of two types of relocation characteristics, namely 1) moving the administrative center from the old state capital to the new location by maintaining the status of the old state capital, and 2) moving the old state capital to the new location by revoking the status of the old state capital.

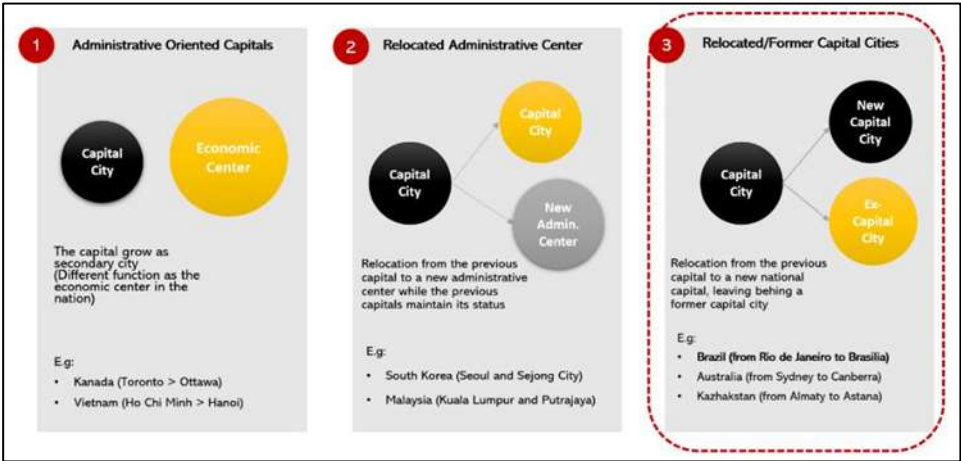


Figure 1. Various types of capital cities based on its function

The results of the precedent study show that the type of the nation's capital based on the characteristics of moving the capital to the new capital is the type of state capital that is most suitable for the case of moving the country's capital in DKI

Jakarta Province. The country of Brazil has become one of the precedents which is quite close to the case of IKN transfer in Indonesia. This can be seen from the characteristics of the City of Rio de Janeiro prior to the transfer of IKN which is close to the characteristics of the Province of DKI Jakarta in terms of economic and government status, namely the City of Rio de Janeiro as the economic center of the State of Brazil and as a special region located one level below the central government. In addition, the City of Rio de Janeiro also acts as an international gateway for the State of Brazil, as is the Province of DKI Jakarta for Indonesia.

After the capital relocation, City of Rio de Janeiro lost its special status and revert back to become a regular city inside a state, with it's own local government. Though it would then forms Metropolitan of Rio de Janeiro with the surrounding cities, since it's development while being the capital of the country grew tremendously in compare to other cities.

2. Role and function of DKI Jakarta after Capital Relocation

Role and function of DKI Jakarta was identified through leading economic sector analysis, strategic issues identification, and analysis of the role National Government had in Development of DKI Jakarta as part of a National Strategic Area in Indonesia.

a. Leading Economic Sector of DKI Jakarta

This analysis was conducted by reviewing regulations and analysing statistic data. Regulation review are conducted to view the direction of economic development set by the government, while statistic datas are used to observe the existing economic growth happening in DKI Jakarta. Regulation reviewed in this analysis including Medium Term Development Plan DKI Jakarta 2017-2020, Spatial Planning DKI Jakarta 2020-2030, and Presidential Decree 60 2020 of Spatial Planning Strategic National Area Jabodetabek-Punjur, while statistic data analysed including GRDP of DKI Jakarta from 2014 to 2018.

Table 1. Leading Economic Sector Analysis in DKI Jakarta

GRDP Analysis 2014-2018	Medium Term Development Plan DKI Jakarta 2017-2022	Spatial Planning DKI Jakarta 2020-2030	Presidential decree 60 2020 Spatial Planning Strategic National Area Jabodetabek-Punjur
Highest Contributor: <ul style="list-style-type: none">Wholesale and Retail Trades SectorManufacturing SectorConstruction SectorFinancial and Insurance Services Sector	Economic Structure: <ul style="list-style-type: none">Wholesale and Retail Trades SectorConstruction SectorManufacturing Sector	Economic Base: <ul style="list-style-type: none">TourismWholesale and RetailCreative IndustryFinance and ServicesHigh Tech and clean Industry	Development of DKI Jakarta towards: <ul style="list-style-type: none">IndustryTrades and services

Based on this analysis, we got several leading economic sectors in DKI Jakarta as follows 1) Wholesale and Retail Trades, 2) Manufacturing, 3) Construction, 4) Financial and Insurance Services; While economic development also directed towards the growth of 1) Tourism, 2) Creative Industry, and 3) High Tech and clean Industry.

b. Strategic Issues in DKI Jakarta

Strategic issues in DKI Jakarta was gathered from multiple resources, one of them was primary survey which conducted through distribution of online forms. This online forms targeted resident of DKI Jakarta. Based on the online surveys, majority issues perceived by the respondents are issues on transportation (especially congestion) and flood management. These issues also confirmed to be the top issues which handling is deemed a priority by the respondent.

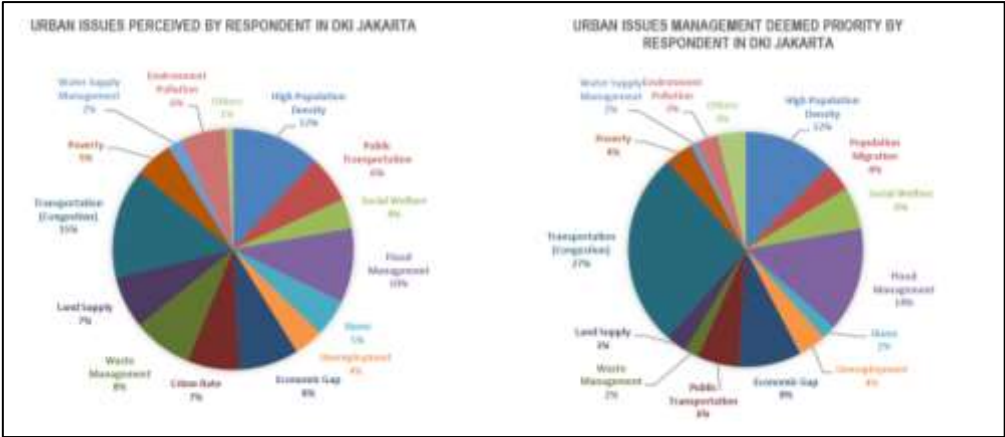


Figure 2. Online Survey’s Result Targeted to Residents of DKI Jakarta

c. Role of DKI Jakarta in National Development

As one of the National Strategic Area in Indonesia, DKI Jakarta Province still has national strategic programmes regulated in RPJMN 2020-2024 as follows:

- 1) National Capital Relocation
- 2) Fast Train Railway Development (Jakarta-Surabaya / Jakarta-Bandung)
- 3) Tourist Destination Development Priority at Kota Tua Jakarta
- 4) Metropolitan Jakarta Area development

Based on Presidential Decree 60 2020, regulation for spatial planning of National Strategic Area of Jakarta-Bogor-Depok-Tangerang-Bekasi-Puncak-Cianjur (Jabodetabek-Punjur), DKI Jakarta Province has a role as the center of the metropolitan area. By given this role, DKI Jakarta Province is expected to pushed development towards the surrounding cities, while the surrounding cities given

the role as supporting system for activities continuity in DKI Jakarta. This regulation also direct DKI Jakarta’s development to be the center for national government development and international scale commercial center in Indonesia.

The management for the National Strategic Area of Jabodetabek-Punjur is stated in the regulation chapter VIII, where the management supposed to be held by minister, head of institution, governer, and mayor whom their authority correspondent with the area’s management. To facilitate the coordination needed in Jabodetabek-Punjur’s management, a governance is formed to perform the spatial planning in Jabodetabek-Punjur. The governance at minimum consists of 1) Minister of National Development Planning, 2) Minister of Home Affairs, 3) Minister of Public Works and Public Housing, 4) Minister of Transportation, 5) Minister of Finance, and 6) Governor of DKI Jakarta, Banten, and West Java Province.

d. Proposed Form of DKI Jakarta Governance after Capital Relocation

From the role and function of DKI Jakarta identified in the previous section, researchers tried to identified proposed form of DKI Jakarta governance by the national government as part of the national capital relocation plan. Information was obtained from stakeholder interview with main actors from national government level, with result as depicted in table 1.

Table 2. Proposed Form of DKI Jakarta Governance after National Capital Relocation

Stakeholder	Form of Governance
Ministry of National Development Planning/BAPPENAS Expert Staff for Institutional Interrelations	Return the government form as an autonomous region, according to the Local Government Constitution of Indonesia
Ministry of National Development Planning/BAPPENAS Director for Regional Development and Special Zones	While returning to local government, it still needs special status to maintain its role as financial and commercial hub

Based on the interview, the form of DKI Jakarta governance after the capital relocation is inclined to be returned as a local government on Provincial Level but with special status given to the governance. The special status needed by Jakarta to maintain its role currently studied by the Provincial Government with the help of Ministry of Internal Affairs.

Discussion

The relocation of IKN outside of Java in accordance with the 2020-2024 RPJMN strategic priority projects has implications for changes in the status and

institutional form of DKI Jakarta Province, so changes / revisions to regulations related to the status and form of institutions are needed. Currently, proposed amendment is being facilitated by the Ministry of Home Affairs Directorate General of Regional Autonomy to be discussed at the Central Government level. This discussion was carried out to produce a proposed bill.

Based on the webinar exposure by Indraprahasta (2020), DKI Jakarta after the removal of the country's capital still has a significant role and function nationally and globally. Nationally, Jakarta is part of the largest Metropolitan Area in Indonesia with a high population growth rate, has a strong network of manufacturing industry centers, and is part of the Jabodetabek- Punjur Urban Area. Whereas globally, the Jakarta Metropolitan area has the potential to play a role as one of the industrial centers in the world. In addition, Jakarta, which has long been a major city in Indonesia, is estimated to continue to be able to continue collaboration and connectivity with other cities globally, such as overseas business relationships that continue to be carried out in Jakarta.

Role analysis of DKI Jakarta identified through DKI Jakarta's leading economic sector, national strategic projects, and national strategic spatial planning previously described would also contribute to the importance of DKI Jakarta in Indonesia, thus in an effort to maintain its role in Indonesia, special status is considered to be vital for the continuity of Jakarta's development, despite it's nature as an autonomous region at Provincial Level.

Aside from that, in the context of spatial planning, which includes handling of strategic issues identified in DKI Jakarta, the governance of DKI Jakarta won't be able to work independently from the national government as part of Strategic National Area, where many issues in DKI Jakarta needs to be managed together with surrounding cities, across different provinces. As an example, in flood and transportation issues, key actors and main actors responsible in handling these issues could be mapped as follows.



Figure 2. Stakeholder mapping of Flood Issue Management in Jakarta

Based on the result of stakeholder analysis, it was found that stakeholders who must be involved in flood management in DKI Jakarta are BBWS Ciliwung-Cisadane and the Jakarta Water Resources Agency (Dinas SDA DKI Jakarta) as key stakeholders. BBWS Ciliwung-Cisadane, which is a structure within the Ministry of Public Works and Housing (Directorate General of Water Resources), is still needed to become the institution that served as umbrella body for river area management flowing across three different Provinces (DKI Jakarta, Banten, and West Java Province), after the relocation of National Capital from DKI Jakarta.



Figure 3. Stakeholder mapping of Transportation Issue Management in Jakarta

While for the management of transportation issues in DKI Jakarta, based on the result of stakeholder analysis, it was found that that stakeholders who must be involved in transportation management in DKI Jakarta as key stakeholders are Greater Jakarta Transportation Agency (BPTJ) and Jakarta Transportation Agency (Dinas Perhubungan DKI Jakarta). BPTJ as a structure within the Ministry of Transportation is still needed to become the institution that served as umbrella body for transportation management within several cities across three different provinces, despite the National Capital relocation.

Since the development of DKI Jakarta as a metropolitan area and as a National Strategic area is heavily related with surrounding cities and many other cities in Indonesia, the role and responsibility of national government in DKI Jakarta after the relocation of national capital could not be laid off.

Conclusion

It can be concluded that the transfer of state capital will affect the status of privileges and institutional forms of DKI Jakarta Province. Preliminary analysis results show that there is the urge from the local government of DKI Jakarta to be granted a special status after the relocation in order to maintain its role as the center development for financial, industrial, and services nationally and globally. Aside from its role, DKI Jakarta also already have a special status as a part of National Strategic Area Development, which in its development would still need intervention from National Government. Thus, further studies are needed to analyze the role National Government needed by local government in its development, which would affect the alternative forms of DKI Jakarta institutions that are appropriate for the specific status and current conditions.

3.3 SDGs and Tourism Development Practice: COVID-19 Impacts on Bali Tourism (Case Study: Bali, Indonesia)

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Research Background

Global tourism is considered to have a significant impact on socio-economic development, including development in Indonesia (WTO, 2011). In 2019, the Tourism Sector was the largest contributor by contributing 15% of GDP. This national contribution was also supported by the absorption of a workforce of 12 million, 15 million foreign tourist visits, and 265 million visits by domestic tourists (Kemenpar, 2019). In 2020, the Tourism sector in Indonesia is facing major challenges with the COVID-19 Pandemic. This pandemic has an impact on the enactment of social restriction policies that are used to reduce the number of victims of the Coronavirus. With these conditions, the tourism sector has experienced a major decline, especially in provinces which make the tourism sector the main driver of its economy. One of these provinces is Bali, which is the gateway to Indonesia's foreign tourism (Setyani, 2016).

Tourism on the island of Bali is the main driver of the economy which plays a role by not only increasing Bali's economy of scale but also expanding Bali's sources of growth to be more heterogeneous than when it was only driven by the agricultural sector (BPS, 2019). In 2018, it reached 6.07 million visits which broke the highest number of visits achieved in 2017. In 2017, Bali's economic growth stood at 6.04%, which indicates that Bali's economy remains stable amidst a slowing national economy (Nyoman, 2017). The tourism sector is very strategic in the economy of the Province of Bali, making the impact of the pandemic in the world giving a big blow to the life of its people. Since February 2020 when the virus began to spread in the world, Bali tourists decreased by 31% compared to the end of 2019. When the first case occurred in Indonesia in March, foreign tourists again decreased to 156,877 people. Until when the Large-Scale Social Restrictions (PSBB) in Indonesia was implemented in April-July, foreign tourist visits in Bali reached their lowest point of 32 people. The Badung City Government to the Bali Provincial Government has confirmed that the decline in international and domestic tourists has had a major impact on Bali tourism (DetikTravel, September 2020).

Therefore, The purpose of this study is to identify the impact of COVID-19 on the course of tourism management and its impact on all actors in the course of tourism. The purpose of this research is to identify the impact of the COVID-19 Pandemic on the Bali Tourism Sector. This research has several objectives:

1. Identifying the impact of the COVID-19 pandemic on the tourism sector in regional economies of scale;
2. Identifying the impact of the COVID-19 Pandemic on tourism business actors and tourism supporters;
3. Identifying adaptation efforts with the COVID-19 Pandemic by tourism sector actors in Bali;

Research Methodology

The research used Questionnaires as the primary data collection method and research documents and statistical data as the secondary data source. In conducting the survey, the questionnaire was carried out in offline method. The total number of respondents targeted in the survey was 150 respondents. The questionnaire survey was distributed to 14 predetermined locations in five (5) districts/cities on the island of Bali with 6% of the total respondents (10 offline respondents and 15 offline) distributed outside these areas. The 14 areas with predetermined targets The location of the focused tourist areas as follows: Kuta, Legian, Seminyak, Canggu, Sanur, Ubud, Tuban/Kartika Plaza, Sunset Road, Nusa Dua, Tanjung Benoa, Jimbaran, Uluwatu, Ungasan, dan Kintamani. The analysis methods include Quantitative Descriptive Analysis and Qualitative Descriptive Analysis. The data is displayed and used as a narrative to describe the conditions. Also, to deepen the study conducted on these impacts, the periods that occurred during the pandemic will be given. The period is divided into 5 times which are described in Table 1.

Table 1. Divisions of the COVID-19 Pandemic Study Period

Period	Explanation
November - December 2019	Before the New Year (first cases in the world)
January - March 10, 2020	Beginning of the Pandemic (before PSBB)
March 10– June 10, 2020	PSBB - closure of foreign and domestic access
10 June 2020 - 31 July 2020	Opening of flights
1 August 2020 - 13 September 2020	Domestic Tourist Opening
13 September 2020 - present	Reenaction of the Jakarta PSBB

Discussion



Figure 1. International Tourist & Hotel Occupation 2019-2020

The impact of the COVID-19 pandemic is also significant on Bali tourism. According to BPS data, foreign tourist visits in August 2020 decreased to -100%. This decline has occurred since April 2020 when the policy of closing international flights was initiated. Data on international passenger arrivals also show the same thing, wherein the third quarter of 2020 there was still a decrease in international passenger arrivals by - 99.92%. Accordingly, domestic tourists also fell significantly. The decrease in visits had a significant impact on tourism business operations. This led to the closure of hotels and tourist destinations (DTW) in Bali. According to PHRI data, the number of PHRI Bali hotel members that are closed as of June 2020 has reached 289 hotels. Meanwhile, the number of DTW closed as of June 2020 reached 288 DTW. It is also shown in Figure 1 about the international tourist number and hotel occupation 2019-2020.

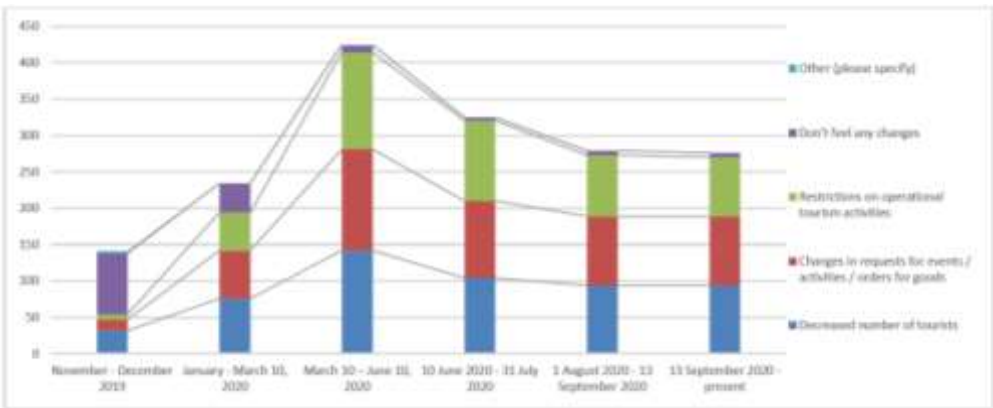


Figure 2. The Impact of the Pandemic on Tourism by Period of Analysis

The declining performance of Bali tourism as a whole has a significant impact on Bali's economic growth. Based on BPS data, Bali's economy has experienced fluctuations in the last 2 quarters. In the first quarter of 2020, the Balinese economy grew -1.14% while at the same time the National economy still grew positively at 2.97%. Then, in the second quarter of 2020, the Balinese economy contracted further, namely growing -10.98%, lower than the national economy which grew -5.32%. The economic growth of Bali in the second quarter of 2020 is spatially the lowest economic growth compared to other provinces in Indonesia.

Impact analysis on micro-scale is done by looking at the results of the information obtained from the research questionnaire. In general, this questionnaire is structured into several parts: working conditions before the pandemic, and the immediate impact of the pandemic. The impact of the pandemic studied specifically focuses on employment and income: monthly income, employment status, occupation, job responsibilities, and job duration. The total number of respondents for the offline questionnaire was 150 people. 40% of respondents before the pandemic worked in the food and beverage supply sector (restaurants, dining establishments, etc.) while 37% worked in the accommodation sector (hotel and villa staff).

Based on Figure 2, it is found that the impact of the pandemic the majority of respondents felt when the first PSBB was implemented when the COVID-19 case was found in Indonesia, namely 10 March - 10 June 2020. The impact of the pandemic in general for tourism that was felt was a.) The decrease in the number of tourists; b.) Changes in requests for events/activities/orders for goods; and c.) Restrictions on operational tourism activities. During this period the greatest impact was felt on tourism actors in Bali. The results of the questionnaire showed:

- The income of tourism operators decreased from the majority in the range of 3,000,000 - 4,000,000 to 1,000,000 - 2,000,000;
- 25% of respondents started to be laid off;
- 23% began unemployment and did not have a second job;
- 63% of tourism operators who are still working in the same field;
- On average 18% of tourist actors who are still working experience changes in work duration or working time (shift);
- 31% of tourist actors who are still working experience multiple duties due to the many layoffs;

Until the period 13 September 2020 - November 2020 when the research was carried out, this condition did not change much.

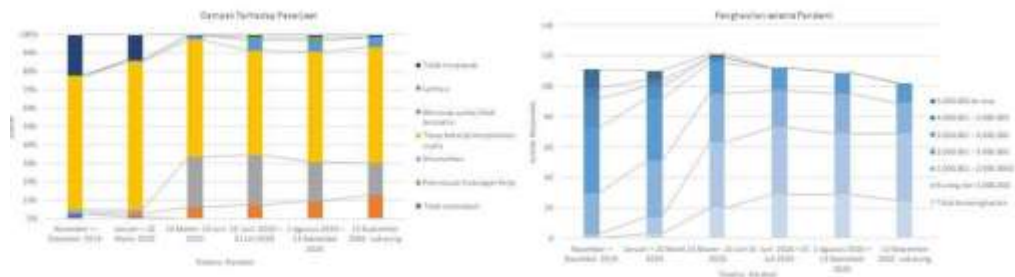


Figure 3. The Impact of the Pandemic on Employment (left) and Income (right) by Analysis Period

In discussing the strategies used by actors of pandemic tourism, several things are reviewed: strategies for fulfilling daily needs, strategies for coping with the impact on employment, and assistance that has been received. The results show that 67% of business operators use savings to meet their daily needs, then use assistance from their parents/family. On the aspect of the impact on work, there are several kinds of answers obtained including: Trying new things by opening a business/trading; Switch professions and study online selling; Implement health protocols; reduce operational costs. Finally, at the point of supports, it was found that the form of assistance received by respondents was basic food (*sembako*). The majority of these necessities are provided by the Traditional Village and the local government. There are other forms of assistance distributed such as cash and procurement of *Kartu Pra-Kerja*.

Conclusion

Bali Province as a province that has a tourism base sector, imposing restrictions on the movement of the population has a significant impact on their daily lives. Since the implementation of the PSBB on March 10, 2020, it can be seen that the economic impacts have begun to be felt on the course of Bali tourism. The impact that has been felt includes a decrease in the number of tourists and a decline in the economic growth rate of Bali. Also, on a micro-scale, business actors have been terminated and many have started changing jobs. Tourism actors who are still working have also experienced changes in terms of working time and responsibilities due to the reduction in labor. In adapting to face a pandemic, many business actors are starting to learn to trade, especially online. Assistance in the form of necessities, cash, and pre-employment cards was also distributed to tour operators for daily life. Based on this research, it can be concluded that the COVID-19 pandemic has a profound impact on the economy, tourism in Bali, and tourism actors. Therefore, in formulating a strategy to restore tourism to pre-pandemic conditions, a comprehensive review of both macro and micro is needed to overcome all its impacts.



Figure 4. Research Documentation

3.4 The Use of Big Data Analytics in Public Sector Responding to COVID-19 Pandemic: Case Study of Indonesia's Health and Transportation Sectors

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This article is the first part of a research project funded by the P3MI, Institut Teknologi Bandung. It seeks to address the project's first objective: to identify the state of the practice of exploiting big data for planning and policymaking globally. The study employed a systematic review of peer-reviewed journal articles from planning, social science, and public administration literature. The findings from this study would contribute to the existing understanding of opportunities and challenges in exploiting big data to inform planning and policymaking processes.

Introduction

Urban planners and policymakers alike are required to respond to the ever-changing environment with timely and sound planning and policy recommendations. However, public efforts to respond to these fast-paced changes of urban, national, and global contexts are often undermined by the lack of reliable and valid data and information. Traditionally, urban planners and policymakers rely on formal data generated and collected by the public organizations and government agencies. Nevertheless, these data are often stored in a way that is often unusable, inaccessible to the public, unstructured to provide meaningful insights, poor quality, and out-of-date[1]. Fortunately, advancements in information technologies in the past decade, have brought unprecedented opportunities with regards to data for planning and policy analysis. There has been a proliferation of data that vary in terms of the nature of objects (static vs dynamic), granularity (e.g., individual, city, or national level), temporal nature (delayed vs real-time), and volume (i.e., big data)[1]. The emergence of big data as an alternative to traditional forms of data has garnered widespread interests among urban planners and policymakers to promote sound data-driven planning practices and public policies. Despite the growing interests in this topic, the extent to which the use of big data has contributed to improved planning practices and policies is still unknown [2]. This study seeks to

contribute to the existing understanding of opportunities and challenges in exploiting big data to inform planning and policymaking processes.

Methods

Analytic Overview

This study used a systematic literature review method to summarize, analyze, and synthesize current literature on big data governance for public sector [3]. We adapted the guideline of conducting systematic literature review [4, 5] to ensure the validity, reliability, and replicability of the study. First, we framed the research question that is “what is the current state of big data governance for planning and policy making?” Next, we developed a research strategy that involved the selection of keywords and article databases. The next step was the review process, which included the screening of articles based on inclusion and exclusion criteria, and quality assessment of the articles. We proceeded with the following step to extract relevant information for the analysis. The final steps include data synthesis and reporting.

Search Strategy

We searched peer-reviewed journal articles published from 2000 to 2020 from the following databases: Academic Search Complete, Business Source Complete, Applied Science & Technology Source, MEDLINE with Full Text, EconLit with Full Text, Social Sciences Full Text (H.W. Wilson), Computer Source, Public Administration Abstracts. These databases covered literature that is relevant to the study objective.

Because articles discussing big data governance of big data for public sector specifically are limited, our review study combined keywords that would capture the concept of “big data” and public sector activities. To encompass the concept of “big data” our search terms included "big data," "data mining," and "data science". Although our focus was to search articles that were relevant to the research topic of big data application in planning and policy making, we also used broader related terms to capture a myriad of public sector activities. Thus, we included "government," "public sector," "government program," "public policy," "government service," "public service," "urban management," "urban planning," "land use planning," "city planning," "public administration," and "public management." We used Boolean operators to improve precision in the literature search process.

Review Process

Articles were eligible for the review process if they met our prespecified inclusion and exclusion criteria (Table 1). The inclusion criteria were peer-reviewed, academic journal articles, English language articles, original empirical and/or case studies, and articles published from 2000 to 2020. The exclusion criteria included non-academic text (e.g., news, interview, magazine, etc.), book reviews, editorial, review articles, summaries of meeting or conferences. This study did not focus on any particular country.

Table 1. Inclusion and exclusion criteria

Inclusion Criteria	Exclusion criteria
<ul style="list-style-type: none">• Peer-reviewed, academic journal articles• English language articles• Fields of social science, information and computer science, economics, urban planning, public health• Empirical studies and/or case studies• Articles focusing on the application/use of big data in public sector settings	<ul style="list-style-type: none">• Non-academic text (News, interview, magazine, etc.)• Book reviews, editorial, review articles• Summaries of meeting or conferences

Data Extraction and Synthesis

From the selected articles, we extracted the following information for analysis: research question/research objective, study design, big data used/definition, use of big data/purposes, implementation/research context (pilot project, proof-of-concept, program, policy, etc.), source of big data, privacy confidentiality issues, data ownership, key findings. The final selected studies were grouped based on major the themes in big data governance. The selected studies would also be organized by the form of data used for the initiatives, which include traditional and new forms of data. We also identify any issues arising from the use of data in each respective case (e.g. privacy, interoperability, ownership, etc.)

PRELIMINARY RESULTS

Figure 2 presents the flow diagram of the process of identifying and including articles for this review. We initially retrieved 1,112 records from the database search. After removing duplicates, we had 857 records for title and abstract screening process. We screened out literature records based on articles’ titles and abstracts for duplicates, non-academic texts, book review, editorial, and non-English articles. We also excluded conference papers, summary of meetings, book reviews, editorials, and review articles. In the next step, we reviewed articles using the same inclusion and exclusion criteria for eligibility. Additionally, we assessed articles for inclusion based on whether the studies were empirical and/or case studies research, focused on application/use of big

data in public sector settings. In the last step, additional records were also added in the selection if the articles fit the inclusion criteria.

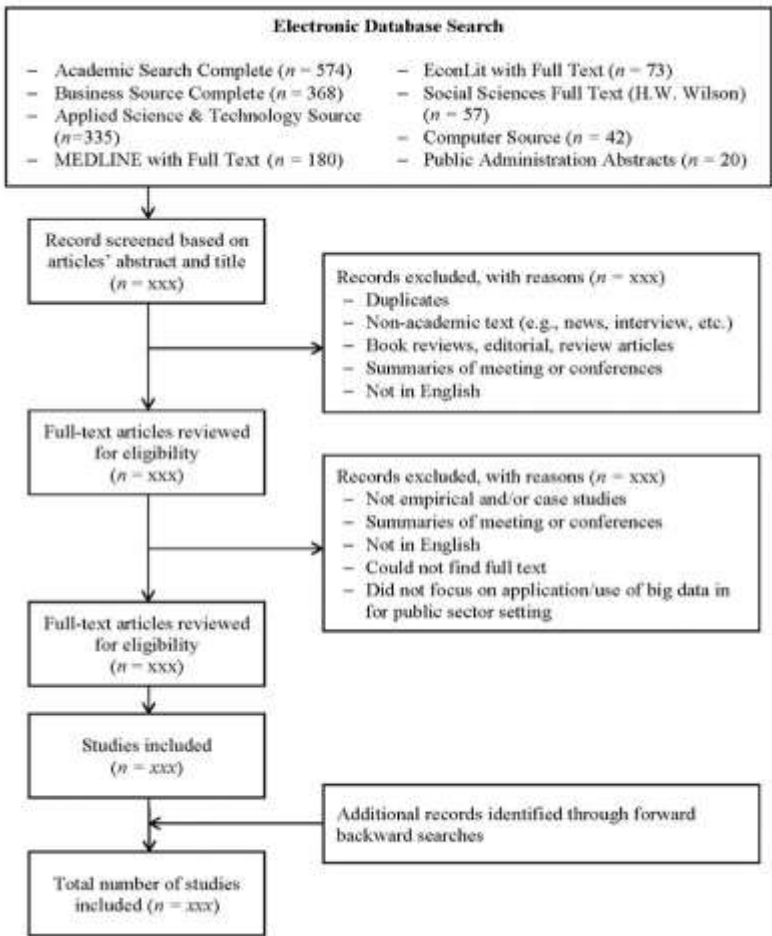


Figure 2. Literature Search and Evaluation of Inclusion

CONCLUSION

Our study’s results are pending upon the completion of the screening and review process of articles. We expect that our study would provide a better understanding of the potentials and opportunities of exploiting big data in advancing data-driven policymaking and planning practices. We also expect that our study would also elaborate the current state of persistent challenges surrounding the use of big data in policy

making and planning processes, which include data representativeness, result validity, roles of citizens' views, and the lack of data analytical skills in public sectors [4].

ACKNOWLEDGMENT

We are grateful for receiving funding from the P3MI program at Institut Teknologi Bandung.

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Regional & Rural Planning

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This research group aims to be the center of research in regional and rural planning, promoting regional research groups, integrated, equal, and sustainable rural and regional areas. This research group covers broad aspects, divided into three main topics, namely Environmental Management and Planning, Regional Policies and Governance, and Transformation of Rural and Society Development.

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4.1 Urbanization and Urban Development Patterns in Indonesia 2005 – 2015

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- 2. TEAM MEMBERS : Fikri Zul Fahmi,
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The process of urbanization in Indonesia is reflected in the spatial patterns of urban population growth between 2005 and 2015, and an increase in the number of urban localities. Economic activity in Indonesia is also becoming more concentrated in urban areas, especially in the bigger metropolitan regions. It seems that the peripheries of metropolitan regions are becoming more urbanized, as most cities and districts around the core cities of metropolitan regions experience higher population growth than their corresponding core cities. On average, the islands outside of Java experienced a higher rate of urbanization than that of the highly urbanized Java, marked by the higher rate of urban population growth. This presents a challenge for central and local governments across Indonesia to manage the growth of urban regions.

Introduction

In the last two decades, the phenomenon of urbanization has become the focus of attention from various groups, not only because of its theoretical approach, but also the increasing number of countries, especially developing countries that experience this phenomenon. It has implications for various aspects of development, both related to the provision of basic infrastructure, agglomeration of economic activities, to the extent associated with institutional changes in the region. Besides, the percentage of people living in urban areas, especially in big cities in Southeast Asia, tends to increase. A study conducted by the Institute of Southeast Asian Studies (2010) found that in 1950, the percentage of urban population was 15.4% and increased sharply to 41.8% in 2010 or as many as 245 million people lived in cities in Asia Southeast. This study also estimates that the urban population will reach 49.7% of the total population by 2025. The high rate of urbanization is due to improved technology in agriculture and better levels of public services in urban areas (Hauser and Gardner 1980). It leads to increased urbanization to get better livelihoods (Ramachdanra, Aithal, and Beas 2014; Haggblade, Hazell, and Reardon 2010).

This urbanization process will lead to regional development (Verzosa and Gonzalez 2010), both planned developments, such as in the form of new cities and unplanned developments that will lead to the formation of urban sprawl (Ramachdanra, Aithal, and Beas 2014). The most noticeable impact of regional development is the expansion of built-up areas in urban centers that cross

administrative boundaries and cover diverse economic activities (McGee, 2012; Champion & Hugo, 2004). This intensive urban development will form a conurbation and become a very large urban area (Weber and Puissant 2003; Yang and Lo 2003; Masek, Lindsay, and Goward 2000). In literature, it referred to as metropolitan (Hudalah and Firman 2012; World Bank 2010; Scott 2001; Firman 1997), which is an area with a large concentration of population with economic and social unity that characterizes city activities. Subsequent urban development is no longer confined to the metropolitan area. Still, it has developed into a wider area where network links arise between the metropolitan area and the surrounding area, especially for settlements, industry, and commercial (Marull et al., 2013; Pezzagno and Docchio 2011). The more integrated network infrastructure of roads, railroads, and airports (Marull, Font, and Boix 2015; Woo et al., 2008), and the more integrated economic activities from upstream to downstream. Florida, Gulden, and Melldaner (2008) state that the formation of this megaregion is not just a larger version than the metropolitan area, but the emergence of enormous economic integration and increased interaction between centers of innovation, production, and consumption. This megaregion phenomenon shows a shift in urban patterns from monocentric to polycentric (Arrisbas-Bel & Sanz-Gratia, 2014; Feng et al., 2009; and Mori, 2008).

The phenomenon of mega-urbanization that led to the formation of this megaregion is indicated to occur in Indonesia. Firman (2009) found that there are seven characteristics of mega-urbanization in Indonesia. It is characterized by the development of economic activity on a global scale, the division of functions between the core and its periphery in big cities, the change from one core to multi-core in urban areas, land-use change in the city center and the conversion of agricultural land into suburban, urban land use, the development of large-scale urban infrastructure, the excessive use of space, and the increasing number of commuters and commuting times in Indonesia. Another study conducted by Firman (2015) further strengthened this argument wherein the 2000-2010 period, Indonesia's urban population increased by 39%, from 41.9% to 49.7%, and 68% of them lived in Java. Detailed findings from the study also state that this urban growth no longer only occurs in 5 big cities that are the centers of Indonesia's economic concentration (Greater Jakarta) but also occurs in other cities such as Palembang, Semarang, and Makassar. Even urban population growth in big city periphery areas tends to be much faster than the core of the city itself. Murakami et al., 2003 in Hudalah et al. 2013 also reinforce the argument that there has been a phenomenon of mega-urbanization in one region in Indonesia by finding Jabodetabek, one of the metropolitan areas in Indonesia located on the island of Java, is the most urbanized megacity in Southeast Asia.

The issue of contemporary urbanization in developing countries, including Indonesia, is different from urbanization in developed countries (Cohen, 2004). It makes research on urbanization more interesting to do. The blurring of boundaries between rural and urban is marked by the strengthening of the global economy (Firman, 2017). Some of the results of the new global economy include traditional rural-urban differences, some urban centers experiencing spatial polarization, and mega-urban areas that form around the city center. Firman (2015) also added that urbanization is also associated with a shift in the economic structure from agricultural to industrial and service sectors. This condition encourages the issue of mega urbanization to be seen as a comprehensive urban phenomenon.

The process of mega-urbanization in Indonesia (Firman, 1997b, 2004, 2015 and Firman et al., 2007), even specific to Java (McGee, 1987, 1991, 2012; Firman, 1992, 1997a, 2003, 2017) has been studied continuously with using population and specific data. The results of these studies indicate the increasingly expansive urbanization in Indonesia in major cities in Indonesia, especially in Java. It reflected in the intensification of the formation of massive urban corridors, such as Jakarta-Bandung; Jakarta-Cirebon-Semarang-Surabaya; and Yogyakarta-Semarang, which made it an "island of mega-urban regions." Besides, Firman (2015) added that small and medium cities outside Java showed faster urban growth than cities on Java, indicating that in the future, economic centers outside Java would play an important role in the Indonesian economic structure. By considering the globalized development, this research is needed to renew and assess the continuity and change in the megaregion's formation in Indonesia at the macro level during the period 2005- 2015.

Methodology

To show the current patterns of urbanization and the formation of mega-regions, the analysis in this study focuses on urban populations, urban population growth, and urban employment structures in all cities/districts in Java and spatial patterns of land-use change. The main data needed for this research is the 2005 and 2015 Intercensal Population Survey (SUPAS) data.

Quantitative descriptive analysis is used to determine the level of population growth, the percentage of population employment per sector, the contribution of each city's GRDP to national GDP. Furthermore, the analysis is strengthened by spatial analysis, which is an effort to manipulate spatial data into various forms and extract new notions as a result. With spatial data (data that has geographical references), the visualization can be used to prove hypotheses about patterns or groupings in geographical space and the role of location on human activities and environmental systems (Mac Eachren 1995 in Rustiadi, Panuju, and Saefulhakim 2003). The use of spatial analysis is intended to determine the spatial patterns of

urbanization in Indonesia, focusing on gradual changes in areas from 'rural' to 'urban,' the sustainability of mega-urbanization, shifts in urban employment structures, and the development of small towns and medium cities. Besides, spatial analysis is also used to describe changes in non-residential land use in settlements in the territory of Indonesia.

Results and Discussion

Table 1: Proportion of Urban Localities (Village / *Kelurahan*) in Indonesia, 2005-2015

Region	2005*			2010			2015		
	Urban	Total	%Urban	Urban	Total	%Urban	Urban	Total	%Urban
Java	7,445	24,931	29.9%	9,239	25,202	36.7%	9,225	25,276	36.5%
Outside Java	4,576	43,646	10.5%	6,547	51,924	12.6%	7,019	56,598	12.4%
Indonesia	12,021	68,577	17.5%	15,786	77,126	20.5%	16,244	81,874	19.8%

Source: Village Master File Documentation (MFD), Indonesian Central Statistics Agency
*In 2005, there were 1,603 localities outside Java that were not included because of their statuses were blank in the data, so the actual total was 70,180 localities.

The number of urban localities (village / *kelurahan* as documented by the BPS or the Central Statistics Agency) in Indonesia increased from 12,021 to 16,244 in the period 2005-2015, thereby increasing the proportion of urban villages/villages from 17.5% to 19.8% in the same period (Table 1). When separated, it appears that the increase in the percentage of urban localities in Java is more significant, from 29.9% to 36.5%. It is different from the increase that occurred outside Java, from 10.5% to 12.4% in the same period. Provinces outside of Java that experienced the highest increase in percentage were East Kalimantan, where there was an increase from 12.0% to 19.2%, followed by West Nusa Tenggara (23.5% to 29.2%) and Bali (33.7% to 37.6%).

Table 2: Urban Population in Indonesia, 2005-2015

	Java	Outside Java	Indonesia
SUPAS 2005*			
Total Population	128,025,689	85,349,598	213,375,287
Urban Population	63,246,333	28,758,736	92,005,069
Proportion of Urban Population	0.494	0.337	0.431
Share of Urban Population	68.74%	31.26%	100%
SP 2010			

	Java	Outside Java	Indonesia
Total Population	136,610,590	101,030,736	237,641,326
Urban Population	79,949,854	38,370,402	118,320,256
Proportion of Urban Population	0.585	0.380	0.498
Share of Urban Population	67.57%	32.43%	100%
SUPAS 2015			
Total Population	145,013,573	110,168,571	255,182,144
Annual Population Growth (average, 2005-2015)	1.25%	2.59%	1.81%
Annual Population Growth (average, 2010-2015)	1.20%	1.75%	1.43%
Urban Population	90,825,696	44,787,390	135,613,086
Proportion of Urban Population	0.626	0.407	0.531
Share of Urban Population	66.97%	33.03%	100%
Annual Growth of Urban Population (average, 2005-2015)	3.69%	4.53%	3.96%
Annual Growth of Urban Population (average, 2010-2015)	2.58%	3.14%	2.77%

Source: Publication of the 2005 SUPAS Results, the 2010 Population Census, and the 2015 SUPAS (BPS RI)

*The population data from SUPAS 2005 did not include the province of Aceh and Nias Regency (part of the North Sumatra province). This affects the total number of the Outer Java and Indonesia regions for 2005. It is estimated that there are around 5.5 million people in Aceh and Nias who were not included in population data for 2005.

The results of the Inter-Census Population Survey (SUPAS) in 2005 and 2015 showed that when Indonesia's total population increased by nearly 20% from 213.3 million to 255.2 million during 2005-2015, the urban population increased by 47.4% from 92 million to 135.6 million people (Table 2). It shows a significant increase in the proportion of the population living in urban areas from 43.1% to 53.1%, where more than half the population lived in urban areas in 2015. Of the 135.6 million urban population, around 90.8 million (67%) lived in Java, and 44.8 million others (33%) live on other islands. During the period 2005-2015, Indonesia's urban population grew by 3.96% per year, higher than the overall population growth of 1.81% per year. If separated, urban populations outside Java experienced higher growth where the growth rate reached 4.53% per year, while urban populations on Java experienced growth of 3.69% per year.

Table 3: Population of Big Cities in Indonesia and Their Growth Rates, 2005-2015

	Population	Growth Rate
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City	2005	2010	2015	5-year growth (10-15)	Annual growth (10-15)	10-year growth (05-15)	Annual growth (05-15)
Jakarta*	8,841,737	9,586,705	10,130,863	5.68%	1.11%	14.58%	1.37%
Surabaya	2,611,506	2,765,487	2,847,480	2.96%	0.59%	9.04%	0.87%
Bekasi	1,993,478	2,334,871	2,708,721	16.01%	3.01%	35.88%	3.11%
Bandung	2,288,570	2,394,873	2,480,615	3.58%	0.71%	8.39%	0.81%
Medan	2,029,797	2,097,610	2,209,139	5.32%	1.04%	8.84%	0.85%
Depok	1,374,903	1,738,570	2,099,989	20.79%	3.85%	52.74%	4.33%
Tangerang	1,451,595	1,798,601	2,043,213	13.60%	2.58%	40.76%	3.48%
Semarang	1,438,733	1,555,984	1,698,777	9.18%	1.77%	18.07%	1.68%
Palembang	1,342,258	1,455,284	1,578,582	8.47%	1.64%	17.61%	1.63%
South Tangerang**		1,290,322	1,538,970	19.27%	3.59%		
Makassar	1,194,583	1,338,663	1,447,677	8.14%	1.58%	21.19%	1.94%
Batam	616,088	944,285	1,184,978	25.49%	4.65%	92.34%	6.76%
Bogor	891,467	950,334	1,046,579	10.13%	1.95%	17.40%	1.62%
Pekanbaru	717,618	897,767	1,035,834	15.38%	2.90%	44.34%	3.74%
Bandar Lampung	790,057	881,801	977,686	10.87%	2.09%	23.75%	2.15%

Source: Population Data from SUPAS 2005, SP 2010, and SUPAS 2015 compiled at www.citypopulation.de

*The city of Jakarta here is a combination of 5 administrative cities in DKI Jakarta: North Jakarta, Central Jakarta, East Jakarta, West Jakarta, and South Jakarta. The Thousand Islands (Kepulauan Seribu) is not included.

The number of cities that have more than a million inhabitants has also increased. In 2005, there were 10 cities with populations of more than one million: Jakarta, Surabaya, Bandung, Medan, Bekasi, Tangerang, Semarang, Depok, Palembang and Makassar. In 2015. The number has become 14 cities with the addition of South Tangerang, Batam, Bogor and Pekanbaru (Table 3). It should be noted that of these cities, six cities, namely Jakarta, Bekasi, Depok, Tangerang, South Tangerang, and Bogor, are within the Jakarta Metropolitan area (Jabodetabek).

When compared with the national annual population growth rate of 1.81%, most of the cities above have lower annual population growth rates, except Bekasi (3.11%), Depok (4.33%), Tangerang (3.48%), Makassar (1.94 %), Batam (6.76%), and Pekanbaru (3.74%). We can see that the growth of the population of cities around Jakarta in the Greater Jakarta area is higher than the population growth of the city of Jakarta itself as the center of the metropolitan area. This phenomenon does not only occur in Jakarta but also occurs in other regions. For example, in the period 2005-2015, the city of Bandung as the center of the Greater Bandung metropolitan area experienced a population growth of 0.81%

per year, while the surrounding area of Bandung (2.07%) and West Bandung regency (1.77%) grew faster.

Another thing to note is population growth from cities outside of Java, such as Makassar, Batam, and Pekanbaru. Batam City in particular experienced rapid population growth from 616 thousand people in 2005 to 1.2 million people in 2015. In addition to the cities above, Bandar Lampung city, with a population of 977 thousand people in 2015 also showed a growth rate relatively high annual population (2.15%).

Table 4: Proportion of Metropolitan Areas' GDRP in the National GDP, 2006-2015

Metropolitan Area	Population, 2010 (million)	Proportion of GDRP in the National GDP		
		2006	2010	2015
Jabodetabek (Jakarta)	28.0	21.3%	22.8%	24.6%
Gerbangkertosusila (Surabaya)	9.1	5.7%	6.4%	6.6%
Greater Bandung	7.6	2.8%	2.7%	2.9%
Mebidangro (Medan)	5.1	2.5%	2.3%	2.3%
Kedungsepur (Semarang)	5.9	1.5%	2.2%	2.2%
Patungraya Agung (Palembang)	3.3	1.3%	1.3%	1.4%
Mamminasata (Makassar)	2.6	0.7%	1.1%	1.3%
Other Cities	21.9	11.7%	12.2%	12.2%
Other Regencies	154.2	52.7%	48.9%	46.4%
Indonesia	237.6	100%	100%	100%

Source: Population Data from the 2010 Population Census compiled on the website www.citypopulation.de, Regional Review Documents Based on Regency / City GRDP from BPS, and GDP data on the site www.bps.go.id.

Urban areas in Indonesia have a large portion in the national economy. The Jakarta Metropolitan Area, which consists of the city of Jakarta and its surrounding cities and districts, contributed 24.6% of the Gross Domestic Product (GDP) in 2015, and the proportion tends to increase during the period 2006-2015 (Table 4) .This proportion is much higher compared to the metropolitan area which has the second largest proportion, namely the Surabaya metropolitan area (Gerbangkertosusila) with a contribution of 6.6% of GDP in 2015. Several other metropolitan areas such as Greater Bandung, Medan, Semarang, Palembang, and Makassar each contributed around 1-3% of GDP. Taken together, the seven largest metropolitan areas in Indonesia contributed 41.3% of GDP in 2015, representing an increase in the proportion of the figure of 35.8% in 2006 from the same region. Outside the seven metropolitan areas, other cities in Indonesia contributed a GRDP of around 12% of GDP, while the

GRDP contribution of other districts experienced a decline in the proportion from 52.7% of GDP in 2006 to 46.4% of GDP in 2015.

The proportion of the core city population from several metropolitan areas tends to decrease. The proportion of Jakarta's population to the Jabodetabek region's population declined from 37.2% in 2005 to 32% in 2005 (Table 5). In the same period, the proportion of the population of the city of Bandung to the population of the Greater Bandung region also declined from 32.3% to 30.2%. The same thing happened in the Mebidangro region with the core city of Medan (42.6% to 40.2%) and the Gerbangkertosusila region with the core city of Surabaya (30.4% to 29.8%). On the other hand, not all metropolitan areas have experienced a decline in the proportion of core city population. The proportion of the Semarang population to the Kedungsepur area in 2015 was 27%, an increase from 25.2% in 2005. The same thing happened in the Patungraya Agung region with the main city of Palembang (43.4% to 44%).

In 2005 Indonesia had 30 provinces, but that number had increased to 34 provinces in 2015 thanks to several provincial divisions. Provinces on the island of Java have relatively high proportions of urban populations, specifically DKI Jakarta, West Java, Banten, and DI Yogyakarta (Table 6). These provinces also experienced an increase in the proportion of the urban population during the period 2005-2015.

Table 5: Proportion of 'Core City' Population to Metropolitan Area Population, 2005-2015

Metropolitan Area	Population	2005	2010	2015
Jabodetabek (Jakarta)	Core City	8,841,737	9,586,705	10,130,863
	Metropolitan	23,786,450	27,957,194	31,652,751
	% Core pop.	37.17%	34.29%	32.01%
Gerbangkertosusila (Surabaya)	Core City	2,611,506	2,765,487	2,847,480
	Metropolitan	8,585,596	9,115,485	9,563,572
	% Core pop.	30.42%	30.34%	29.77%
Greater Bandung	Core City	2,288,570	2,394,873	2,480,615
	Metropolitan	7,076,860	7,624,877	8,223,235
	% Core pop.	32.34%	31.41%	30.17%
Kedungsepur (Semarang)	Core City	1,438,733	1,555,984	1,698,777
	Metropolitan	5,708,344	5,921,631	6,291,632
	% Core pop.	25.20%	26.28%	27.00%
Mebidangro (Medan)	Core City	2,029,797	2,097,610	2,209,139
	Metropolitan	4,768,457	5,079,538	5,496,565
	% Core pop.	42.57%	41.30%	40.19%
Patungraya Agung (Palembang)	Core City	1,342,258	1,455,284	1,578,582
	Metropolitan	3,093,144	3,313,674	3,584,499
	% Core pop.	43.39%	43.92%	44.04%

Metropolitan Area	Population	2005	2010	2015
Mamminasata (Makassar)	Core City	1,194,583	1,338,663	1,447,677
	Metropolitan	2,300,945	2,580,209	2,794,813
	% Core pop.	51.92%	51.88%	51.80%

Source: Population Data from SUPAS 2005, SP 2010, and SUPAS 2015 compiled at www.citypopulation.de.

Several provinces outside Java had a relatively high proportion of the urban population in 2005. Still, they showed an increase during the period 2005-2015, such as the Riau Islands, East Kalimantan, Bali, and North Sumatra. Some other provinces that show a relatively high proportion of the increasing urban population are West Sumatra, Gorontalo, Bangka Belitung Islands, North Sulawesi, and Maluku. When comparing values in 2015, there is a positive correlation between the level of urbanization and the level of economic growth in a province, although not very strong. The Spearman Correlation coefficient between the percentage of the urban population and the provincial GRDP per capita in 2015 was 0.430.

Conclusion

Urban population in Indonesia has increased significantly over the years, but its annual growth has slowed recently although it is still higher than that of the total national population. The growth of urban population outside the island of Java appears to be higher than that of Java. Though it may be because Java was already highly urbanized ahead the other islands, it could suggest that the urban regions outside Java are becoming more significant in terms of their economic activities. In general, economic activity in Indonesia is becoming more concentrated in cities and urban regions, especially the metropolitan areas like the Jakarta Metropolitan Area (Jabodetabek).

Urban development especially in Java can be characterized by the formation of urban belts that span beyond the cities’ administrative boundaries, even linking cities. The peripheries of large cities, which make up the outer parts of metropolitan areas, are undergoing rapid urban population growth, as opposed to slower growth in the core cities.

The study used population data from Indonesia’s Intercensal Surveys of 2005 and 2015, which used sampling as opposed to the 2010 Census which attempted to record every single citizen. They are also macro in character. Nevertheless, this study is an attempt to capture the trend of Indonesia’s urbanization as a whole. Detailed studies with a more focused areas of discussion can be done depending on the needs, and accordingly with the availability of data.

Table 6: Percentage of Urban Population in Indonesia by Province (2005-2015) with GRDP / capita (2015)

Province	Percentage of Urban Population			PDRB/capita, 2015 (thousand Rupiah, current price)
	2005	2010	2015	
Aceh*		28.1%	30.4%	25,808.45
North Sumatra	45.9%	49.2%	52.0%	41,019.54
West Sumatra	29.9%	38.7%	43.9%	34,630.86
Riau	36.6%	39.2%	39.6%	102,887.81
Jambi	27.2%	30.7%	31.6%	45,580.04
South Sumatra	33.5%	35.8%	36.6%	41,201.28
Bengkulu	28.4%	31.0%	32.1%	26,845.61
Lampung	21.0%	25.7%	28.5%	31,153.72
Bangka Belitung Islands	40.9%	49.2%	52.5%	44,425.08
Riau Islands	79.4%	82.8%	84.4%	101,148.53
DKI Jakarta	100%	100%	100%	195,431.68
West Java	51.6%	65.7%	72.3%	32,648.02
Central Java	40.5%	45.7%	48.5%	29,933.75
DI Yogyakarta	59.1%	66.4%	70.2%	27,571.53
East Java	40.8%	47.6%	50.8%	43,541.40
Banten	52.8%	67.0%	69.0%	40,091.23
Bali	50.7%	60.2%	65.3%	42,480.08
West Nusa Tenggara	35.3%	41.7%	45.3%	21,851.53
East Nusa Tenggara	15.6%	19.3%	21.5%	14,867.16
West Kalimantan	26.9%	30.2%	32.8%	30,619.33
Central Kalimantan	28.9%	33.5%	37.0%	40,105.06
South Kalimantan	38.1%	42.1%	44.9%	34,351.69
East Kalimantan	56.5%	62.1%	66.7%	147,405.43
North Kalimantan**			47.6%	96,150.38
North Sulawesi	37.3%	45.2%	48.9%	37,786.58
Central Sulawesi	20.0%	24.3%	27.2%	37,394.89
South Sulawesi	30.2%	36.7%	40.4%	39,950.48
Southeast Sulawesi	21.8%	27.4%	31.8%	35,092.25
Gorontalo	26.0%	34.0%	38.7%	25,143.39
West Sulawesi**		22.9%	20.4%	25,728.07
Maluku	28.7%	37.1%	39.9%	20,365.60
North Maluku	24.5%	27.1%	27.5%	22,917.73
West Papua**		30.0%	39.0%	72,159.85
Papua	26.1%	26.0%	27.1%	47,726.07
Indonesia	43.1%	49.8%	53.1%	45,180.00

Source: Publication of the 2005 SUPAS Results, the 2010 Population Census, and the 2015 SUPAS and GDP per capita and GDP data from the BPS RI website (www.bps.go.id).

*Percentage of Aceh's urban population for 2005 is not yet available.
**The provinces of West Sulawesi and West Papua were not yet established in 2005 and the province of North Kalimantan was only established after 2010.

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4.2 The Maritime Silk Road Policy Potential Effect Towards The Outer Island Development

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The development of outer islands or small border islands has begun to be widely discussed in the development theory literature. The development of the island area is emphasizing on the role of the state, focusing on economic growth, attracting many investors and building massive infrastructure such as roads, dams, airports and port facilities to increase accessibility (Selwyn, 2011; Clark, 2009; Persoon & Simarmata, 2015). This kind of development attracts investors from global and national. This type of development requires a lot of funds and investors, both foreign and domestic investors. For foreign investors, one of the policies that are currently being initiated and will affect the outer islands of Indonesia is the Maritime Silk Road. On the other hand, the government has also prepared an exogenous form of development for the outer islands which is realized in the form of industrialization.

Industrialization and modernization will increase many stakeholders and make changes to the co-management pattern of the island's natural resources. It also can increase the potential for conflict in management (Pomeroy and Berkes, 1997; Torre-Castro, 2006). These changes cannot be captured by a quantitative approach that emphasizes income and other material values as a quantification of an area's underdevelopment (Grydehoj & Hayward, 2014). The impact that occurs must be seen socially with a qualitative approach to the life of the island community. Social impact can be defined as all the social and cultural consequences on the human population from any public or private action that changes the way people live, work, interact with others, organize to meet their needs, and generally cope as members of society (Burdge and Vanclay, 1996). The social impact has the same degree of urgency as the economic impact generated by a policy, therefore it is necessary to carry out an analysis of the social impacts that occur on island communities, particularly fishing communities due to exogenous development from the center.

By knowing the social impact, policymakers will be able to predict changes that occur in local communities, such as fear, anxiety, distrust of programs which will certainly affect attachment to place, social capital, and community welfare which is the goal of creating development in an area (Vanclay et al, 2015). This social impact will be measured by a Social Impact Analysis (SIA) as a tool to assess the social and cultural impacts of industrial activities on indigenous peoples and can increase the positive impact on society (Esteves 2008, Joaño et al. 2011). The SIA approach will identify the social impacts of the development of the Integrated

Marine Fisheries Center (SKPT) in accordance with the Ministerial Decree Number 40 / PERMEN-KP / 2016 concerning the Assignment to Implement the Development of Integrated Marine and Fisheries Centers in Small Islands and Border Areas applied to Natuna Regency as one of the outer islands in Indonesia.

Identification will be carried out on 1). Awareness of the community; 2). Cohesion and the formation of social networks between communities; 3). Participation in decision making both internally and with other parties; 4). Equitable distribution of income, quality of life and level of happiness. This identification will explore the rights of local communities that should be considered in the context of fisheries industrialization. Data collection was carried out through FGD (collecting public opinion on the industrialization of fisheries being built) and in-depth interviews to obtain primary data on Pulau Tiga (5 key informants) and Pulau Sedanau (4 key informants).

Changes that occurred due to the SKPT's development can be divided into changes in the upstream and downstream sides.

Table 1. Changes in Fisheries Management on Island

Upstream Side	Downstream Side
<div>1. Increasing operational cost of fisherman to get the fuel and ice because SKPT located in Selat Lampa (southern tip of Natuna Regency)</div> <div>2. The mismatch of fishing gear on ex-cantrang relocation to EEZ North Natuna, has made ex-cantrang fishermen go to the territorial sea (local fishing ground). The local compete with the ex-cantrang fishermen</div> <div>3. Change on fishing days duration (from 1 day to 3-5 days) and fishing ground (from <12 miles to >70 miles)</div>	<div>1. Increasing operational cost of fisherman to land the catch due to Selat Lampa location</div> <div>2. Price takers in the bussines industry. PERINDO didnt give transparant price</div> <div>3. Lack of managerial capacity in PERINDO as bussines operator</div> <div>4. The emergence of new traders as a patron</div>

Source: Primary Data (In-depth interview with Pulau Tiga's and Pulau Sedanau's Fishermen)

Those changes have social impact on the local fishing communities on the island. **The first** is related to awareness of the community and social cohesion. The current formal institutions are directed by the government and not a genuine desire from the community. It should be noted that the local Natuna culture is very solitary. This can be seen from the capacity of the ship which can only be boarded by 1-3 people, they do not work with other people. Some local institutions being inactive and creates jealousy among members or other groups. For example, the decision to provide assistance, training to a certain group caused envy in other fishing communities, which had never happened before.

The institutional formation process that occurred in the Natuna fishing community was not successful even though various facilities and large funding had been provided. For this reason, the industrialization program that is built in it must contain a vision, mission, values, rules, perspectives that can be translated into fishermen's institutions at the community scale, not just a matter of building facilities and infrastructure (Jentoft, 2014). **The second** is the formation of networks and social cohesion. It is certain that there is a social network that is already very attached to the fisheries community (Miñarro et al, 2016; Turner et al, 2014). The existing social network in the local Natuna fishing community has a patron-client pattern. However, actors such as the market or fishing business actors from outside the region have actually opened up other networks, both with new players from the center and with new local players arising from SKPT activities. These newcomers come from the fisheries business chain or local political actors who take advantage of the momentum of the industry on the island of Natuna. **The third** is participation, both internal and external to the community. The level of participation of fishermen is basically quite good in internal institutions. This is especially for fishermen associations or cooperatives that created on the initiative of their leaders. In Pulau Tiga, the head of village took the initiative to create an association of fishermen for Pulau Tiga which was continuously active in holding meetings and activities. However, it needs to be admitted that they still need to improve their organizational skills so that external participation can further develop. **The fourth** is income inequality. Local fishermen feel that they have not benefited too much from the integrated fishing industry in Natuna. From the results of interviews with the Pulau Tiga Subdistrict fishermen, most of the fishermen thought there was no difference in income before and after the construction of the SKPT. In fact, they are now being disadvantaged by the transfer of ex-cantrang fishermen to the territorial sea. Actually, ex-cantrang fishermen have fishing areas in the EEZ, but because they are not suitable in terms of their fishing gear, they move to shallower seas. This has led to several fishermen, based on interviews with fishermen from Sedanau Island, into conflict with migrant fishermen.

The SKPT of Natuna Regency has had several social impacts. We also found the emergence of new actors and networks with different perspectives in encouraging the progress of island development. Through these key figures, it is hoped that there will be bright hopes for realizing a growth center in accordance with the archipelago version. This should be the main task of local leaders and fishing communities in order to minimize social costs. In addition, this approach also shows the elimination of institutional roles that will complicate program implementation, such as the limited role of the District Fisheries Service Agency. It is hoped that this vacant role can be replaced by other institutions if the rules cannot be changed, such as the sharpening of the roles of representatives of the Provincial Marine and Fisheries Service in Natuna District, or the roles of other local institutions. For this reason, it is also important to foster and develop local institutions to increase participation in development.

It is also necessary to identify people's perceptions of past, present and future developments. Local fishermen have sovereignty over their own seas. With the pressure of many migrant fishermen and the rapid expansion of the fishing industry, the government must continue to protect the local fishing activities that fishermen have been doing so far. This means that there are conditions that are less agreeable to them in the current development process. If this condition is left unchecked, it will have the potential to create conflicts which will be counterproductive to the development process. In addition, there is a need to identify local knowledge and use of local knowledge in island development policies so that there is no longer a mismatch between policies and field conditions such as what happened in the transfer of ex-cantrang fishermen to the EEZ region of North Natuna.

4.3 Social Transformation of the Outer Islands Region Due to Infrastructure Development

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In archipelagic countries, outer islands is one of the periphery areas that recently discussed. Its remote location, limited accessibility, limited resource potential, makes development carried out with an exogenous development approach. The use of exogenous development such as the development of the fishing industry on the outer islands will certainly have an impact on the island communities. This paper will analyze the social impacts experienced by fishing communities as a result of massive infrastructure development and financial penetration from the center. The analysis was carried out with Social Impact Analysis (SIA) and located in Natuna Regency, Riau Islands Province, Indonesia. Sources of data obtained from interviews with stakeholders and analysis of content in related documents. From the results of the study illustrated that the financial penetration carried out by the center provides changes to the social structure of fishermen who have long been formed. Changing social order has the potential to marginalize the fishing community if it is not immediately recognized by the central government.

Introduction

Development of the outer islands has been discussed recently in island development literature. In Friedman's (1966) core and periphery model, these areas are called Resource Frontier Regions because of their remote location and their potential of resources. The area which is still lacking in development, is now beginning to be developed by attracting many investors and building massive infrastructure. Development approach on small islands have traditionally focused on economic growth, with an emphasis on the state perspective and economic aid [1;2]. The development is expected to increase better opportunities for improving the welfare of the island community. Infrastructure development such as roads, dams, airport and harbour facilities can lead to the integration of isolated areas into wider socio-economic activities because of increased accessibility [3].

However, development that aims to improve welfare and eliminate the marginality of an area will cause a shift in the pattern and social order of the traditional community. Modernization will also bring changes to the island community. Even in the modernist thought, the nature of traditional community is the cause of backwardness [4]. This is contrary to the characteristics of the island which inhabited by traditional communities. For traditional communities or islanders, their social life is a way of life that they maintain for generations. As

small places, all events in islands, exogenous and indigenous will interact and can affect the vulnerability [5]. The insular characteristics of island communities, make people maintain their traditions, maintain their thinking, different ways of socializing and various other characteristics that tend to be closed to the outside world. Although community social networks of island can build resilience to adapt unexpected change, but not all communities can survive among the changes [6]

Shifts that occur in these communities can not be captured only with a quantitative approach that emphasized on income and other material values as quantification of underdevelopment to access external funds [7]. Many quantitative approach try to evaluate in order to show the results of projects [e.g 8,9,10]. They tried to look the social impact but in a quantitative ways. The shift should be explored by looking at the social impact qualitatively on the welfare of the island community. Social impact can be defined as all social and cultural consequences to human population of any public or private actions that alter the way in which people live, work, interact to another, organize to meet their needs, and generally cope as members of society [11]. Social impacts have the same degree of urgency as the economic impacts produced by a policy and need to be treat as qualitative indicators, so it is important to analyze the social impacts qualitatively that occur on island communities, especially fishing communities due to massive development from the center.

The ignorance of looking social impacts genuinely can cause adverse effects on local people, such as fears, anxieties, untrust about the project and impacts on senses of place, social capital, and wellbeing of communities. If projects fail to properly address social impacts matter, it will decrease support from local communities to implement or run a particular project, potentially causing serious financial setbacks for investor. This social impact will be evaluated by Social Impact Analysis (SIA) as a tool to assess social, and cultural impacts of industrial activities on indigenous communities and can enhance positive impacts to the communities [12;13]

Methodology

This article using SIA to answer the research problem. The objective of SIA is to ensure that the developments (or planned interventions) that do occur maximize the benefits and minimize the costs of those developments, especially those costs borne by the community. SIA is a tool to assess the economic, social, and cultural impacts of industrial activities on indigenous communities. This is particularly relevant for the extractive industries, whose activities frequently encroach on the lands and waters that indigenous peoples depend on for their traditional livelihood activities. An SIA identifies potential impacts on indigenous titled lands and territories of customary resource use. As such, it helps to avoid

potential negative impacts on critical natural resources, such as water and forests, as well as impacts on cultural resources, such as sacred sites. An SIA process also helps to identify ways that indigenous communities could benefit from a proposed development, for example, through infrastructure development, job creation or support for traditional enterprise, and should enable residents of that community to shape the way the development moves forward.

Results and Discussion

Fisheries Industrialization Program on Islands

The central government is trying to revive the economy of the border islands by initiating a fisheries industrialization program on the island. This industrialization was inspired by the creation of economic growth through the poles of growth. By developing economic life, it is expected to strengthen regions and villages within the framework of a archipelagic state. This fisheries industrialization is implemented by the Ministry of Maritime Affairs and Fisheries (KKP) through the Integrated Maritime and Fisheries Center program in Small Islands and Border Areas (SKPT). The SKPT program is aimed to optimizing fishing, fish aquaculture, salt pond business, and processing and marketing of fishery products so that the main players and marine and fisheries businesses will get high economic benefits (economic margins). The development of island-based and / or border-based SKPT is the main driver in the development of the marine and fisheries sector, because it integrates activities in the upstream and the watershed and the development in a marine and fisheries development process [14]. The SKPT program will improve accessibility and connectivity in the use of marine and fisheries resources with the market. The SKPT program will encourage integration from landing of marine and fishery products, processing of marine and fishery products, to marketing aspects. To pursue effectiveness and efficiency, SKPT will also be equipped with facilities and infrastructure needed for fishermen to go back to sea, such as the availability of fuel and logistical needs for other seas. The aspect of improving the quality of human resources and strengthening institutions is also an absolute thing that is a priority target in the SKPT.

SKPT was started in 2015 through Ministerial Regulation No. 48 of 2015 concerning General Guidelines for the Development of Integrated Marine and Fisheries Centers in Small Islands and Border Areas with Natuna Regency as one of the development sites. The determination of Natuna as a center for Maritime Affairs and Fisheries has been started since 2016 which was strengthened by the issuance of KEPMEN KP No. 17 of 2016 which was later updated through KEPMENKP No. 51 of 2016 concerning Determination of Integrated Marine Centers Development Locations in Small Islands and Border Areas. Related to the organization managing the KP Centers are stipulated through KEPMEN No. 73 of

2016 concerning Management of Integrated Marine and Fisheries Centers in Small Islands and Border Areas.

Geostartegic position of Natuna Regency bordering directly with East Malaysia, Vietnam and Cambodia and traversed by international transportation routes makes this district potentially a the gateway to economic development in northern Indonesia. The Ministry of Maritime Affairs and Fisheries through the SKPT program in Natuna Regency has set the Lampa Strait as the Center for Maritime and Fisheries Development. Program for the development of the Lampa Strait port and the completeness of supporting facilities and infrastructure have been started since 2015. Until 2017 the target of the KKP program is the construction of infrastructure and supporting facilities and infrastructure, including a 3 hectare port area, ship dock, Brackish Water Reverse Osmosis (BWRO), Fish Auction Place (TPI), fishing equipment repair facilities, Integrated Cold Storage (ICS), generator rooms, water towers, water reservoirs and fuel stalls. The infrastructure was built because one of the problems in the development of the outer regions is the lack of facilities and infrastructure. After the infrastructure, the program target are institutional and business chain creation. However, until now, the current program carried out by the government has only been in the form of physical development.

Characteristics of Fisheries Communities & Early Field Findings in Natuna Islands

Coastal communities have unique characteristics that distinguish themselves from other communities. This is because coastal communities are very dependent on fishery livelihoods, which are a complex system because many parties are interested in using them. Moreover, in coastal communities on small islands, they are very dependent on the sea. Seen from transportation, logistical entry, and the biggest source of livelihoods and natural resources are products from the sea [15, 16] High dependence on the sea causes changes that occur whether marine life created by humans or from nature greatly affects the socioeconomic life of small island coastal communities. The link with the discussion in the previous sub-chapter is that the fishery industrialization created by the central government will more or less change the coastal communities. But the initiated industrialization program must be able to distinguish between large-scale fishermen and small-scale fishermen.

From the results of the study, the industrialization of fisheries on a small island seems to rule out the differences between large-scale and small-scale fishermen. Industrialization must provide different roles and regulations to large and small scale fishermen so that inequality does not occur later. Polnack distinguished characteristics of large scale fishermen and small scale fishermen. The characteristics of large-scale fisheries are (a) organized in ways similar to agro-

industrial companies in developed countries; (b) more capital intensive; (c) provide a higher income than a simple requirement, both for the owner and crew of the boat; and (d) produce cans for canned and export-oriented frozen fish [17]. Meanwhile, small scale fisheries operate more in coastal areas that overlap with aquaculture activities. In general, they are labor intensive. Small fishermen cover a variety of fishing characteristics, both fishing gear and fleet technology capacity and culture. Characteristics of small fishermen, among others, are still using traditional fishing gear, due to limited knowledge and capital. Natuna fishermen are still limited in their fishing fleet capacity (3-5 GT), causing the fishing yield to be still low, the type of fishing gear used is less varied so that the types of fish caught are less diverse. Marketing is simple, that is, they usually sell fish to middlemen or their patrons and the rest is for personal consumption.

In addition, environmental damage due to unfriendly ways of catching by using bombs and poisons is still widespread, facilities and supporting facilities for fishing activities are still not optimal (landing sites and fishing areas are limited because Natuna is spread out), resources humans (HR) have not been trained, especially for aquaculture and processing of fishery products, business management has not been well ordered, seed quality is not guaranteed, there are conflicts of interest between government agencies. If the SKPT does not consider these characteristics, with the number of small fishermen of 91%, then this program will be difficult to produce the desired social transformation.

Some of the actions that have been taken by the government are to provide a lot of regular training in improving skills, for example training in making swamps (fishing gear), from making to swamp operations. The assistance of new tools from the government such as Bionet, can not be directly adapted by fishermen in Natuna, although training has been done for fishermen. Bionet equipment is used to catch fish in shallow seas, while ordinary fishermen with a fishing rod can catch fish in the deeper sea. The price of pelagic fish tends to be cheaper than demersal fish, so fishermen are rather reluctant to switch.

Conclusion

From the research, temporary results that can be seen are the fishery industrialization program on the island, more emphasis on infrastructure development to support facilities and infrastructure. Meanwhile, with various data obtained related to the characteristics of the fishing communities on the small island, they need many things beyond the provision of facilities and infrastructure. The exogenous development model, considering the characteristics possessed by the fishing community, can damage the social order that has or may not have much impact on the social economic life of fishermen. For this reason, research must look further about is it the social transformation happen in fishing community as expected from SKPT's program.

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4.4 Community Oriented Marine Spatial Planning

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Experts criticized the practice of MSP because of its shortcoming in engaging the human dimension. But working with this dimension is like grasping at straws that put planners in a dilemma. This study explores and provides a framework for understanding this issue by borrowing the terrestrial planning dilemma consisting of an intervention dilemma, regulatory dilemma, and investment dilemma. This research conducts an extensive literature review to reveal the theoretical base and the empirical evidence.

Introduction

The ideal concept of Marine Spatial Planning (MSP) considers ecology, economic, and social aspects comprehensively. Unfortunately, the majority of current MSP practices focus more on economic-ecological interaction and discuss a bit regarding social issues (Saunders et al., 2019). Lack of these issues is also the core of Flannery et al. (2016) critics, in particular, the neglect of power concern and cultural values consideration. Flannery et al. (2018) showed the effect of this indifference that caused stakeholders exclusion, particularly those who have no power to negotiate their interests. This exclusion then created a deeper conflict in several MSP due to the inequality issue of benefit distribution (Pomeroy et al., 2014; Mahmud et al., 2015; Flannery et al., 2016; Flannery et al., 2019). Such evidence proved Koehn et al. (2013) concern regarding the sustainability of heritage, livelihoods, and the culture of coastal communities in case of lack of social issues.

The term social issues also called the human dimension aspect that used interchangeably in many works of literature. It covers broad topics such as regulation and management, impacts of marine use, tenure and rights, values and culture, human welfare, equality and justice, social security, behavior, and sustainable livelihood (Bennet et al., 2016; Bennet, 2019). A short definition of the human dimension described by Dalton et al. (2010) which is giving spatial and temporal characteristics of human use on the marine environment and analyzing how these uses relate to complex social and natural systems.

The question is, why has the human dimension not been appropriately applied in MSP? Ehler and Douvere (2007) mentioned employing such aspects requires a broad diversity of scientific disciplines as well as biophysical assessments. It implies a need for extensive research that demands a high cost and a long time process (Blaeserbjerg et al., 2009). Meanwhile, this conception is considered to lack convincing evidence when attaching to a particular place in the sea (Gee et al., 2017). In this point, integrating the human dimension to other spatial measurements seems to be problematic (Ives and Kendal, 2014; McKinley et al., 2019). Those arguments may provide some justifications, although it was not

answered the question comprehensively. For example, do the discussions take into account the conflict of interests that comes from ideological differences, political alignments, bureaucratic, and market structures? Or is it a possibility that those justifications come from the dominance of power/ though. Therefore I suggest the need to explore the MSP dilemma when incorporating the human dimension.

This research aims to reveal the concern issue by borrowing the terrestrial concept, which comprises three different types of dilemmas known as intervention dilemma, regulatory dilemma, and investment dilemma (Savini et al., 2014). The importance of this research is to uncover the political system or planning culture, technical and political conflicts faced by planners, and the existence of ethical issues (Campbell and Marshall, 1998; Ferreira, 2013; Savini et al., 2014).

Method

This research conducts a case study to explain and describe the practice of MSP in regard to community-oriented concern. Case study is a method that allows investigators to reveal a reality in a holistic and meaningful way (Yin, 2009). Data analysis was performed using qualitative descriptive techniques.

Result and Discussion

Human dimension: A Critical Theoretical Review

The issue of the human dimension has been discussed by Ehler and Douvere (2007) in the early moments of MSP. However, this dimension has not yet received a proper stage in MSP development and practice. Stamoulis and Delevaux (2015) argued this situation occurs due to insufficient existing methods for identifying and representing socio-cultural benefits or interests, community dependency, and temporal-spatial use patterns. Others link this issue with the difficulties of spatial marine use mapping that changing over time because of oceanographic characteristics (Steinberg, 2014). Nevertheless, social experts have developed and offered various concepts in this regard. McKinley et al. (2019) classify them into ten different approaches (table 1.).

Table 1. Various Concepts of Human Dimension for MSP

Concept	Definition
Cultural ecosystem services (CES)	Concern to the nonmaterial benefits derives from marine ecosystems services through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences.”
Ocean literacy	Understanding of the impact of the sea on human life, and people on the sea
Marine citizenship	Encouraging people rights and responsibilities towards the marine environment and ensuring their role in ongoing sustainable management

Attitudes and perceptions	Concern to public perceptions of marine environments that encompass broadscale and regionally distinct social perspectives
Well-being	Centring the quality of life, particularly human health and well-being, as the main issue to evaluate the outcomes of marine planning
Cultural heritage	Focus on the tangible and intangible heritage of a community that relates to the marine environment and resources.
Seascape	Consider people perception of the sea area, coastline, and land where the characteristics affected by natural and/or human factors
Human activities	Recognition of human activities across space and time including its importance to society
Social values (monetary and non-monetary)	Understanding a diverse range of social values related to the marine environment and drawing its importance to marine planning
Socio-demographics	Mixing traditional measures of socio-demographics and recent concepts including coastal typologies and population projections

Source: McKinley et al. 2019

Various concepts above show that knowledge regarding this dimension progress significantly. Some of them even offer operational tools such as psychometric scales and spatial mapping of values (Ives and Kendal, 2014). Psychometric scales is useful to measure the orientation of the environmental values of target populations such as local communities or visitors to conservation areas. By this scale, it is possible to distinguish the importance of the ecosystem by its services for each stakeholder. The spatial mapping of values will bridge the result with specific spatial areas through GIS public participation (GIPP). Klain and Chain (2012) used three general categories of value using GIPP, namely monetary, non-monetary and threat. This information is useful to uncover future potential conflicts among competing parties from spatial zonation over marine and coastal areas.

Working with human dimension: The MSP Dilemma

Employing the human dimension seems not a simple task due to the lack of this dimension in MSP practice despite the rise of related concepts. A complicated situation may put planners in dilemmas when working with it. This study borrows the framework of the terrestrial spatial planning dilemma introduced by Savini et al. (2014) to uncover the realities. This framework divides the planning dilemma into three areas, namely the intervention dilemma, the regulatory dilemma, and the investment dilemma.

The intervention dilemma discusses the contradiction approaches between planning for an ideal future scenario and the reality in society at present. An ideal future situation may lead the researchers to use a typical instrument to justify spatial arrangements and regulations. The other approach puts the communicative method as a priority for the rationale of spatial planning, which

means depend on negotiation processes. The regulatory dilemma focuses on the contradiction between the need to establish definitive and flexible material norms and standard procedures. At the same time, the investment dilemma relates to development choices based on market demands or government supply. The preferred choice from the two available options will determine how public policy is taken and financed.

In the case of Karimunjawa, the dilemma framework of Savini can work well to explain the constraints of using the human dimension on MSP. In general, all dilemmas occur, but investment dilemma is the most concern. The magnitude of market forces can put pressure on planners in spatial planning. Moreover, it enters through the power mechanism so the planners cannot merely avert from this dilemma. Even the change in zoning in the Karimunjawa National Park in 2012 was also preceded by the market forces to accommodate the economic development based on tourism activities.

Planners face an intervention dilemma where the planner's ideal scenario must deal with the rejection of local communities. Planners tend to favor the interests of conservation under the main tasks and functions of the institution. The educational background of the environmental science of the planners contributes to the choices that prioritize ecological interests. This tendency can also be seen from networks built by BTNKJ. BTNKJ involved intensively pro-environmental NGOs such as WCS and RARE and universities in the planning process. The collaboration strategy was intended to provide more bargaining power when the scenarios prepared must be faced with a broader group in the community. Nevertheless, the management seems to be still constrained by various demands from the community who want wider access to the sea area. The history of the people who first lived and controlled lands around the coast became a condition that must be considered. Moreover, there have been conflicts between the community and BTNKJ, which make its employees feel threatened. In this context, planners were pragmatic actors that picked the best affordable choice after maximum efforts to convince the public.

In terms of regulation, some regulations are not described in detail. For example, incompatible fishing activities among different types of gear prone to conflict because of spatial competition among them, such as net fishermen and dive fishers. In tourism zoning, it does not regulate specifically which tourism facilities are allowed or suitable both for the community or the environment. General precaution warning is not enough and prone to be abused by multiple interpretations.

Conclusion

Long experience in handling MSP has made planners at BTNKJ better prepared in facing the three dilemmas. This can be seen from the strategy chosen to accommodate two competing interests, namely protecting the environment and fulfilling human needs. A sequential strategy where the instrumental goes first

before the communicative process is one of them. Accommodative strategies are also reflected in regulations in zoning that mediate the need for specific and general regulation. Specific arrangements are made in the core zone, while arrangements are generally applied to utilization zones such as fishing and marine tourism. But in the case of the investment dilemma, planners seem difficult to accommodate the contradiction between supply led and demand led approach in MSP policy. They are forced to prioritize the demand led due to lack of power to control other stakeholders. At this point the community is potentially disadvantaged from spatial arrangements that prioritize the interests of capital owners

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4.5 Development of Tourism Village Innovation

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The development of tourism village innovation is directed to optimize the potential of the village as an advantage that can be raised in the development of tourism villages. The concept of a tourism village offered is a thematic tourism village that elevates agricultural potential as the main tourist attraction. This research took place in Mekarwangi Village, Sindangkerta District, West Bandung Regency as a locus. The selection of Mekarwangi Village as a locus of study for several reasons, namely, its potential, policy support from the West Bandung Regency Government and the village's geographical proximity to the existing market in the Ciwidey Region.

Introduction

Tourism village is a village administrative area that has the potential and uniqueness of a unique tourist attraction that is to experience the unique life and traditions of people in rural areas with all its potential (Kemenpar, 2019). Efforts to place the village as a thematic tourism village have been carried out with a variety of development themes, including the theme of batik (Tyas and Damayanti, 2018; Praswati, Wajdi, Syakal, 2018), and agro themes (Gunawan, 2016; Dwiridotjahjono et al, 2017). Meanwhile, this research was not only the development of an agricultural thematic tourism village but also tried to integrate it with other potential supporters and the development of thematic homestays.

Development policies in West Java currently place villages as the center of growth and development. Therefore, villages are required to be able to play an active role in creating innovations that can support these development efforts. Mekarwangi Village, Sindangkerta District, West Bandung Regency is one of the villages owned by West Java which has potential and excellence at regional and international levels. The advantage of this village is as a producer of vegetables for the needs of Bandung and its surroundings as well as the producer of Gunungghalu Coffee which has been worldwide. However, this potential has not been able to be optimized as value added advantages. In addition, the very high level of dependence on agriculture makes the people of Mekarwangi Village very vulnerable to market turmoil and crop failure. Therefore the development of thematic tourism villages based on agriculture is very relevant to be developed so that the community has a strong economic resilience by diversifying sources of income while being able to grow the tourism sector.

The momentum of the development of thematic tourism villages in Mekarwangi Village coincided with efforts to restore the community's economy after the co-19 pandemic that had affected the income and economic resilience of the village community.

Methodology

The tourism village development activities in the Mekarwangi Tourism Village will be carried out with participatory participation in the first three main stages, discussion of improving the community towards tourism and the tourism village by providing training in the development of tourism villages and conscious tourism. the second stage, the stage of community improvement in product development carried out through the development of development programs and assistance for product development with tour packages. For the third, namely agro-homestay development, through agro-homestay management training, home inventory that can be developed as an agro-homestay, assessing the needs of its development by making interpretation media, and finally management assistance.

Results and Discussion

The Study on the Development of Tourism Village Innovations in Mekarwangi Village has identified several things as initial findings, namely (1) mapping of stakeholders who can be involved in developing thematic tourism villages in Mekarwangi Village; (2) identification of potential supporting tourist attractions that can be developed; and (3) there is support from village officials in developing thematic tourism villages in Mekarwangi Village.

Conclusion

The development of tourism village innovation in Mekarwangi Village in the form of thematic tourism village development requires the active involvement of all stakeholders including the community in it. The great potential of Mekarwangi Village as a thematic tourism village must be able to be effectively translated by all the existing stakeholders. Therefore, ongoing assistance is needed to guard so that the thematic tourism village concept that will be developed can be run consistently.

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4.6 Informal Economy and Creative Industry Strategies

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- 2. TEAM MEMBERS : Zahara S. Iskandar**

The main focus of this community empowerment project is to identify a network of economic activities in the informal sector including production and marketing and the interrelationships formed between actors in their economic activities. This community empowerment is carried out in the city of Bandung but the focus is on informal economic activities that are developing in the Kampung Rajut Binongjati. This community service also involves NGOs and academics from ITC to produce a policy brief that can be input for the government to initiate more effective policies.

Introduction

The term "Kampung" in Bandung city has special characteristics of the informal economy including home-based industries, creative industries (crafts, culture, and arts), and tourism industries (Aritenang et al, 2018). Apart from the informality aspect, the kampung has considerable economic potential. Kampung in Bandung also plays an important role as the center of the informal economy for marginalized communities. Based on this, the kampung can be the basis of an urban development strategy that aims to take advantage of the development of creative industries and provide opportunities for local economic growth and the commodification of existing economic activities. Research at the kampung scale also helps to understand how the kampung can influence the spatial patterns of urban development, the formal economy, and its relationship with formal authorities and governance structures within the city.

The development of various kampung in Bandung has a very broad impact on the development of the City, both spatially and aspatially. The kampung has great potential for the economy because it supports the creation of inclusive local economic activities which in accordance with the norms, values and beliefs that exist in society (Webb et., 2009). In addition, informal economic activities in a kampung also become a major driver of innovation and entrepreneurship in the community (Kraemer-Mbula and Wunsch-Vincent, 2016; Bureau and Fendt, 2011; Williams, 2010). In addition, kampongs in Bandung also play an important role as the center of the informal economy for marginalized communities. Based on the economic potential of kampung, it is important to determine a creative economic strategy that can encourage economic development through increasing the knowledge of business actors regarding the network of industrial activities in their region and policy recommendations that can be taken to maintain the existence or expansion of the network in Binongjati that can accelerate the economy.

Methodology

The project begins by gathering information about the geolocation of actors involved in economic activities in Binongjati. Information was obtained from the results of the survey through a questionnaire in the INECIS research activities carried out with the help of ITC as a partner in October to November 2019. The number of samples was determined based on the craftsman population of 133 samples. The data generated from the questionnaire is used as the main information in making network analysis and becomes the material in preparing the draft policy paper. We also conducted interviews with key informants of the Binongjati knitting community to triangulate data related to networks. The analysis is performed by the network analysis method. The analysis was carried out with the help of ITC as a partner. After conducting network analysis, we conducted another interview with key informants to confirm and complete the results of the network analysis that had been conducted.. In addition, we also explore information about community issues related to economic activities including production, packaging, and marketing. In addition, interviews were also conducted to found information about policies related to the informal economy or creative industries in the Binongjati knitting community, including the weaknesses and benefits of the policy. Interviews were conducted online through Google Meet due to restrictions on interactions during the COVID-19. After confirming the results of the analysis with key informants, we finalized the draft policy paper.

Results and Discussion

First, we identify the stakeholders in Binongjati business network in addition to the 133 firms in our sample. The graph bellows depicts the supplier companies that provides input for Binongjati firms (Fig. 1). The largest supplier company is the CV Pribumi that supplies more than half of the firms surveyed, 83 firms out of 133 firms. The following largest supplier company is Kurnia Baru and Kurnia Abadi that each supplies 6 and 7 firms respectively.

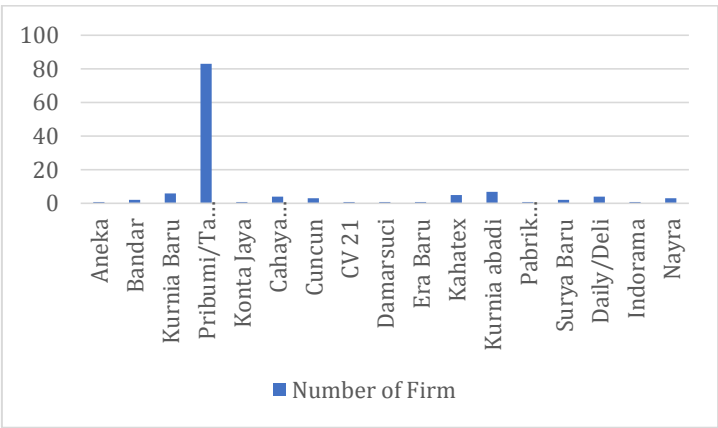


Figure 1. Supplier Companies for Binongjati Firms

These supplier companies are located within the Binongjati kampong so there is relatively no transportation cost for firms to obtain supplies from these companies for their production input. This was confirmed with the following quote from the Binongjati firm association representative

“We use yarn as main raw material from Kahatex that distribute through distributor which located in this kampong”

Interview with the Bainongjati representative reveals that there are several considerations for craftsmen in choosing suppliers, i.e price, completeness of material and color, and payment facilities. In general, suppliers located within Binongjati provide a credit facility for 14 days in payment.

“There are a number of things that we consider in choosing suppliers including the completeness of colour, price, completeness of materials, type of material (cotton, acrylic 52/2, acrylic wool synthetic 32/2, PE polyester) and the availability of instalment, although the price is more expensive we can credit within a period of 14 days. If not through a supplier, for example directly from the factory, the payment can be within 1 month but we need to purchase on large scale”

Next, we visualize the business network analysis of firm suppliers in Binongjati. The first graph shows that CV Pribumi as the main supplier for firms in the kampong with second tier suppliers such as Otista and Kurnia Abadi, and followed by smaller supplier that supplies to less than 3 firms (Fig. 2).

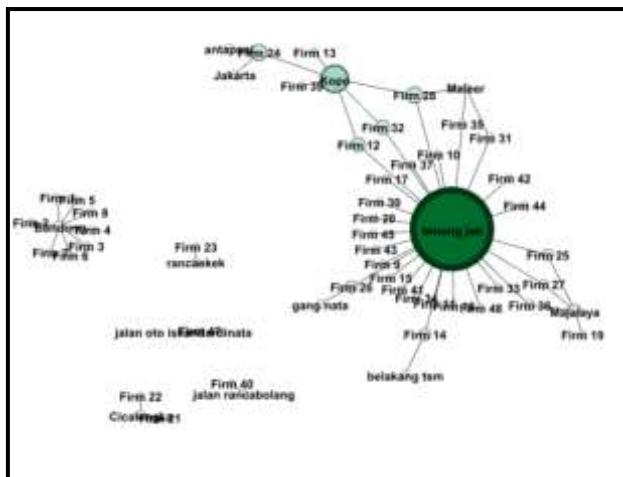


Figure 2. Locations of Supplier Companies for Binongjati Firms

The graph suggests that locations of suppliers are mainly within the city of Bandung such as Kopo, Maleber, and Cicalengka. This is confirm with the following quote from the Binongjati firm association representative

“All raw materials in the production process are available in Bandung unless we get special requests from buyers, such as buyers who ask for raw materials from non-syntetic wool, so we need to import”

However, besides crucial role in supplying raw materials, these suppliers also influence production costs. For example, when certain types of raw materials are in great demand, suppliers often raise the price of raw materials, thereby affecting the price of production.

The next graph depicts the business network analysis by rank of suppliers (Fig. 3). The red edges show the main supplier, blue edges show the second supplier, and green edges shows the third supplier. Similar to the previous graph, this graph shows that the CV pribumi remains as the main supplier for firms in Binongjati, however the graph also shows that the company is also the main supplier for the firms. In addition, as the main supplier, the company also acts as second and third supplier, each for one firm.

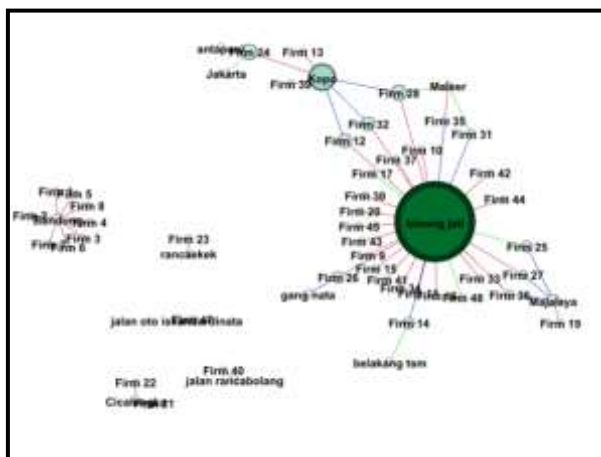


Figure 3. Locations of Supplier Companies for Binongjati Firms, by Rank

Last, we display the locations of Binongjati firm customers (Fig. 4) . The graph reveals that the largest market for Binongjati products are within the city of Bandung, followed by Jakarta and Tanah Abang, to be more detailed. Interestingly, there are two firms that has customers within the Binong only. A further analysis of the firms suggested that both firms, 18 and 22, operate as a finishing product firms referring to firms that received sub-contracted work from other individuals or firms in Binongjati to finish the production process (such as ironing and packaging).

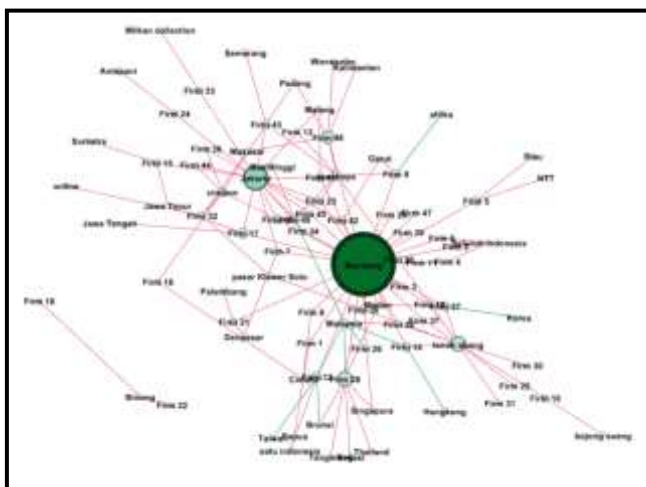


Figure 4. Locations of Customers for Binongjati Firms

The green edges also showed the presence of foreign customers that are found in neighbouring countries such as Malaysia, Singapore, Brunei and also farther countries including South Korea, Taiwan and also in Africa. The graph also

reveals that firms that exported to abroad, also exported to other parts of Bandung and other cities in Indonesia, suggesting the wide and established market that Binongjati firms has. The use of marketing technology through online systems is one of the causes of the widening market in Binongjati. Based on the results of the interview from Binongjati representative, the shifting from conventional market to online can shorten the market chain and promote firms to directly distribute/sell their products.

Our network analysis suggests the sustainable production and market network that Binongjati firms have for more than a decade as found by Soedarsono (2006). However, besides its wide and established market, Binongjati has a threat that affects its marketing. Most firms in Binongjati lacks unique design of their products, they do not have their own product label and brand packaging. The products between the firms are homogeneous, resulting fierce price competition. Based on the interview from Binongjati representative, Hence, market segmentation among firms could be seen as a business strategy to sustain existing market.

Conclusion

The paper shows that business networks in the Binongjati creative kampong are spatially wide and economically established. Despite its informality and traditionally craft, the knitting industry in the Kampong has reached international market. This study contributes to the creative industry literature by highlighting the potential and importance of knowledge and innovation generated, in which it is recognized by both domestic and international market. While this study also contributed to the urban planning through revealing the spatial distribution and the economic-impact of Binongjati firms to the urban economy. The paper also highlights that the Binongjati knitting industry are significantly relied its production input to local suppliers, thus the industry is fragile to any disruption to local economy in Bandung.

The paper further argues two policy implications; first, the importance to capture local knowledge and innovation to ensure sustainable knowledge spillover to younger generations of artisans in Bandung city. This could be included in the government's creative industry policy by programs such as knowledge sharing, vocational education and design-related technical skills. Second, the creative industry policy should also focus to expand market by enhancing business network analysis and business database of both supplier and customer. Thus, the local government could support informal business such as in Binongjati by maintaining and extending these business network through annual trade expo, business meetings, and product promotion domestic and globally. In addition, local government could also promote business and production innovation to accelerate product diversification and market segmentation among firms.

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4.7 Rural Community Development Through Revitalization of Perpustakaan Desa and Taman Bacaan Masyarakat

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- 2. TEAM MEMBERS : Khonsa I. Zulfa**

Government has put the role of *Perpustakaan Desa* (Village Library) into *Indeks Desa Mandiri/ IDM* (Independent Village Index). This means, government has concerned in social capital development through enhancing reading interest and knowledge among rural community. However, *Perpustakaan Desa* is not optimized yet to build social capital of community. In other side, *Taman Bacaan Masyarakat/ TBM* (Community Reading Park) has grown base on the initiative of community itself. *Perpustakaan Desa* and *TBM* could facilitate in developing identity and collective ties within community to determine a collective goal. In addition, social capital is a resource of community sustainability. Therefore, there is a need of accompaniment to rural community in revitalization the role of *Perpustakaan Desa* and *TBM*.

Introduction

Indonesia Government puts serious attention in improving welfare and living standard of rural community. Starting from 2015, *Dana Desa* (Village Fund) has kept rising each year from APBN. However in these past years, *Dana Desa* only concerned in physical infrastructure spending. Physical infrastructure development needs to be completed with human capital development to strengthen community sustainability. *Perpustakaan Desa* and *TBM* is required to be revitalized in their role to build community capacity in the ability of identifying problems and potency, and also determining solution. Therefore, this project aims to (1) Strengthen the role of *Perpustakaan Desa* dan *TBM* in rural community at Jawa Barat, (2) Optimizing the role of *Perpustakaan Desa* dan *TBM* to solve particular problem in rural community

Methodology

This project will be conducted using social action research method. Accompaniment process will use participatory appraisal namely (1) community dialogue, (2) focus group discussion that will be conducted at least 2 times, discussing about programs in the first one, and discussing about monitoring and evaluation in the second one, (3) social mapping, and some other practical methods that will be determined with facilitator/activist.

The chosen villages need to meet requirement as follows :

1. Four contiguous villages in one sub district to ease accompaniment mechanism

2. Backward villages base on IDM of Regulation of the Minister of Village, Development of Disadvantaged Regions and Transmigration No.2/2016
3. Village has active TBM within or at least in around neighbor village
4. Village has local policy in improving human capital development through nonformal education or in improving public participation in formal education

Results and Discussion

During large-scale social restriction, the team meets obstacles to conduct field activities in villages. Therefore, we plan timeline adjustment according to the current situation. While we are writing the accompaniment module, we plan to conduct field visit to villages in the middle/end of August using health protocol of Covid19

Conclusion

Due to the policies responding of global pandemic, we consider possibilities to adjust project timeline. However, it will not give significant affect to the initial output plan. The output of this project consists of:

1. Problems and Potency Map, agreed by several community stakeholders, figures, TBM and facilitator/activist
2. Community accompaniment designed by faciliator/activist and TBM
3. Report of accompaniment activities, which consist of progress report, documentation, and analysis of problem solving in village
4. Paper in analyzing the development process, social capital dissemination, and strength map in the facilitator/activist interaction process with community. Published in accredited national journal and presented in accredited national seminar

Acknowledgement

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4.8 Disaster Risk Reduction of Tsunami in Tourism Area Development

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- 2. TEAM MEMBERS : Sisilia Vidia Elok Hapsari
Novi Puspitasari**

The development of the tourism area not only has to consider the economic profit but also the threat of hazard. The manifestation of that consideration can be done through the Disaster Risk Reduction (DRR) strategy. One of the tourism areas in Indonesia that have been threatened by hazard is coastal tourism areas of Pandeglang Regency. On December 22nd, 2018 tsunami that followed an eruption of Anak Krakatau volcano has been struck most of the areas and it was caused huge loss and damage. In any disaster, the disaster impact supposed to be reduced through the DRR strategy. After the initial survey, the results of the preliminary analysis shows that the DRR efforts in the coastal tourism area of Pandeglang Regency that had been carried out in dealing with the tsunami on December 22, 2018, in every disaster management stages, but it is still lacking in pre-event and preparedness stages especially in formulating structural and non-structural disaster management. Besides, the problems are still found in the recovery stage, which is the difficulty of returning the trust of investors and tourists to return to the tourism area in Pandeglang Regency.

Introduction

Indonesia is an archipelagic country that has the longest coastline in the world. It can be a potential tourist attraction that will be captivating for tourism. However, the coastal area can be threatened by tsunami hazards. One of the coastal tourism destinations in Indonesia that have been struck by tsunami is a coastal area in Banten, especially Pandeglang Regency. On December 22nd, 2018 a tsunami caused by an undersea landslide that followed an eruption of Anak Krakatau volcano in the Sunda Strait. According to BPBD of Pandeglang data, at least 437 people were killed and about 14.000 were injured (BPBD of Pandeglang, 2019). The most impacted location is the tourism area in Pandeglang, which are the coastline of Tanjung Lesung, Sumur, Teluk Lada, Panimbang, dan Carita Beach.

The damage that is happened on the coastline gave a significant impact on the tourism sector in Pandeglang. The local economic activity in the tourism sector was forced to vacuum for several months after the tsunami. It causes economic losses that are not small due to building damage and tourist arrivals decrease.

Tourism and disaster have a unique reciprocal correlation. Most people traveled to feel comfortable and free from any threat, so the tourism attraction supposed

to ensure the safety and amenity of tourists from any potential crisis, pressure, or disaster (Zaenuri, 2016). However, there is some tourism destination with beautiful scenery that has a high disaster risk level. Therefore, a disaster risk reduction strategy supposed to get special attention in the tourism area. The study of Becken & Hughey (2013) shows that the disaster aspect is not considered yet in most tourism sector development.

Learn from the tsunami that causes huge damage and loss in Pandeglang Regency, so the effort of disaster risk reduction in coastal tourism areas has to be improved. It is needed for recovering the sense of security of people to do the economic activity and to travel in the coastal area of Pandeglang. Therefore, the objectives of this study are identifying tsunami risk reduction strategy in the development of the tourism coastal area of Pandeglang Regency.

Methodology

The data collection method is through interviews and secondary data collection that has been done in the preliminary survey before the pandemic. The interviewee is a representative of the Regional Disaster Management Agency (BPBD) and Tourism Agency of Pandeglang as the key stakeholder in disaster management in the tourism area. It will be completed with the literature review of previous research and the benchmark of other countries that have implemented disaster risk reduction in the coastal tourism areas. Then, if in October 2020 the condition of pandemic starts to subside, observation will be held to assess how far the disaster risk reduction effort in the prone areas has been updated after the tsunami in 2018. After that, the collected data were analyzed by using content analysis methods.

Results and Discussion

The tourism sector represents a very broad spectrum of different sectors both on a small, medium to large scale (Hughey, 2013). Increased interest in tourism will depend the first time on the diversity of tourist attractions offered. Various types of landscapes and socio-cultural phenomena from various countries or regions are used as tourist attractions to be enjoyed by local residents and residents outside the region or country (Rosyidi, 2014). However, the characteristics of tourism reside in sectors that are easily susceptible to being affected by events beyond control, one of which is disaster (Rindrasih et al, 2019). Thus, it is important in formulating a disaster management framework for tourism (Hystad & Keller, 2008).

Disaster management for tourism includes the sum of all activities, programs and steps that can be taken before, during and after a disaster with the aim of avoiding disaster, reducing its impact and recovering from its loss in the affected tourism area (Swestiana, 2017). Through the development of a disaster

management strategy, at least the impact can be minimized as a consequence and quick response facilitated by the plan. In addition, it can also reduce the sense of tourist panic if there have been signs of a disaster happening. There are 6 stages in disaster management for tourism, namely the pre-event, preparedness, emergency, intermediate, long-term recovery and resolution stages.

The tsunami disaster in Pandeglang Regency on December 22, 2018 had an impact on the occurrence of damage, losses and fatalities in several tourism areas. Through this condition, making 6 stages in disaster management is carried out. The following are the results of the identification of things that have been done by Pandeglang Regency from each stage based on the results of interviews, chronological reports, tsunami response reports and the 2014-2018 Pandeglang disaster management plan documents in the following table.

Table 1. Results of the Identification of Disaster Management in the Coastal Tourism Area of Pandeglang based on the Tsunami on December 22, 2018

No.	Disaster Management Phase	Description	Disaster Management in the Pandeglang Coastal Tourist Area based on the Tsunami on December 22, 2018
1	Pra-Event	When action can be taken to prevent or mitigate the effects of potential disasters	In general, from what has been done at this stage, Pandeglang Regency does not yet have a mitigation plan, operations, recovery, special disaster planning for the tourism area, and a multi-hazard based land use plan to produce a risk map in determining the appropriate land use and building solutions . In addition, there is still no agreement and commitment to activate the protocol, not yet explained in more detail structural mitigation measures related to providing information on physical building engineering or utilizing public facilities, providing building codes and spatial planning as one formulation of non-structural mitigation and also still hampered in changing the paradigm of fear of some NGOs which still considers that providing disaster facilities can reduce the number of tourists.
2	Preparedness	When it is apparent that a disaster is imminent	In general, from what has been done at this stage, Pandeglang Regency is still limited in providing evacuation sirens and shelters in the tourism area.
3	Emergency	The effect of the	At this stage after the tsunami,

No.	Disaster Management Phase	Description	Disaster Management in the Pandeglang Coastal Tourist Area based on the Tsunami on December 22, 2018
		disaster is felt and action is necessary to protect people and property	Pandeglang Regency carried out rescue or evacuation procedures, provided emergency accommodation and food, handled basic infrastructure and transportation, provided medical or health services, conducted monitoring and provided financial assistance to refugees.
4	Intermediate	A point where the short-term needs of people have been addressed and the main focus of activity is to restore services and the community to normal	During the emergency phase of transition to recovery in the short term, Pandeglang Regency has conducted an audit system or assessed damage, losses, rehabilitation and reconstruction needs, made efforts to make temporary shelters and worked with various print and electronic media to inform that Pandeglang Regency has conducted recovery effort
5	Long-term Recovery	Continuation of previous phase, but items that could not be attended to quickly are attended to at this stage. Post-mortem, self analysis, healing	In the long-term recovery phase, Pandeglang Regency has carried out repair of damaged infrastructure, rehabilitation of damaged environments, counseling for victims including tourists, economic recovery of the community especially in tourism areas, restoration of tourism and consumer business confidence, provisioning to revise disaster management strategies, preparation of mechanisms institutions that are in line with the recovery plan and involve all key stakeholders, and use laws and regulations to enforce the Building Back Better (BBB) concept and facilitate the recovery process for the tourism sector. However, in the recovery of investment there are still fears of investors to reinvest in the tourism sector
6	Resolution	Routine restored or new improved state establishment	At this stage, Pandeglang District is in the process of revising its disaster management strategy, providing regular socialization related to disaster knowledge, especially in the tourism zone located in the red zone and intensifying the promotion of the

No.	Disaster Management Phase	Description	Disaster Management in the Pandeglang Coastal Tourist Area based on the Tsunami on December 22, 2018
			tourism area in Pandeglang District that has been recovered from the disaster and safe for re-visit.

Source: Results of Analysis, 2020

Based on the table above, it can be seen that there are some things that are not yet owned and have not been done related to disaster management efforts in the coastal tourism area of Pandeglang. This is in the pre-event and preparedness stages. From this condition it shows that Pandeglang Regency is still of low value in formulating actions before the disaster and also preparedness actions. This action covers both structural and non structural. In addition, it was also identified that the recovery phase that had been carried out after the tsunami of December 22, 2018 was the return of investor confidence to reinvest in the tourism sector and also that tourists had not yet returned to visit. However, the Pandeglang Regency government is now continuing to make various routine recovery efforts to make the Pandeglang Regency tourism area resilient from disasters and be able to attract tourists.

Conclusion

Based on the results of the preliminary analysis, it was found that from the disaster management efforts in the coastal tourism area of Pandeglang Regency that had been carried out in dealing with the tsunami on December 22, 2018 both before, during and after the disaster, several things are still lacking. Those are in the pre-event and preparedness stages especially in formulating structural and non-structural disaster management. In addition, problems are still found in the recovery stage, which is the difficulty of returning the confidence of investors and tourists to return to the tourism area in Pandeglang Regency.

Acknowledgement

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4.9 Digitalization and Rural Entrepreneurship

- 1. HEAD OF TEAM : Fikri Zul Fahmi**
- 2. TEAM MEMBERS : Medina Savira**

Digital technologies and infrastructure in rural areas offer an opportunity to foster the development of agricultural sector, as they can open up the access to information needed for the development of this sector. However, rural communities might not merely have the capabilities to take advantage of the digital technologies. This study aims to develop a framework for fostering entrepreneurial abilities in agribusinesses in Pangalengan agropolitan area, Bandung District. Pangalengan has agricultural potentials, but the local communities have not been able to use digital technology to increase the added value of agricultural products and expand marketing. We use a case study approach, in which we compare the conditions in Pangalengan with some good practices in other regions, namely the Kintamani rural area, in Bali, in which coffee farmers have utilized digital technologies and the Internet in gaining new knowledge about production and distribution of the agricultural product. In our model, we propose a mechanism for developing the digital literacy and entrepreneurial capacity in the community so that they can utilize digital technologies in the agricultural sector.

Introduction

Since 1960s, rural development paradigms have placed the agricultural sector as engine of rural growth [1]. Rural communities are assumed to make the agricultural sector the foundation of life in daily life. The agricultural sector tends to be developed to fulfill their daily needs without considering profit-oriented. However, traditionally, developing the agricultural sector is considered unable to welfare the community [2, 3, 4]. There was a need to improve the value of the agricultural sector, so that community's welfare increases; one of the strategies is to develop an agribusiness system.

Agribusiness is defined as an agricultural business system more broadly and implemented in a whole system [5]. The development of the agribusiness system could influence productivity, organizes the commercialization of agriculture, increases the income of farmers, and provides new ways to improve the economic conditions [6, 7]. The agribusiness system is considered as the right choice to improve the quality of life of rural people who depend on the agricultural sector because it gives added value to the whole system. The agricultural product is one of the most common of agribusiness implementation in Indonesia.

To develop an agribusiness system in rural areas, one of the significant supporting factors is rural entrepreneurship [8]. In line with the integrated agribusiness system, rural entrepreneurship gives a new perspective on

agriculture, such as industrialization (e.g., [9]). Rural entrepreneurship becomes one of the strategies for the rural community to survive in a rural area. Rural entrepreneurship highlights the utilization of local resources, such as agriculture, as physical resources in a particular area.

The improvement of technology and information also presenting the digitalization of entrepreneurship in a rural area. Digitalization is an important thing needed to develop rural entrepreneurship because it could improve the competitiveness of the business [10]. Digitalization fostering the provision of information in a rural area [11, 12, 13, 14]. The easiness of information acquisition would improve the rural community's knowledge that will influence the ability of them to identify new opportunities and make some innovations. The appearance of new opportunities and innovation will improve the regional economy condition [10]. Unfortunately, not all of the rural communities can utilize the opportunity of digitalization. The availability of digital technology will not deliver a positive impact if the rural community does not have the digital competency to utilize the technologies. This situation is associated with literacy digital of the rural community.

This study aims to propose a model that focuses on the mechanism of developing digital literacy and rural community entrepreneurial capacity so that they can utilize digital technology in developing the agricultural sector. Therefore, the case studies were conducted in two rural areas to compare and replicate the good case. The development of digital literacy and community capacity has been effectively used in agricultural development in other rural contexts. Kintamani Rural Area represents the good case, in which rural communities in the area are developing coffee as the foundation of their daily life. The farmers in Kintamani Rural Area used the technology digital in every step of the coffee integrated development. The Kintamani case will be reflected in Pangalengan Agropolitan, which has good physical, environmental and economic potentials in developing agribusiness, but it is still quite behind in the use of digital technology. The rural community in Pangalengan Agropolitan is unable to utilize digital technology to sell the agricultural products and look for information about the production process.

The community in Kintamani Rural Area has a good digital literacy. Entrepreneurs have the desire to learn the use of digital technologies in business development. To learn the use of digital technology, they do the process of exchanging knowledge and information built through a harmonious social relationship. In general, farmers in Bali are involved in Subak Abian (farmers groups). These groups make them have a good relationship with humans. Apart from Subak Abian, the farmers also build a good relationship with other coffee entrepreneurs in Bali and outside Bali. The information they obtain will be delivered to the farmers; this shows that they have a good collective capacity and improve the learning process of using technology digital. Digital literacy grows in line with collective capacity in a rural community. Both of these things encourage

the formation of better entrepreneurial capacity. Otherwise, digital literacy and collective capacity are not yet owned by Pangalengan Agropolitan rural community. In the end, this paper shows that digital technologies can be utilized in developing the agricultural sector by fostering entrepreneurial capacity by developing individual and collective capacity.

The remainder of this paper is structured as follows. The next section discusses the literature review about agribusiness, rural entrepreneurship, and digitalization in a rural area. In order to understand case replication, there will be overview cases (Pangalengan and Kintamani cases). Finally, the paper will explain the mechanism to develop literacy digital and entrepreneurial community capacity in a rural area.

Literature Review

Digitalization in rural areas

Nowadays, the agribusiness concept becomes a new perspective on the agricultural sector. The agribusiness concept views the agricultural sector as an integrated system. According to Maulidah [15], agribusiness is all activities, including the procurement and distribution of production facilities (inputs) to the marketing of products produced by farming and agro-industry, which are interrelated. The agribusiness concept gives new nuances in developing the agricultural sector in a rural area. The development of the agricultural sector, which initially only focused on the cultivation stage, began to develop into integrated agriculture. One of the significant supporting factors to develop agribusiness activity in rural areas is rural entrepreneurship.

Rural entrepreneurship is defined as the creation of a new organization, which introduces a new product, serve or create a new market, or utilize new technology in a rural area [8]. Rural entrepreneurship gives a new perspective about the agricultural sector, such as industrialization of the agricultural sector [9]. In order to develop rural entrepreneurship, the important aspect needed to involve is local resources, such as physical resources [16]. Several studies have revealed that local resources can be used in developing rural entrepreneurship so that have a positive impact to economic condition [16, 17]. Rural entrepreneurship has attached spatial characteristic since it involves a relationship between the location where the activity took place.

Recent evidence suggests that the concept of digital entrepreneurship began to develop [e.g., 18, 19, 20, 21, 22] as a new way to offer the product and the market involves digital technology. A previous study also reported that digital entrepreneurship presents in a rural area (e.g., [10]). Digitalization in rural areas fostering the appearance of digital entrepreneurship. Digitalization is the adoption of the increase of digital technology usage or computer by an organization, industry, or country [23]. Throughout this paper, the term digitalization will refer to the adoption of digital technology usage or computer to develop entrepreneurship in rural areas.

Digitalization can have a positive impact on economic activities, such as increasing creativity and producing an innovative product [24, 46]. Digitalization also encourages up-skilling by providing more time and resources for workers to do skilled work. However, new technology can also be a threat because of the variety of jobs reduced due to automation. Hence, the provision of technology digital viewed as potency and threat toward economic activity.

Digitalization also brings disruption effects into economic activities. In an entrepreneurial context, digital technology changes the uncertainty and the strategies to face uncertainty [25]. Digitalization is an important thing needed to develop rural entrepreneurship [10]. Digitalization can increase the competitiveness of the business. The rural community has the opportunity to utilize digital technology in a rural area. Digital technology can simplify the provision of information and facilitate access for rural communities to obtain this information. Information obtained through the use of digital technology can help the rural community develop their business [26] and help identify new opportunities [10]. These things will encourage the emergence of new jobs and increase the regional economy. Lekhanya [10] also shows that digitalization has an impact on economic diversification in a rural area. Digitalization can be utilized to create innovative product diversification to increase the agricultural sector's value. The communication process with the consumer becomes easier because the use of technology digital, the same goes for understanding market needs and information acquisition. Diversification that occurs is not changing or developing various sectors of the rural economy, but innovation in diversifying agricultural products. Therefore, digitalization in a rural area can be utilized to develop the integrated agricultural sector.

Digital literacy

Digital literacy is a fundamental thing for rural communities to develop their business through the use of digital technology. Digital literacy is viewed as the ability of a rural community to utilize digital technology. The first discussion of digital literacy emerged in 1997 by Paul Gilster [27], which defined digital literacy as the ability to understand and use various resources from several resources accessed by computers. The definition of digital literacy continues to develop according to the context of the discussion. In 2018, UNESCO [28] defined digital literacy as an ability to manage, access, understand, integrate, communicate, evaluate, and create information safely and adequately by digital technology to work, decent work, and entrepreneurship. Given the dynamics of technological development that cannot be avoided, digital literacy is an important thing that needs to be owned by the community. Many countries implementing various strategic plans and digital literacy frameworks to encourage digital literacy in the community, as reported by UNESCO [28], namely strengthening digital literacy to improve efficiency, transparency, and service to the community through public administration in Korea [29] and adoption of a

digital literacy curriculum to reduce digital divide and build youth capacity in Oman [30].

The utilization of digital technology in a rural area can have a positive impact on the community's economy [31, 14]. However, not all community in a rural area have the same chance to utilize digital technology because the access is expensive, this condition will occur new problem like the digital divide between rural and urban community [32]. The other technical problem that might be faced by the rural community is limited options for choosing a broadband provider [33]. We assumed that digital technology could be a catalyst to accelerate the disappearance of the digital divide. Otherwise, the digital divide increases because the availability of internet connection is not enough, rural community must have digital competency to reduce the digital divide [34]. The decent knowledge about digital innovation and the ability to use digital technology becomes an important factor. That way, internet connection can help the development of the community in a rural area [35]. Several studies conducted before showed that digital literacy is an important thing needed to have by the rural community to support their business.

Collective capacity

According to Chaskin [36], community capacity is defined as the interaction of human capital, organization resources, and social capital, which exist in certain societies that can be used to solve collective problems and improve or maintain the welfare of that community. Collective capacity arises when interactions between individuals employ different and convergent ways to understand and respond to reality [37]. The collective capacity will help the community to understand the group's needs, set the goals, organize the plan, allocate resources to implement the plan, and do the teamwork [38]. In addition, the collective capacity will help the community carry out its functions well.

Collective capacity in a rural community will help the process of knowledge accumulation to understand the use of digital technology. The previous study showed that collective capacity would help the community do something new; for example, diffusion innovation is easier to occur in farmers groups with high social capital [4]. Social capital's existence indicates that each person can gather help and have the collective capacity to take advantage of a climate of trust. A climate of trust helps farmers to gather knowledge and personal insights into community knowledge, abilities, and insights that are very strong to encourage the growth of innovation in the community [4]. The use of digital technology in business development might be a new thing for the rural community. Previous research showed that collective capacity could help the learning process of digital technology for the community in Kampung Internet, Yogyakarta [14]. The research showed that the community in Kampung Internet commit to building

digital literacy in the whole community through collective actions. The harmonious social relations in the community trigger the desire of the rural community to learn how to use digital technology. In the end, the technology adoption in Kampung Internet has a positive impact on their social, economic condition. Tremblay's study [14] showed that is important to build collective capacity in a community to help build the curiosity to learn digital technology.

Informal learning

Informal learning is the most common learning form in a farmer's group. However, the form of informal learning is often ignored, whereas informal learning plays an important role in building the knowledge of a group of people. Landini [39] shows that informal learning has an important role in linking the various learning resources and supporting the learning process for a long time. Previous studies reported that informal learning is more important than formal learning [40].

Informal learning is defined as learning form is not institutionalized or less formal than formal education and nonformal and is outside the institutionalized educational curriculum offered by a training or education agency [39, 40]. Informal learning associated with learning by doing and learning from mistakes. The informal learning process occurs spontaneously, unrealized, and unstructured. Consequently, the form of informal learning is very diverse and can occur everywhere, such as in a family, groups, and many more. Informal mentoring and learn with peers also categorized as informal learning forms. The informal learning system will increase the confidence and pleasurable to communicate with each other so that knowledge accumulation will occur easier in a group. Informal learning highlights a self-directed and self-reflective process.

Informal learning is important to be considered to be complementary to formal learning and non-formal learning. Landini [39] recommends that institution can develop a strategy to facilitate the informal learning process. The other recommendation to support the informal learning process is to facilitate peer interactions in a group. The provision of digital infrastructure, such as internet connection also needed to support the informal learning process. Informal learning process gives freedom for a learner to use their cognitive resources, and they can use tools such as email, reading some information from the internet, fingertip knowledge (Google), and unplanned meet [40]. Digital technology in rural areas can be utilized by farmers to support the informal learning process.

Methodology

This research uses a qualitative method by using a multiple case studies approach. The case study approach is a description and intensive analysis of a phenomenon or social unit, namely individual, group, institution, or community

[41]. A multiple case studies was used to extract a lesson from a good case which shows the success of digital technology utilization to be replicated towards other cases. The chosen case represents the use of digital technology in the agricultural sector. In selected cases, researchers chose rural areas that showed the successful use of digital technology and rural areas that were not yet able to use digital technology to develop the agricultural sector. The selection of the case study is useful to build a model mechanism of digital literacy development in a rural community. By choosing the cases, the researcher will replicate the digital technology utilization mechanism in Kintamani Rural Area to implement in Pangalengan Agropolitan.

A semi-structured interview is conducted to obtain information. A semi-structured interview is an interview using the questions list, but it is more flexible because it tries to adjust to the issues raised by the informant [42]. Interview in Kintamani Rural Area conducted by choosing informants according to predetermined criteria, which is called purposively. There were nine entrepreneur informants in Kintamani Rural Area. The questions for the entrepreneur informants consist of 1) factors that influence the utilization of digital technology; these factors classified into personal factor (such as educational background and age), social factor (such as a social relationship), and environment factor (such as infrastructure); 2) opportunity recognition carried out by entrepreneurs using digital technology; 3) risk-taking carried out by entrepreneurs using digital technology. Informants in Pangalengan Agropolitan consist of farmer and entrepreneur, located explicitly in Pangalengan Village, Margamulya Village, Margamekar Village, and Warnasari Village. The selected villages are the village that has agribusiness development potential. The interview in Pangalengan Agropolitan were conducted purposively and using snowball technique. The collecting data began by interviewing Village head (*Kepala Desa*), then we ask for information about farmers and entrepreneurs who are the best practices in the village. We continued the interview with one farmer and one businessman in selected villages. The questions proposed to farmers and entrepreneurs consisted of business overview, social relationship, internet connection availability, and the strategy to do something new in developing their business, including the use of digital technology.

Case Overview

The first case study is Pangalengan Agropolitan, which has agricultural potential. However, their community is not able to utilize digital technology yet. Pangalengan Agropolitan is appointed as the Agropolitan area in Bandung Regency because of its agricultural potential. Several parties are involved in developing Pangalengan Agropolitan, namely the government, private, supporting institution, and researcher. The government (Bappeda) was responsible for coordinating perangkat daerah. The private allocated their CSR's fund to Pangalengan Agropolitan, and the supporting institution lend the fund to a rural community. Several researchers did their research about Pangalengan

Agropolitan. Unfortunately, their research did not have an impact on Pangalengan Agropolitan. Although there are already a variety of actors involved, the interaction currently happening is limited to interactions between the government and the community, interactions between supporting institutions, namely banking institutions and the community, and interactions between the private sector and the community. The actors have not coordinated yet.

The physical and environmental conditions of the Pangalengan Agropolitan are adequate for the development of the agricultural sector with varied commodities and high economic prospects. The development of agribusiness systems in Pangalengan Agropolitan is still very limited to certain farmer groups. A few farmers could do seed development, commodity planting, product processing, and selling the product in a whole integrated system. The rest of the farmers are selling raw products to a businessman. Coffee-based products and milk-based products are most widely sold in Pangalengan Agropolitan. Only one farmer group has the facility to do a teleconference with other farmer groups in many regions. Several businessmen are looking for information using the internet and selling the product by using an online platform. However, they only did it once and decided not to continue to use digital technology.

Table 1: Characteristics of Case Study

	Kintamani Rural Area	Pangalengan Agropolitan
Agribusiness characteristics	The farmers develop an integrated agricultural sector	The farmers and the businessman develop an agricultural sector partially
The use of digital technology	E-business (It means they use digital technology for all whole business process): looking for information by using Google, Pinterest, and Youtube; networking with other entrepreneurs by using Instagram	E-business (It means they use digital technology for all whole business process): looking for information by using Google and Youtube, unfortunately only few farmers did it and it was only done once
	E-commerce (It means they use digital technology to support transactions): they did online marketing by using Instagram & Tokopedia	E-commerce (It means they use digital technology to support transactions): they did online marketing by using Tokopedia, but did not massive
	Technology automation: they use an advanced engine connected to handphone and internet connection to support production process	

	Kintamani Rural Area	Pangalengan Agropolitan
Digital literacy	Digital literacy is high, indicated by two conditions: the awareness and the desire of rural the community to learn digital technology; the intensity of using the digital technology in developing agricultural sector is massive	Digital literacy is low, indicated by two conditions, namely: the awareness and the desire of rural community to learn digital technology is still low; the intensity of using digital technology in developing the agricultural sector is not massive
Social relationship	Harmonious social relationship makes the informal learning process easier	The farmers and the businessman tend to work individually

Digital literacy in Pangalengan Agropolitan is still low, even though the internet connection already is available in every village. The rural community only uses digital technology to communicate with social media, such as *WhatsApp* and *Facebook*. They still do not show the desire to learn about digital technology together; it might be because they tend to work individually rather than collectively. The collective learning process only occurs in one group farmer and one cooperation. The learning material is about plantation strategy; they did not learn about the use of digital technology. The low interest of the community also affects the ability to use digital technology in Pangalengan Agropolitan. There was a businessman who tried to sell the product by using an online platform, but he thought offline marketing is easier than online marketing.

The second case study is the Rural Kintamani Area, representing the success of utilizing digital technology in developing agricultural-based entrepreneurship. The farmers developed integrated arabica coffee development system including plant, process, and sell, contrary to Pangalengan Agropolitan. The farmers in the Rural Kintamani area already use digital technology in their business. By using digital technology, they can get information about how to plant coffee, a variety of processing coffee, and coffee market development worldwide. There was an entrepreneur that utilized digital technology to keep the taste consistency of coffee, manage the taste of coffee, and do the roasting. The use of digital technology has impacts on their business; they can compete with other processors, achieve the broader market, and innovate.

The farmers in Kintamani Rural Area realized that digital technology is needed in developing their business. Despite of their old ages, they have a strong motivation to learn how to use digital technology. They realized that digital technology is useful in achieving a broader market. The university helps the old farmers to learn about digital technology. They learn collectively in their group. The harmonious social relationship is well-maintained because they are involved in Subak Abian (farmer groups). Because of the harmonious social relationship, collectively, they can learn something new in developing the agricultural sector supported by digital technology use. By comparing both cases, the researcher

able to learn something that Agropolitan did not have. These differences will affect how to develop a proposed model.

Extracting lessons from cases

Digital literacy

The rural community in Kintamani Rural Area has good digital literacy, which was shown by the massiveness of digital technology usage. The harmonious social relationship in Kintamani Rural Area triggers the growth of digital literacy. The government also has a role in fostering digital literacy; for example, they carried out digital-based entrepreneurs training. The entrepreneurs in Kintamani Rural Area can explore and utilize the information they get from the internet. Besides that, they are capable of expanding their market product. For that reason, the form of digital technology usage in Kintamani Rural Area can be classified into three categories: e-business, e-commerce, and technology automation.

All informants in Rural Kintamani Area can do e-business and e-commerce, while automation technology was only done by one entrepreneur; it shows that there is a different level of digital technology adoption. By using digital technology, the entrepreneurs in Kintamani Rural Area can recognize the new opportunity and utilize it to their business, for example, looking for information about the coffee market development in several countries, sounding product, and understanding consumer's behaviour, and collaborating with other entrepreneurs. The information about coffee industry development helps the entrepreneur to create new products and carry new methods, for example, conduct new fermentation and roasting technique. Using digital technology, they know the situation in other countries; thus, they can learn it to implement it in their area. One of the informants mentioned that he could understand consumers' behaviour by using social media to arrange the marketing strategy. The new strategy to sell the product is a sounding product, thanks to digital technology, the entrepreneurs could inform their consumers that they will launch new products soon. A sounding product is a strategy to increase the attractiveness of consumers on the new products. The networking process with other entrepreneurs also becomes easier because the use of digital technology.

The entrepreneurs not only are able to recognize new opportunity, but also able to take a risk. The entrepreneurs sacrifice their resources, such as time and resigning from their jobs. In developing the coffee business, they sacrifice their time to experiment. The experiment becomes easier because they already get information from the internet. This information helps the entrepreneurs to reduce the margin error. Some entrepreneurs resigning from their jobs and start to run a coffee business, it is caused by the information from the internet make them feel confident to run a new business.

There were some differences between both cases. First, both case studies show the different agribusiness characteristics. The farmers in Pangalengan

Agropolitan were not able yet to processing products based on the commodities they grow. They only focused on planting commodities, while the businessman is processing the agricultural-based products; it shows that they have not yet developed agriculture in the agribusiness system. The explanation about digital literacy in Pangalengan Agropolitan will be divided into a farmer unit and a businessman unit.

The digital literacy in Pangalengan Agropolitan is lower than digital literacy in Kintamani Rural Area. The form of digital technology utilization carried out in the Pangalengan Agropolitan consists of e-business and e-commerce, but it is very limited to farmers and certain business actors. The farmers and the businessman are not able to explore and utilize the information by using digital technology. Some farmers and businessmen find inspiration to create new products from the internet. However, they only did it once, and they decide to stop using digital technology to search for broader information. The farmers and the businessmen are not trying to explore the information either to build a marketing strategy or understanding consumer's preferences. This condition is quite different from the conditions in the Kintamani Rural Area. They continue to follow the development of the coffee industry that occurs in various countries by utilizing digital technology.

Other conditions that indicate that digital literacy in the Pangalengan community is still relatively low is that digital technology has not been utilized to help exchange information and network processes by farmers and entrepreneurs. They tend to exchange information between businessmen or through technical guidance (Bimbingan Teknis, bimtek) organized by the government. Only one informant used Tokopedia to sell their products; the rest only did marketing at home and left the goods to the center of souvenirs in Pangalengan and surrounding areas. This condition is quite different from Kintamani's conditions, where entrepreneurs in Kintamani have been using social media such as WhatsApp and Instagram, to communicate with other entrepreneurs both inside and outside Bali and trainers from various countries. The use of digital technology as a communication medium facilitates the exchange of information and facilitates the collaboration process.

Although the availability of the Internet networks in the Pangalengan Agropolitan is quite good, it is not utilized by farmers and businesses to support economic activities. The use of digital technology in agriculture-based entrepreneurial activities in Pangalengan Agropolitan only carried out by some people. This condition shows the low digital literacy in Pangalengan Agropolitan. There was no intervention from external parties such as the government to foster digital literacy in Pangalengan Agropolitan. In addition to the lack of digital literacy, farmers and businesses also have limited capacity to develop a more entrepreneurial agricultural sector.

Collective capacity and informal learning

Collective capacity in Kintamani Rural Area helps the community to learn digital technology. Good collective capacity is shown in farmer groups, one of which is the Paramitha Catur Productive Unit. The old farmers have the desire to utilize digital technology in business development, but they have limited capability. The university helps them learn about the use of digital technology. When the training held, the leader of the unit engages the young farmers to participate in the training. There is a division of roles between young farmers and old farmers, namely young farmers focusing on developing the coffee business by using digital technology and older farmers focusing on coffee production. Together with a leader of the Productive Unit, the young farmers, who are over 40 years old, learn to use digital technology together. The information they get from the internet, such as coffee product innovations, will be distributed to the old farmers. The young farmers will also help the marketing of coffee through social media like Instagram. The division of roles is suitable for their groups because each group of farmers can focus on their duty.

Almost all informants in Kintamani Rural Area are members of Subak Abian, a farmer group in Bali. In Subak Abian, several values are adhered to, and traditions that must be maintained, following the Tri Hita Karana Principle, one of three principles are to maintain human relations. Therefore, they always help and trust each other. The rituals performed by Subak Abian increase the cohesiveness of the farmers because they have to meet regularly to prepare the rituals. The harmonious social relationship in Subak Abian helps the farmers to trust each other. Subak Abian's members tend to be easier to receive new information. Informal learning, such as information exchange among farmers, is easier to occur, including learning through digital technology. Information exchange takes place face-to-face and online via WhatsApp group, as did one of the informants in this study. Some entrepreneurs in Kintamani also have coffee shops located in Seminyak, Badung, and Denpasar. To supply the coffee, they collaborated with several other local farmers. To guarantee the quality of coffee produced, entrepreneurs often share information to farmers about the procedures for planting and producing quality coffee.

Some entrepreneurs in Kintamani received non-formal education, such as training in the use of digital technology from the government. The rest independently explored new things about the use of digital technology in informal business development. Background education of all informants in the Kintamani Rural Area is not associated with either digital technology or digital marketing. Entrepreneurs who have never been involved in the coffee business use digital technology to find information about coffee development and communicate with their coffee entrepreneur colleagues to discuss their business. The variety of requests from customers also encourages entrepreneurs to learn new things by utilizing digital technology. Learning from experience, collectively, is the most common learning form in Kintamani Rural Area.

In Pangalengan, the condition is quite different from Kintamani Case, in which farmers and businessmen tend to work independently. Only one farmer group and one coffee cooperative are known to hold regular meetings to exchange information on planting and production procedures. This condition indicates that the rural community in Pangalengan Agropolitan does not have a good collective capacity. Farmers and businessmen also do not show a desire to study the use of digital technology for business development. Digital technology in Pangalengan is more widely used to adjust the lifestyle of urban communities. The low collective capacity of the Pangalengan community is indicated to inhibit the growth of digital literacy there. Reflected on the Kintamani case, the community has a good collective capacity, shown by the social relationships that are very well maintained so that it is very easy to build trust to receive and exchange new information. They are not reluctant to teach each other to learn new things, including using digital technology. Good social relationships also help build an atmosphere conducive to learning. There is no competition between entrepreneurs in Kintamani Rural Area; they are happy when farmers compete to produce quality coffee because it will help their businesses. When there are entrepreneurs who duplicate other entrepreneurs, it makes them proud and motivates them to create a better product. Continuously, the informal learning and accumulation of digital technology knowledge carried out. The Kintamani case shows that informal learning plays an important role in fostering digital literacy in society and also supported by good social relations and collective capacity.

A conducive learning environment like in Kintamani was not found in Pangalengan. The rural community in Pangalengan Agropolitan does not desire to learn about digital technology, either individually or collectively. They also tend to develop their business to fulfill their needs only rather than develop their business to become more profit-oriented. Referring to the Kintamani case and the previous studies, there needs to be an intervention to establish a conducive and constructive learning atmosphere in growing collective capacity and digital literacy. The model proposed in this paper is to facilitate the informal learning process among farmers.

The proposed model

To propose a model, we would like to identify the factors influencing the utilization of digital technology in the Kintamani Rural Area. This will allow us to know the right intervention so that digital literacy could be built in Pangalengan Agropolitan. Since digital literacy is growing, it can help the farmers and the businessman to have the entrepreneurial capacity.

Based on the interview results, it is known there are several factors influencing utilization of digital technology, namely personal factor, social factor, and environmental factor.

1. Personal factors

Personal factors include educational background, age, experience, physical condition, and the other characteristics personal can be classified as personal characteristics which owned by every person and might influence the physical and psychological conditions [43, 44, 45]. According to interview results, several factors are influencing the utilization of digital technology in the Kintamani Rural Area, namely age, educational background, and experience.

The younger entrepreneurs (less than 40 years old) tend to use digital technology easier because they have experience in using digital technology in daily life, for example, communicating using social media WhatsApp & Instagram. The development of digital technology occurs when they take formal education; this is quite different from the older farmers. The older farmers tend to harder in using digital technology because they lack experience. When the older farmers took a formal education, the development of digital technology has not occurred yet. Personal capability entrepreneurs also influenced by training.

2. Social factor

Social factors include norm, policy, rule, community relation, social capital, and education structure [43, 44, 45]. This research showed that social relationships, namely internal and external relationships, can influence the utilization of digital technology. Some entrepreneurs use digital technology because they motivated by the younger family member, such as their child and their cousin. The entrepreneurs were also motivated by the government and the consumers. The training which was carried by the government build the personal capacity's entrepreneur.

3. Environmental factor

Environmental factor includes the availability of infrastructure and geographic conditions [43, 44, 45]. This research showed that a good internet connection has an impact on the utilization of digital technology in the Kintamani Rural Area.

This finding has important implications for replicating a mechanism of digital literacy. We have to intervene in things that will affect personal capacity's entrepreneurs to use digital technology to create a conducive digital entrepreneurship ecosystem. The conducive digital entrepreneurship ecosystem includes a conducive learning atmosphere and the provision of digital infrastructure. This ecosystem is needed to develop digital literacy in Pangalengan Agropolitan rural community. Digital literacy is needed to increase awareness of the rural community. The utilization of digital technology is important in developing their business. Then it will help build entrepreneurial capacity.

The institution has to develop its strategy to facilitate informal learning. We can learn from the regional planning concept, namely the learning region, that several components are needed to create interactive learning continuously consisting of institution support, the thick and quality of network in a productive

environment, and institutional thickness. Therefore, institutional support is needed to support the informal learning model offered in this paper. In the end, the conducive learning atmosphere will affect the personal capacity of farmers and businessmen.

The following models are proposed to encourage the use of digital technology in the development of rural agricultural businesses in Pangalengan.

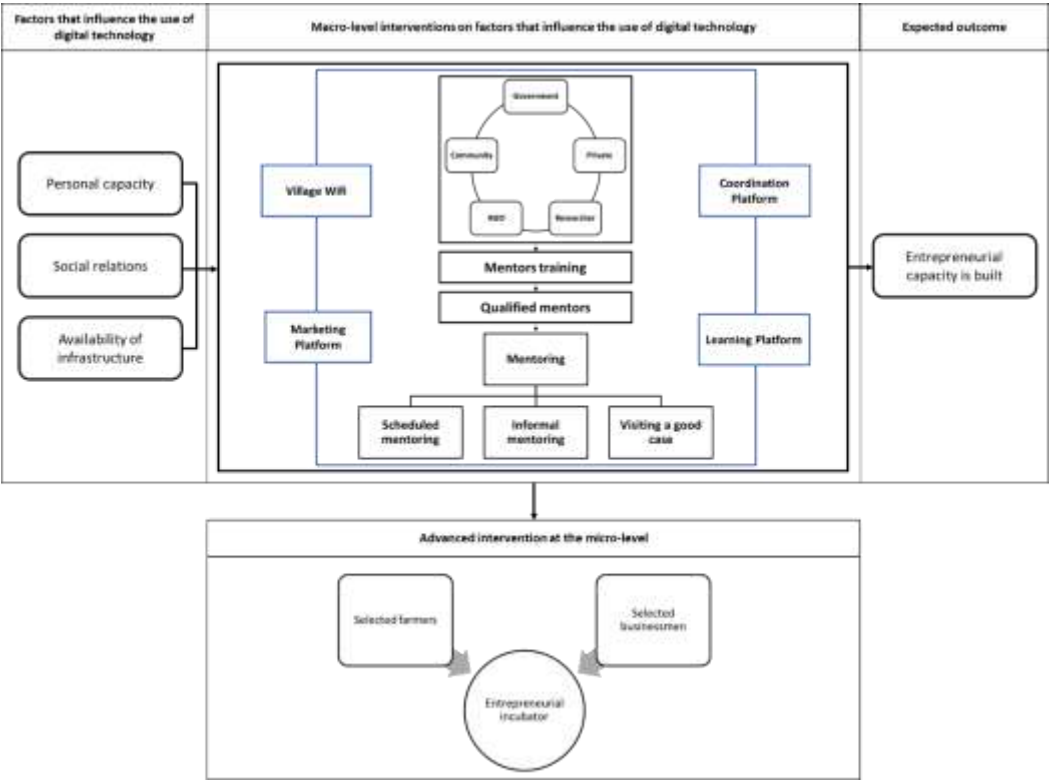


Figure 1: The proposed model

The proposed model highlights mentoring as an effective informal learning method to build digital literacy and collective capacity in Pangalengan Agropolitan rural community. The qualified mentors include the trained farmers, and the trainer businessmen are needed to implement the mentoring system. Coordination between the government, private sector, researcher, and NGO is needed to train the mentors. These parties are also responsible for preparing the basic module of digital entrepreneurship development. The farmers and the businessmen in every village can give their opinion regarding the development of digital entrepreneurship to the mentors. Then, the mentors will deliver it to the government and the other parties. The coordination between many parties is needed because they have different roles in supporting the knowledge

accumulation process about digital technology in rural entrepreneurship. The knowledge has to be delivered inclusively to the community because it might help to build curiosity to learn digital technology and utilize digital technology to develop their business. As the community's curiosity develops, a learning atmosphere will be formed that supports the learning process of new things, namely the use of digital technology in entrepreneurial activities.

Informal learning needs to be encouraged because knowledge transfer can occur quickly, and farmers can adapt quickly in the process that occurs [40, 46] An adaptation that occurs quickly in informal learning can stimulate social learning [46]. Some strategies to foster digital literacy and the collective capacity of the Pangalengan Agropolitan community through informal learning, namely:

- Basic module of digital entrepreneurship development
The basic module as a guideline for developing digital entrepreneurship is important to support the informal learning process.
- Scheduled mentoring
The qualified mentors will divide the group and arrange a schedule of mentoring. They already utilize digital technology in their business so that the mentoring's participants can learn from their mentors. This situation needs to be built because it can provide a supportive environment for informal learning. When there is a role model to use digital technology, it will trigger the desire of farmers and businessmen to utilize digital technology in developing their business.

Scheduled mentoring is an activity to educate the farmers and businessmen about the strategy of developing digital entrepreneurship. Mentoring activities are carried out in groups to build the collective capacity of farmers and businesses. By mentoring in a group, it is expected to build a sense of belonging and trust among each other. Mentoring activities need to be done in the long run so that mentoring participants feel more comfortable to know each other [40]. The existence of the trust and a sense of belonging to each other facilitates the exchange of ideas and knowledge within the group [39]. When members in the group find the difficulties in using digital technology or need advice, they can tell the mentoring group and get input from other group members. In addition to recounting problems or obstacles encountered, each participant was also given the opportunity to tell their progress in developing a digital-based business; this is expected to motivate each other. Each participant can also take important points from other participants' stories relevant and useful to be applied in the business he is running. Interactions that occur in mentoring groups exchange information, ideas, and knowledge and reflect with one another.

Mentoring is an important activity to build knowledge of farmers and businessmen. The farmers and the businessmen will place their mentor as a trusted learning resource that has more knowledge than them. The people

that they trust will give valuable support and feedback to their business [40]. Previous studies reported that having a mentor will positively related to the career development of mentoring's participants [40]. Previous studies showed that mentoring is a proper system to build digital literacy and collective capacity in Pangalengan Agropolitan.

- Informal mentoring
Informal mentoring occurs spontaneously and can be done in a group or individually. Informal mentoring can be a consultation session for a farmer and a businessman when necessary without waiting for the next mentoring schedule.
- Visiting the good practice
Visiting the other location which carried digital entrepreneurship is important to give an experience for farmers and businessmen. It is expected that they can extract a lesson from the location they visited.

By developing an informal learning system as described, it is expected to create a supportive work environment as in the following scheme:

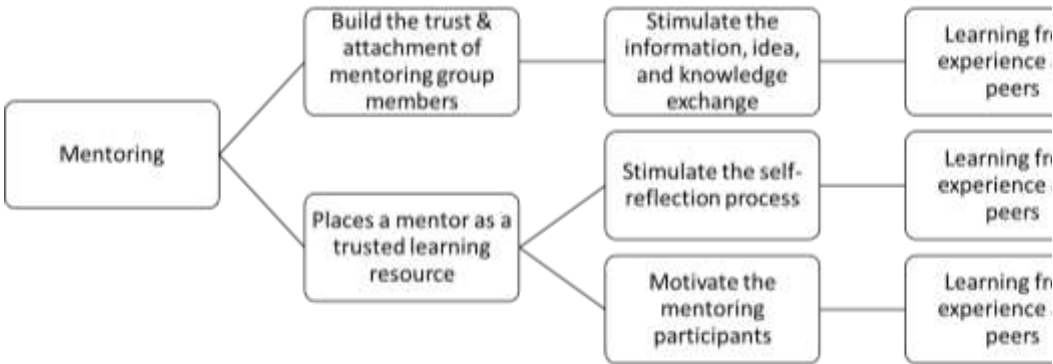


Figure 2: Outcome Expected of Informal Learning

Informal learning is expected to build a collective capacity in a group. The cohesivity inter farmers and businessmen will be built through routine mentoring. The learning process carried out collectively will help build the collective capacity of a group. A conducive learning atmosphere in a group will help group members learn from experience and learn from their peers.

To support the learning process in Pangalengan Agropolitan, there are several digital infrastructures prepared by the government, namely:

- Village Wi-Fi

Village Wi-Fi is provided to be utilized by the community in developing their business.

- **Coordination Platform**

A coordination platform is provided to facilitate interaction between farmers, business actors, government, private sector, academics, and NGOs. The coordination platform can be used to make announcements regarding entrepreneurship development in Pangalengan and give aspirations.

- **Learning Platform**

A learning platform is provided to facilitate valuable information and knowledge exchange in developing rural entrepreneurship. Every farmer and businessman can give their opinion and idea freely on the platform. If they find the difficulties when running the business, they can ask for a solution and opinion in the platform.

- **Marketing Platform**

A marketing platform is provided to facilitate the marketing of local products. Every farmer and business actor will be accompanied by a mentor to be able to register their business in the marketing platform. In mentoring sessions, the mentors will teach about online marketing strategies.

These platforms are applications that can be downloaded by the Pangalengan Agropolitan community. The marketing platform is also integrated with the marketplace in collaboration with the government to encourage the acceleration of the growth of UMKM (Micro Small and Medium Enterprises) Digital.

Furthermore, if there are farmers and business actors in each village committed to developing their businesses further, they can be included in entrepreneurial incubation. Incubation participants will be accompanied in stages until finally, they can become independent and developing entrepreneurship. During the incubation period, participants will receive assistance, market access, and financing facilities. After the incubation process, there are no more differences between farmers and businessmen because they have been encouraged to develop businesses in the agribusiness system, namely integrated agriculture.

Conclusion

This paper aims to propose a model that focuses on a mechanism in developing digital literacy and collective capacity so that they can utilize digital technology in developing the agricultural sector. The result of this paper is to propose a model of the informal learning process to build literacy digital and collective capacity in Pangalengan Agropolitan. The informal learning process plays a crucial role in increasing entrepreneurial capacity in farmer groups and businessmen groups. Informal learning in a supportive group will help the formation of a personal capacity's entrepreneur. The entrepreneurial capacity will be built in line with the growth of digital literacy and collective capacity; this can be realized by institutionalizing informal learning systems. There are several

strategies to facilitate informal learning in Pangalengan Agropolitan: compiling digital entrepreneurship development modules, educating qualified mentors for farmers and businesses in each village, conducting scheduled mentoring, conducting informal mentoring, and conducting visits precedent location. Digital infrastructure also needs to be provided to support the exchange of ideas, information, and knowledge online. The digital infrastructure provided includes Village WiFi, coordination platforms, learning platforms, and marketing platforms. All platform is an application that can be downloaded on smartphones by the Pangalengan Agropolitan community. To support the successful implementation of the strategy, coordination between actors, namely the government, private sector, academics, and NGOs, also needs to be supported. The proposed model is expected to foster a conducive entrepreneurial ecosystem in Pangalengan Agropolitan. Further interventions can also be given to entrepreneurs who are ready to commit themselves through the entrepreneurial incubation process.

Acknowledgement

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Architectural Design

Those who focuses on development of architectural sciences and research, also topics in design related to tropical and developing countries as context.

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Architectural Design research group focused on learning, development, and teaching sciences that came as basics in architectural education. This group develops architectural sciences and research, that related to the design as topics, with developing and tropical countries as a basis. Also, study design theories and skills developed by experienced architects and professional practitioners. The scope of knowledge covers four main fields:

1. Design of Building,
2. Design of Urban Areas
3. Landscape Architecture, and
4. Environment and Behavior

This group develop skills related to forming manipulation, spatial forming, design theory, approaches in design, design methodology, facilities programming, and strategic planning for design and architecture. Activities in this group are not only in research, but also in other activities, such as contests, workshops, and teaching. This group also involved in collaboration with the various institution and diverse other skills.

5.1 Investigasi Metode Pencarian Bentuk (*Form Finding*) Berbasis Prinsip Homeostasis dan Optimasi Multi Obyektif

1. **HEAD OF TEAM** : Aswin Indraprastha
2. **TEAM MEMBERS** : Himasari Hanan,
Prasetyo Effendi,
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Isu keberlanjutan, biaya, kecepatan membangun dan teknik serta teknologi konstruksi menjadi faktor-faktor dominan yang menentukan dalam perancangan arsitektur untuk bangunan-bangunan publik. Rancangan yang lebih efisien dilihat dari beberapa faktor di atas menjadi tolok ukur dan kriteria atas kinerja desain untuk diterapkan dalam berbagai proyek bangunan publik, terutama yang dibangun oleh pemerintah. Munculnya indikator-indikator obyektif (multi-obyektif) atas hasil desain ini membuat studi tentang optimasi pada proses desain berkembang dalam kurun lima tahun kebelakang dan semakin lama menjadi semakin esensial sebagai bagian dari perangkat desain bagi arsitek. Kebutuhan dan kriteria desain yang semakin kompleks dan dalam beberapa kasus menimbulkan konflik antara satu obyektif dengan obyektif yang lain, membuat metode optimasi multi obyektif (*multi objective optimization*-MOO) lebih dari sekedar mentranslasikan hasil kompromi antar obyektif. Secara teoritis dan ideal, arsitek memerlukan himpunan informasi yang lengkap atas variasi desain yang dibuat, melibatkan setiap indikator kinerja atas desain-desain tersebut, yang membantunya dalam mengambil keputusan dan menentukan desain yang terbaik dan paling optimum (yang tidak selalu berarti bernilai rata-rata atas semua indikator kinerja desain tersebut). Studi ini membuat investigasi dan evaluasi atas sebuah model berbasis algoritma evolusioner (*evolutionary algorithm*) menggunakan prinsip homeostasis, yakni prinsip pada entitas biologis dalam mempertahankan kesetimbangan dalam dirinya untuk beradaptasi secara dinamik dengan lingkungan, untuk metode optimasi multi obyektif pada proses desain arsitektur. Tujuannya adalah untuk melihat dan memahami potensi metode MOO berbasis prinsip Homeostasis dalam proses desain yang memerlukan alternatif desain, dan melihat sejauh mana algoritma evolusi dapat digunakan untuk mengevaluasi kinerja atas desain arsitektural.

Kata Kunci: Algoritma evolusioner (*Evolutionary Algorithm*), Prinsip Homeostasis, Optimasi Multi-Obyektif (*Multi-objective Optimisation*), Proses Desain Arsitektur

Background (*In Bahasa Indonesia*)

Dalam arsitektur, alam seringkali menjadi sumber inspirasi baik formal maupun metafora. Dalam konteks formal, tektonika atau keterbangunan dan prinsip-prinsip pengendalian lingkungan serta pada akhirnya domestikasi perilaku berhuni atau bermukim merupakan adaptasi manusia dalam arsitektur yang mengambil inspirasi dari alam sekitar. Sebagai metafora, lahirnya langgam-langgam dalam perkembangan arsitektur mulai dari arsitektur tradisional, *art nouveau* sampai pada *post-modernism* tidak lepas dari alam sebagai sumber inspirasi. Namun demikian, seperti dituliskan oleh Steadman di tahun 1979 dan revisinya di tahun 2008 dalam "*The Evolution of Design: Biological Analogy in Architecture and Applied Arts*", penggalan gagasan dan inspirasi dari alam pada desain khususnya arsitektur lebih dari sekedar metafora dan analogi formal namun mulai masuk pada proses-proses dinamis yang terjadi pada entitas biologis. Hal ini mulai mengemuka pada dua dekade belakangan dengan alasan utama adanya pemahaman bahwa arsitektur hauslah dikendalikan oleh sistem dan proses yang inheren dengan sistem biologis, alih-alih hanya menjadi imitasi statik morfologik dan bentuk-bentuk organik.

Pemahaman atas proses dan properti emergens (*emergence*) pada sistem biologis dan alam mengubah implementasi dari prinsip-prinsip ini pada tataran desain arsitektur dari *top-down* menjadi *bottom-up*. Ini berarti bahwa sebuah sistem akhir atau final sebagai sebuah produk yang telah dicapai merupakan kondisi kesetimbangan (*equilibrium*) dari agregasi beberapa komponen yang saling beradaptasi untuk mencapai tujuan kesetimbangan tadi. Menurut Turner (2002) dalam memahami sebuah perilaku kompleks dan emergens dari suatu sistem alam "...design principles extracted from these systems have changed the role of architects from "specifiers" to "facilitators" (Turner, 2002). Dalam hal itu, emergens (kemunculan) dari suatu bentuk atau perilaku yang melewati proses desain generatif tidak melulu merupakan hasil dari keputusan yang ditentukan oleh arsitek, melainkan ditunjang oleh keluaran dari model-model dan simulasi interaktif dari beberapa komponen desain yang dilakukan pada proses desain. Mario Carpo (2017) menyatakan bahwa dalam proses demikian, arsitek melakukan peran yang dinamakan "Digital Author" yang memfasilitasi proses-proses simulasi yang *bottom-up*, generatif dan interaktif dalam proses merancang.

Kondisi kesetimbangan dalam setiap proses biologis ini dinamakan Homeostasis, yang merupakan proses fundamental dari setiap entitas biologi dan spesies dalam beradaptasi dengan lingkungannya. Proses ini beroperasi pada ranah spasial yang ditentukan oleh tiga faktor: lingkungan internal, lingkungan eksternal dan batas antara lingkungan internal dan eksternal. Setiap spesies biologi memiliki strateginya sendiri-sendiri dalam mempertahankan homeostasisnya agar tetap dapat bertahan pada lingkungan yang berubah. Homeostatis sebagai sebuah proses yang *bottom-up* dan generatif serta secara intrinsik digerakkan oleh sel-sel dan gen pada setiap spesies, belum banyak distudi di ranah desain dan arsitektur khususnya walaupun proses ini memiliki

potensi sebagai metode dan strategi dalam menghasilkan bentuk rancangan yang memiliki kinerja lingkungan (*environmental performance*) yang lebih baik.

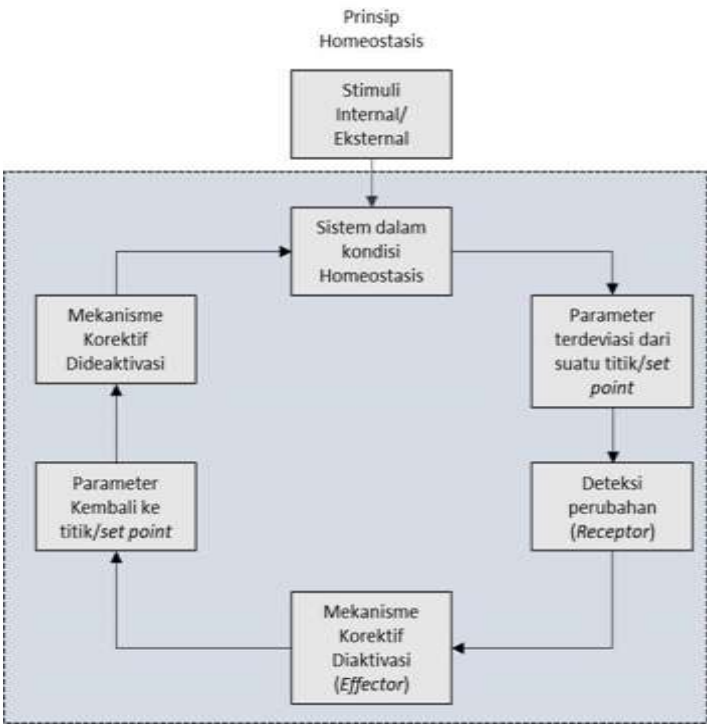


Figure 1. Prinsip proses Homeostasis (disadur dari Milad Showkatbakhsh & Muhammed Makki, 2020)

Dalam artikelnya yang berjudul “*Evolving Homeostatic Tissue Using Genetic Algorithm*”, Gerlee et.al., menuliskan bahwa homeostasis adalah properti signifikan dari setiap mahluk biologis yang didalamnya terkandung kemampuan untuk meregulasi diri sendiri sebagai respon adaptif terhadap perubahan pada lingkungan yang bertujuan mencapai kesetimbangan (keseimbangan dinamis) yang berdampak pada bentuk atau fungsi organ atau kumpulan organ bersangkutan (Gerlee, Basanta, & Anderson, 2011). Regulasi diri sendiri lewat proses homeostatik ini terjadi pada berbagai tingkatan pada sebuah spesies dan homeostatik ini yang mengendalikan beberapa variabel dengan tujuan utama kesetimbangan dan adaptasi. Salah satu variabel tersebut yang juga menjadi obyek studi adalah energi dan panas, serta kemungkinan kontribusinya dalam meregulasi proses dalam menghasilkan bentuk-bentuk arsitektural yang adaptif sebagai atribut dari proses homeostatis.

Dalam konteks tersebut, studi ini akan menitikberatkan pada proses homeostatis berupa *thermoregulation*, yakni proses terkendali berupa pertukaran panas/kalor antara entitas biologis dengan lingkungannya. Proses pertukaran kalor ini melalui tiga mekanisme: radiasi, konduksi, dan konveksi. Selain itu *thermoregulation* ini dikategorikan ke dalam dua proses: *endothermic* (umumnya

kategori makhluk berdarah panas) dan *ectothermic* (umumnya kategori makhluk berdarah dingin). Spesies biologi *endothermic* memiliki kapabilitas *thermoreglation* internal yang lebih efisien dan mereka mempertahankan suhu dalam tubuh mereka dalam rentang yang pendek. Spesies ini perlu strategi di luar tubuhnya untuk beradaptasi dengan lingkungan termal yang ekstrim (misalnya, pakaian dan rumah). Spesies biologi *ectothermic* di sisi lain, temperatur internalnya berfluktuasi dalam rentang yang lebih lebar dibanding spesies *endothermic* dan diregulasi melalui perubahan perilaku baik individual maupun kolektif, untuk mempertahankan kondisi homeostatis.

Studi ini secara eksperimental menginvestigasi prinsip-prinsip *thermoregulation* pada entitas biologis dalam pendekatan dan proses generatif untuk mengamati proses evolusi bentuk arsitektural yang adaptif terhadap kondisi lingkungan yang disimulasikan. Dalam konteks ini, adaptasi *endohermic* didefinisikan dengan perubahan adaptif dalam rentang variasi yang pendek, sedangkan adaptasi *ectothermic* didefinisikan dengan perubahan adaptif dalam rentang variasi yang lebih lebar. Tujuan pengamatan dalam eksperimen ini adalah memahami penggunaan prinsip-prinsip adaptasi pada produksi bentuk-bentuk arsitektural yang dapat diterapkan sesuai dengan proses desain evolusionari (*evolutionary design process*).

Methodology (*In Bahasa Indonesia*)

Metodologi riset berdasarkan algoritma yang dikembangkan oleh Makki et.al. (2014), dimana persiapan platform komputasional *Wallacei* dikembangkan berdasarkan prinsip *Homeostatis*. Eksperimen dilakukan untuk memahami dan menganalisis serta mengimplementasikan prinsip *thermoregulation* pada proses generatif yang memproduksi komponen arsitektural pada suatu bentuk bangunan yang dapat melakukan optimasi pada beberapa obyektif yang bertolak belakang. Sebuah kasus bangunan tinggi fiktif dijadikan obyek studi dan untuk keperluan eksperimen, radiasi matahari (*solar radiation*) adalah satu-satunya sumber kalor yang radiasinya akan dimitigasi oleh elemen-elemen pada fasad bangunan studi. Sehingga eksperimen ini akan mengamati dampak radiasi matahari pada permukaan obyek studi dan produksi atau generasi bilah-bilah pembayang (*shading device*) yang ber'evolusi' sesuai dengan beberapa obyektif yang ditentukan.

Computational Platform Setup (*In Bahasa Indonesia*)

Aplikasi prinsip-prinsip homeostatik pada ranah desain arsitektur memerlukan model generatif yang responsif terhadap beberapa obyektif (*fitness criterias*) yang bekerja dalam sebuah mekanisme umpan-balik (*feedback loop*) yang memungkinkan terjadinya proses evaluasi, seleksi dan rekonfigurasi dari solusi-solusi desain yang digenerasi (istilah generasi (*generated*) alih-alih produksi (*produced*) lebih pada konteks generasi akan menghasilkan produk yang memiliki variasi sesuai dengan prinsip evolusi). Dalam hal itu, eksperimen akan mereplika model evolusionari biologi (*evolutionary biology*) dari penciptaan

variasi, evaluasi, seleksi untuk meng-generasi populasi dari kandidat solusi desain yang semakin ber'evolusi' meningkatkan nilai-nilai *fitness* sesuai beberapa obyektif yang ditentukan (Luke, 2013). Di sini, parameter-parameter yang merupakan variabel terkontrol dari sistem Homeostasis didefinisikan sebagai *fitness objectives*.

Dalam bentuk sederhana, sebuah model evolusionari dideskripsikan sebagai proses dua tahap dari penciptaan variasi-variasi secara acak (*random*) dalam genom (*genome*) suatu fenotip (*phenotype*), dan seleksi dari fenotip yang akan dihasilkan, melalui proses dan stimuli atau tekanan dari lingkungan (baca: alam) (Mayr, 1988). Definisi ini adalah basis dari beberapa algoritma evolusionari yang digunakan dan diimplementasikan di beberapa software seperti: algoritma NSGA-II (Deb, Agrawal, Pratap & Meyarivan, 2000) dan algoritma SPEA-2 (Zitzler, Laumanns, Thiele, 2001) dimana secara prinsip algoritma ini akan melalui mekanisme umpan balik (*feedback loop*) dalam proses berikut (Fogel, 2008):

1. Meng-generasi populasi awal dari solusi secara acak.
2. Memodifikasi solusi melalui variasi acak
3. Mengevaluasi solusi dengan menganalisis kinerja pada *fitness objective*
4. Memilih solusi dan mengabaikan sisa populasi melalui mekanisme seleksi

Experimen ini menggunakan software *Wallacei* sebagai *add-in* dari software editor algoritma visual *Grasshopper*, yang dikembangkan oleh Makki et.al. (2014), dimana basis algoritma evolusi (*Evolutionary Algorithm*) menggunakan SPEA-2 (*Strength Pareto Evolutionary Algorithm 2*) yang dikembangkan oleh Robert Vierlinger (2013). Untuk keperluan studi, simulasi evolusionari ini dijalankan pada komputer komsumer dengan spesifikasi umum yakni laptop dengan prosesor Intel Core i7, 2.8 GHz dan RAM sebesar 16GB.

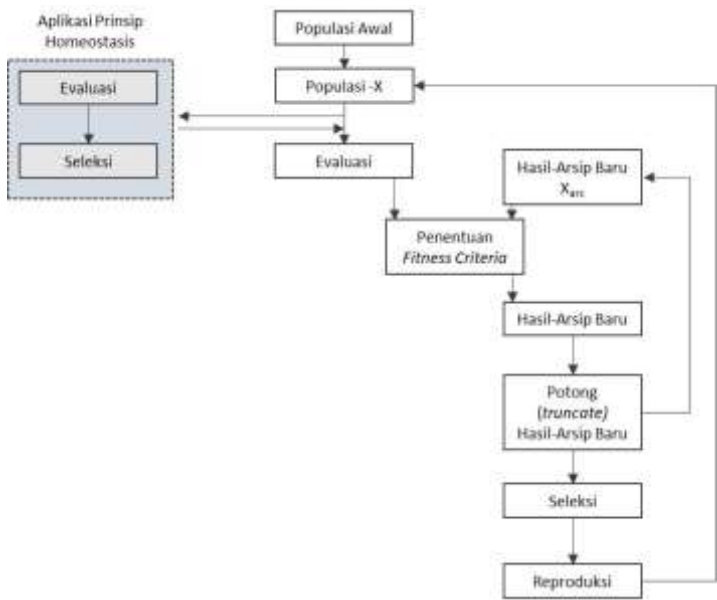


Figure 2. Diagram algoritma evolusionari yang dikustomisasi. Memadukan prinsip Homeostatik dalam algoritma SPEA-2 (disadur dari Milad Showkatbakhsh & Muhammed Makki, 2020)

Obyektif eksperimen adalah memproduksi atau meng-generasi komposisi bilah-bilah pembayang pada permukaan eksterior obyek studi yang mengakomodasi atau memenuhi beberapa obyektfif atau *fitness criteria* yakni:

- Maksimalkan view dari interior ke eksterior (F01)
- Minimalkan radiasi matahari (F02)
- Minimalkan jumlah bilah atau panel pembayang (F03)

Masing-masing dari obyektfif ini berhubungan langsung dengan transformasi bentuk bilah-bilah pembayang yang merupakan variabel terkontrol dari obyek studi yakni bentuk bangunan. Dalam konteks sistem evolusionari atau mesin evolusionari, transformasi bentuk (dimensi panjang, tebal) bilah-bilah pembayang ini didefinisikan sebagai kode genetika (*genetics code*) atau genome dari bilah pembayang. Genome bilah-bilah pembayang terdiri dari atau diperoleh dari kombinasi dan permutasi dari transformasi (genes).

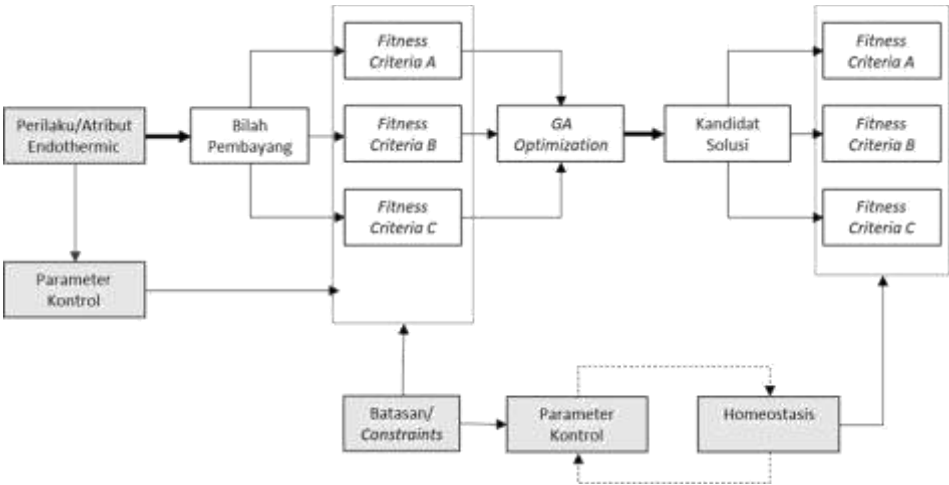


Figure 3. Pseudocode untuk eksperimen dengan algoritma evolusionari (dimodifikasi dari Milad Showkatbakhsh & Muhammed Makki, 2020)

Experiment (In Bahasa Indonesia)

Kasus studi berupa massa bangunan tinggi konseptual yang terletak di Jakarta (-6.12 LS, 106.821 BT) yang akan dikembangkan rancangannya fasadnya menggunakan bilah-bilah pembayang vertikal (*vertical shading device*). Kinerja lingkungan (*environmental performance*) yang ditetapkan adalah: 1) memaksimalkan view dari interior ke eksterior; 2) Meminimalisir radiasi matahari; 3) meminimalkan jumlah bilah pembayang di setiap orientasi permukaan. Dalam hal ini, kinerja lingkungan didefinisikan sebagai *Fitness Objectives* (F01, F02, F03) dan beberapa variabel terkontrol yang didefinisikan sebagai genes dalam mencapai *Fitness Objectives* tersebut adalah:

1. Pembagi setiap permukaan: menentukan berapa banyak angka pembagi pada setiap orientasi fasad.
2. Tebal bilah: menentukan banyaknya radiasi, potensi view dan juga banyaknya panil bilah untuk setiap permukaan fasad.
3. Pembagi horizontal: menentukan berapa banyak variasi bilah vertikal akibat pembagi horizontal
4. Posisi titik atraktor: menentukan posisi titik atraktor untuk variasi bilah vertikal
5. Sudut rotasi: besar sudut yang menentukan banyaknya radiasi matahari yang masuk dan potensi view.

Tabel matriks hubungan antara *Fitness Objectives* dan *Genes* (Variabel Kontrol) sebagai berikut:

Table 1. Matriks penentuan *Fitness Objectives* dan *Genes* (Variabel Kontrol)

<i>Fitness Objectives</i>	<i>Genes</i>				
	Pembagi Setiap	Tebal	Pembagi	Posisi Titik	Sudut

	Permukaan	Bilah	Horizontal	Atraktor	Rotasi
Maximize View (F01)	v	v	x	v	V
Minimize Solar Radiation (F02)	v	v	v	v	v
Minimize Number of Panels (F03)	v	v	v	v	x

Matriks di atas merupakan sebuah kerangka kerja (*framework*) yang menentukan ruang solusi (*solution space*) menggunakan algoritma evolusionari.

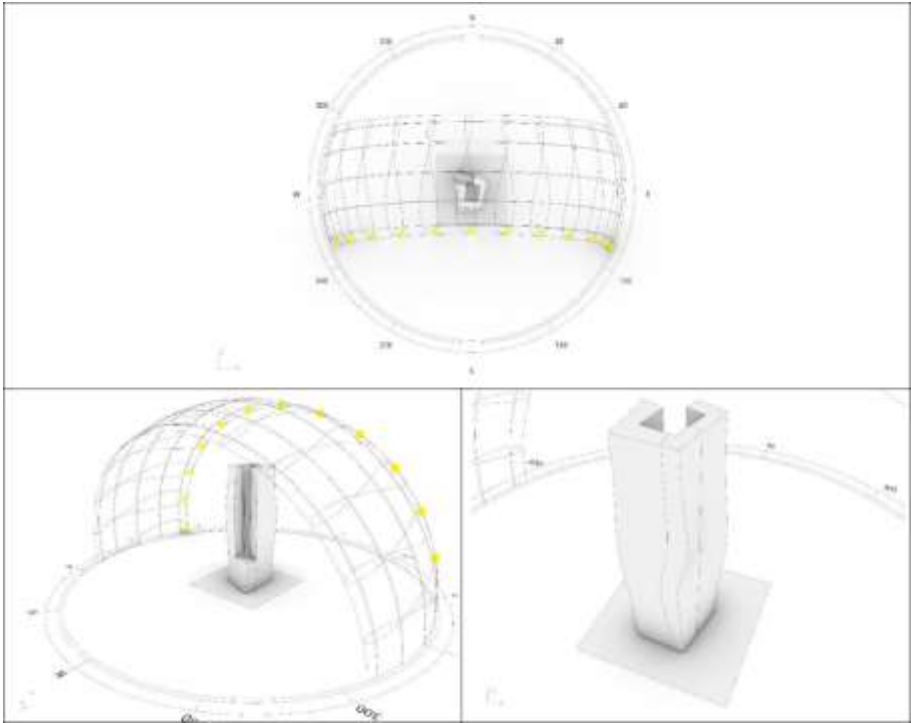


Figure 5. Kasus studi massa konseptual

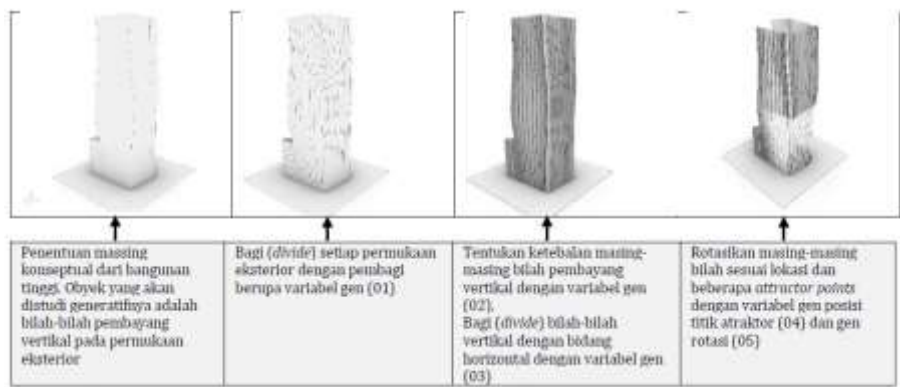


Figure 6. Tahapan eksperimen dan visualisasi variabel-variabel kontrol (genes)

Dalam eksperimen ini, besarnya populasi ditentukan sebagai berikut: ukuran generasi (*Generation Size*) = 50; banyaknya generasi (*Generation Count*) =100 sehingga ukuran populasi = 50x100=5000. Sesuai teori evolusi dan prinsip algoritma evolusionari, semakin besar ukuran generasi dan semakin banyak populasi, kemungkinan terjadinya mutasi dan akhirnya menghasilkan produk/anak yang memiliki gen yang mendekati *Fitness Objectives* akan semakin tinggi.

Analisis Hasil Permutasi

Analisis hasil permutasi dilakukan terhadap setiap obyektif. Dalam hal ini, seleksi pada populasi dilakukan pada generasi terakhir (no.99, karena indeks generasi dimulai dari nol (0), sehingga generasi ke-100 adalah generasi nomor 99) dan juga solusi terakhir, nomor 49. Hipotesisnya, sesuai teori evolusi, generasi terakhir merupakan generasi permutasi yang menghasilkan solusi yang memenuhi semua *Fitness Objectives*. Gambar di bawah (Figure 7) menunjukkan bahwa kandidat solusi terpilih adalah lima puluh (50) solusi pada generasi terakhir.

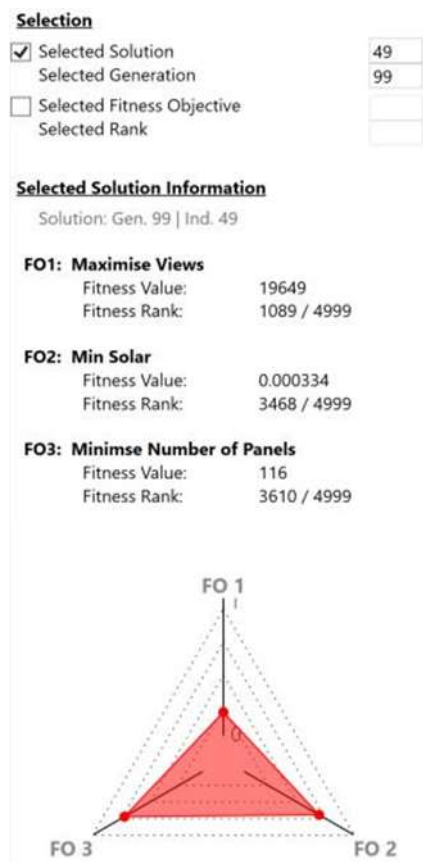


Figure 7. Panel kontrol dan pemilihan solusi atas Fitness Objectives

Analisis terhadap kandidat solusi ini diperlihatkan dalam diagram Standar Deviasi dan *Fitness Values* yang menunjukkan posisi kandidat solusi terseleksi dalam proses permutasi. Gambar di bawah menunjukkan bahwa kandidat solusi berada pada kategori generasi terakhir permutasi (kelompok kurva berwarna biru) yang pada masing-masing kurva Standar Deviasi dan *Fitness Value* (Figure 8). Selanjutnya, pada masing-masing diagram *Trendline* yakni SD (*Standard Deviation*) *Value Trendline* dan *Mean Value Trendline* terlihat posisi kandidat solusi yang berada pada bagian akhir kurva *Trend* yang menunjukkan kecenderungan kestabilan (Figure 9).

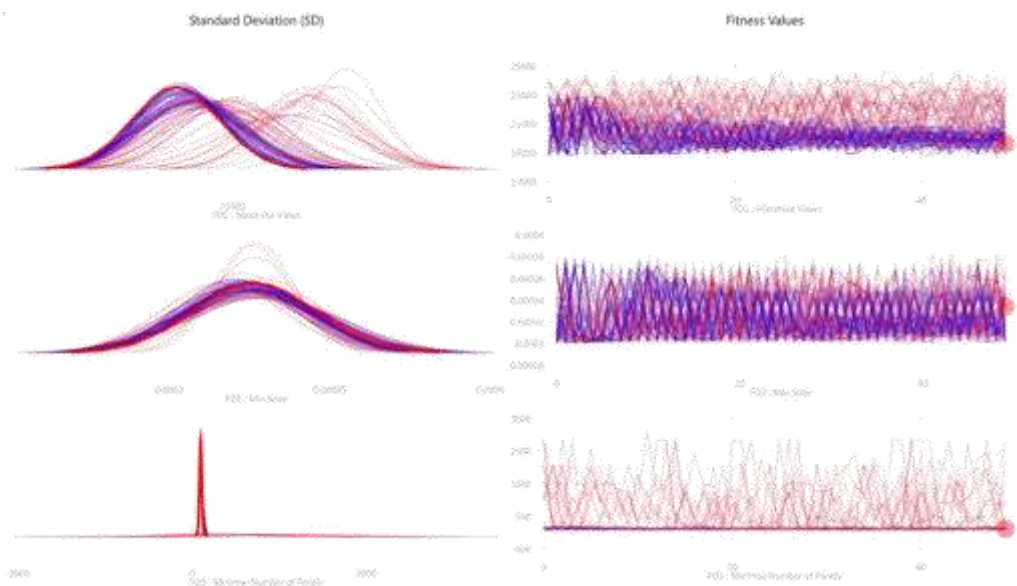


Figure 8. Posisi kandidat solusi pada diagram Standar Deviasi dan *Fitness Values*



Figure 9. Posisi kandidat solusi pada diagram *Trendlines*

Dari beberapa diagram yang menunjukkan posisi kandidat solusi yang dapat memenuhi ketiga *Fitness Objectives* yang ditentukan, selanjutnya dilakukan proses menyeleksi dari 50 kandidat solusi ini.

Seleksi dan Optimasi

Dalam algoritma di software Wallacei, terdapat tiga metode dalam melakukan seleksi atas kandidat solusi: 1) PCP (*Parallel Coordinate Plot*) dengan 4 metode

analisis; 2)*Unsupervised Machine Learning* dengan K-means algorithm; 3)*Pareto Front Solution*. Metode *Unsupervised Machine Learning* digunakan dalam studi ini untuk melakukan klasterisasi atas kandidat solusi dan menentukan seleksi atas kandidat solusi berdasarkan kedekatan setiap calon terseleksi terhadap pusat-pusat klaster. Pada kandidat generasi ke-99, ditentukan jumlah klaster=3 (Figure 10 dan 11).

Penggunaan *Unsupervised Machine Learning* untuk melakukan klasterisasi berdasarkan nilai jarak masing-masing kandidat solusi terhadap titik pusat klaster memperlihatkan tiga individu yang menjadi pusat masing-masing klaster (ditunjukkan pula dengan garis tebal hitam pada *Parallel Coordinate Plot*). Tiga individu ini merupakan hasil permutasi yang paling mewakili pemenuhan ketiga *Fitness Objectives* yang ditentukan.

Dalam proses seleksi dan optimasi, obyeknya adalah informasi genome- bukan geometri, yang mana setiap genome melekat informasi klaster (setiap klaster mewakili *Fitness Objective*), generasi, dan individu.

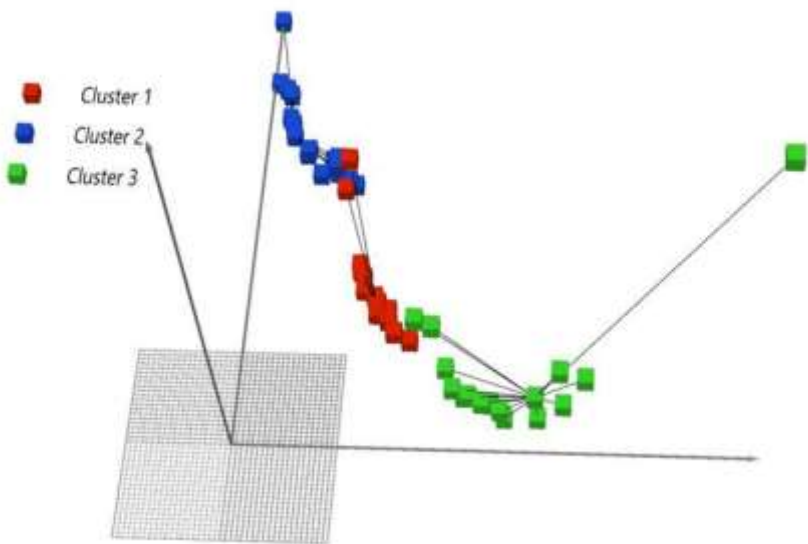


Figure 10. Hasil klasterisasi atas generasi-99

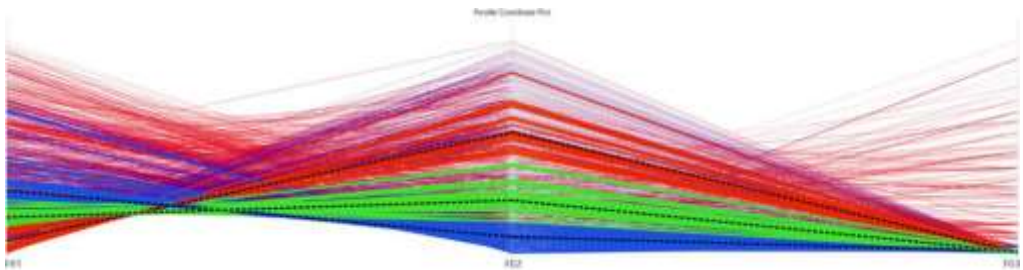


Figure 11. *Parallel Coordinate Plot* untuk generasi-99

Visualisasi geometri

Sesuai hasil klasterisasi, maka ada 85 individu yang semuanya memiliki ranking tertinggi untuk pemenuhan *Fitness Objectives*. Geometri hasil klasterisasi ini selanjutnya dapat divisualisasikan dimana kita dapat mengamati variasi-variasi dalam setiap individu yang dihasilkan oleh proses evolusionari.

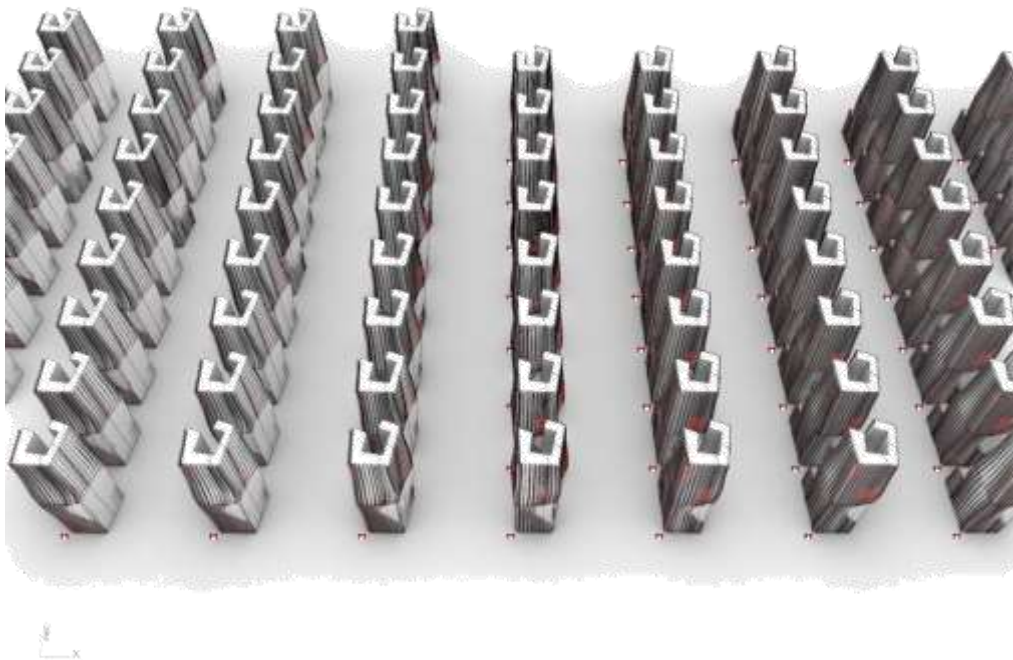


Figure 12. Geometri solusi terpilih

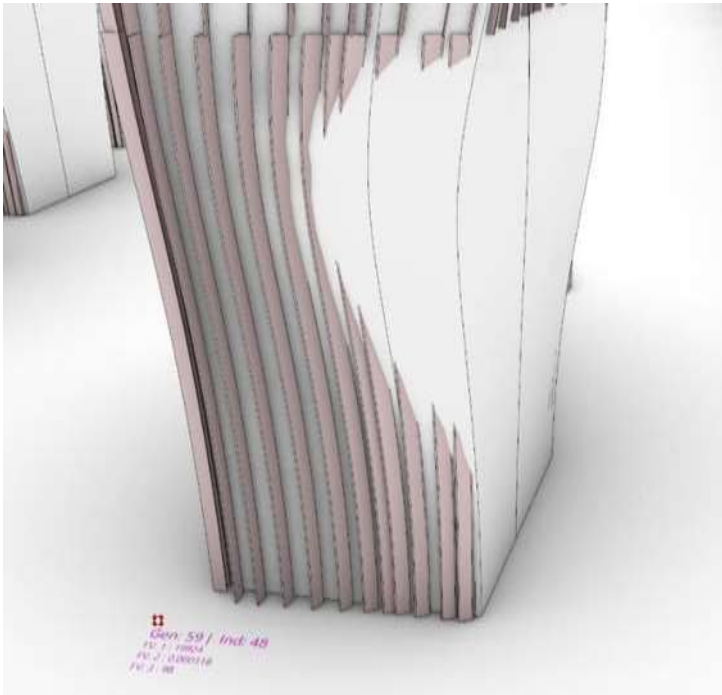


Figure 13. Informasi nilai setiap *Fitness Objective*

Discussion (in Bahasa Indonesia)

Studi ini menginvestigasi metode pencarian bentuk dalam proses desain arsitektural menggunakan metode generatif yang berbasis pada prinsip Homeostasis yang mana, generasi adaptif dalam memenuhi beberapa obyektif sekaligus, ditentukan oleh beberapa variabel kontrol dan algoritma evolusionari yang sudah dikembangkan.

Dalam hal ini, metode ini menjadi potensi baru dalam melakukan optimasi atas beberapa obyektif dalam proses pencarian bentuk, yang tidak berupa pendekatan *top-down* dan formal morfologik, melainkan *botton-up*, berbasis teori evolusi dan permutasi dari gen untuk beradaptasi dengan lingkungan. Proses rekombinan dan permutasi dilaksanakan berdasarkan metode dan algoritma yang telah digunakan untuk beberapa aplikasi generatif lain dan mulai digunakan di ranah desain.

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5.2 Budaya Kreatif dan Produksi Ruang dalam Inovasi Berbasis Lokalitas

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- 2. TEAM MEMBERS** : Prof. Widjaja Martokusumo
Nissa A. Ardhani, M.S.c.
Nurrohman Wijaya, M.Sc.

ABSTRAK

Industri genteng di Jatiwangi, Kabupaten Majalengka merupakan salah satu industri genteng di Jawa barat yang cukup terkenal karena kualitasnya yang cukup bagus. Industri genteng ini menjadi komoditas ekonomi di Jatiwangi sekaligus menjadi salahsatu lokalitas setempat. Namun Industri genteng ini seiring berkembangnnya jaman mengalami penurunan karena berbagai faktor. Pemerintah Kabupaten Majalengka melalui BP4D Kabupaten Majalengka memiliki gagasan untuk mengembangkan kembali industri genteng di Kecamatan Jatiwangi dan sekitarnya. Gagasan tersebut adalah penciptaan nilai tambah produk terakota, baik untuk produksi maupun pelestarian. Produksi terakota yang dimaksud mengarah pada dua kategori produk, diantaranya produk massal dan produk kreatif. Dalam rangka mendukung gagasan pemerintah Majalengka dalam pengembangan produk terakota makan maksud penyusunan kajian ini adalah mengkaji dan mengidentifikasi peluang dan tantangan pengembangan Kawasan Terakota dan metode yang di gunakan adalah pengumpulan data dan metode analisis.

Kata kunci: Majalengka, lokalitas, industri genteng, terakota

PENDAHULUAN

Latar belakang Gagasan Kota Terakota

Industri genting di Kabupaten Majalengka bermula di Desa Burujul, Kecamatan Jatiwangi dengan fungsi religi, yaitu atap masjid sebagai pengganti elemen ijuk. Proses pembuatan genting untuk atap masjid tersebut dilakukan pada tahun 1905 dengan menggunakan peralatan yang sederhana. Pada tahun 1930, produk genting dari Kecamatan Jatiwangi mulai diperhatikan oleh pemerintah Belanda sehingga mulai dipergunakan untuk pembangunan kantor dan perumahan pegawai. Sejak tahun tersebut, genting menjadi suatu komoditas ekonomi yang ada di Kecamatan Jatiwangi dan sekitarnya. Berawal dari produk subsisten, genting saat itu sudah menjadi produk massal yang bernilai jual. Pada tahun 1980, produk genting menjadi mata pencaharian utama masyarakat yang dicirikan dengan tingginya jumlah industri genting, baik skala besar, menengah, maupun kecil. Tercatat, pada tahun 1980, terdapat 630 industri genting di Kecamatan Jatiwangi dan sekitarnya (BP4D Kabupaten Majalengka). Namun, terdapat tren penurunan jumlah pengusaha dan pabrik genting secara signifikan selama 50 tahun terakhir, dengan persentase penurunan hingga 76% (BP4D Kabupaten Majalengka). Penurunan jumlah industri genting tersebut disebabkan

paling tidak oleh tiga faktor, diantaranya bahan baku, tenaga kerja, dan persaingan pasar.

Ketersediaan bahan baku tanah liat di Kecamatan Jatiwangi dan sekitarnya semakin terbatas. Lokasi pengambilan tanah liat semakin bergeser menjauhi Kecamatan Jatiwangi dan sekitarnya. Selain bahan baku faktor penyebab selanjutnya dari adanya penurunan jumlah industri genteng yang signifikan di Kabupaten Majalengka adalah tenaga kerja. Industri genteng secara umum sudah memiliki tenaga kerja yang terbatas, khususnya tenaga kerja usia produktif. Faktor ketiga adalah hambatan produksi dan persaingan pasar. Industri genteng di Kecamatan Jatiwangi dan sekitarnya sering mengalami kegagalan produksi karena musim kemarau yang berkepanjangan (BP4D Kabupaten Majalengka). Pemerintah Kabupaten Majalengka melalui BP4D Kabupaten Majalengka memiliki gagasan untuk mengembangkan kembali industri genteng di Kecamatan Jatiwangi dan sekitarnya. Gagasan tersebut adalah penciptaan nilai tambah produk terakota, baik untuk produksi maupun pelestarian. Produksi terakota yang dimaksud mengarah pada dua kategori produk, diantaranya produk massal dan produk kreatif. Produk massal yang digagas untuk dikembangkan adalah penutup atap, penutup dinding, dan penutup lantai. Sedangkan produk kreatif jauh lebih beragam sesuai dengan kapasitas dan kompetensi pengusaha terakota. Adanya diversifikasi produk terakota yang kemudian dipromosikan, baik pasar lokal, regional, maupun nasional diharapkan akan menumbuhkan kembali pengusaha genteng di Kecamatan Jatiwangi dan sekitarnya. Selain itu, terdapat fungsi pelestarian yang tecermin dalam tiga kategori, diantaranya pelestarian produk melalui riset produk, pelestarian alam melalui riset bahan baku, dan pelestarian budaya melalui konservasi kawasan produksi terakota (BP4D Kabupaten Majalengka).

Pemberitaan tentang Wacana Kota Terakota

Wacana Kota Terakota dimunculkan dalam berbagai diskusi yang diselenggarakan oleh komunitas Jatiwangi Art Factory (JAF). JAF bisa dikategorikan sebagai kelompok kreatif karena mencoba melakukan gerakan perubahan lewat kesenian dan kebudayaan. Lewat seni, isu budaya tanah liat bisa digunakan untuk membangun dengan jejaring kelompok kreatif internasional. Dalam jejaring ini, media banyak berperan, sehingga dalam gerakan kreatif ini selain jalinan universitas, pemerintah, dan industri (triple-helix), komunitas dan media dianggap berperan penting dalam gerakan kreativitas dalam jalinan penta-helix.

Untuk itu, pemberitaan media bisa menjadi saluran bagaimana wacana Kota Terakota itu terbangun. Kajian ini meneliti bagaimana media internet memberitakan Jatiwangi dan Kota Terakota. Ada 3 isi pemberitaan yang dipelajari, yaitu pemberitaan tentang Jatiwangi yang tidak memberitakan genteng, pemberitaan tentang genteng Jatiwangi di luar JAF dan Kota Terakota, dan pemberitaan tentang JAF dan Kota Terakota. Dari pembacaan terhadap

pemberitaan media internet, ada beberapa temuan: 1) Dalam media internet pemberitaan tentang genteng Jatiwangi dan JAF dan Kota Terakota lebih didominasi media nasional, sehingga isu Jatiwangi dan JAF telah mampu menarik perhatian nasional, 2) dalam pemberitaan tentang genteng Jatiwangi, buruh dan pengusaha lebih banyak diberitakan, sedangkan pemberitaan tentang JAF dan Kota Terakota lebih banyak menyebutkan seniman lokal dan tokoh politik, 3) Dalam perspektif media internet, ada pemberitaan tentang genteng Jatiwangi dan JAF/ Kota Terakota masih terpolarisasi tentang pemberitaan terhadap buruh/ pengusaha dan seniman lokal/ tokoh politik.

METODOLOGI

Metodologi yang akan digunakan pada kajian ini terbagi pada metode pengumpulan data dan metode analisis. pengumpulan data berupa primer dan sekunder. Pengumpulan data primer berupa observasi lapangan, wawancara mendalam dengan informan kunci, serta *focus group discussion* (FGD). Metode analisis data yang digunakan adalah analisis statistik deskriptif sederhana, serta perhitungan geofisika untuk mengetahui kandungan tanah lempung pada beberapa lokasi pengamatan. Juga, analisis isi kualitatif dilakukan untuk menganalisis sumber data media dan dokumen rencana/kebijakan terkait.

DISKUSI DAN HASIL

Gambaran Umum Kabupaten Majalengka

Kabupaten Majalengka merupakan salah satu daerah di Provinsi Jawa Barat dengan luas wilayah sebesar 120.424 hektar yang terdiri dari dataran rendah di Kabupaten Majalengka bagian utara, dataran menengah di Majalengka bagian tengah, serta dataran tinggi di Kabupaten Majalengka bagian selatan. Kabupaten Majalengka secara administratif dibatasi oleh Kabupaten Indramayu di sebelah utara, Kabupaten Sumedang di sebelah barat, Kabupaten Tasikmalaya dan Ciamis di sebelah selatan, dan Kabupaten Cirebon dan Kuningan di sebelah timur. Kabupaten Majalengka memiliki 26 kecamatan dengan ibu kota kabupaten terletak di Kecamatan Majalengka. Berikut ini adalah peta administrasi Kabupaten Majalengka berdasarkan dokumen RTRW Kabupaten Majalengka tahun 2011—2031 (Gambar 1).



Gambar 1: Peta Kabupaten Majalengka

Gambaran Umum Wilayah Jatiwangi dan Sekitarnya

Kecamatan Jatiwangi dan sekitarnya berdasarkan topografi merupakan wilayah dengan dataran rendah, dengan fungsi sebagai wilayah perkotaan, perdagangan dan industri, serta sentra tanaman padi. Kecamatan Jatiwangi menjadi kecamatan dengan jumlah penduduk tertinggi di Kabupaten Majalengka, dengan kecamatan sekitarnya yang juga memiliki jumlah penduduk yang relatif tinggi dibandingkan kecamatan lainnya. Kondisi tersebut mengindikasikan Kecamatan Jatiwangi dan sekitarnya secara eksisting sudah dimanfaatkan sebagai kawasan permukiman di Kabupaten Majalengka. Penduduk Jatiwangi dan sekitarnya secara umum memiliki tingkat pendidikan yang masih rendah, yaitu didominasi oleh masyarakat lulusan SD serta didominasi oleh penduduk usia produktif.

Berdasarkan RTRW Kabupaten Majalengka tahun 2011—2031, Kecamatan Jatiwangi menjadi salah satu Pusat Kegiatan Lokal (PKL) dengan fungsi pelayanan sebagai kawasan pengembangan industri, kawasan komersial, pelayanan sosial termasuk pengembangan perumahan dan pertanian yang meliputi lima kecamatan di sekitarnya, yaitu Kecamatan Jatiwangi, Kasokandel, Sumberjaya, Palasah, dan Leuwimunding. Kecamatan Jatiwangi dan sekitarnya dilalui oleh koridor utama Bandung-Cirebon sebagai jalan nasional dan juga dilalui oleh Tol Cipali, sehingga terdapat aksesibilitas yang tinggi dibandingkan wilayah lain di Kabupaten Majalengka.

Berdasarkan fungsi ekonomi, Kecamatan Jatiwangi dan sekitarnya termasuk dalam kawasan peruntukkan pertanian yang sebagian menjadi lahan pertanian pangan berkelanjutan (LP2B) dengan spesialisasi berupa peruntukkan sawah irigasi teknis dan nonteknis, sawah tadah hujan, dan kawasan peruntukkan hortikultura. Kemudian, Kecamatan Jatiwangi dan sekitarnya juga menjadi kawasan peruntukkan mineral dan batuan, diantaranya batuan nonlogam berupa batu gamping, lempung, batu pasir, batuan beku, pasir endapan, dan sirtu. Kecamatan Jatiwangi dan sekitarnya juga merupakan kawasan peruntukkan kegiatan industri besar, menengah, dan kecil. Terdapat pariwisata budaya yang dicirikan dengan adanya *Jatiwangi Art Factory (JAF)* di Kecamatan Jatiwangi. Berdasarkan kondisi eksisting, Kecamatan Jatiwangi dan sekitarnya memiliki beberapa kegiatan ekonomi, diantaranya kegiatan ekonomi sektor pertanian, industri besar, perdagangan jasa, dan industri genteng.

Analisis Usaha Industri Genteng di Jatiwangi dan Sekitarnya

Kecamatan Jatiwangi posisi strategis yang memiliki luas 40,03 km² (3,32% luas dari Kabupaten Majalengka). Kepadatan tertinggi di Majalengka (2.105 jiwa/km²) banyaknya para pendatang dari berbagai etnis dan budaya.

Persebaran Industri Genteng di Kecamatan Jatiwangi, terdapat 10 pabrik dengan skala industri besar, sehingga mata pencaharian sebagai buruh pabrik masih mendominasi. Kabupaten Majalengka memiliki dua jenis bahan bangunan yang diproduksi dari tanah liat bakar, yaitu batu bata dan genteng, dengan persebaran produksinya, yaitu berpusat di Jatiwangi dan menyebar ke daerah sekitarnya di Dawuan dan Kasokandel.

Permasalahan dan Potensi Kawasan

Pada bagian ini akan dianalisis mengenai permasalahan dan potensi kawasan perencanaan dengan merumuskan kekuatan, kelemahan, kesempatan dan tantangan yang ada. Hasil analisis ini diperoleh dari pengumpulan data, baik data primer (survei lapangan, wawancara dan FGD) maupun data sekunder, serta analisis sebelumnya.

Tabel 1. Analisis Kekuatan, Kelemahan, Peluang, dan Tantangan Pengembangan Terakota

Kekuatan/Strength	Kelemahan/Weakness
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<div><div>a. Jatiwangi masih dikenal sebagai produsen tanah liat (terakota) terutama industri genteng.</div><div>b. Ada beberapa pengusaha industry genteng masih memproduksi.</div></div>	<div><div>a. Kurangnya diversifikasi produk dan inovasi</div><div>b. Mekanisme pasar mempengaruhi produk tanah liat</div><div>c. Nilai budaya egaliter dan berusaha antar pelaku pengusaha sudah menurun</div><div>d. Persaingan tenaga kerja dengan industri garmen</div><div>e. Persaingan dengan material lain selain tanah liat</div><div>f. Kurang perhatian pemerintah terhadap pengusaha lokal</div><div>g. Kurangnya modal atau pendanaan operasi</div><div>h. Belum adanya bantuan teknologi</div></div>
<div><div>Peluang/Opportunities</div><div><div>a. Perhatian pemerintah (Provinsi Jawa Barat dan Kabupaten Majalengka) terkait isu Kota Terakota.</div><div>b. Potensi pengembangan produk tanah liat di masa mendatang</div><div>c. Budaya masyarakat Jatiwangi memandang tanah liat sebagai anugerah, serta nilai-nilai berusaha dan egaliter untuk kelangsungan produksi tanah liat.</div><div>d. Transformasi gerakan seni dan desain dalam industri tanah liat yang berdampak ekonomi.</div><div>e. Adanya kawasan yang memiliki bangunan lama (terakota)</div><div>f. Kabupaten Majalengka diarahkan sebagai kawasan kreatif Produsen tanah liat di Jawa Barat: Plered, Sitiwinangun, Garut</div></div></div>	<div><div>Ancaman/Threats</div><div><div>a. Resiko kegagalan terkait pengembangan inovasi</div><div>b. Belum adanya dukungan anggaran dan kebijakan pengembangan.</div><div>c. Adanya implikasi sensitivitas politik (kontestasi) lokal antar kelompok masyarakat tertentu.</div><div>d. Kurang keterlibatan akademisi pada pengembangan produk terakota.</div></div></div>

KESIMPULAN

Rumusan strategi dilakukan berdasarkan analisis SWOT agar dapat mencapai tujuan kajian yang dimaksud. Pada analisis internal (*strength* dan *weakness*), lingkup yang dimaksud adalah pemerintah daerah dan industri atau pengusaha genteng. Melalui tabel analisis SWOT pada bab sebelumnya, maka strategi umum

pengembangan kawasan Terakota di wilayah perencanaan adalah sebagai berikut:

Tabel 2. Strategi Pengembangan Terakota berdasarkan Analisis Kekuatan, Kelemahan, Peluang, dan Tantangan

Strategi Strengths-Opportunities	Strategi Weaknesses-Opportunities
<div>a. Pemerintah (Provinsi Jawa Barat dan Kabupaten Majalengka) memberikan perhatian terhadap industri-industri genting yang masih berproduksi mengenai potensi pengembangan produk tanah liat pada masa mendatang untuk meningkatkan kapasitas ekonomi masyarakat.</div> <div>b. Pelestarian ruang dan kegiatan industri terakota eksisting yang diiringi dengan penguatan kapasitas masyarakat terkait seni dan desain dalam industri tanah liat sebagai upaya pelestarian budaya dan peningkatan nilai ekonomi.</div> <div>c. Penguatan kolaborasi dalam rantai produksi terakota (bahan baku, proses produksi, dan distribusi) dengan wilayah produsen tanah liat yang potensial.</div>	<div>a. Pemberian fokus terhadap diversifikasi dan inovasi produk terakota, baik produk massal maupun produk kreatif yang diiringi dengan peningkatan kapasitas penggunaan teknologi dan dukungan anggaran berupa modal dan biaya operasional.</div> <div>b. Peningkatan promosi dan peninjauan prospek pasar industri terakota sebagai upaya menumbuhkan kembali minat masyarakat untuk bekerja dalam komoditas terakota.</div> <div>c. Penetapan regulasi yang dapat mendukung keberjalanan aktivitas ekonomi pengusaha industri terakota.</div>
Strategi Strengths-Threats	Strategi Weaknesses-Threats
<div>a. Penetapan kebijakan pengembangan dan dukungan anggaran dalam pelaksanaan kegiatan ekonomi terakota saat ini dan masa yang akan datang.</div> <div>b. Peningkatan keterlibatan akademisi dalam memberikan knowledge effect terkait inovasi-inovasi yang dapat dilakukan untuk produk turunan terakota.</div> <div>c. Penguatan interaksi antaraktor, baik</div>	<div>a. Peningkatan keterlibatan akademisi dalam pemanfaatan teknologi produksi terakota sebagai upaya untuk melakukan diversifikasi produk terakota</div> <div>b. Peningkatan dukungan anggaran modal dan biaya operasional dalam industri terakota yang berasal dari berbagai aktor pelaku ekonomi (pemerintah, private sector, LSM,</div>

<p>pemerintah, pengusaha terakota, komunitas dan lembaga masyarakat, serta akademisi dalam pengembangan industri terakota.</p>	<p>dan aktor lainnya).</p> <p>c. Pemberian fokus terhadap rencana pengembangan kawasan industri besar di Jatiwangi dan sekitarnya untuk tetap tidak menimbulkan kerugian bagi pengusaha industri terakota di sekitarnya.</p>
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5.3 Heritage area for citizens' wellbeing and healthy urban space

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This paper demonstrates open space's influence on the wellbeing of citizens in the Indonesian context, which happened to heritage open space. The case-study approach in this research is used to gain a detailed understanding of the built heritage of the city because of its ability to capture the complexities of the phenomenon. The research indicates that the heritage area supports the citizen's wellbeing, in many cases, it is not only a place for daily routine sport but also for exchanging thoughts. It is not merely an open gathering place, it has supported the safety of the city, during this time of economic hardship due to the pandemic, the function became paramount. As it fulfilled the duty as a place for citizen to express themselves, this heritage area with multipurpose functions from individual purpose of reducing stress to communal purpose – mingling with others. It is important to note that the scarcity of open space has a directional relation to wellbeing. This research suggested that protection toward the open space – heritage area should not only be based on its ecological function but also its function as social space.

Keywords: citizen's wellbeing, urban space, heritage area, Indonesia

Introduction

Since wellbeing is not only as a result of the action of the people but many contributing components to the situation is needed to be observed. While Germany has put many criteria for this namely health, education, a strong economy, and work-life balance, those criteria might be varied to other contexts (Dalziel *et al.*, 2019). In Indonesia, One can live in a poor economy and not having a work-life balance, but the sense of happiness is still there. This research observed in heritage space which mostly also function as open space in the city has served as a place which supports wellbeing. Those components associated with wellbeing, within the neighborhood area placed in the heritage area.

Thus, there is a longing hope from the citizens that they might obtain healthy urban spaces, including some within the heritage area. This research has taken the examples of big Indonesian cities which represent millions of inhabitants; Jakarta, Bandung and Surakarta. The percentage of green space in those cities is still below the minimum requirement, which is 30% of green space (Dinas Pertamanan dan Hutan Kota Provinsi DKI Jakarta, 2018, DLH Surakarta, 2017 and DPKP3 Bandung, 2015). Those three cities have something in common in the

aging population, shrinking of open space due to expanding growth of economics and inhabitants.



Activities in Lembang Park (Asriana, 2019) and Gasibu Field (Paramitasari, 2019)

Contested space, limited space for everyone

If the proposition is true that Kampung is a traditional settlement, hence the closeness of one housing to the other is seen as adequate space. Hence the problem comes, the culture of sharing a small amount of space has made this the root of the problem. There are interwoven reasons of affordability, social status, and availability of land. It is always a contested space for the citizen, like many other megacities, the triumph of the economic forces forces the occupancy of lands. The question is not only about the commitment of the government and good planning, but also the chance of optimizing the economy of the cities. If the city municipality assumed that the more commercial it is, the better the tax will be for them at any cost, then the reserved land would be seen as expensive and not productive. Why would a place like a city forest in the prime economic area, or many examples of the newly built real estate try to maximize the sellable parcel due to the maximum profit? It is huge shift changes, the consideration of humans with its own need for the amount of space in their residential was cutting through the bottom. Let's forget about proper space and aesthetics, the orientation of an area and other urban designs are mostly done to get best living design area, and due to this greediness, those basic need of space has gone.

There should be a standard for the minimum width of the area, neighborhood area, then there should be some space left open. The tangled problem, the size that the buyer, the citizen will take because it fits their affordability versus the health standard. The earlier research on the quality of life has shown that those aspects matter (Reilly *et al.*, 2018). As Covid-19 has spread, and it requires quarantine of the citizen, this has proved the basic need of space of the citizen is

ultimate. The mental health would determine productivity; lack of space does not only lead to a lower health condition and limited private life, but for most less productivity which needs to break the chain of their misfortune. It is widely known from the earlier research that children from dense neighborhoods have shown poor performance in school, adults in the area are prone to sickness, and the elderly might have a shorter life expectancy. Enough space means one can do their activities more easily, children may have enough playing grounds, the adult may have their hobbies or daily task, the elderly have their own space to wonder.

In the scale of the city, proper space would mean each citizen would find it easier to walk to the garden, to the market and services. The walkability also means healthier living, enough physical movement without dedicating time for doing sport, promote socializing to the people, promote happier living. Hence, many problems of big cities would be reduced with these proper space, in particular, the dense city of Indonesia.

A reflection for wellbeing practice

For years some people have doubts about proper space for staying at home, proper space for leisure activities in the city, and proper space that each city should have as a buffer for other cities, let alone the need for fresh air supply efficiency. Certainly, there is never a correct time to apply the idea of proper space. Even though people in the poorer areas of the city tend to have a lower health condition compared to the healthier ones, in some heritage places in Indonesia, this can be varied. The elderly might still have their main physical activity work and surprisingly, they might end up living longer compared to those who are living in a foster home or family home. In my opinion, one who has their own business as food sellers have the joy of living until the end of their lives. Some of their descendants would not take their business due to the different tastes of cooking or simply because they are not interested in their parents' business. Among the many reasons, one of it is because it is not seen as a prestigious career in comparison to a white-collar job even though the income would relatively be the same or even lower compared to running their own business. This simple mindset has generated the shift of open space in the bigger space, the younger generation would go out from their parents' home, move to a mostly relatively smaller home in the outskirts of the city because it is cheaper. Aside from the problem of dividing the inheritance to descendants, this is also the root problem on the old part of the city's preservation. Since it always needs both ways, not only the people but also activities that generate income, the inner-city would be left empty due to this paradigm shift. It is the starting point of lower quality of space, newer residential of the city periphery mostly are smaller, the open space scarce, it would also take a longer time to get through the inner city where they are working. What an entangled situation, moving to outer space to have cheaper homes, but when many citizens of the second generation have the same pattern, the unbearable traffic, it generates polluted street, flooded the

street which is their hood. The left-over elderly would still live in the same street which is not the same anymore.

Heritage area for wellbeing

he heritage area is a locus for wellbeing by Allison Heritage (2019) this idea is aligned with activities in Indonesia, in which the heritage area in the city mostly became the center of activities. To answer why – it is the only place which people hesitant to change, including the investor who mostly became the actor. Traditionally, the city center which is sacred for the citizen is one of the latest barriers for the city lung, the area which is associated with the traditional belief which brings misfortune for people who threaten the trees – banyan trees. This side of the belief system is helping the city to retain open space. Another part of the city which remained as public space is the old part of the city which some shared heritage building from the colonial era. This research has not justified the glory of those eras, but the current situation needs those open spaces more than before. Those buildings with their previous scale had a courtyard, the existence of those open space is tremendously valuable for this time. Take a look at the example of block patterned in Indonesian dense city, if there is an open space and was found mostly in an area which is protected due to its heritage status by the city. The question is rather why would not Indonesian cities protect more open space for its own sake? It is just not an affordable city.

Methodology

As some heritage and well-being theories were only applicable depending on particular context, the case-study approach (Leaf, 2013) is used in this research to gain a detailed understanding of the built heritage of the city because of its ability to capture the complexities of the phenomenon. To be able to see the wellbeing aspect of the heritage area in Indonesia, three cities become a sample. Jakarta, Bandung, and Solo become representatives as these cities are having massive growth in terms of building development. The reviews of the historic park in each city are collected from Google reviews, with the assumption that Google is one of the most used search engines in Indonesia (Statista, 2020). The retrieved reviews in each park are analyzed using software, generating data frequency of term and phrase and word cloud. The most frequent term was classified to identify user perception of the selected park.

1. Lembang Park in Menteng, Jakarta

Lembang Park is a neighborhood-scaled park located in the middle of the historic residential area of Menteng. The park has a variety of wide-canopy trees and a reservoir in the middle, the activities are mainly for leisure, such as fishing, walking, jogging, relaxing, etc. Surrounded by the high to middle-class neighborhood, the visitors are diverse, from children to the elderly. Situated in Jakarta - the capital city of Indonesia, located on the north coast of Java Island, with average temperature 28,9 C and relative humidity 74% (BPS DKI Jakarta, 2020), classified with tropical rainforest climate. As one of the world's most

populous metropolis, business hub, and government center, the density of Jakarta city is filled with skyscrapers and informal settlements, due to rapid urbanization and expansion. With its average topography level is 7 meters above the sea level and becomes flooded in the rainy season, Jakarta faces a serious ecological problem, both from its land and water quality. The earlier planned Jakarta since Dutch East Indies Company (Merriless, 2000) period, Menteng which was given the name *Weltevreden* has considered the importance of green and blue spaces (Silver, 2007), and was following the trend of Garden cities movement in the world.



Cloud Word and Term Frequency of Lembang Park's Reviews

The most frequent words from the reviewer are related to the positive ambience or atmosphere and viewing the Lembang park as a green and blue public space. With an average review score of 4.5 stars (from maximum 5 stars) from 4,710 google users on Lembang Park, it can be concluded that people are satisfied with their visits to the park. Based on 100 online reviews from google place as a sample using the term Lembang Park, Taman Lembang, and Situ Lembang, most of the reviews have given positive feedbacks. The most shown term on the reviews can be classified, such as place (f=40), park (f=38), lake (f=17), area (f=13), *situ* (reservoir)(f=13), Jakarta (f=12), Menteng (f=12), Lembang (f=11), air (f=10), garden (f=8), and trees (f=8) can be identified as information about the physical appearance and location of the Lembang Park. Words for cool (f=30), comfortable (f=20), suitable (f=15), clean (f=12), beautiful (f=11), good (f=11), relaxing (f=10), and nice (f=8) can be identified as the atmosphere or ambience when visitors come to Lembang Park.

The green and blue elements create diverse activities for visitors. While the users indicated that the park is inclusive and family-friendly, health and wellbeing can be created if the activities and users are sustained. Words like play (f=14), fishing (f=12), relax (f=11), and sports (f=9) are most shown in the reviews, indicating

the activities that the visitors can do in the park. Children (f=13) and family (f=10) are the users of Lembang Park. Terms for afternoon (f=8) and morning (f=8) can be identified as the most popular time for people visiting Lembang Park. These reviews show the quality of Lembang Park that can't be ignored in future development and need to be taken into consideration with its location in the middle of Jakarta's central business district and high-income residential, in addition to its presence as one of the historic features in the Menteng heritage precinct.

2. Monument 45 Park in Banjarsari, Surakarta

Banjarbaru is one of the heritage areas in Surakarta, with two large and historic parks, Mangkunegaran square and Monument 45 park, the area has the largest green space in the city (Atmojo, 2019). Surakarta is a city in Central Java, formerly a center of Mataram Kingdom, before splitting into Kasunanan Surakarta (Surakarta Sunanate) and the Princely state of Mangkunegaran in the Dutch colonial era. Surakarta has an average temperature of roughly 30 C and average humidity of 75% (BPS Surakarta, 2020). One of Mangkunegaran's well-known historic area is Setabelan, Banjarsari. Setabelan area located on the northside of Mangkunegaran Palace, known as a residential area called Villa Park, made for the cannon army legion of Mangkunegaran which was the Dutch or the European who stayed in Surakarta during the Dutch colonial era. Dominantly the Indische architecture style buildings can be found as evidence of Dutch colonialism in Surakarta. At the heart of the Setabelan area, Monument 45 park was built to reminisce the struggle of the People of Surakarta from Dutch colonialism after the Independence of Indonesia. This park becomes a green space for the surrounding residences and tourist attraction, due to the architectural style around the park.



Cloud Word and Term Frequency of Monument 45 Park's Reviews

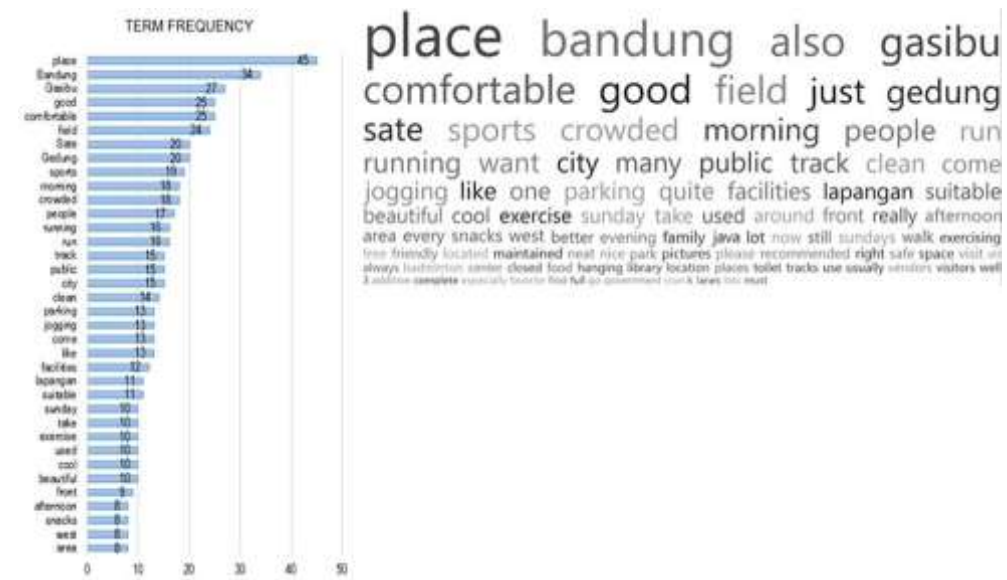
The result of text analysis indicates the importance of Monument 45 Park for the citizen near the area as the favorite public outdoor space following the nearby people's healthy activity with a tendency towards fun activities. The average score of 4,5 / 5 was given by 3.298 users for Monument 45 Park, which proved that the park has positive qualities, although the traffic was not as high as parks in Jakarta and Bandung. Four categories of term results revealed the main influence of the park that has the highest frequency, which is; *user activity, quality, facility, location, and time*. The number indicates the largest positive factor of Monument 45 Park as an outdoor public space which is mainly for the user activity, with *children* (f=58) as the most dominant user and *family* (f=9) as the less frequent one. The frequent phrases such as *children playing* shows that the primary user of the park is children and playing as the main activity. Other keywords also indicate user activities such as *sport* (f=11).

The analysis also represents the positive quality of space in the park, complete facility, and when it was used the most. Quality of space can be concluded from the various frequent terms such as *cool*(f=28), *clean*(f=18), *comfortable*(f=14), *nice*(f=12), *shady*(f=9) etc. On the other hand, a few keywords indicated the existence of park facilities such as *facilities* (f=15) and parking areas (f=10). Minor keywords with smaller frequency such as; monument (f=19), afternoon(f=12), and day(f=10) show that the most frequent time to visit Monument 45 Park would be in the daytime or the afternoon.

4. Gasibu Park in Citarum, Bandung

Bandung City serves as the capital of West Java with a long history of the Dutch colonial era and a total of 2,5 million registered citizens in 2020, which makes Bandung the third city with the most population after Jakarta and Surabaya (BPS Kota Bandung, 2020). This city located 768m above sea level has a comfortable environment and mountain climate, which drove the former plan to be developed as a resort city in the 1800s by the Dutch government. In the 1900s, there was a plan to replace Batavia with Bandung as the new capital city. Later, the city was chosen as the capital of West Java Province in 1925 (Kunto, 1984).

Gasibu Park or Gasibu Field was built and revitalized in 2016. The newly revitalized park became a landmark of Bandung city, and also a popular public outdoor area. This park was known mainly for the jogging track and grass field which became a valuable green space for the surrounding government building and busy street.



Cloud Word and Term Frequency of Gasibu Park's Reviews

As an outdoor public space, the review score and terms frequency reflect user perception towards Gasibu Park and the suitability of the park planning with the current utilization. Based on the Google Places Review of Gasibu Park, the average score of 4,6 / 5 was given by 21.809 users, which proved that the park has positive feedback, high traffic, and high interest from the users. The text analysis result of 100 Google Places Review on *figure x* shows that term such as *place* ($f=45$), *Bandung* ($f=34$), *Gasibu* ($f=27$), *comfortable* ($f=25$), etc. has the highest frequency which is also represented in the word cloud.

The most frequent terms indicate the importance of Gasibu Park which can be seen in four categories with location as the most influential factor, and other elements such as activity, facility, and time. The highest terms distribution belongs to locational factor (*place* ($f=45$), *bandung* ($f=34$), *gasibu* ($f=27$), *field* ($f=24$), *gedung* ($f=20$), *sate* ($f=20$), etc.) and locational phrases (*gedung sate* ($f=20$), *lapangan gasibu* ($f=10$), *city of bandung* ($f=9$)) which validate the reason of people coming to Gasibu because of it strategic location, in front of iconic heritage building and in the midst of busy governmental areas.

Gasibu Park also has a notable quality of space (*comfortable* ($f=25$), *good* ($f=25$), *clean* ($f=14$)) supported by it is most famous activity (*sports* ($f=19$), *people* ($f=17$), *run* ($f=16$), *morning exercise* ($f=3$)) and existing facilities (*jogging track* ($f=4$), *running track* ($f=4$)). People usually used the Park on Sunday (*morning* ($f=18$), *evening* ($f=7$) and *Sunday* ($f=10$)). These results show the role of Gasibu Park in the heart of Bandung city as the popular outdoor public space especially with the main usage as a jogging area and spacious space in the midst of heritage government buildings that attract more healthy activities. Thus, reflected the

concern of wellbeing and the need for health-related activities for the citizen in the surrounding.

Conclusion

Proper space is needed for a healthy urban area, especially in the dense Asian cities, which tend to have smaller space compares to counterparts in European cities. Limited space prevents citizens from obtaining proper space for optimal health conditions. As a natural condition for health space, it is important to have a larger space. It is not only the quality of the street but also the space in between. As health was formed by a peaceful in mind, then the fulfillment of space would be necessary. The need for wellbeing in the Asian cities might seem simpler compared to European counterparts, because some factors like strong governance and citizen's level of education might not have much influence in the citizen's wellbeing. To conclude, healthy urban area is ultimates for wellbeing in Indonesian cities.

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5.4 Study of the Use of Open Space in Riverside Settlement.

Case: Kota Muara Muntai District.

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Background

The meaning and characteristic of a public space are shaped and formed by the activities that grow and develop around it (Lynch, 1969); Hadimovic (2000) also argues that the spatial pattern of urban activity depends on the qualitative transformation of its people over time. The relationship between this pattern of spatial use and activity becomes more dynamic when placed in a changing landscape, such as a riverside with tidal cycle. The existence of a river in this case does not only affect the physical form of the settlements on its banks, but also the daily lives of the people, so that the social and cultural conditions of the riverside community are formed.

The uniqueness of the waterfront residential area is part of the embodiment of a cultural landscape, which is not only formed from distinctive natural elements, but is also closely related to the social system and society (Taylor/Lennon, 2012). Considering that both the economic and technical processes of efforts to build settlements or even the urban environment and also the process of forming the spatial organization of a distant city area (settlement) seem to be separated from the architectural discourse, this condition is the reason why in the discussion of urban/residential environmental planning is not a priority concern (Wolfrum/Janson, 2016). Furthermore, it can be ascertained that the discussion in the analysis of environmental problems in the field is still dominated by disciplines such as Geography, Economics, Sociology, and Ethnology.

When architecture is seen as a form of cultural expression, which can be seen through the physical form and space that occurs, there is actually a limitation or reduction process, where architecture is only considered to have a role in buildings and spaces formed from housing. In today's complexity and dynamics, genuine architecture cannot be separated or separated from the understanding of the existing urbanity context. Therefore, it is important to ascertain what is formed and influenced by architecture and what potential can be utilized and/or useful for a city (environment). From this background, there is a critical view that architecture performance plays an important role. In this understanding, the performance of the architecture, e.g. covering relationships with building/architectural forms, society, public perception and space creation, are believed to be important (Wolfrum/Janson, 2016). In fact, urban space and the environment (area) are in a process of continuous change and have a dynamic tendency. It is not surprising that the process of creating urban space interacts with social change and vice versa.

The case study chosen is Muara Muntai, the capital of Muara Muntai sub-district, located at the junction of the Mahakam and Mahakam Mati rivers. Because of its strong historical community ties to the Mahakam River, the existence of several local geniuses that are interesting to explore (for example: ironwood roads and terraces, where daily activities take place), as well as the phenomenon of landscape changes that occur regularly in which rising water levels flood the city for 2-3 months of the year. This change in the use of open space for community activities eventually forms a complex pattern that becomes an important element in a cultural landscape.

The physical changes in the landscape on the banks of the Mahakam River have led to a dynamic use of spatial patterns that are part of the traditions of the Muara Muntai riverside community. This tradition produces architectural typology and spatial morphology, a cultural heritage that has become the local identity of the Indonesian people as a maritime country (Putro/Nurhamsyah, 2015).

In the last decades there have been a number of new approaches to studying and interpreting cultural landscapes that have been culturally and historically adopted by geographers, as well as experts from the disciplines of archeology, sociology and architecture. New interpretive and theoretical approaches in studying the cultural landscape have developed as a consequence of cultural changes/shifts in the social sciences and humanities. This brings to the importance of understanding the signs, symbols and sites of the landscape where you live as part of cultural heritage (Moore/Whelan, 2016).

Based on the understanding that cultural landscapes are formed from a constellation of landscapes, social systems, and communities (Taylor/Lennon, 2012), this study aims to read the spatial use patterns of riverside areas and their impact on spatial morphology and residential typology. The pattern of the use of open space can provide information about a number of community activities in the area/environment of Muara Muntai. Furthermore, the typical environmental conditions, as a waterfront city, and partly also a tidal marsh area on the banks of the Mahakam river, will also be fortified.

Methodology

This research will be conducted by:

- Literature study, covering urban morphology studies, city elements (building mass, circulation, open space and its landscape, intensity and density, supporting activities), architecture/traditional settlements/stilt houses, tidal areas, environmental conditions of the Mahakam River and access and attainment to the workshop, also local government policy.
- Survey and field observation to find out: time and schedule of activities, specific activities, use of space (shared) by the community, as well as community responses to environmental change, element/component of

building mass observation, open space and its landscape, circulation/achievement pathways and building intensity and function.

- Interviews and online FGDs with residents, local government, actors in conservation and tourism.

**Due to the Covid-19 pandemic, the scheduled travel and field observation were cancelled; instead, data collecting was implemented through online both interviews and FGDs. Field observation had also been partially carried out with the help of local contact.*

Outcome

This research will deepen the understanding of the relationship between activities, communities and landscapes as an element of cultural landscapes and their influence on spatial morphology and architectural typology that will be useful for practitioners in the fields of architecture, landscapes, and conservation.

Results

1. Muara Muntai City has an area of 493.07 km² consisting of 5 (five) villages, namely Muara Muntai Ulu, Muara Muntai Ilir, Rebaq Rinding, Kayu Batu and Pulau Harapan. Muara Muntai City is inhabited by 7421 people, consisting of 3744 men and 3632 women.



Fig. 1. Muara Muntai map. Source: Redrawn by Nadia, 2020

2. Muara Muntai, which is located in a tidal swamp area, faces floods for 3-4 months every year around February-March to May-June. It experiences 72 rainy days in one year or an average of 6 rainy days per month. Due to Climate Change this period is now shifting and difficult to predict. Muara Muntai also abides major floods every 5-6 years, with the last one occurred in 2006 where most of the floors of the stilt houses were

- submerged in water up to 10 cm (Aji Djon, 2019; Asmara, 2020; Jaini, 2020).
3. Houses and shops in Muara Muntai were erected on Ironwood pillars with an average height of 1-2 m above the ground depending on the location of the building. Ironwood boardwalk was permanently built to facilitate the mobility of government employees who come to visit Muara Muntai sub-district. Now, the Ironwood boardwalk is currently reaching the total length of 21,630 Meter (Asmara, 2020; Jaini, 2020).

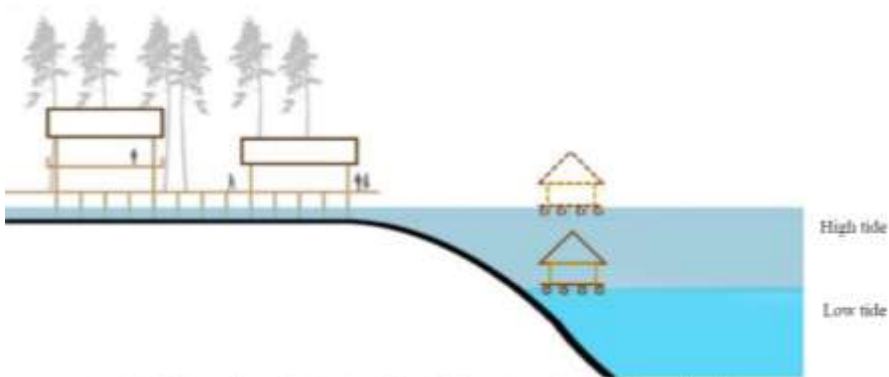


Fig. 2. Buildings are located in riparian of the Mahakam river, and are erected on ulin pillars due to face annual flooding. Building located in tidal swam area. *Source: Drawn by Nadia, 2020.*

4. The landscape of Muara Muntai is characterized by the use of Ironwood or *Eusideroxylon zwageri* Teijsm (locally known as Kayu Ulin). Compared to other establishments in Indonesia, Muara Muntai is one city district with the most usage of Ironwood, notably on boardwalk (+21.63 km length, 2-5 m width) and public squares (about 10. 242 m2). The squares are usually connected to the boardwalk.



Fig. 3. Ironwood used for squares. Left to Right: Elementary School (*Sekolah Dasar-SD*) 001 Muara Muntai, Asy-Syakirin Great Mosque, residential. *Source: Doc. Nurjanti, 2019.*



Fig. 4. Ironwood used for village infrastructure. Left to Right: Bridge, Boardwalk and Pontoon for boat house. *Source: Doc. Nurjanti, 2019*

5. Ironwood, the native plant of East Kalimantan, is currently categorized as “threatened” due to exponential deforestation in the last decades—making it scarced and costly to find. Locals are in the favor of replacing Ironwood boardwalk with concrete for practicality reasons, such as lower maintenance cost of the infrastructure.
6. As an impact of modernization, some locus of historical and cultural of significance in the Muara Muntai, including the use of Ironwood have been threatened in recent decades. From the perspective of ecology, Ironwood has played an importance role and it has been registered as one of the protected natural resources of Indonesia.
7. Based on the observation, there are three types of open space, i.e. linear open space (street, alleys, bridge/boardwalk (locally called *jembatan*), non linear open space, i.e. school playground, mosque and office squares, sport yards, and green open space along the riverbank of Mahakam.
8. The use of such spaces are very diversified. The boardwalk or street are used as means of transportation. The use of motorcycle as a primary mode of so called “modern” transportation (also part of modern lifestyle) jeopardizes the boardwalk and produces noises. This circumstance is considered annoying by the inhabitants. Furthermore, open space, whether linear or non linear, are also used for neighborhood-related activities, such as economic and socio-cultural activities (selling and buying food, vegetables, home appliances ect.), and as playground for children.
9. Due to rapid urbanisation, the settlement developed linearity along the riverbank, and to some extent also expanded into the hinterland area of the riverside. The development has been pragmatically carried out and, according to the findings, the locals have specific norms in building new settlements. Nevertheless, formal building and neighbourhood regulation (such as; land use changes, space between buidings, fire mitigation, sanitation and waste etc.) are neither to handle nor implemented due to the lack of control/monitoring, law enforcement schemes, and supporting resources.

**Further findings can be found in the attached field survey report and accepted paper draft.*

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Housing and Human Settlement

Those who pioneering research and study about housing and settlements as independent knowledge in Indonesia.

Housing and Settlement Research Group

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Housing and Settlements research group is a pioneer in developing research and study about housing and settlements as independent knowledge to respond to current issues and problems in developing countries, such as Indonesia.

This group develops relevant knowledge related to:

1. Planning in develop housing and settlements, and design processes related to the urban and rural context,
2. Environmental development formula and settlement development policies based on the community in urban or rural scale.

Four major aspects addressed in this research group:

1. Morphology or transformation process of housing,
2. Construction process and improperness of housing,
3. Environmental impacts and settlements
4. Demand, needs, and preferences of settlements

6.1 Study of Data / Information Quality Improvement for supporting KoTaKu program in the city of Cimahi

- 1. HEAD OF TEAM** : Dr. Ir. Agustinus Adib Abadi, MSc
- 2. TEAM MEMBERS** : Romi Bramantyo, ST., M.Sc.
Amada Rahmalia Syafitri, ST.

According to UN-Habitat, currently, about 25% of the world's urban population lives in slums. In Indonesia, according to data from the Ministry of Public Works and Public Housing, in 2018, there are 38,641 hectares of slum areas located in 269 cities/districts and 11,076 villages/villages. According to the Regulation of the Minister of Public Works and Public Housing of the Republic of Indonesia No14 / PRT / M / 2018, slums are settlements that are not habitable due to building irregularity, high density of building, and the quality of buildings and facilities and infrastructure that do not qualify. Fulfillment of the conditions in question is conformity to the fulfillment of technical standards and the ability of functions that include: building quality, tertiary roads; provision of drinking water; drainage; wastewater management; waste management; and fire protection.

For more than 25 years, Indonesia has efforded to improve the quality of slums. Many local communities, cities, and international organizations have carried out various programs to deal with slums, but it has not shown significant results.

The observations that there are problems handling slums in Indonesia are still not optimal because the handling process is inadequate. One of them is that slums' decision is still often missed because of the lack of data support in the decision-making process.

The problem and objectives.

The main problem raises as the understanding of the slums are very diverse. For certain conditions, the term describes a different level of settlement. The understanding starts from informal and illegal settlements to land rights status and the area that lacks planning. Spontaneous or irregular developments show the processes and dynamics of development, where severe deficiency, shacks, and sub-standards infrastructure are associated with poor physical and socio-economic conditions. Many terms used popularly about squall is widely associated with politics generally associated with the Agenda of habitat in development goals.

However, slum alleviation efforts are less supported by comprehensive data and information so that the various policy decisions taken can be more effective. The condition requires integrating social data and remote sensing data to become comprehensive and measurable and reliable information as the primary purpose of this study. Often researchers intend to provide necessary information about

squall location in urban networks and whether the area is large? However, it does not sufficiently integrate with existing social information.

Handling the dynamics of slum development carefully on a particular scale requires local planning and precise decision support. This effort requires further study considering that multi-temporal information can be a simulation model material about the growth of slums to build policy-related information for future development scenarios.

Potential applications for remote sensing-based information on morphology and temporal dynamics of poverty include four main domains: economic, environmental, governmental and planning, and social. This condition reflects the government's weakness in the ownership of spatial data information of the local squalor.

The objective of the activity is to provide support to the city of Cimahi government to improve the quality of data or information in managing slum improvement so that in the future the city government can produce better and precise decision, approach and strategy for dealing with urban slum.

Methodology

The quality of the data will depend primarily on the suitability of the information for its purposes. The data largely depends on how it is taken and utilized in determining slums that experience many irregularities. Adequate data and further analysis of the case's essential information are required. Therefore, reliable ways to obtain quality data are needed to make strategic decisions according to the conditions. With this category, today it requires to find the characteristics of comprehensive map data, which is easy and inexpensive to obtain but has a significant effect on policy-making efforts to improve the quality of slums in the form of complete information images. However, the availability of imagery with a sub-meter resolution still has many unresolved technical issues for mixed seedy material characters.

Results

Remote sensing technology obtains specific information from the targeted slum area. More detailed information is the basis to determine handled regional boundaries and taken strategies. This method is essential because, in reality, there are characteristic differences from the existing slum, both based on its location and socio-spatial characteristics. The figures below show how remote sensing technology improves data quality in dealing with the complexity of slum area improvement. By having a more detailed map and information, the local authority will hopefully make a more strategic program to improve slum areas in the cities.

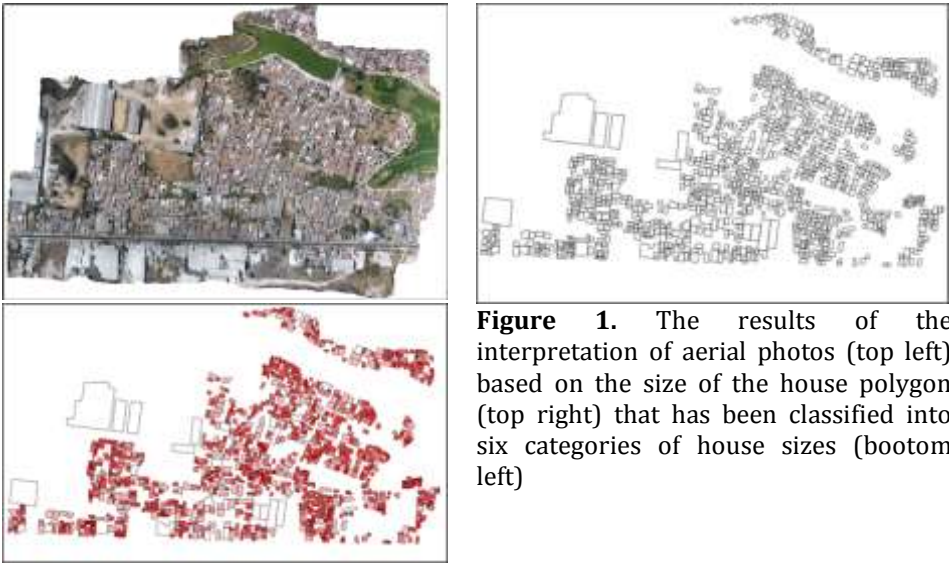


Figure 1. The results of the interpretation of aerial photos (top left) based on the size of the house polygon (top right) that has been classified into six categories of house sizes (bootom left)

To conclude, the RS technology will help improve the map of slum areas by providing more accurate data and physical and spatial configuration. Furthermore, it expectedly will create a better and strategic approach to deal with the urban slum.

6.2 The Urban Growth and Neighborhood Changes in Indonesian Urban settlement

- | | |
|------------------------|--|
| 1. HEAD OF TEAM | : Dr. Ir. Agustinus Adib Abadi, M.Sc. |
| 2. TEAM MEMBERS | : Adhitya Rizky Isnandya, ST., M.Sc.
Mutia Ayu Cahyaningtyas, ST. |

Background and motivation

Neighborhood change is a term to describe the process of physical and socioeconomic change in and between environments. This term can have a positive meaning by analyzing the process of environmental change over time, or it can have normative meaning in the sense of a changing environment. Urban development, considered by the increasing population and expansion of the territory, is an almost inevitable reality. Various contexts related to this process will be necessary, given the neighborhood's consequences as an entity that plays an essential role in the development of life in urban environments. This view refers to a definition that one of them mentions the neighborhood as an area within the city recognized by the community as an ordinary place, different, has its character and predetermined physical boundaries (Power 2007: 17).

There are many real developed concepts, but Keller (1968) briefly points out that most neighborhood definitions include two main components: physical and social. More specifically, the environment's essential elements are human beings, places, interaction systems, shared identities, and common markers.

Thus, a neighborhood is a relationship between a population that inhabits a particular part of the city organized in a network of interactions in both formal and informal bonds stating its general status. Porteous (1976) generally underscore that the community's social and cultural life continues to evolve with its social dynamics, both positive and negative, showing its influence on the quality of community ties in an environment. Therefore, efforts are needed to recognize the social conditions and characteristics of an environment to see its potential to maintain settlement life sustainability.

The problem and goal

Downs (1981) mentions three essential aspects of urban settlement development: urban settlement dynamic, the relationship between urban environment, the relationship between the center and the edge of the city. Naturally, the three interact and, under certain conditions, produce social and economic problems in urban residential environments.

The most significant cause of changes in a neighborhood's population composition is displacement, which in developed countries are immigrants from other countries. Migrants have to socialize in a new way of life. If the newcomers

differ culturally and ethnically from the natives, they will integrate into the more extensive social system. If migrants are socially unacceptable to local communities, there will likely be violent rejection as, in many cases, racial invasions occur.

The research will look at the neighborhood's social dimension – and how they will correlate with the physical dimension that builds neighborliness and neighborhood, a sense of community, and the scale of the neighborhood.

The purpose of this research is to:

- a. Identifying the factors of neighborhood change and perceptions about the quality inherent in settlements in the city of Bandung
- b. Identify the characteristics, scale, and hierarchy of the correlation between changes in the neighborhood and the qualities inherent in them

The benefit of this research is to enrich theories about neighborhoods in urban housing planning in Indonesia whose cities are facing urbanization. This study aims to help the government reformulate the standards and guidelines for the development of balanced housing areas in an urban part to consider better aspects of scale and hierarchy related to the social space of its residents.

In a recent study in which Neighborhood change had become an essential topic in urban research, Olson (1982) suggested six significant themes in the study namely: neighborhood as a form of social organization, an ideology, a determinant of behavior, a result of the form of social organization, a social network and a typology.

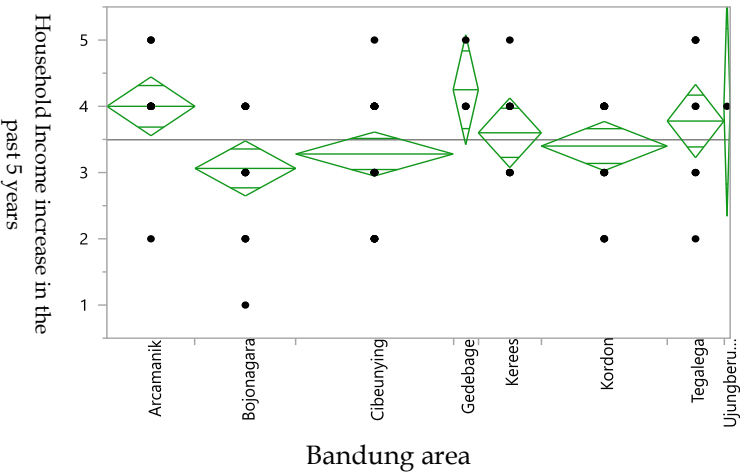
The current library study of neighborhood change shows several different theoretical perspectives (London 1980; London et al. 1980) such as demographics /ecology, socio-cultural / organizational, political-economic, and social movements. Based on various views, this study will look at neighborhoods as socio-spatial entities that include physical and social environments and reciprocal relationships.

Result

The data basically consists of four variables, which are, general household condition, household socioeconomic condition, household's house condition, neighborhood condition including the residents. By analyzing those four variables for understanding its' correlation and association with the neighborhood changes variable. The analyses show that the households' general and socioeconomic condition are not directly correlate with the neighborhood changes. The data depict that, most of the respondent with higher economic level stay in their neighborhood for longer time with stable condition, or no significant

demographic changes or any other related socio-economic aspect. However, the data also shows that, factor such as housing improvement correlate with the changes of neighborhood physical condition. As more households develop and improve their own house the neighborhood physical quality increase.

Hence, the neighborhood changes variable is significantly correlated with the overall neighborhood condition. The neighborhood with most of the residents has been living for only short period of time, less than 5 years, the neighborhoods are more dynamics. Several neighborhood changes indicator that exists in this neighborhood include, changes in customs and tradition, high level of demography changes with newcomers come from different socioeconomic class, and several residents also unavoidably moved out due to several reason including financial.



The study also conducts association analysis using ANOVA, and obtain association between, household economic increase with the area where the household live. It is depicted that the respondent who live around South (Gedebage, Tegalega) and East (Arcamanik and Ujungberung) area of Bandung experience household economic improvement significantly.

Conclusion

The study indicates that the main factor that initiates neighborhood changes is the residents' length of stay. The changes include customs and tradition, and the socioeconomic condition—the shorter on residents' stay period, the more prone to neighborhood changes. However, the period of stay also has a relation with households' socioeconomic conditions. To conclude, the study suggests that households' socioeconomic condition tends to correlate with neighborhood changes, although indirectly.

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6.3 Real-time User-Based Housing Data and Information Quality Improvement as Housing Provision Management for Low-income group: Student Rental Housing Rating App

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2. TEAM MEMBERS : Adhitya Rizky Isnandya, ST., M.Sc.

Background

Indonesia main cities, for instance Bandung has been attracting more people, especially working age population to stay for educational motive. Bandung has educational facilities, mostly universities, as their main pull factor. Based on Directorate of Higher Education, in 2019 the number of Universities located in West Java is 525, 11% of national total number of Universities. The number of students considered plentiful, 518.857, including student from other area.

With enormous number of students stay temporarily, for around 4 years or for shorter period, the demand for basic needs, including housing increase significantly. Thus, due to its temporary stay, the student, especially from other area prefer transient housing or rental based accommodation (*indekos*). However, the universities are not able to accommodate student housing needs thoroughly due to several limitation. Therefore, students have to depend on the housing market.

The housing market provide wide range criteria of rental-housing, although students still encounter difficulties in the searching process. The main concern is the price, the provided facilities, and the housing environment as well, which most of the time does not fulfill the student needs entirely. In some cases, to tolerate with the price, students must stay in rental house with low quality facilities and environment. Due to the high demand, the supply of rental housing near the university follow. The price increase follows as well, even though the facilities are not well build. Based on this issue, market management mechanism, especially related to the rental housing market is required to help student find suitable transient housing for their educational stay.

An approach within this management mechanism is data and information improvement. Data about rental housing, related to its' price, condition, and facilities is required to provide student adequate information and find house that suit their needs and budget. The data and information itself could be presented as an application. Application, in this era has been a main tool for data and information source, especially for millennials.

Therefore, this research aim to establish rental housing related application for universities student as data and information quality improvement for housing provision management.

Method

the application established as rental housing rating application, namely **i-housingmetric**. The application aims to create user-friendly application, which main goals is to provide data and information based on the user rating of the rental housing. This application development process consists of:

- 1. Determining the rental house quality review/rating main indicator, by studying similar rating/review-based application and online housing marketplace.
- 2. User-friendly online-based data collection method study
- 3. Collaboration with application developer, PT. Sanbersy, to establish web and mobile application

Result

Based on the study, the main rating indicator for the application determine as several factors, which are, health, safety, convenience, comfort, affordability. Moreover, to accommodate the recent pandemic condition, several indicators also included, which are cleanliness, flexibility (period of rent), inclusivity.

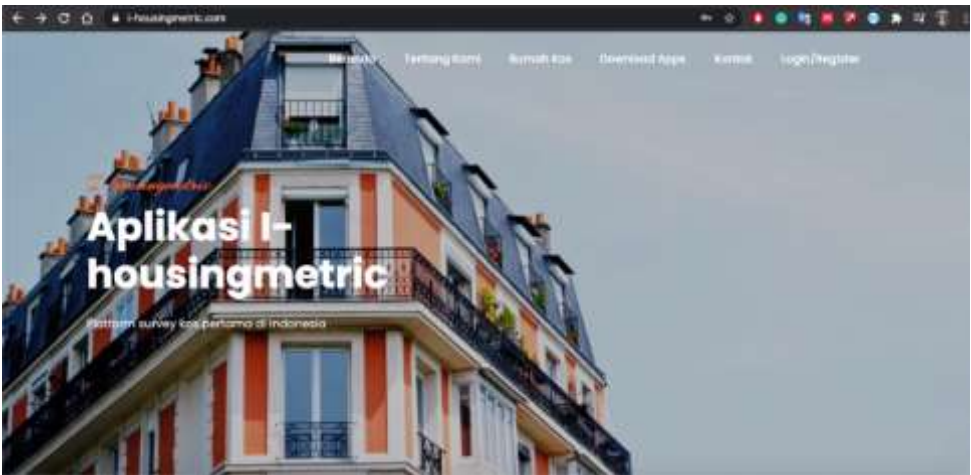
The application main scheme developed into two option, based on the user. The scheme consists of ‘user as reviewer/rate’ and ‘user as property owner’.

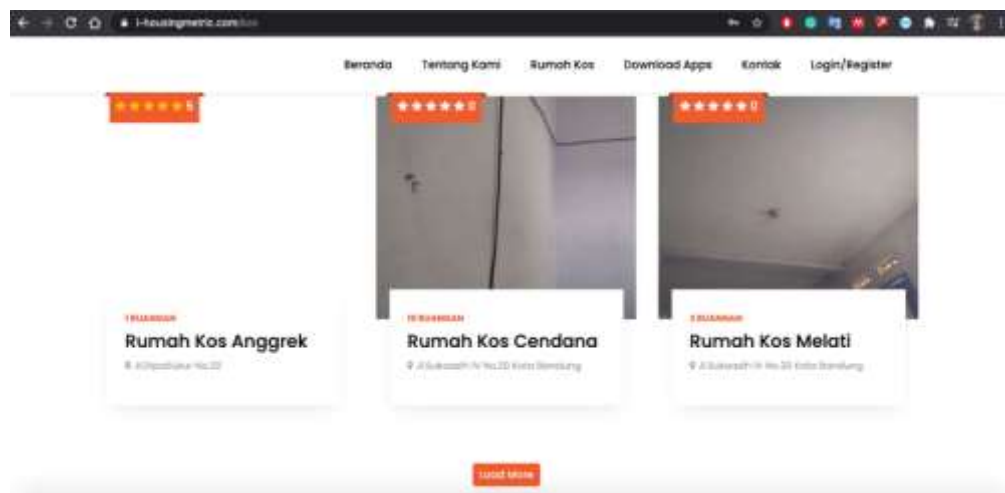


Skema kerja Aplikasi (Pemilik Kosan)



The application developed into mobile apps and website, that could be accessed publicly. The website could accessed through <https://i-housingmetric.com/>, and the mobile apps is ready to be downloaded from google play.





6.4 Preference of High-density Housing Typology and The Implications for Settlement Redevelopment Processes Pre and During Pandemic Covid-19

1. HEAD OF TEAM

:

Dr. Allis Nurdini, S.T., M.T.
2. TEAM MEMBERS

:

1. Amelia Tri Widya

2. Mutia Ayu Cahyaningtyas

Some major cities in Indonesia such as Jakarta-Bogor-Depok-Tangerang-Bekasi (Jabodetabek) and Bandung Raya (Bandung City, Bandung Regency, West Bandung Regency, Cimahi City, and Sumedang Regency) face issue of the high number of affordable housing needs due to high growth rate population. According to the Central Bureau of Statistics, the urban population currently reaches 50% of Indonesia's total population, with growth concentrations in large and metropolitan cities. Achieving the provision of affordable housing in high-density cities is possible by the redevelopment of villages and under-utilized areas. This condition has prompted the government to launch the 1000 Towers program, the affordable flats, or *Rumah susun* (the Indonesian name for a low-cost apartment) to meet the housing needs of densely populated settlements in Indonesia since 2004.

Furthermore, in 2018, urban area development is directed based on transit in major cities in Indonesia, implies the increasing push for the formation of high-density housing typology. The transformation of urban settlements into high-density needs to be studied more deeply, especially the implications for the redevelopment approach in housing planning based on dwellers' preferences. Concerning this issue, Millennial (born in the 1980s until the late 1990s) will be the largest group living in the urban area in Indonesia. In the other hand, at the end of 2019 until now, the world is being attacked by the pandemic Covid-19 or corona virus 2 (SARS-CoV-2), and Indonesia is one of the countries exposed.

Some health protocols are applied to minimize the spread of Covid-19, such as physical and social distancing by avoiding crowd, using masks, and washing hands, self-isolation, or even restricting the movement of people and goods (lockdown).

The identification of millennia's preferences for housing needs in high-density urban areas, especially in metropolitan cities, requires to be renewed and identified based on covid-19 spreading. Several previous studies have revealed the impact of Covid-19 on declining housing prices and housing characteristics. However, studies that indicate changes in housing preferences accompanied by price changes before and during Covid-19 are still limited explored. In this case, the researchers hypothesized any changes in occupational typological preferences concerning the implementation of health protocols before and during Covid-19. Therefore, this study aims to identify urban housing demand profile and high-density housing typology pre-and-during Covid-19 pandemic based on millennial preferences in Jabodetabek and Bandung Raya. This knowledge is important for developing acceptable high-density housing and minimize conflict in urban society.

To reveal the purpose of the study, the researchers consider the concept of transit-based vertical housing development, namely *walk, cycle, connect, transit, mix, densify, compact and shift*. Then, researchers added the concept of green social variables. In this study, there are 30 measured variables tested further. These variables are translated into several categories namely: i) location, ii) neighbourhood, iii) site design, iv) building, v) residential unit and vi) supporting facilities. Researchers used quantitative methods using a hedonic pricing approach. The housing price acted as the dependent variable, while the factors that can affect the price of a housing unit are independent variables. Data collection was done through the distribution of online and direct questionnaires in pre-Covid-19 pandemic (June-August 2019) and during the Covid-19 pandemic (June-July 2020). Questionnaires were distributed to the millennial who currently live in the area of Jabodetabek and Bandung Raya. The sample was chosen by non-random sampling with snowball sampling technique. In the first stage, respondents were asked to fill personal data (open-ended). In the next stage, they were then asked to fill in some questions (close-ended) related to vertical occupancy quality preferences in the future (30 measurable variables) which is a dummy variable. The data were analyzed by multiple linear regression analyzes to seek the housing quality based on unit prices of pre and during the Covid-19 pandemic. The regression analysis was done by separating the analysis based on domicile (Jabodetabek Area and Bandung Raya) and period (pre and during the Covid-19 pandemic). Researchers used stepwise regression analysis to obtain the best model of a regression analysis.

From the data collected, the number of respondents selected as the sample is 293 people consisting of 153 people for Jabodetabek Area and 140 people for Bandung Raya Area. The majority of respondents are dominated by students and private employees, both pre and during Covid-19. However, employee presentations during Covid-19 were almost two times larger than pre-covid-19 presentation. Furthermore, the presentation of higher education levels of undergraduates and masters degree during Covid-19 is greater than the presentation of pre-covid-19. Generally, respondents chose to live in self-owned housing. They also prefer to live in low-rise housing (3-4 floors), with presentations of 45% and 40% respectively pre and during Covid-19. However, during Covid-19, the presentation respondents who want to live in high-rise housing (more than 11 floors) increase from 17% to 23%. Respondents were dominated by the lower middle class (income <Rp 5 million), but, during Covid-19, the presentation of upper-middle-class respondents increased if compared to pre-covid-19. Furthermore, respondents tend to live in vertical housing with a price range of <Rp 200 million with a rental cost of <Rp 10 million per year. However, in general, the presentation of residential unit price preference and rental price/year during Covid-19 was greater than pre-Covid-19.

The regression analysis showed a good significance value in Jabodetabek and Bandung Raya areas in the pre-pandemic period ($p\text{-value} = <.0001$), which each explained data of 78%. During the period during the pandemic, the results of the analysis explained 50% of the data with significant values of 0.0033 (Jabodetabek Area) and 0.0468 (Bandung Raya Area) respectively. There was a difference in the price of pre and during the pandemic in each area of Jabodetabek and Bandung Raya. The price of vertical housing units of interest during the pandemic in both areas is higher than the price before the pandemic. For Jabodetabek Area, the price of residential units during the covid-19 pandemic increased almost twice, from Rp 122.063.252 (pre-covid-19) to Rp 214,318,119 (during covid-19). Meanwhile, the difference of housing unit price preference in Bandung Raya Area pre and during the Covid-19 pandemic was not very significant. The price of vertical occupancy before the pandemic in Bandung Raya was Rp 272,894,596 and rose to Rp 300,156,130 during the pandemic. The increase in the price of residential units during the pandemic, in this case, is in line with the different profiles of respondents in 2019 and 2020.

The results showed that there were differences in the high-dense living typology pre and during the covid-19 pandemic. Overall, the typology of high-dense living typology during the pandemic is low-rise housing (3-4 floor) which was indicated by a decrease in housing prices. During pandemic covid-19, prevention of the spread of the virus and awareness of increasing immunity was found to affect millennial preference. Restorative and healthy activities (such as walking and gardening) increased during covid-19 although cycling was not found to

have a significant effect. In addition, green residential blocks were found to increase housing prices. However, the results of the analysis revealed that millennials were not ready to live in urban environments despite the presence of green open spaces which was represented by declining the housing prices. During covid-19, the availability of balconies could increase the price of occupancy, especially in the Jabodetabek area. Contrary to that, the building that has a yard actually lowered the housing price during the pandemic covid-19. Meanwhile, the millennial decision to choose a mode of public transport for mobility during covid-19 reduced housing prices. Furthermore, the characteristics of the residence near public transport and communal parking are also found to decrease the occupancy. If observed more closely, the decrease prices were affected by the worried of public space that potentially could spread the virus in crowds.

From the research conducted, it could be concluded that these changes in high-density housing preferences were expected to be related to changes in income as well as increased desire to gain a sense of security in housing during Covid-19. This study was conducted in pre and during the Covid-19 pandemic with different demographics of the sample. This will, of course, result in different responses as well because the research subjects did not assess each form of pre- and during-covid-19 questionnaires. Thus, the factors that determine vertical occupancy would be different according to the background of the respondent. Further research could be done by considering the limitations of research with a larger sample.

6.5 Sustainable Built Environment Development: Training Materials in the Regional Government of the Greater Bandung Metropolitan Area

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Introduction

The making of the Sustainable Built Environment Training Module includes the development of the quality of housing and urban settlements, which is one of the aspects of knowledge development in the Housing and Settlements Research Group, within Roadmap SAPPK-ITB environment. This training material module activity is included in the form of community service activities and is in the context of built environment development, especially in the Greater Bandung metropolitan area. In practice, the development of the built environment (built environment) in various regions of the country has had important impacts on the balance of the natural environment and the social environment of the community. Likewise, the development process of the built environment in the Greater Bandung metropolitan area, both in the scale of buildings, the environment to residential and urban areas.

Description of the Problem and Objective

Problems and challenges for the sustainability of the built environment development need to be anticipated through various capacity building and knowledge management activities, including through various forms of training. Thus a step is needed to prepare training materials related to the issue of sustainable built environment development.

The purpose of this training is to provide insight and knowledge related to the principle of balance / cycle in the earth's ecosystem and efforts to maintain this balance. This is mainly faced with the development of human civilization, where the cycle of the elements of energy, material, air and water is an important part that greatly influences and simultaneously supports life in the ecosystem.

Through this training, it is hoped that the local government in the Greater Bandung Metropolitan area will realize and understand the existence and cycles of energy, material, water and air systems as important elements in life on earth, as well as knowing that development for human welfare requires elements. These natural elements and at the same time affect their existence and mutually affect human life on earth.

Methodology

The methodology used in this activity are:

1. Study of literature, such as books and journals, both physical and electronic books.
2. Study of secondary data documents, especially related to the development case in Indonesia.
3. Focused group discussion to get feedback on the preparation of training materials

Outputs and Outcomes

1. Sustainable Built Environment Training Module as material for the implementation of training.
2. Preparation for socialization of the training plan to the Regional Government in the Greater Bandung Metropolitan Area, in order to have practical analytical skills to develop reasoning in development, so that the sustainable nature of development and livelihoods can be achieved as optimally as possible.

The outcomes of this activity is the knowledge management in form of materials to understanding of the earth's ecosystem and efforts to maintain this balance in the development of human civilization, as well as the growing understanding of sustainable built environment issues from a social, economic and environmental perspective, and sustainable architecture as a part. Thus, through this activity there would be increasing quality of settlements and cities through the application of sustainable built environment development concepts. In turn, the Greater Bandung Metropolitan area can progress and develop while still paying attention to environmental sustainability and social justice within the community in the area.

**6.6 Participatory Design of Settlement Open Space in Bandung.
Case Study: Kangkung Kaler/Kidul Park, Lingkar Selatan
Subdistrict, Lengkong District, in Bandung City**

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Introduction

Public open spaces have various important roles in a residential area. Among them is as the heart where the community states its existence in the form of communication and social interaction as well as facilities to meet healthy physical needs. This role is increasingly needed, especially in dealing with pandemic conditions, namely as a community education facility in building AKB culture (Adaptasi Kebiasaan Baru/New Normal Adaptation). So in responding to this, the strategy for the utilization of public space requires far-sighted thinking, which is not only oriented towards meeting short-term goals but also needs to be reoriented that takes more into account the health factors of the users and the environment. The design of public space has an important role in realizing these long-term goals.

This community service scheme with the title of Participatory Design of Settlement Open Space in Bandung has taken place on Kangkung Kaler/Kidul Park, Lingkar Selatan Subdistrict, Lengkong District, in Bandung City. Kangkung Kaler/Kidul Park is a linear park reside in the middle of a residential area in the city of Bandung. The length is around 250 meters with a total area of around 5,600 m2. The location is in the middle of Jl. Kangkung Kaler and Jl. Kangkung Kidul which belongs to the region of Lingkar Selatan Subdistrict-Lengkong District. The location is within the downtown area of Bandung and currently the Lengkong District itself is a sub-district planned to become the Central Tourism District in the City of Bandung. Currently, the park has various trees with wide canopies which are decades old and other plants that are managed individually or by groups of local inhabitants. In the middle of the park, there is a 1.5m wide city drainage flow with a depth of 1.2 m. On the site, several buildings have been built. Some building are already in a very poorly maintained condition, filled with vandalism in the form of graffiti on the wall, or have already collapsed. The conditions of heavy rain, this area has experienced flooding due to overflowing water from the drainage flow in the middle of the park.

In line with the plan of Lengkong Subdistrict as a Tourism District in Bandung City, the Lengkong District Chief (Camat) sees the Kangkung Kaler / Kidul park needs to be revitalized and begins with a redesign of a better park so that it fulfills its function well as one of the public open spaces of settlements in Bandung City. Starting from all the potentials and physical constraints of the park and the problems faced, the purpose of this community service is to produce a design of Kangkung Kaler / Kidul Park that suits the needs and aspirations of local residents through a participatory design process. Furthermore, with the pandemic situation happen today, the design also needs to be inline with the rules and policies of new normal established by the government in an effort to reduce the spread of COVID-19. The design of open space settlements on Jalan Kangkung Kaler / Kidul expected to be one of the efforts from the local government to improve the quality of residential space in this region and to realize Lengkong District as a Tourism District in The City of Bandung.

Methodology

The participatory design has a number of methods in obtaining information from local communities, that are:

- Transect Walks, which is a method of collecting data that is carried out by going through a place that is used as an object that is observed in depth
- Diagramming (diagramming), to see the relationship between elements
- Mapping (mapping), to see the hidden structure of space
- Modeling, to see the sense of space that occurs.

Previously this community service activities are planned to be implemented in the form of several Focus Group Discussion sessions involving residents, community leaders, local community organizations, RT, RW, and District. But, considering the pandemic situation, the team only use deep interview with District Leader to find out the needs of the residents, architectural 3D modelling and illustration, and distribution of questionnaires to obtain the design preference from local residents.

The design process also involving mapping expert to obtain precise existing condition map that will be use as the main reference for the design process (See figure 2). The use of drones is also implemented to obtain a more comprehensive physical condition of the area.

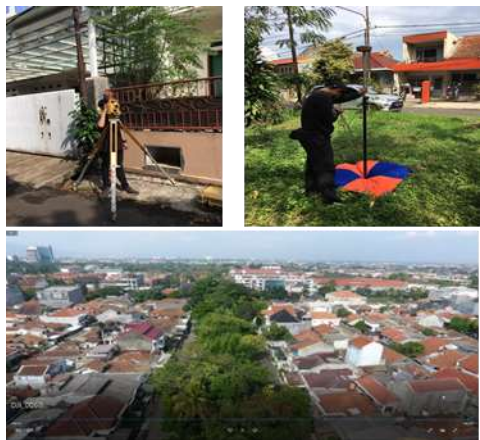


Figure 1. Mapping and Site Measurement Process (upper),
Drone Documentation Video (below)

Findings and Discussion

Mapping Survey

On the first step, the team conducted mapping and site measurement process to obtain the precise condition of the area contours and existing vegetation especially old and mature trees. In the design process, hopefully majority of those mature trees will be preserved and do not need to be cut down.

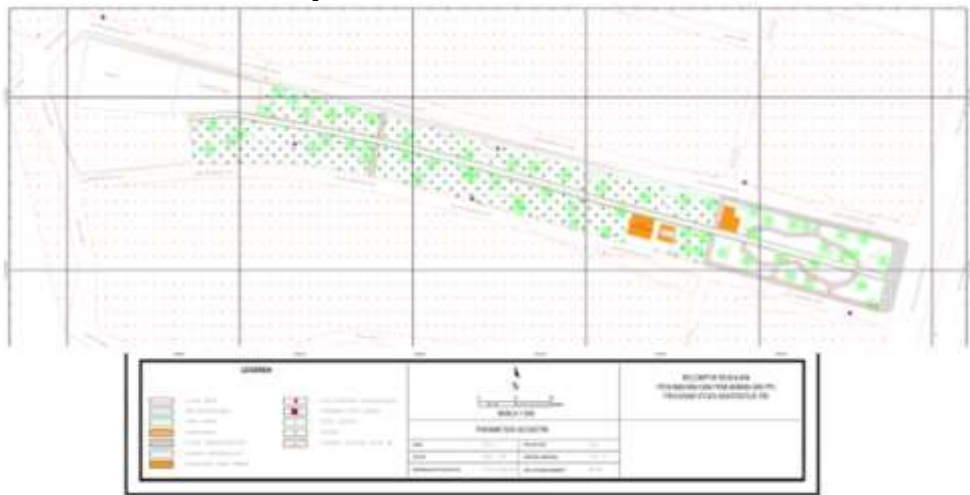


Figure 2. Site Mapping Result

The Design Process

The design process begins with direct observation and mapping of several problems and issues related to the park's conditions. From the deep interview with District Leader there are several key points that will need the design to responds:

- The existence of the park and its development plan must consider the consequences for the surrounding community, especially RW 01 and RW 02

- The buildings in the west are temporarily left as it is because we don't know their status yet
- The existing Posyandu building is recommended to be developed as a multipurpose place that can be used by residents for multiuse purposes such as posyandu, resident's meeting etc., there is an idea to make it also as an isolation place for residents affected by Covid -19 (it is mandatory for every kelurahan to have it according to Perwalkot).
- The realization of development will involve several donors
- Reducing the use of pavements to allow water to infiltrate to the ground
- Several parts of the park will require cut & fill
- There is a need for a community reading park, at the Ministry of Education and Culture there is assistance for the establishment of a reading park, there must be a building for storing the books (quite permanent)
- There is a Program of 1 village 1 PAUD. We can add a PAUD garden
- There is a need for the development of a communal septic tank in the southern part of the park

From site analysis, this park has the issue of disconnected access due to the drainage channels in the middle of the land. The issue was resolved by the existence of woven form of path lanes joining the two sides of the road. Path positions are designed to avoid cutting down any existing mature trees.



Figure 3. Basic Concept of Woven Form of Pedestrian Path

The design team came out with a design proposal which is divided into a number of segments. The division of segments aims to facilitate the funding for the development and management of the park by several donors.



Figure 4. The Design Segments

The Wayang & Sunda theme is the main design theme applied to the landscape and architectural elements of the garden. The theme was chosen based on the uniqueness of this district. It is hoped that this theme will be able to raise local uniqueness as well as to attract interest to visit the park.

The results of the study revealed that Kangkung Kaler/Kidul Parks’ utilization and benefits can be optimized. The active community involvement and initiative will make this park has a strong sense of belonging. It is also led the design process to obtain the essential needs of the community to be translated into a design. Numerous facilities proposed for this park, to support the local community activities, for example, urban farming area, outdoor gym, acupuncture path, library, amphitheater, gazebo, and playground. The design also considering new normal standards in response to the pandemic situation. The intervention is expected to meet the various basic needs of the community and being able to adapted to the new condition issue.

The park design aimed to accommodate users of all ages, kids, teens, and the elderly. The placements of facilities are considering the age group of the users. The elderly group facility placed farthest from the main road. It is followed by a facility for the kids, so the elderly that often brings their grandchild can do activities while supervising their grandchild. The facility for the teens located near the main road, it is considering the ‘seen or to be seen’ behavior that that is common at that age.



Segment 1 is focused on children and the elderly to avoid the crowds of main roads. The facilities for this segment are in the form of a sitting area, gardening area, acupuncture pathway, library and playground

Segment 2 is provided as a hangout area that flexibly accommodates several activities. This area features a wayang-themed landscape, seating facilities, and a performance stage.

Segment 3 has communal and community function with facilities in the form of a waste processing workshop area and community hall (posyandu building)

Segment 4 is the segment closest to the main road. Outdoor gym facilities are provided and are intended especially for adolescents who respond to the 'seen or to be seen' behavior that is common at that age.

Figure 5. The Concept of each Segment



Figure 6. 3D Animation Video of Taman Kangkung Kaler/Kidul

Conclusion

The existence of a park in a residential area will indirectly have an impact both on the physical quality of the settlement, as well as on the non-physical quality such as the quality of social interactions between communities. The availability of a park in a community residential area which is not supported by good accessibility and adequate provision of facilities will make the park not function optimally. From the results of Kangkung Kaler/Kidul Park observation it can be concluded that there is a need to revitalize the residential area by adjusting innovative and creative design patterns, of course without neglecting social aspects of the community.

The purpose of this study is to produce a well-planned design of Kangkung Kaler/Kidul Park that is in accordance with the needs and aspirations of the residents of the settlement so that it can be part of supporting the efforts of Lengkong District as the Center for Tourism District in Bandung City.

6.7 Physical Impact of Theme Parks On Settlement Morphology In Lembang Sub-District, West Bandung

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Introduction

Lembang is one of the tourist destinations in West Bandung Regency that has a lot of tourism destinations choice. All types of tourist attractions are there including one of artificial attraction: Theme Park. Some of developed Theme Parks in Lembang are FH and FM. Theme Park is classified as mass tourism which is able to invite thousands of tourists in one day. Based on data quoted from www.bandungbisnis.com, the number of FH tourists in 2016 reached 17,000 per day and based on the data quoted from www.pikiran-rakyat.com, the number of visitors to the FM in 2017, especially during long holidays zreached 13,000 tourists /day. Mass tourism has some characteristics: large scale tourist volume, fast spending time, and hedonistic motives (Nanang, 2003). This study aims to assess how the physical impact felt by communities in residential areas around the Thемаe Park. An understanding of the physical impact of the existence of Theme Park on settlement areas and its inhabitants can be the basis of a sustainable strategy for developing Lembang tourism.

Literature Review

Theme park is recreational facilities that have special basic ideas that characterize the entire recreation area (Raluca and Gina, 2012). According to Clave (2007) in his book entitled *The Global Theme Park Industry*, the criteria for theme parks include: (1) having a thematic identity that determines recreational alternatives; (2) contains one or more thematic area; (3) set in a closed area and controlled access; (4) centrally managing the productivity and consumer processes. The existence of theme park gives physical impacts for surrounding area including settlement area as a part of built environment. According to Waluya (2013), the existence of tourism to the built environment has an impact on urban environment, scenery, infrastructure, urban forms. If reviewed more specifically for settlement areas, the existence of Theme Parks has a physical and non-physical effect on residential areas. According to Elmia (2019), changes from physical aspects in settlement area are viewed from changes in land use and building functions (Clave, 2007) and changes to the quality of local infrastructure (Lanquar, 1991 in Clave, 2007).

Methodology

This study uses concurrent mixed methods quantitative and qualitative research strategies or approaches. This approach is carried out by collecting quantitative-qualitative data at one time, then combining it into one information in the one interpretation results (Creswell, 2008). Mixed Method Research aims to overcome weaknesses in quantitative qualitative approaches. The data used in this study are primary data and secondary data. Primary data is obtained through questionnaires, interviews, field observations, and image documentation. Secondary data is obtained through the study of literature, government policy documents, data from government agencies, reports, and other media both form mass media and the internet.

Study Area

The definition of Theme Park attraction is considered by academics as single units, individual sites or small-scale geographical areas that are accessible and motivate large numbers of people to travel far from their homes, usually in their free time, to visit in a short period of time and limited (Raluca and Gina, 2012). The two interesting parks in Lembang Sub-district include FH and FM. Farmhouse is a tourist destination area that has theme nuances of Europe that developed in Lembang. While FM is a tourist attraction with the theme of international flavors in the world with nuances of Japan, miniature replicas, fantasy, traditional and so on which presents various rides in one area.

Discussion

The development of Theme Park in Lembang Sub-district grew from year to year, starting when the FM was established in 2012 (Secretary of the Village of Lembang, 2018). After that period, other tourist destination began to emerge including FH in 2015. Theme Park developments happen from time to time, in line with the company strategy to maintain the number of tourists by expanding the area and adding new attractions. Changes in land use that happen in the Theme Park, in FH case study, there was a change land use from agricultural and settlements into tourist destination, while in the FM case study there is a changing from Umar Lake become a recreational area.

The presence of Theme Park opens opportunities for workers to come and live around these attractions (Clave, 2007). However, Clave's statement, was not proven in this study. Based on the results of the primary survey of residents who living around Theme Parks, known that residents who live in their house after the existence of Theme Parks is 13% in FH case studies and 26% in the FM case study. But none of the respondents moved to residential areas around the Theme Park because they work at the Theme Parks. Then the scale of Theme Park determines how the need for new settlements around the area. Theme Park with the Destination Park scale needs more workforce than Regional Park and Urban

Park Scale. It can be concluded that the existence of Theme Parks in Lembang Sub-district does not significantly affect population migration or grow new settlement area.

Typo-morphological transformation of the houses, is similar. Most residents around Theme Parks are not affected by the presence of the tourism sector when they change their house in to another function. The presence of Theme Parks in Lembang Sub district has a little impact on change in building functions from house to tourism facilities. Mostly houses that affected to become tourism facilities are located in collector road so people can easily reach their house/tourism facilities.



Figure 1. Morphology of housing surrounding PH and FM theme parks

Transformation analysis on the facilities and infrastructure of the surrounding settlements seen from how the presence of thematic amusement parks makes use of facilities and infrastructures used jointly by residents and tourists. There are several facilities and infrastructure that are used simultaneously between residents and tourists, which is roads, clean water, houses of worship, parking lots.

Conclusion

In the Lembang Sub-district case study, physically, the presence of Theme Parks led to changes in land use in tourist areas, from the agricultural land and settlements to tourist areas. But changes in land use do not have a significant impact on the surrounding area. Meanwhile, the change in the function of thematic residential buildings due to thematic existence happened in 8.3% of respondents. The impact on public facilities and infrastructure is negative and positive. Negative, because the presence of the Thematic Amusement Park raises increasing congestion. But on the other hand, there is a positive impact in the form of funding support for mosque public facilities and infrastructure from the

managers of Theme Parks to the local population as well as the empowerment of community vacant land for tourist parking spaces.

To increase the positive impact and minimize the negative physical impact of the presence of Theme Parks, for managers it is recommended to analyze parking capacity by the projected number of visits in the future. Recommendations for local governments are appropriate zoning regulations for regional planning tourism which has the potential to invite large numbers of tourists in order to reduce congestion externalities, increase road access and traffic engineering in Lembang to eliminate congestion, and reduce or even stop the construction of new tourist attractions in Lembang because of its reduced capacity at the time the survey was conducted.



Building Technology

Those who concern and interested about building structure, construction management, and building science.

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Building Technology research group focuses on six primary fields:

1. Building System,
2. Building Performance,
3. Architectural Projects and Construction Management,
4. Building Control and Environment,
5. The architecture of Disaster Mitigation, and
6. Architectural Computation and Modelling.

All six primary fields of study is a product of three main fields of study, namely building structure, construction management, and building science, that expands into diverse professional activities and current research. It is common knowledge that architectural academics and education cannot advances without professional activities as a field of practices and technology implementation in architecture.

Rapid advancement in building technology today are encouraged by numerous factors, such as environmental degradations, scarcity of energy and natural resources, and also advances in management science and computation.

7.1 Bamboo Space Frame

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Recently, bamboo has been growing rapidly as a building material. This is because bamboo can be categorized as a sustainable material. Bamboo also can be used as a substitute material construction, for example space frame or space truss. The biggest challenge to use bamboo for space frames is in developing a connection system. Many architects and engineers have proposed joint designs that eliminate the eccentricity of force channeling. Apparently, bamboo cannot be treated as other material such as steel or timber because of its material features which influences the cost of its treatment.

Space frame structure is a structural system composed of linear elements arranged and the loads transferred in three-dimensional way. In some cases, the constituent elements are two-dimensional. In macro spatial system often takes the form of a flat or curved surface. Spatial structure A space frame is usually arranged in a single, double, or multiplicative member arrangement. The main characteristics of space structure usually are grid construction and spread of load is omnidirectional as opposed to the linear transfer load in the ordinary framing system. Because of the transfer loads mainly by bending, for larger spans the bending stiffness increases most efficiently by changing to a double-layer grid (Figure 1).

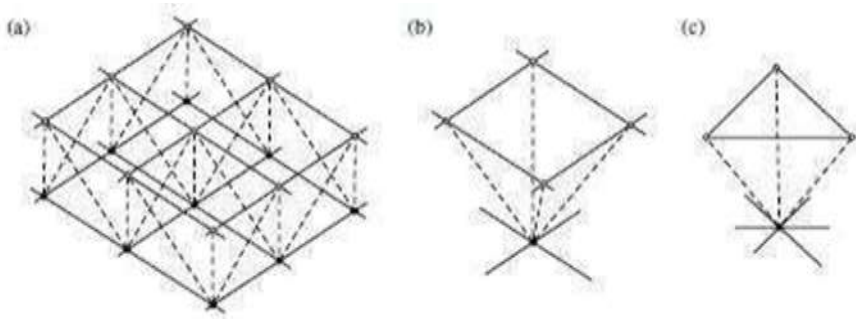


Figure 1. Basic elements of double-layer grids (W.F. Chen, E.M. Lui (2005). Handbook of Structural Engineering. CRC Press LLC.)

Bamboo has its own challenges to turn it into a space frame. Bamboo has a hard surface outside and each segment of the culm that is strong enough to withstand certain loads. However, the layer of the stem and hollow between the segment are two unique features in bamboo. These features need to be treated differently than other materials including in space truss. Bamboo can become a bar component in space truss, substitute timber or steel. The hollow feature in bamboo has similarity with hollow pipe steel. Usually, hollow steel material can be treated easily with a MERO joint by welding to a particular connection, but it cannot be done for bamboo. This research develops bamboo as a space truss

material. The main issue of this research is to find effective and low-cost bamboo joints in bamboo space truss.

The method of this research is experimental of bamboo as a space frame. The study was carried out through the stages of building a test model to be tested for loading on the structure. This paper discusses how to improve systems that work on structural systems and look at the application of structural systems to permanent structures. The next stage is the analysis of the results of the test model data which is done by looking at the effectiveness of the connection system to be used and its potential development.

Bamboo space frame is part of substitutive bamboo construction according to the structural classification by Widyowijatnoko (2012). In this connection, bamboo is used as a substitute for metal pipes which are the main elements of this structure. The main problem arises is how to connect the bamboo, so their force lines meet at one point without eccentricity.

In general, bamboo space frames have been created by using expensive nodal joints. This basically only replaces the space frame element stem with bamboo, while the nodal joint system (such as mero joint) is still in use. In this context, a major effort was made to connect bamboo to the nodal joint. The most effort made to solve this problem is to connect the bamboo tip with bolt using concrete or resin injection into bamboo. This connection principle is in accordance with the principle of Group 2, transferring force through friction on the inner surface or compression to the diaphragm (Widyowijatnoko, 2012).

To solve those problems, it used a particular connection by using a T-joint and Hub Connector. The T-joint uses a 5mm thick iron plate for connecting to the Hub Connector and is locked with M12 bolts. On this iron plate section is given room to tolerate the different lengths of members of each bamboo stick. The binder on the bamboo uses an M12 threaded rod with eyenut attached to the inside end. In Hub Connector, the iron plate has 5mm thickness with a cross section size of 90x90mm below. Hub Connector is a connection system that is made through the process of laser cutting iron plate material which is then combined with the welding process. The weight of one Hub Connector is around 550 grams. The connection system is designed to be used with varying degrees of tilt. That way the slope can be adjusted according to the module size specified. This system also prioritizes the ease of assembling bamboo space frames.

Bamboo space frame applications are generally the same as space frame applications with steel rods. The stems are cut short as needed. Usually there are two main dimensions, namely the horizontal bar and the diagonal bar. For steel pipe material, the length of the truss space truss can be cut anywhere as needed. When this is applied to bamboo material, a problem arises because it becomes difficult to obtain bamboo stems for space truss frames that have nodes at both ends. Even though bamboo can be 12 meter long. This problem becomes greater if the bamboo tip connection system relies heavily on the presence of nodes.

The implementation of this structural system is applied to residential buildings in Parongpong, Bandung, Indonesia. The size of the bottom area of the bamboo space frame structure is 9x12 meters with the use of a 3x3 meter module. The duration of this structure work process is around 15 days starting from the connection fabrication and assembly process in the field. The roof covering used transparent polycarbonate roof.



Figure 2. Implementation of Bamboo Space Frame

The process of the building construction was done by builders. Builders do not need a long time to understand the technical installation of connection system. The assembly process is directly carried out at a predetermined height.

7.2 Sistem Prefabrikasi Elemen Struktur dan Kinerja pada Bangunan Tradisional di Sumba dan Ternate

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West Java is known as the most populated province in Indonesia. There are two main cluster of population in West Java, Bandung Raya cluster as the capital of province which consist of Bandung City, Bandung District, West Bandung District and Cimahi City, and Indonesia Capital's Buffer Zone which consist of Bogor City, Bogor District, Bekasi City, Bekasi District and Depok City. The Bandung Raya cluster population is 8.670.501 people or 18% from total population of West Java. Meanwhile, The Capital's City Buffer Zone population is 11.930.991 people or 26% from total population of West Java.

However, this province is vulnerable to several natural disaster, such as flood, landslide, earthquake etc. The seismic earthquake source in this province are Indo-Australia Subduction, Cimandiri Fault, Lembang Fault, Opak Fault, Sunda Fault, Semangko Fault, Kumering Fault and Manna Fault, with three major source activity that mostly affect this province namely Indo-Australia Subduction, Cimandiri Fault and Lembang Fault. This province also has several active volcanoes, namely Tangkuban Perahu, Salak, Guntur, Papandayan and Ciremai. Therefore earthquake has been quite an issue for this province. Lembang Fault has been a haunting disaster source on Bandung region, due to its location that is on the northern part of Bandung. This fault spreads from Manglayang Mountain to Cimahi City. A GPS measurement in 2007-2008 has not shown any significant movement to this fault, and the activity of this fault has not been able to be identified up to now. A study shows that the last active period of this fault is approximately 10.000 years ago, and the last micro earthquake that has been recorded is 19 September 1999 in Cihideung with 3,9 magnitudo. Thus, earthquakes originating from Lembang Fault may be caused by the level of stress accumulated in the fault which has not been released, and it is feared that one day it will be released and an earthquake of very large magnitude will occur

The research will be conducted in an explorative research structure, by conducting interviews with several actors in construction field and simulating the model based on the interview result. The simulation objective is to compare it with the required standards based on the literature reviews, thus we will be able to analyse the impact of the earthquake disaster to the housing in Bandung or nearby West Java region. The simulation will be done by finite element method through Structure Analysis Program (SAP), which will be push over to the estimate earthquake scale in Bandung and nearby regions. The subject that will be analysed are : (1) traditional housing in Kampung Naga, Tasikmalaya; (2)

traditional housing in Kampung Dukuh, Garut; (3) vernacular housing; and (4) RISHA modular housing.

A. Traditional Wooden House : Kampung Naga and Kampung Garut

Both of the traditional wooden house systems investigated had a distinct foundation system in which the structural column only rests on top of a stone without being tied or planted into the foundation. This connection between column and stone is taken as the governing mechanism against earthquake, where after a maximum base shear the structure will slip and fall to move freely. Hence the maximum base shear load that must be able to be withstood by the structure to withstand earthquake is calculated by using the friction between the wooden column and the stone. Investigation on the strength of the wooden structure before slipping is also calculated.

In this study, research will be carried out related to traditional houses in the Kampung Naga area. The buildings analyzed in this study were constructed without using planning in accordance with SNI or based on local wisdom only. The structural modeling and simulation was done using SAP2000. In conducting structural modeling, supporting data is needed so that the modeling can be made as similar as possible to the original house, however due to the documentation of this house construction process is not done properly, there are data that cannot be obtained during the survey, and thus its value will be assumed

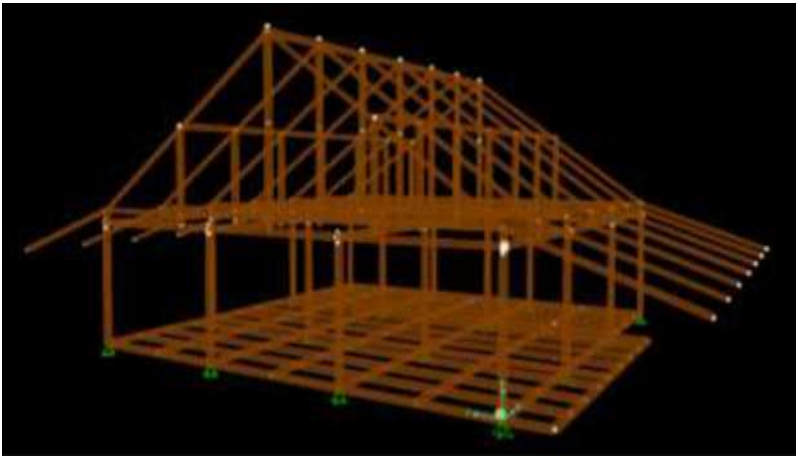


Figure 5. Structural Model of Kampung Naga House in SAP2000

Due to the analysis obtained on SAP2000 does not have validation of the structural behavior that will occur. Simple analysis is used in calculating the resistance of structures to earthquakes. The method used is to use a comparison of the rolling force of the structure by taking into account the friction force of the stone foundation stone attached to the structure. Based on the simulation results, due to the design earthquake force is greater than the basic shear resistance, it can be concluded that the building will overturn in the event of a planned earthquake in the area. Furthermore, an analysis will be carried out

related to the structural elements that will collapse first in the event of a planned earthquake.

$$V_d < V_E$$

$$24,2437 \text{ kN} < 81,7312 \text{ kN}$$

C. Conventional Housing

In this study, a residential building will be studied, where the building is built without any planning according to SNI or built based on the experience of local contractors only. Such buildings are very common in most parts of Indonesia, especially in rural areas. In this study, a residential building will be observed in an area in Bandung. The mechanical properties of these typical structures were acquired based on an in-depth interview with a local contractor that had built a total 1000 houses in the area of Bandung using the techniques and assumptions reported. Several deficiencies of the building practices were observed: 1) the employed design philosophy does not comply to the Strong-Column Weak Beam criterion regulated in the Indonesian Design Code for Concrete Buildings (SNI 2847-2019); 2) concrete material is designed based on field-work obtained know-how with no proper mix design standard; and 3) inadequate seismic detailing. Initial investigation on the demand/capacity ratio (DCR) of the main structural components indicates that these typical structures are purely designed based on gravity load scenario, with no consideration on earthquakes. This situation is also worsened by the inadequate seismic detailing of the main structural components which resulting in very minimum level of ductility.

According to the Indonesian Standard for Earthquake Design (SNI 1726-2019), the Spectral Acceleration at Short Period for Bandung city is 1.211 g, which corresponds to a probability of occurrence of 2% for a 2500-year return period. The results of the analysis show that even at much lower ground acceleration, the structure already experiences collapse. Findings from this study is quite alarming because the building practices describe here are not small cases of individual houses, rather they were representatives of residential complexes at large scale

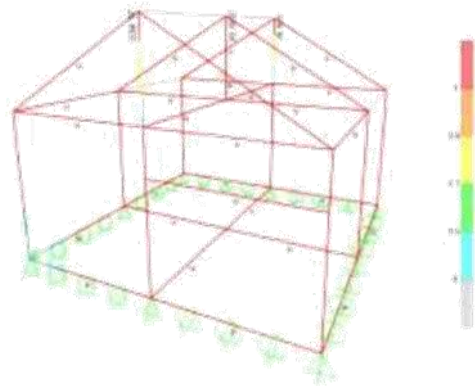


Figure 7. Failure of structure at just 140,8 kN

D. RISHA Modular Housing

RISHA is an engineered solution for residential buildings, and therefore it performs well with earthquakes. However field observations had shown that the connection between the engineered frame structure to the foundation and the structure to the roof is not standardized. In this study the impact of these unstandardized practices towards the behavior of the structure is investigated. The structure-foundation relationship will impact the behavior of the structure in earthquake, so in this study an investigation on how the performance of the structure will be if the connection was rigid or hinge is investigated. Moreover, findings show that he roof structure is more prone to wind load; even with low wind speed, the roof structure is at risk of collapse.

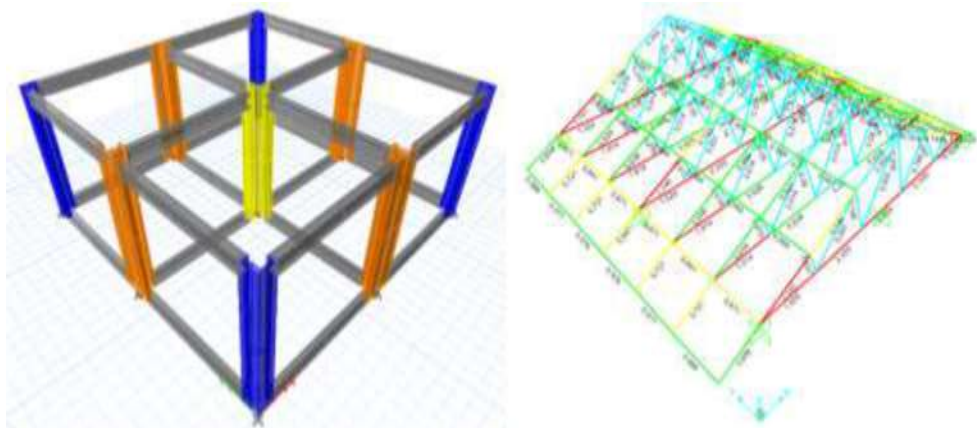


Figure 8. SAP2000 model of RISHA structure and Simulation result of the roof truss under wind load

Based on the simulation result showed that wind load is crucial and chord truss failure due to bending moment (ratio> 5).

Aside from the physical vulnerability of the area, several research also show another issues of resilience in Indonesia, which is the social or community resilience. Malik (2010), in his research about determining typology of Pangalengan earthquake prone area, mentioned five social or community issues in Pangalengan, Bandung District, due to the 7,2SR earthquake in Tasikmalaya in September 9th 2009, such as : 1) public ignorant of disaster, 2) lack of understanding in the community regarding the physical conditions of their residential area, 3) physical condition of buildings are permanent structure yet does not consider earthquake, 4)the irregular and dense settlement pattern, 5) total population and density.

7.3 Development Of Green – Low Energy Apartment Building Criteria

- 1. HEAD OF TEAM : Dewi Larasati
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INTRODUCTION

The urbanizations significantly affected the number of apartment constructions in urban areas. Likewise, with the one million housing program managed by the Indonesian government since mid-2015 to provide adequate housing in urban areas, these also affect an increasing number of apartment constructions. With the target of reducing the housing backlog in 2017, the government was targeting to build 700,000 houses for low-income families and 300,000 homes for those who received higher incomes in the city per year.

The development of infrastructure like housing provision also affected the material constructions. According to the National Statistics Agency data, the amount of construction material expenditure increased significantly since 2017. Due to the increasing demands toward new residential units in the city, the apartment constructions also have some impacts on the increase in the building energy sector from year to year.

Therefore, the Indonesian government has committed to focus on energy-oriented development. In 2019, Indonesia developed several policies and guidelines on energy-efficient development, including the Local Green Building Regulations and the recently drafted one, which is the Framework for the 2020-2045 Infrastructure Development Program on Low Carbon Development. This emphasizes that the principle of low carbon has begun to be considered in the development programs in Indonesia. The development of regulations is also in line with the "2016 Paris Agreement", which is one of the parties of the United Nations Framework Convention on Climate Change (UNFCCC), and the Sustainable Development Goal (SDG) as an effort to build a more sustainable world.

Although several policies have been established, the sustainability approach has not been widely applied in the apartment development. The consideration of sustainability in reducing carbon emissions is needed. In the tropics, the energy burden for cooling space is the greatest cause of carbon emissions. Therefore, the efforts to reduce the impact of carbon emissions in tropical buildings are things that must be taken seriously to reduce the cooling load. On the other hand, development also needs to consider using materials efficiently and low-embodied energy materials in order to reduce carbon emissions. This research will discuss various approaches to reduce the burden of carbon emissions in the development of apartment design criteria. The results of this study are expected

to contribute to knowledge about the construction of energy-efficient apartments in the future.

BASIC CONSIDERATIONS FOR THE DEVELOPMENT OF LOW ENERGY APARTMENT CRITERIA

Approach on apartment design trends in unit development

Since 2007, the construction of mid-level apartments has increased significantly, especially in big cities in Indonesia. Apartment development is becoming a new trend of residential areas in urban areas. According to Colliers, this increase was due to housing demands that occur every year, that in 2021, the increase in apartment construction can reach 60%, especially in lower-middle apartment units. In line with this, the results showed that the typology of apartment units in major cities in Indonesia shows that studio apartment units (22.5 m²) and unit 2 BR (34.04 m²) are the frequently constructed ones. This shows that the trend of apartment construction is no longer aimed at attracting the upper-middle class, but also the lower middle class.

In addition, the construction of apartments also changes the methods in construction, such as the types of material used and the process of material construction. This apartment is a high-rise building, a type of building that currently tends to use modular materials to increase time and cost productivity. Nonetheless, this approach can actually contribute to the efforts to reduce carbon emissions as the modular method can reduce construction waste that affects carbon emissions consumption.

Bioclimatic approach in the development of building mass

The bioclimatic design approach, an approach to achieve thermal comfort, is applied to this building. This approach is used by utilizing the potential of wind (natural ventilation) in the city of Tegal. Modular materials, precast materials, and other materials, which were obtained from demolished buildings and were reused, are also applied to reduce waste materials and carbon during building construction.

The bioclimatic design aims to get the maximum level of comfort for the users in building operations. On the other hand, it also aims to reduce energy consumption, building operation, and construction costs. Bioclimatic design in buildings is used as a passive system of sustainable design criteria. In the passive design, energy savings can be implemented through passive use of natural lighting and wind, without the use of electrical energy. The passive design relies more on the ability of architects to design buildings that can anticipate climate problems. The bioclimatic design framework is shown in Figure 1 below.

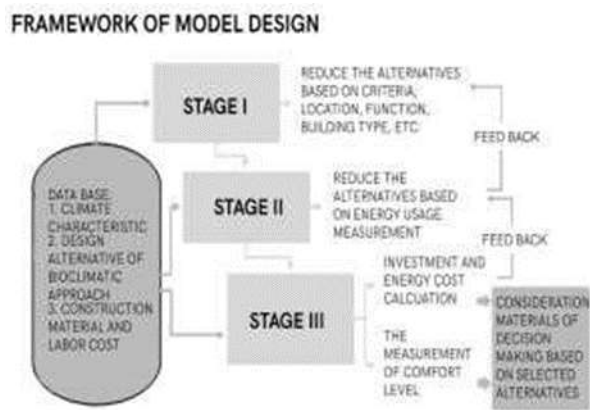


Figure 1. The bioclimatic design framework

The bioclimatic design approach consists of three stages, namely the stage of alternative selection based on needs, the stage of adjustment to energy use, and the stage of adjustment to user comfort and construction costs. To achieve an optimal bioclimatic design, a research is carried out on climatic conditions in Tegal. Climate data are used to compile the simulation models that are conducted by using Open Studio and CFD applications. The simulation is conducted to examine the possibility of passive cooling techniques suitable for the experimental house, which was conducted in the previous research.

Passive strategy approach in developing building elements

To create energy-efficient buildings, buildings must be able to reduce the possible energy use by using passive design strategies. Passive design strategies are very dependent on the climate and conditions around the site. Passive design strategies can be classified into two categories, aspects of planning and building envelope, as shown in Table 1.

Table 1. Passive design strategy categorization

No	Category	Passive design indicators
1.	Planning	Building mass Building orientation Landscape and vegetation
2.	Building Envelope	Thermal insulation for wall and flooring Roof – considering the material and color External wall – considering the material, color, and OTTV Window – considering the window characteristic, WWR and window orientation Natural ventilation Glazing Shading device

The bioclimatic strategy factors are obtained from the results of the literature review used by the previous studies. These factors are elaborated through the categories of passive design strategy factors in Table 2.

Table 2. Passive design strategy

Design strategy	Impact
Building Orientation [13,14,15,16,17,18]	<ul style="list-style-type: none">• Optimizing the building orientation with a longer building facade facing north and south• Facades and openings facing east or west• Saving cooling loads with the right orientation that can reach 8% -11%
WWR [19,20,21,22,23]	<ul style="list-style-type: none">• Optimizing WWR size at 24% with additional horizontal overhangs.• Radiation on the east side is hotter than on the west; however, with WWR 25%, the radiation is almost the same• WWR rate cannot be more than 40%
Opening or Natural ventilation [23,24]	<ul style="list-style-type: none">• The application of cross ventilation and building layout can make cooling in buildings faster and better.• The application of natural ventilation (crossing) is good, depending on the window and the appropriate shading device• Saving cooling load up to 19%
Glass / glazing [25,26,27]	<ul style="list-style-type: none">• Double low-e glass types are more effective than other types of glass that are able to block heat and receive light very well• Saving total energy up to 35,2%
Overhang [28,29]	<ul style="list-style-type: none">• Overhangs of 0.3 m, 0.6 m, and 0.9 m reduce the cooling load by 3%, 7% and 10% in the East facade, and 3%, 6% and 9% in the West facade
External wall [30,31,32,33,28]	<ul style="list-style-type: none">• Bright colours and reflective paint can help reducing heat build-up• The insulation for external walls is able to create a stable temperature of application
Roof [34]	<ul style="list-style-type: none">• The dividing wall along the roof must not be high and the slope must be at least 300 to protect the walls and openings from radiation and rainfall• Light-coloured coatings and reflective paint can reflect solar radiation

The results of the categorization of these factors become the references for the Tegal apartment design. As a design element is based on the results of the bioclimatic discussion, this includes the optimization of Appropriate Site Development (ASD) in the form of building that has been previously approved.

7.4 Disaster Evacuation Strategy in Urban Kampung. Case Study: Kampung Taman Sari, Bandung

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Acceleration in urbanization and the growth of densely populated urban kampung in big cities in Indonesia raises problems related to disaster evacuation. When natural disasters such as earthquakes, tsunamis, typhoon, fire, or volcano eruption occur, often a large number of people in the affected regions require evacuation. It means that the failure to evacuate will cause many casualties. Casualties can be prevented or reduced if people evacuate from dangerous areas to safe areas timely and effectively. Effective evacuation routes: shortest spatial distance, shortest evacuation time, and the largest number of people can be evacuated [3], and flexibility in destination selection. According to the evacuation theories, a safe large-scale evacuation can be achieved if the time needed to get to a safe place is short or fast, and the evacuation process is easy and complete. One of the evacuation successes is influence by the effectiveness of the evacuation routes. The routes should have the shortest distance, shortest travel time, more path choices, as well as more options of destination, and more people can be evacuated.

This research studied the street networks in urban kampung to find out how reliable the existing road network is for safe, easy and fast evacuation processes. The study assumed that the irregular, unclear and tangled hierarchy of road network in urban kampung could prolong the evacuation times. However, this research is still a preliminary study in the context of formulating a disaster evacuation planning for urban kampung. The case study is Kampung Taman Sari in Bandung, which is one of the most densely populated urban villages in Bandung, Indonesia, with a very complex street network (Figure 1). The map indicates the hierarchy and width of the road network in the study area; the average road width is between 1 and 2.5 m.



Figure 1 Area of study ini Kampung Taman Sari. A,B is Jalan Taman Sari, C is Jalan Plesiran

The method of analysis in this study is in the form of axial map analysis using UCL Depthmap simulation software, which analysis consists of four parameters: connectivity, step depth, integration, and choice. The higher the connectivity index value, the more streets connected, and vice versa. The fewer step depth means the shorter distance and vice versa. The higher integration values indicate that the road segment has better permeability and accessibility. Meanwhile, the high choice index shows that the road segment is a shortcut-road for the network. The data sources are the Openstreet map and Google Earth which is redrawn and combined with the results of the field survey. Other input data are the road condition data such as road width, direction, topography, the existence of obstacles are also added. The output of this simulation is presented in Figure 2 to Figure 5.



Figure 2. Connectivity index



Figure 3. Choice index



Figure 4. Step Depth index, the highest value (red dot/left), and the lowest value (black dot/right)

The highest connectivity value is 121 (at Taman Sari Street), and the lowest value is 3 (at the inner part of Kampong Taman Sari). Meanwhile, the choice indexes of all the streets are low. The analysis result of Step Depth indicates the highest value is on Jalan Taman Sari (red dot), and the lowest is on the small alleys at the settlement area of Kampong Taman Sari (black dot). It means that if someone from inside the village is going to one of the main roads outside, the distance covered is quite long. So does, if the person walks from the Taman Sari road to the village. There are two levels of Integration analysis; they are Local integration analysis and Global Integration analysis. Local integration shows the number of village areas that can be connected by the existence of a particular road section, meanwhile, Global Integration indicates the number of urban areas that can be connected by the presence of a specific road section. The highest Local integration value is on the western end of Plesiran, while the lowest is in the middle section of Jalan Plesiran. The highest Global integration value is on Jalan Taman Sari, while the lowest value is on the western end of Jalan Plesiran.

Based on this study, we found that only Taman Sari street has high connectivity because this road is connected to several collector roads in the eastern and southern parts. Jalan Taman Sari does not directly connect the surrounding area with the residential area in Kampong Taman Sari. Jalan Plesiran, has almost no branches that can be traversed by four-wheeled vehicles (only footpaths for pedestrians and motorbikes). The low integration is presumably because the road sections do not have a clear hierarchy, and there are no apparent connections between road segments that can be read by road users. The low level of integration in the road network in the Kampong Taman Sari area causes long distances to travel and lack of route options for users travelling to and from residential areas to the surrounding main roads.

In terms of ease of disaster evacuation, the lack of options for rescue routes from residential areas to main roads and the long distances that must be travelled will pose a risk to the safety of residents. The unclear road hierarchy and the large number of dead ends and turns will also hinder the access of rescue teams who come from outside the area. If a fire occurs, likely, the fire engine cannot reach the location of the fire so that the extinguishing process will be delayed, causing

a massive fire. In order to prevent risks to the safety of residents' lives, existing roads, especially those that can be traversed by vehicles and pedestrians, need to be opened so that they are directly connected to the main road (Jalan Taman Sari). Thus, it will increase the number of alternative roads for evacuation routes that can be reached in a shorter time due to shorter distances. Therefore, this study proposes to conduct further studies to identify existing road sections that have the potential to increase the permeability and accessibility of the Kampong Taman Sari and facilitate the evacuation process. The conclusion is the ease of evacuation in an urban kampong is influenced by factors in the street network in terms of connectivity, integration, convenience, and the number of path choices for residents to get to a safe location. A good network flow degree will shorten the evacuation time and facilitate the rescue process. The results showed that the spatial characteristics and street networks in the urban kampong area under study could hamper the evacuation process and rescue efforts from outside the area. It needs to be anticipated by rearranging the street network and configuring the urban village space, which is oriented towards easy and safe evacuation.

7.5 Application Development for Communities in Designing Modular Wooden Block Buildings

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: Irma Handayani, ST, M.Sc.,
Deny Wahyu Saputro Wibowo

Pendahuluan

Papan Kayu Modular merupakan hasil riset dari KK TB Prodi Arsitektur-SAPPK ITB adalah sebuah produk inovasi komponen bangunan. Berupa papan dari kayu ringan dengan desain pada kedua ujungnya membentuk profil kaitan dan kuncian (*interlocking*). Kombinasi pasangan papan kayu ini mampu menyusun komponen vertikal bangunan seperti; dinding, kolom, bukaan serta komponen horizontal seperti atap, kanopi dan pergola. Kombinasi dari kedua jenis komponen tersebut akan membentuk ruang dan bangunan dengan bentuk arsitektur yang costum dan fleksibel. Komponen bangunan ini terdiri dari dua sistem, yaitu Blok Kayu Modular dengan Paten Terdaftar No. P00201700592 yang membentuk sistem dinding dan Papan Kayu Modular dengan Paten Terdaftar No. P00201609045 yang membentuk sistem atap. Program P3MI kali ini adalah lanjutan pengembangan profil ujung papan dan sambungan dengan kolom yang akan lebih memudahkan aplikasinya dikerjakan oleh masyarakat.

Metoda dan Pelaksanaan Experimental

Metodologi riset yang digunakan adalah eksplorasi material berupa kayu ringan dan besi hollow dan eksplorasi konstruksi sambungan secara eksperimental. Proses metoda eksperimental dimulai dengan pembuatan model skala 1: 20 dengan material tripleks 2 mm, dan dilanjutkan ke dalam modeling gambar 3D seperti pada gambar sbb :



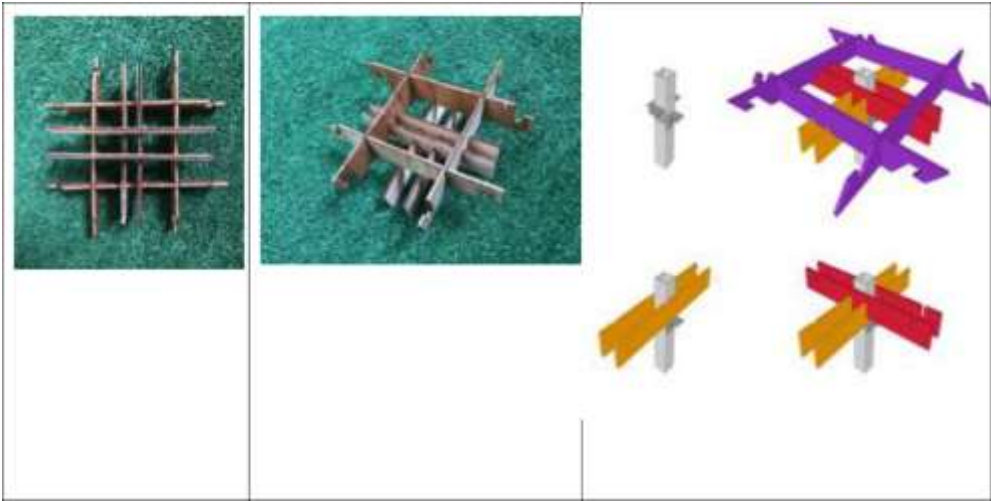


Figure 1: Metoda Eksperimental melalui maket dan *modelling*

Metoda eksperimental melalui pembuatan maket studi skala 1:20 ini membuat kegiatan simulasi perakitan papan kayu modular dengan berbagai jenis sambungannya menjadi mudah. sebagai acuan untuk mengembangkan aplikasi secara eksperimental. Pengembangan aplikasi ini memerlukan kolaborasi keilmuan di luar bidang arsitektur, seperti teknik sipil dan programmer komputer maka diperlukan pembelajaran dan konsultasi lebih lanjut dengan ahli di bidang struktur maupun IT dan yang berhubungan dengan pengembangan konstruksinya di lapangan. Dari proses tersebut akan dilanjutkan dengan pembuatan komponen skala penuh dan pengembangan aplikasi secara eksperimental secara simultan.

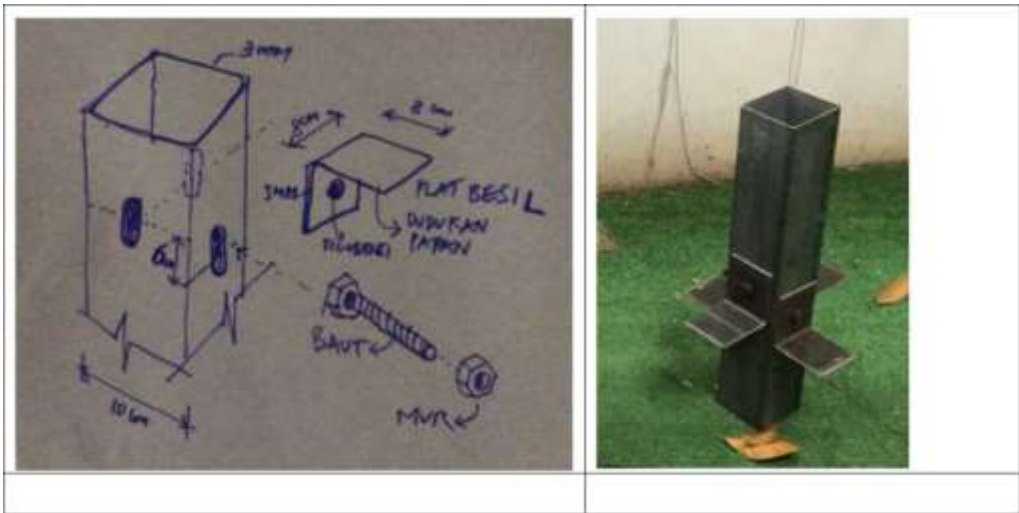


Figure 2: Desain dan Prototipe Baja Hollow untuk Tumpuan dan Sambungan

Hasil dan Diskusi

Menghasilkan inovasi sekaligus instrumen pendukung untuk riset Blok Kayu Modular berupa pelaksanaan aplikasi desain ke dalam konstruksi yang dapat mempermudah proses desain dan perwujudannya agar menjadikannya lebih terjangkau oleh masyarakat.

Gambar dan Skema Pemasangan

Keluaran (output) Hasil Program tahap interim ini berupa Prototipe Papan Kayu Modular dengan pengembangan inovasi kaitan baru yang berbeda dengan desain inovasi sebelumnya. Kombinasi aplikasi pemasangan antara dua material dan komponen struktur yang berbeda yaitu : papan kayu untuk elemen horizontal, serta besi hollow untuk elemen vertikal. Dampak (outcome) Hasil riset eksperimental ini berupa uji coba yang memberikan alternatif pengembangan inovasi konstruksi kayu modular yang lebih advance dan memudahkan aplikasi di lapangan.

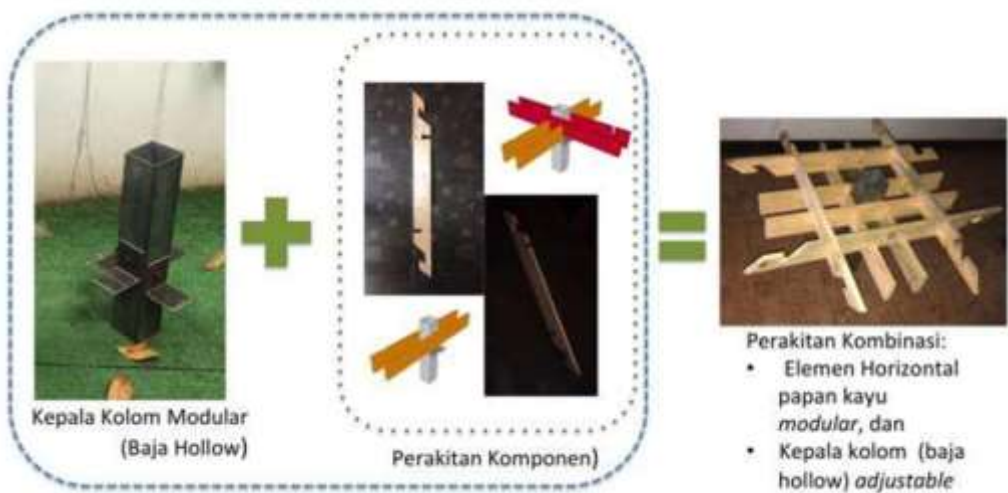


Figure 3: Skema Penggabungan dan Aplikasi komponen Tumpuan Sambungan Baja dan Perakitan dari Papan kayu Modular

Di bawah ini diperlihatkan sistem sambungan papan kayu modular terhadap kolom besi hollow dengan tumpuan yang *adjustable*. :



Figure 4: Ilustrasi konstruksi pemasangan papan kayu modular dengan tumpuan besi hollow

Kesimpulan

Kegiatan riset ini telah mendapatkan inovasi pengembangan profil konstruksi ujung papan kayu modular skala penuh (full scale) yang dapat bertumpu kepada desain baja hollow yang fleksibel. Rinciannya adalah : (a) aplikasi desain elemen horizontal untuk papan pergola penyaluran beban dua arah, (b) aplikasi desain kepala kolom untuk penyaluran beban vertikal ke kolom dari besi hollow, dan (c) desain hubungan antar kedua elemen keduanya secara *knockdown dan adjustable*. Program P3MI ini dapat membantu pengembangan riset lanjutan yang dapat diaplikasikan kepada masyarakat.

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Architectural History, Theory & Criticism

Those who concern and interested on the field of history, theory, and criticism of architecture and urban area.

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Architectural History, Theory, and Criticism is a group that focuses on the field of history, theory, and criticism of architecture and urban areas. There are five primary fields of study:

1. Dwelling culture, local wisdom, and vernacular architecture of ethnic in Indonesia,
2. Architecture development and Urbanism in Indonesia
3. Relevant application from a theoretical and methodological point of view,
4. Critics of architecture and urbanism based on formal and alternative paradigm, and
5. Documentation of ideas and works of Indonesian Architects and architect communities.

This group members attempt to contribute a better understanding of the architectural phenomenon with context and power that influence it.

8.1 The Influence of Architecture and Spatial Order

Development of Siti Inggil in Keraton Kasepuhan Cirebon on Traditional Ritual Activities

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Background

Keraton Kasepuhan Cirebon is the oldest and largest palace in Cirebon City, and has been designated as a Cultural Heritage Area based on the Decree of the Mayor of Cirebon No: 19 of 2001 concerning Protection, Preservation of Cultural Heritage Areas and Buildings in Cirebon City. Thus its existence and sustainability are protected by Law No: 11/2010 concerning Cultural Heritage. Siti Inggil (Siti Hinggil or Lemah Duwur) Kasepuhan Palace is part of the Baluarti area of the Kasepuhan Palace which has ancient architectural values and unique spatial structure, which functions as a space for the implementation of traditional customs, especially the tradition of Sekatenan (playing gamelan sekaten) every Iedul Fitri Day and Iedul Qurban which are still being implemented today.

According to University of Indonesia archaeologists Prof. Dr. Agus Arismunandar, Siti Inggil Kasepuhan Palace is the most complete miniature architectural heritage of the Majapahit Kingdom that we can still see today. The Siti Inggil complex of the Kasepuhan Palace was built to the north of the Kasepuhan Palace facing the North Square of the Kasepuhan Palace bordered by the Sipadu river and surrounded by red brick walls without lepa (kutha kosod) with two gates in the form of Bentar Temple. Adhi Gate in the north and Banteng Gate in the south, under the foot of the Banteng Gate there is Candrasengkala Kuta Bata Tinata Banteng which according to local tradition means showing the year 1451 Saka or 1529 AD as the year of the construction of Siti Inggil Keraton Kasepuhan Cirebon.

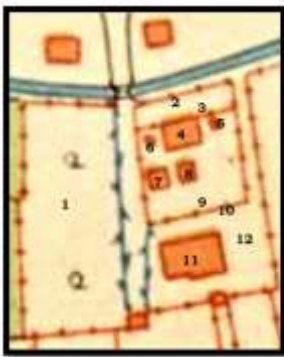
Over time and the dynamics of the history of the traditional Cirebon government (Kasultanan Cirebon), the buildings in the Siti Inggil Complex of the Kasepuhan Cirebon Palace are thought to have changed the form of construction, building materials, and building functions.

Objectives and Methodology

The aims and objectives of this research are to find out and find answers to several problems related to the existence of the Siti Inggil Kasepuhan Palace complex, including the following:

1. History, knowing the history of the construction process of the Siti Inggil Kasepuhan Palace complex and its function of building and spatial planning in the past.
2. Architecture, Documenting and knowing the elements that make up the initial architecture include: building orientation, construction techniques, size, design, tools and materials, and the value of their symbolic meaning.
3. Culture, knowing the changes in the spatial morphology of the Siti Inggil Kasepuhan Palace as the building space for Cirebon culture and its influence on the implementation of traditional traditional rituals in the Kasepuhan Palace today.

This study uses a qualitative descriptive method based on historical science (heuristics), archaeological observation, and architectural analysis.



1. Taman Raja Giyanti
2. Meja Batu
3. Gerbang Bentar Gaputa Adhi
4. Mande Malang Semiran
5. Mande Semar Tinandu
6. Mande Pandawa
7. Mande Karesmen
8. Mande Palinggihan
9. Watu Lingga - Yoni
10. Gerbang Bentar Gapura Banteng
11. Jinem Pengada
12. Jinem Wanowati

Dicussion and Findings

Siti Inggil (Siti Hinggil or Lemah Duwur) Kasepuhan Palace is part of the Baluarti area of the Kasepuhan Palace which has ancient architectural values and unique spatial structure, which functions as a space for the implementation of traditional customs, especially the tradition of Sekatenan (playing gamelan sekaten) every Iedul Fitri Day and Iedul Qurban which are still being implemented today.

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Gapura Adhi in 1890 and 2020

Source: KITLV 162764 (left), Survey (right).

Within the Siti Inggil complex of Keraton Kasepuhan Cirebon, there are five (5) buildings without walls with shingles with different construction, architectural ornaments, materials, sizes and functions, namely: Mande Semar Tinandu, Mande Malang Semirang, Mande Pandawa Lima, Mande Karesmen , and Mande Palinggihan (Mande Pangiring).

Mande Semar Tinandu has a rectangular floor, two (2) pillars with a pyramid-shaped roof extending east-west, as a symbol of the two Kalimah syahada, located to the east.

Mande Malang Semirang has a rectangular layout, has six (6) main pillars as a symbol of the Pillars of Islam and 14 supporting poles, a pyramid-shaped roof extending east - west, located west of Mande Semar Tinandu.

Mande Pandawa Lima with Bujur Sangkar has five (5) roof poles in the shape of Tajug having Memolo (mastaka), located west of Mande Malang Semirang.

Mande Karesmen with a rectangular design has eight (8) pillars of a limasan roof extending south-north behind (south) Mande Pandawa Lima.

Mande Palinggihan (Mande Pangiring) with square design has eight (8) roof support poles in the shape of Tajug with Memolo (Mastaka). Located on the axis (center) symmetrical plan of the surrounding wall (Kuta Kosod) Siti Inggil Keraton Kasepuhan Cirebon.

Over time and the dynamics of the history of traditional Cirebon government (Kasultanan Cirebon), the buildings in the Siti Inggil Complex of the Kasepuhan Cirebon Palace are thought to have undergone a change in construction form, building materials, and building functions.

8.2 Comparative Study of Timorese Architecture in Indonesia and Timor-Leste Post-referendum

- | | |
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Introduction

The occurrence of the division of Timor Island into two regions of the nation-state after the referendum, so it was proper that each region would develop with their policies, including in their attitude towards the idea of the importance of regional identity. The comparative study of Indonesian Timorese architecture and East Timorese architecture is carried out with purposes to explore: 1) how the two administration units of the same culture express their regional representation architecturally, and 2) how the modern regional architecture of Timorese culture reflect the post-referendum architecture in the state of Timor-Leste and Indonesia. Aspects to be explored in each place are the historical developments and the general conceptual embodiment of their architecture, and determining factors of regional identity and representation in modern buildings. This research is important in sorting out the characteristics of architectural representation of contemporary regionalism of the Timorese culture, which developed in two different ideological and historical background or even opposing - Timor Indonesia and Timor-Leste.

Methodology

The research was designed with the motivation to explore aspects of regional representation or nationalism in two major cities in each region / country. This study focuses on the views of architects who contributed to the production of cultural identity in architecture in Timor, especially the city of Dili dan Kupang, and analyzes examples of various existing projects. For the purpose of this study, data were obtained from a number of respondents with the following criteria: 1) several architects were selected from a group of architects working in the city of Timor who expressed cultural identity in their projects, 2) a number of decision-making officials and stakeholders who contributed to various decisions construction of buildings in the city of Timor. The methods used for data collection included literature studies and focused interviews, as well as a number of analyzes of contemporary Dili and Kupang architectural examples representing expressions of cultural identity.

Result and Discussion

Timor Island is the house of multiple ethnics. Anthropologists identify eleven distinct ethno-linguistic groups in Timor. The largest are the Atoni of western Timor, and the Tetum of central and eastern Timor. The most indigenous Timorese languages belong to the Timor-Babar branch of the Austronesian languages spoken throughout the Indonesian archipelago. The non-Austronesian languages of Timor are thought to be related to languages spoken on Halmahera and in Western Papua. Despite the equilibrium state of the Timorese culture, the culture is currently divided into two nationalities, the Timor under East Nusa Tenggara provinces, Indonesia, and the state of Timor-Leste. As result are two states have their own ways in representing national identity and the way they treat regionalism in their architecture. First of all, we could see comparative historical milestones of the Timor in both states.

<div>MilestoneLocation</div>	TIMOR-LESTE	TIMOR NTT
I. First Phase Before 1500	Indigenous Timor Culture	
1500-1700 Timor in the age of mercantile	Portuguese merchant	Dutch Trade commerce (VOC)
II. Second Phase 1700-1945 European Colonization	Portuguese colonization	Netherland colonization
1945-1975 Post Independence		The state of Indonesia
1975-1998 New Order – Indonesia	Timor-Timur provinces under the state of Indonesia under the New Order	
III. Third Phase 1998-2002 Pre-referendum situation	Pre-Referendum conflict	Reformation Movement against the New Order
IV. Fourth Phase 2002-2013 Post-referendum situation	The state of Timor-Leste state	Timor under NTT province the state of Indonesia
2013- Present		

TIMOR-LESTE

The existing architectural footprint in Timor-Leste is divided into four phases of architectural evolution which include:1) the first phase (before 1575) was when the original architectural identity phase was in the form of a house on stilts with a soaring roof; 2) the second phase (1769 - 1975) was when the European-style

architectural identity was brought by the Portuguese; 3) the third phase (1976 - 1999) was when the architectural identity was Asian-style in Indonesian style; and the fourth phase (1999 - present) is when Timor-Leste's architectural identity in the independence era.

Regional representation after the referendum is not a concept used to present architectural identity in Timor-Leste. According to Syamwil in an interview on May 5, 2020, the background of Portuguese officials did not consider traditional communities to be backward societies - they tended to think of traditional communities as people who were outside and on the outskirts of the city. The distance between traditional society and modern society (city) is clearly cut off. This condition is different from Indonesia (3rd phase), namely the Order Baru era which was actually strong with the concept of regionalism. During Indonesian times, the 'brick and zinc theme' was often a very distinct visualization from Indonesia. These procurement channels for building materials / materials originate from many regions in Indonesia but mainly come from Surabaya. Several Chinese traders from Surabaya who had a big role in transporting construction materials from Indonesia to Timor-Leste in this 3rd phase as the 'Clandestine' form, later in the 4th phase, and still exists today in Timor-Leste.

The other 'Clandestine' form actually started far from the 3rd phase with the involvement of Indonesian architects during the post-referendum period. These clandestine moved through informal interactions with various officials in Timor-Leste, based on intensive interactions in earlier period, for instance due to educational experience in Indonesia. Through this clandestine interaction several architectural firms in Indonesia gained access to various projects early in the post-referendum period in Timor-Leste. Formal interactions are starting to take place in 2020, when finally, Indonesian architects manage to gain influence and involved in governmental advisory relations. The presence of Ir. Warsoadhi, who graduated from ITB Architecture class 1971, served as the main advisor in the Ministry of Public Works of Timor-Leste and even President Xanana Gusmao's. Furthermore, Indonesian contractors and consultants received assignments and involved in various sectors of work such as Pembangunan Perumahan, Hutama Karya, Atelier 6, Arkonin, and P.T. BITA.

The various thematic and contemporary architectural visualizations in the city of Dili are more of a consequence of a mixture of design, construction or management of various origins of developers. One architectural variation quite strong is the presence Chinese architectural styles and models. The Chinese impression on buildings does not come through symbolization but rather in the

characters inherent in the architectural construction tradition of developers in China. Portuguese consultant / developer also brought specific visual theme of Portuguese architecture, mostly due to the excellent construction quality. Apart from a number of design inputs and foreign architects, there are several Timorese architects who are actively involved in the modern architectural presence. For example, Salvador Pires and Flavio Miranda who's active on various architectural design and planning, design competition, and the professional as lecture and public servant. The strong influence of Portuguese culture also still influences various activities of residents in the city of Dili such as their love for the evening walks on Sundays which are obtained from Europeans, so it is not surprising that they pay attention to the design of public parks. Today, more recent landscape architectural constructions in the capital portray national bravery and serve the purpose of public walking, such as the new roundabout statue of national hero Nicolau Lobato, the vibrant and colorful waterfront Largo de Lecidere or the long trail to the road pilgrimage to the Cristo Rei Statue.

TIMOR NTT

Kupang has been developing rapidly in the last 10 years. The search for the identity of the city refer to the vision of Kupang city development as contained in the regional master plan for Kupang City 2011-2031 - *the realization of Kupang City as a National Activity Center in East Nusa Tenggara which is oriented towards a Beach City, Modern and Sustainable*. Therefore, physical identity becomes one of the ways to build a modern city of Kupang which in turn gives birth to a strong physical character and identity as a coastal city that is the gateway to southern Indonesia (Andjelicus PJ, 2018)¹. According to Andjelicus PJ (2018) in general, the old city area is dominated by modern and contemporary architectural styles which is yet to demonstrate serious effort to combine unique local potentials. The city area became a trading area and was dominated by people of Chinese descent and formed the Chinatown area of Kupang city. At the same time, the modern building breathes a Portuguese style. The popular architectural expression in Kupang residential architecture is the Mediterranean architecture. Modern clacisism, modern architecture and minimalist architecture.

However, according to Andjelicus PJ (2018), the architectural style in government office area buildings (provincial government and Kupang municipal government) in contemporary architectural style that has attempted to present traditional NTT architectural forms, especially in the design of the roof of the building. Several office buildings are predominantly using traditional NTT roof

forms, such as the Mayor's Office and the City DPRD Building. Meanwhile, other office buildings use the traditional roof form on the terrace building as the receiving building. Several other office buildings appear with the use of the latest materials. In office buildings in the provincial office areas, there is an effort to find a local identity in the architecture of the buildings in an effort to present the nuances of NTT in the office area of Kupang city.

Conclusion

The post-referendum architectural concepts and practices in Timor-Leste and Timor Indonesia provides rich lessons learned about reaffirming and consolidating national identity. For the next researches we could go deeper into more specific and rigorous research in each historical milestone. The concept of national identity and regionalism in post-referendum architecture in Timor island after 2002 share more common characters with countries in post-conflict situations, such as Bosnia-Herzegovina and Serbs conflict in 1992-1995. Their representational characters is pragmatic and practically does not bring much concerns on representational characters due to economic limitations. The architectural reflections of national identity in the Post-referendum Timor is not comparable to the monumental and modern ways of the Asian and African countries when they establish their national identity characters in 1960s and 1980's. It is evident that modern architecture seems to be the language of nationalism and disconnections to the old unfortunate days in most newly independent countries in both places.

However, indigenous architecture is relatively strong in expressing the regional spirit. But they mostly appear in much simpler, more pragmatic and cost-effective architecture. Conclusively both Timor-Leste and Timor NTT, Indonesia have a different way in expressing their national identity in their contemporary architecture.

1. REGIONALISM. Portuguese has assimilated with the local Timorese culture, since 18th Century, in the entire island. In Timor-Leste the notion of regionalism refer to Portuguese culture and Indigenous Timorese Culture. Nevertheless, the regionalism underwent different history in each place. Regionalism politic in Indonesia around 1980's put strong mark on the inclination to refer to traditional form. On the contrary the strong notion of western modernism in Portuguese paradigm tend to put aside indigenous architectural vocabulary. It seems that the Timorese in Timor-Leste does not have a common idea about what is regionalism. Their architecture is derived from pragmatic reasons and modern orientation. If so there is a common

attachment to call for collectivism, it would be ecumenical notion of Catholicism that again affiliate to Portuguese.

2. NATIONAL IDENTITY. As consequence the expression of national identity is manifested differently in both states. National identity in Timor-Leste refer to modern architecture. The main architectural reference is legendary modern Portuguese architects like Alvaro Siza. In Timor Indonesia national identity refer to traditional architecture like Atoni house and Colonial Portuguese architecture.

The architectural production in Timor-Leste and Timor NTT seems to differ only due to different involvement of Portuguese architects. Indonesian architects actually play decisive roles in various projects in Timor-Leste. Although politically, Timor-Leste and Timor Indonesia is in opposition to one another, practically the Indonesian architects and architectural firms still have its bargaining power, due to its ability to establish connections with local building traditions, cost effectiveness, and negotiable partnerships.

8.3 The Making of Place by Pilgrim’s Movement

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Tuban has several historical *Wali* tombs: Sunan Bonang, Ibrahim Asmoroqondi, Sunan Bejagung *Lor* (north), and Sunan Bejagung *Kidul* (south) that are crowded by the pilgrims every day. The graveyard of Sunan Bonang located in Kutorejo district, the downtown of Tuban, is the landmark of the city. Its location is very strategic, at the back of the Great Mosque and in the surrounding of the city square (*alun-alun*). The graveyard of Sunan Bonang becomes a popular destination of pilgrimage tourism and, subsequently, the economic drivers of the city. There are two access to the tomb, one is on the east side facing the city square (*alun-alun*) and the other one is on the west side facing the commercial street *Jalan Pemuda*. Most tourists enter the tomb from the east gate and local people from the west gate in the alley of Kutorejo IV. To support the pilgrimage activities, the local government accommodates a street market along the the alley of Kutorejo IV.

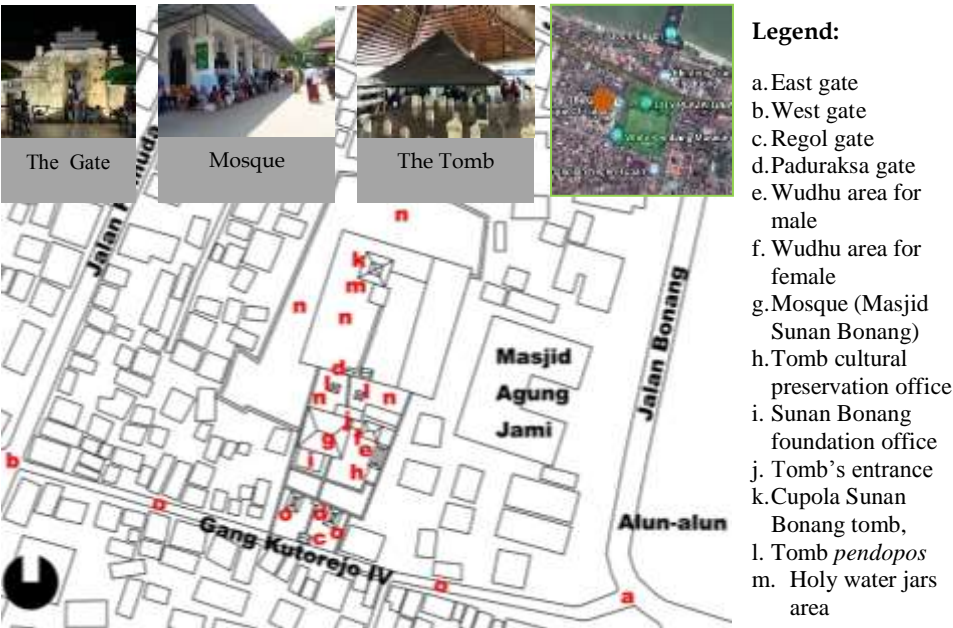
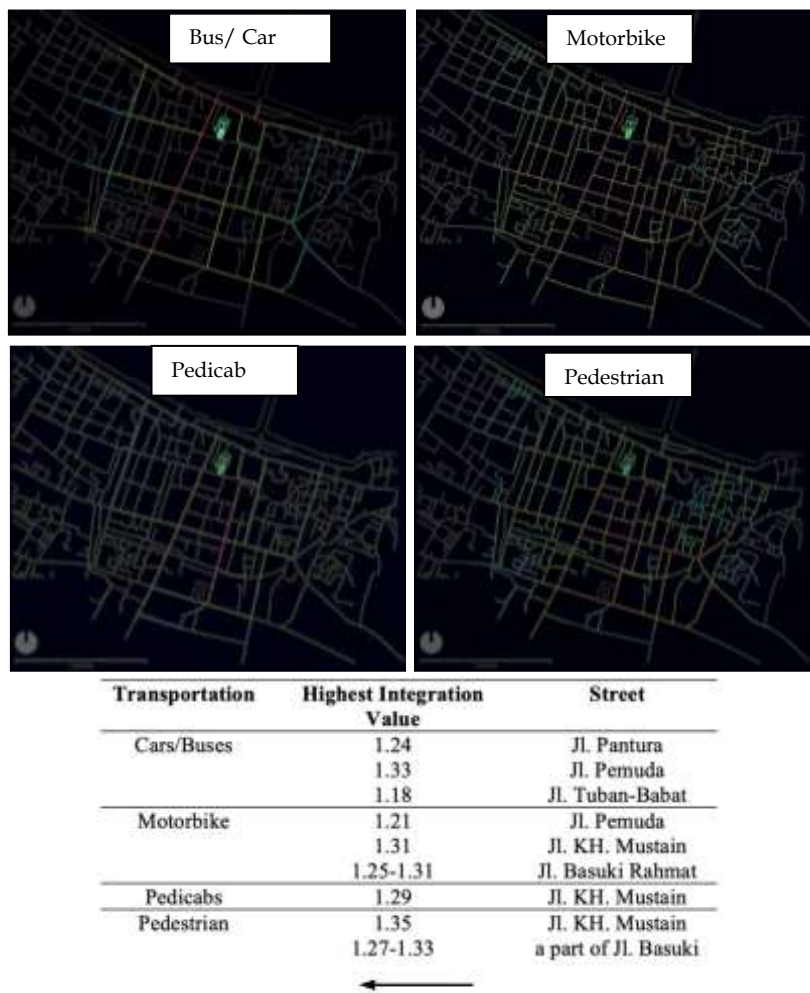


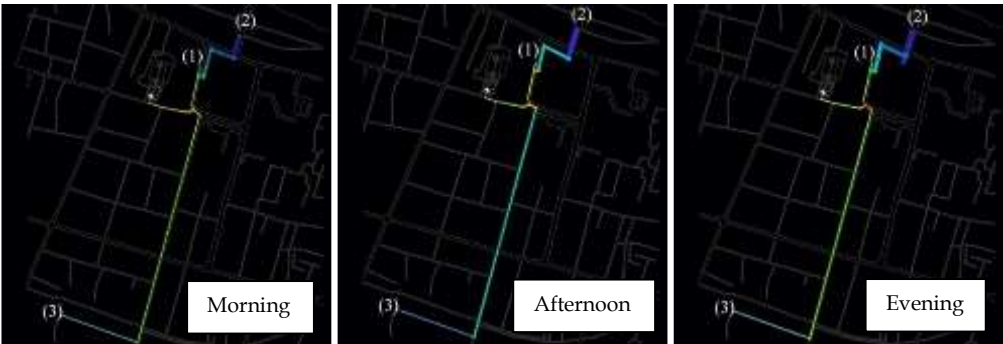
Figure 1. The area of Sunan Bonang’s graveyard


The pilgrims coming to the graveyard of Sunan Bonang are from different backgrounds and have different motivations. The pilgrims are people between 15-64 years old whereas some of them bring their small children. Most of them come from cities in East Java and very few are from cities of West Java. Some local people visit the graveyard to get blessings (*karomah*) from the great figure of Sunan Bonang as they continue their forefather's tradition. Some other pilgrims, especially from the outside of Tuban, come praying to Sunan Bonang for their specific intentions such as preparation for the pilgrimage to Mekkah and success in the family life. Some pilgrims are doing shopping in the street market after the visit to the graveyard.

The pilgrimage activities make the east gate area of the graveyard that is facing the city square a strategic place as a meeting place of various people with different origins and characters. This paper is to analyze the process of placemaking in the area of graveyard through people's movement to and from the graveyard. There are three related points of movement to the graveyard, namely 1) the parking area of the city square (*alun-alun*), 2) the parking area of the Boom Beach, 3) the parking area at the southern part of the city. The intercity vehicles of pilgrims are only allowed to park in these three parking areas. From the parking area the pilgrims must proceed to the graveyard by a pedicab or on foot. The transportation mode of the pilgrims are the bus, rented or private car, motorbike, pedicab and on foot. Using the space syntax method, the DepthmapX, the integration and choice of path of the pilgrims is measured to indicate the people's movement that makes the area near graveyard into a significant place in the city.



High Integration  Low Integration
Figure 2. The analysis of integration and choice of path of pilgrims



High Intensity  Low Intensity
Figure 3. Intensity of Pilgrims' Movement Based on Time and Route Choice

The alley Kutorejo IV transforms into a place where people come and go, meet other people and spent time in the city. The major street perpendicular to the alley Kutorejo IV becomes the next place where people are moving around. The making of places results as an impact of the city policy that oblige pilgrims to transfer their modes of transportation by pedicab or on foot to the graveyard. The pilgrimage program which is typically organized by professional operators causes people to arrive anytime during the day and night, yet in limited time being in the city. This has made strategic streets and spots nearby the gate to graveyard and parking area become an informal public place. Street food and and souvenirs buying dominate people's activity in the public place, by which generates illegal business of urban space consumption.

Keywords: placemaking, pilgrim's movement, pilgrimage, Tuban, Sunan Bonang,

8.4 Study of settlement gender construction and architecture of matrilineal kinship in Tetun Society, Timor, East Nusa Tenggara

- | | |
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Introduction

This research is aimed to identify the impact of modernization on gender relations and roles in traditional matrilineal relations in Indonesia, as well as their manifestations on socio-spatial organizations and the built environment. It is a continuation of a series of matrilineal architectural research studies that have been held previously in three regions: West Sumatra, South Sulawesi and Flores Island, East Nusa Tenggara. The first year (2017) is focused on forming an initial theoretical model on the effect of modernization on gender relations and roles in matrilineal society, which continues to be developed and refined through subsequent research in the Bugis-Karampuang society in Village of Karampuang, South Sulawesi (2018), the Ngadha society on Flores Island (2019), and now the Bunaq and Southern Tetun society of Timor Island.

Both Bunaq and Southern Tetun society was chosen because several reasons: 1) They are matrilineal societies that hold principles of matrilineal inheritance (Therik & ANU, 2007); and 2) Historywise, the Bunaq and Southern Tetun society was intertwined since at least 500 years ago when both were subject of Wehali Kingdom, the main ruler in Timor Island. 3) The migration pattern of matrilineal societies moves along the equatorial path to the Pacific (Lansing, 2016). As one of the most eastern part of Indonesia, it could be said that research on Tetun will open the possibility of further research in the Pacific islands.

The result of analysis and conclusion will strengthen the continuous research since 2017: evaluating existing theoretical models for and formulating the distinguishing aspects and variations of the architecture of matrilineal societies. The analysis is also used to understand their implications for gender relations and roles due to modernization.

Objective

In this fourth year, the field research conducted in Kewar Village, Lamaklen District, Belu Regency (for Bunaq society) and Laran Village, Malaka Tengah District, Malaka Regency (for Southern Tetun society) with objectives as follow:

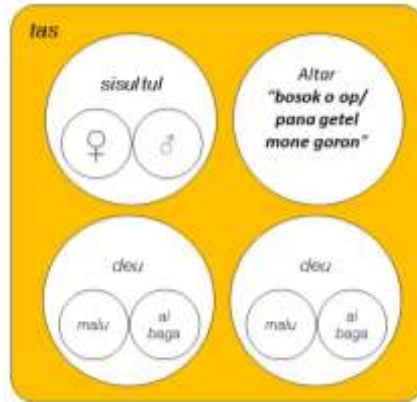
- a. identify the impact of modernization on gender relations and roles on matrilineal society of Bunaq and Southern Tetun,
- b. build a body of knowledge on traditional architecture of Bunaq and Southern Tetun society and its dynamics on modernization era,
- c. evaluate the theoretical models on effect of modernization on gender relations and roles in matrilineal society, and
- d. produce documentation on Bunaq and Southern Tetun Architecture.

Data and Analysis

Bunaq Society

Bunaq Kinship

This society's basic unit, both in ritual and in economic terms, is the house (*deu*), each of which has a name. Houses maintain relationships qualified as *malu ai baqa*, which define the direction in which women and certain goods circulate. As *malu*, houses give wives and feminine goods (pigs and cloth), whereas *as ai baqa*, they receive wives and give masculine goods (formerly gold, silver, and water buffalo, but nowadays money and cows). Although the circulation of goods is reactivated during house celebrations (such as on the reconstruction or repair of the house, and of funerals), and even though the relations between *malu* and *ai baqa* play an essential part in the rites which deal with people's health and 'the flow of life', not many women circulate between the houses. This results from the fact that marriage is usually uxorilocal, and each spouse continues to belong to his or her house of origin while the offspring belongs to the house of the mother. In another type of marriage, however, the woman is represented metaphorically as a cutting that is transplanted in the *ai baqa* house. (Friedberg, 1989)



In summary, every Bunaq belongs to the house of his mother at the time of his birth. If his parents contracted an uxorilocal marriage, then his father belongs to a different house from his mother's, and he will return there whenever the performance of ceremonies requires this. But if his parents married virilocally, then his father and mother belong to the same house, but to different dil. In both cases, his father can only pass on to his son the goods acquired during his lifetime. (Friedberg, 1989)

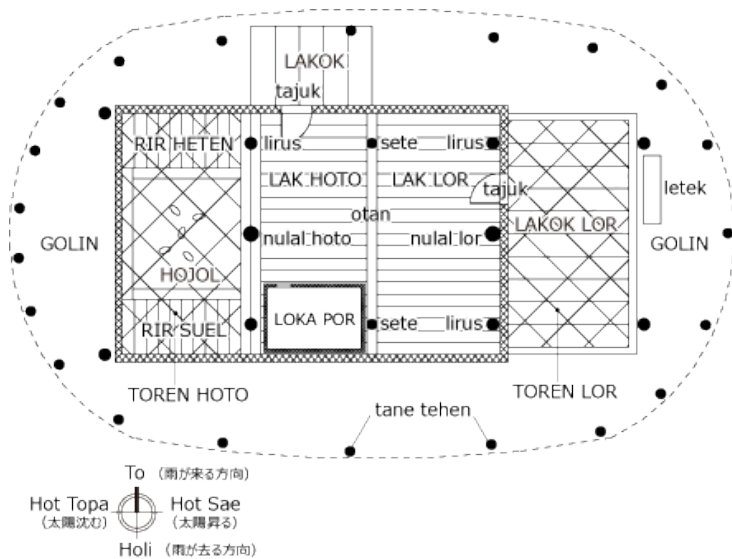
Lineage houses are grouped into villages (*tas*), and each village has its own territory. Inside the village, there is a collective village altar called *bosok o op*, 'altar and height', which represents the life-force of the inhabitants. This village altar is also called *pana getel mone goron*, 'root of women, leaves of men'. (Friedberg, 1989)

Not all lineage houses have the same status. Thus, there are noble houses called *sisul tul*, 'bone piece'. This refers to the rule that a specific share of ritually offered animals containing a bone is due to them (Friedberg 1987). However, not all noble houses have the same status either. The highest status is attributed to the house of the 'feminine chief. He is the one who settles problems arising within the village. Then comes the house of the 'masculine chief, who deals with the relationships between the village and the outside world. Other noble houses hold the office of aide to the village chiefs, or else are considered as 'door' to the houses of those chiefs. (Friedberg, 1989)

Bunag Architecture

Deu also has the meaning of a community that lives in a house as well as a house, and it is understood that one group of origin lives under the same roof. In reality, the customary village is the central house of the group, and each member often builds a new, modern (usually poor) house around the village or in a new village.

Deu 's folklore and the sacred hearthstone lalian por are enshrined in the central house, and when there is a special feast, the entire group gathers in the central house to which they belong. Such a central house is called Deu Hoto (hoto means "fire" of the furnace). (Koji, 2007)



Deu Hoto has an oval flat surface with a roof like a turtle shell. The roof ridge deu maten has a ridge decoration with crossed bamboo pieces, and the royal house has a wife decoration that imitates the head of a buffalo. Passing through the roof of *Imperata cylindrica*, which has been laid down to the ground, there is a high-floor architectural space inside.

There are no single logs on the pillars dug above the ground, neither the bundles that support the raised floors nor the peripheral pillars that receive the eaves of the roof. All the pillars that stand under the floor are dug into a unique shape, and the iconography of spears and combs is engraved. The spear is a symbol of a man, and the comb is a symbol of a woman. Only the two iconic ridge pillars nual lor (sea pillar) and nual hoto (fire pillar), and the four main pillars lirus standing on the left and right of the ridge pillar are left as logs and escaped from engraving.

From the dirt space around the building, Golin, take the odd-numbered stairs letek to the veranda in front of the house. The stilt is divided into three spaces with the position of the pillars on the ridge as the boundary. The area with the veranda Lakok Lor in front of the entrance, the indoor Deu Mil , and the furnace

hojol . Larger royal homes may have moved this area outdoors and added a veranda Lakok Hoto behind it . Furthermore, the floor beam running in the center of the roomotan by Deu Mil is Deu Mil Lor and Deu Mil Hoto are bisected.

Lakok Lor is the residence of male members other than the master and children, and visitors will be welcomed here. What you see is a sculpture of the breast that is lined up on the wall. The walls of the house are lined with vertical boards about 40 to 50 cm wide, and each board is engraved with a relief with the motif of a breast and a maze (a symbol of fertility and prosperity). Just spectacular. The attic is blocked by a board and cannot be seen, but it is actually an attic Toren Lor that protrudes from the room. The indoor door tajuk is decorated with not only breasts and mazes, but sometimes figures and bird reliefs. Push the doors fitted in the upper and lower shaft suspension holes to enter the indoor Deu Mil .

Deu Mil is a pitch-black space with only the flames of the furnace. A sacred ridge pillar nulal lor (sea pillar) stands near the wall on the Lakok side. The nulal lor is a pillar that is the subject of various rituals, and connects the first ears of Tomorokoshi after harvesting, and is hung with buffalo horns sacrificed in rituals, sacred objects of ancestors, and swords.

At the foot of the pillar is the Hiraishi altar lor bul . Offerings to ancestral spirits and (good) spirits are dedicated to this Hiraishi. A ladder up to Toren Lor is attached to one corner of the wall. The attic Toren Lor above the veranda is the most sacred place in the house, where the ancestral ancestors are enshrined, and only those who perform rituals are allowed to climb this ladder.

A threshold with a height of about 30 cm can be seen near the center of the room. Two decorative pillars sete, which are magnificently carved, stand up from the otan of the floor beams that are spread to the left and right . Otan is a boundary that divides the territory of men and women, and at the same time, it is a symbol of contraindications that prohibit marriage between members of the same clan (ideal for cross-cousin marriage).

The interior is divided into two areas before and after otan . Deu Mil Lor, on the front side of the nulal lor , is a place for various ceremonies held inside the house, and the remains of the dead are laid down at this place during the funeral. It is also a sleeping place for old people. Behind otan , the nulal hoto (pillar of fire) stands at Deu Mil Hoto, where you can cook and eat. The husband and wife sleep here. A crated furnace hojol is built, and the sacred hearthstone lalian por, which is said to have been carried by ancestors, is enshrined . For 40 days after giving birth, the mother must spend her time at this fireside.

Veranda on the front side in the big house Lakok Lor in and symmetry, Nulal Hoto launched a wall to the outside of, veranda also behind Lakok Hoto are provided. This attic Toren Hoto is a place for food and cooking trees. As the family grows, it may add a bedroom Loka Lolon (long room) with a floor overhanging the sides of the Deu Mil. Inside the clan's house Deu Hoto, there is a small box-like room called Loka Por (sacred room). Household goods are stored, and the patriarch and newlyweds sleep in this small room during ceremonies.

Southern Tetun Society

Southern Kinship

According to Adnyana (2018), the Tetun society has two inheritance and marriage types: matrilineal and patrilineal. The Tetun which using matrilineal marriage is called as “Tetun Fehan”, and the one using patrilineal marriage is called as “Tetun Foho”. The Tetun Fehan villages are mainly concentrated in a southern plain land in the middle of Timor Island (“fehan” mean “plain” in Tetun language). Many experts also called Tetun Fehan as South Tetun people (Therik, 1995 and Tumonggor et al., 2014).

The discussion around Tetun society should always include discussion on Wehali Kingdom, the oldest kingdom in Timor. The kingdom of Wehali ruled parts of central Timor during the historical period, with Laran as its ritual center. This kingdom is considered as the religious and political core of the Timor world, was also influential in propagating marriage alliances to outlying regions, thus likely stimulating gene flow to the provinces (Tumonggor et al., 2014). Fukutake (2019) also found that whenever tragedy happened to Tetun society, they always ‘escaped’ to Laran, center of Wehali Kingdom. Wehali region now transformed administratively into Village of Wehali in Malaka Tengah District, and Laran became one of its constituent hamlets.

Today, people there still practice matrilocality. Tumonggor et al. (2014) found that the Malaka Tengah district, the site of the historical Wehali kingdom and ritual center, and still a stronghold of matrilineal, matrilocal communities. Wehali is considered ‘female land’, a matrilineal area where all the land, houses and property belong to women. Wehali’s politico-ideological structures extended beyond the limited area of the principedom, eventually comprising 17 domains in both the west and east of the island. The spread of Wehali’s power was primarily achieved through marriage alliances.

Southern Tetun Architecture

According to Fanggidae (2014), there are 3 (three) types of traditional houses in Laran Village, namely *uma timur* (residential houses), *uma lulik* (traditional houses) and *uma kakaluk* (medical houses). The structures made of wood and designed and worked according to the understanding of the Laran Village community based on the beliefs of their ancestors.

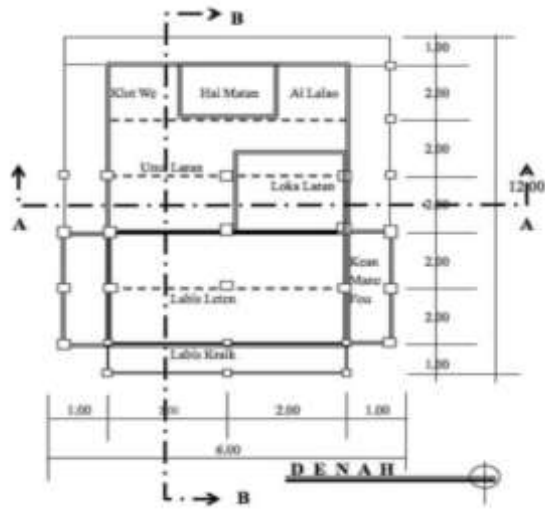


Figure 1. Typical of *uma timur* in Laran Village. Source: Fanggidae (2014)

Uma timur is divided into several rooms, they are: terrace (*labis kraik*), living room (*labis leten*), sleeping room for son-in-law (*kean mane fou*), family room (*labis laran*), girls' bedroom (*loka laran*), baby room (*ai lalao*), kitchen (*hai matan*), drinking-water room (*klot we*), and attic (*kahak leten*). The function of each space is as follows:

- a. *Labis kraik* (terrace), is considered as private part of the house since a guest cannot enter this area without owner's invitation. Most of times, the terrace is used as a place for leisurely sitting.
- b. *Labis leten* (living room), is the room where owner host the guest and as a place for traditional ceremonial activities, such as the betrothal and marriage.
- c. *Kean mane fou* (bedroom for son-in-law), is the bedroom for a son-in-law who has just engaged with the daughter.
- d. *Labis laran* (family room), is as a family room, dining room, as well as a bedroom for parents and children.

- e. *Loka laran* (girl's bedroom), is an adult girl's bedroom that must be separated from her parents' bed.
- f. *Ai lalao* (baby room), is a room for childbirth and keeping the baby and mother for 40 days afterward. Located in the lower part of the house that close to fireplace so that the baby and mother are not feeling cold.
- g. *Hai matan* (kitchen).
- h. *Klot we* (drinking-water room), is a room for storing clay-made jars of drinking (*lolo*).
- i. *Kahak leten* (Attic), is a room located above *labis lalaran* that used as a place to store foods, such as rice, corn, cassava, and types of beans.

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Economics System & Modelling

Those who focuses on supporting government and decision-makers to sort out their economic problems, and identify their relations to the related institutions.

Economic System and Modelling

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Economic System and Modelling is a group of academics that experienced and interested in infrastructure development, marketing management, Visual Modelling of Economics, and Economic System Development.

Founded in 2013, this group focused on supporting government and decision-makers to sort out among complicated chain of cause and effect, also identify impacts from various institutions and related bodies. Supported by competent human resources, this group attempt to contribute and improve the relevant and sustainable knowledge to financial and economics organization.

Keywords: Infrastructure Development, Economic and Infrastructure Management, Modelling and Methodology of Economics. Economics Development System, Economics Theory, Aggregate Supply-Aggregate Demand Model, Loan Model, Model Simulation, and IS/LM Model.

9.1 The Effect Of Toll Road Development On Agricultural Land Conversion

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Introduction

Rice is one of the essential foods in the world, and the 3.5 billion and more world population depends much on rice consumption (Ricepedia, 2020). Especially in Indonesia, although there are many kinds of substitutive foods, such as maize and cassava, rice is more critical. The leading staple food of most Indonesian people is rice, so most people depend on rice. It has occurred for a long time due to the historical and cultural aspects. Also, Indonesia is a third rice producer in the world (Shahbandeh, 2020). Thus, the rice production of the country can influence global food security.

From all largest islands in Indonesia, the majority of rice producer is allocated in Java Island (Arifin et al., 2019) because of the abundance of fertile lands and the farming workers. The Island is about 6.5 percent of the total area of the country (Indonesia Statistic, 2020b), but it produces more than 50 percent of rice in Indonesia (Indonesia Statistic, 2020a). Thus, the Island is strategically vital for the establishment of food security in Indonesia. However, the rice production in Java Island is indirectly threatened by the construction of Trans-Java Toll Road.

Methodology

Data collection

The data for this research is from the publication Ministry of the Agriculture Republic of Indonesia. The mining data is from Indonesian Statistics Agricultural Land 2013-2017 (Ministry of Agriculture, 2018). Agricultural land is common land for agricultural crop products, like corn, yams, soybeans, etc. For rice, the area to produce rice is a farm rice field. In Indonesia, the land to produce rice is a dry rice field and wet rice field or wetland. According to (Irawan, 2011), 95% of the rice field in Indonesia is a wetland, which means that the wetland is a rice field dominant in Indonesia. This research, the chosen of the data is mining is the wetland rice field.

Data analysis

The analysis of the data is identifying the increasing/decreasing the wetland rice field every regency and city in Java Island. The formula is:

$$G = \left(\frac{Y_{2017} - Y_{2013}}{Y_{2013}} \right) \times 100\%$$

G = growth of wetland rice field in regency or city

Y₂₀₁₃ = Total wetland rice field in this regency/city in the year 2013

Y₂₀₁₇ = Total wetland rice field in this regency/city in the year 2017

The growth of the wetland rice field then should be compared by the regencies/cities which passed Trans Java with the regencies/cities that did not cross the Trans Toll Java road. The value of the difference is tested by t-test at 95% confidence level. If the test is significant, then it can be concluded that the toll road has a considerable impact on agriculture land conversion.

The regencies/cities that passed the toll roads is given before the year 2013 because to analyze the impact of the toll road. The data source is based on “Badan Pengatur Jalan Tol” (BPJT) or the Toll Road Regulatory Agency Republic of Indonesia.

Results and discussions

After analysis, the t-test assuming unequal variance the growth (%) of wetland rice field the cities/regencies have passed to toll-road with not passed the toll road. The result is in Table 2.

Table 2. The Result of T-Test Growth the Wetland Rice Field

	<i>Passed</i>	<i>Not Passed</i>
Mean	-17.190986	-1.576756
Variance	490.919384	207.370074
Observations	37	85
t Stat	-3.939705	
P(T<=t) two-tail	0.000253**	
t Critical two-tail	2.008559	

**) High Significance

From Table 2, the cities/regencies the wetland rice field in Java Island is a negative growth, and the cities/regencies have passed the toll road has negative growth more ten times higher than cities/regencies has not crossed the toll road. The difference in these growths is highly significant. Then, the finding of these results is concluded that the toll road has a significant impact on the negative

growth of the wetland rice field. The negative growth of wetland rice field is signing that agricultural land conversion in Java Island is increasing.

The finding reveals that the toll-road conclude the impact on agricultural land conversion. These facts that food security in Indonesia is indirectly being threatened. The production of rice paddy depends on agricultural land; if the farmland being shrinking in the long run, the production is shrinking too. Java Island is the primary land production of rice production in Indonesia. The threat of rice production is threatening food security in Indonesia and global food security.

Conclusion

The research finds that the growth of wetland rice field is negative on Java island. This is means that food security in Indonesia is threatening because Java island is the main producer of food in Indonesia. The research also finds that the cities/regencies have passed the toll road is significantly more negative growth compared to the non-passed. This means the toll road has an impact on the negative growth of the wetland rice field. After all the Trans Java toll completed operational, estimating agricultural land conversion in Java island is rapidly increasing. This phenomenon is very threatening for food security in Indonesia. The development of the trans-Java toll road must be support because this development can increase economic development in Indonesia. But the food security in Indonesia must be maintaining too because this is vital for socioeconomics in Indonesia. The program to hold the negative impact of the toll road to agriculture land conversion in Java Island must be establishing. The implementation of the agricultural land is act 41 No. 2009, especially in the regencies/cities that have passed the toll road is an example of the program to hold the negative impact of the toll road to agricultural land conversion.

9.2 Tourism Destination Management Strategy Based on Adaptation of Abrasion and Extreme Waves Disaster

- | | |
|------------------------|---|
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| 2. TEAM MEMBERS | : Siti Hawa Fitrah Eke, S.T., M.Par
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Introduction

Indonesia tourism sector is prone to disasters, especially natural tourism destinations, which are located in disaster-prone areas (Dahlan, 2014). Degradation of the coastal environment often occurs due to high population density, one form of which is coastal erosion, which is a coastal dynamic that occurs naturally (Akbar, et al: 2017). The coastal environment, apart from having great natural resource potential to become a very beautiful tourist destination, is also prone to disasters (Pratama & Mardiatno: 2017). This natural phenomenon is known as abrasion, besides causing a reduction in the land area, it also often causes a decrease in the beauty of the coast (Rif'an, et al: 2018) (Dampung, et al: 2020). The coastal area in Indonesia is one of the most densely populated areas for settlements and development. The vulnerability of Indonesia's coastal areas to various disasters such as earthquakes and tsunamis, abrasion and extreme waves, requires development planning to become a disaster-resilient tourist destination. One of them is by planning and implementing disaster mitigation in high-risk destinations (Pahleviannur,dkk: 2019) (Yuliani,dkk:2019) (Bencana: 2016). Garut Regency has 1,194 Ha areas with moderate vulnerability and 323 Ha areas with high vulnerability for vulnerability studies to extreme waves and abrasion disasters. Extreme waves and abrasion disasters occur in coastal areas such as South Garut which has many beautiful beaches. Garut Regency itself has classified South Garut as one of the District Strategic Tourism Areas (KSPK) with Sayang Heulang Beach being one of the primary tourist attractions. This then requires a disaster-resilient tourism development plan to maintain destination sustainability and the comfort and safety of tourists when visiting Sayang Heulang Beach.

Research Methods

This research is a qualitative research. The data collection method used in this research is by conducting literature studies and virtual observations (due to the Covid-19 pandemic). This research conduct by two types methodology: the first one using carrying capacity approach and the second one conducted by literature studies to compare on the related research and virtually observed regional

disaster preparedness components in Sayang Heulang Beach. Physical data on the area obtained from secondary data collection sourced from official government websites and other sources from the internet. Spatial analysis related to the condition of the carrying capacity of the Sayang Heulang Beach tourism area, partly using Arcgis data processing related to the topographic conditions of the area and my maps to identify the area that is used by the tourists.

Findings and Discussion

Sayangheulang Beach is one of the 14 primary tourist attractions in the Rancabuaya Beach Ecotourism Area - Santolo - Sayangheulang - Karang Paranje which is included in the development plan for the Regency Strategic Tourism Area (KSPK) South Garut. The target of coastal ecotourism development is the development of beach-based ecotourism to support the protection of the coastal ecosystem and culture in primary tourism attractions and to increase tourism attractions and facilities (amenities) in secondary tourist attractions.

The activities of visitors at Sayang Heulang Beach generally include beach recreation which consists of walking along the beach, playing beach volleyball, seeing small fish at low tide, swimming and camping activities. Sayang Heulang Beach is divided into two zones, namely the West Zone and the East Zone. The western zone is a stretch of rocky and rocky beach, while the eastern zone is a sloping white sandy beach that can be used for swimming activities.



Figure 1 Area of Tourism Activities at Sayang Heulang Beach. Source: analysis results, 2020

Table 1 Physical Supporting Capacity of Sayang Heulang Beach Tourism Area

Tourism Activities	K	Lp (Ha)	Lt (m2)	Wp (hour)	Wt(hour)	DDK
Swimming	1	13,5	50	24	2	32400
Beach Recreation	1	21	50	24	3	33600
Sport	1	0,575	500	24	2	138
Camping	5	21	1000	24	24	1050

Source: analysis results, 2020

It shows that the carrying capacity of the Sayang Heulang Beach tourist area for various activities includes 32,400 people for swimming activities, 33,600 people for beach recreation activities, 138 people for sports activities, and 1,050 people for camping activities. Based on the identification of the physical conditions of the area of Sayang Heulang Beach with the parameters of vulnerability to coastal damage threats, the physical conditions of this area do not support adaptive activities to coastal erosion. Coastal geomorphology, land use, changes in coastline and inadequate width of the green belt in the area make this area has an inadequate area carrying capacity against the threat of coastal erosion.

Table 2 Regional Disaster Preparedness Components at Sayang Heulang Beach tourist destinations

No	Regional Disaster Preparedness	Type	Sayang Heulang Beach
1.	Evacuation Sign	Warning / signs / danger signs	√
		Warnings / signs / gathering point signs	-
		Evacuation Route	-
		Gathering Point	√
		Coast Guard Post / SAR / BPBD	-
		Loudspeaker	-
		Early Warning System	-
2.	Building shape (house, hotel, shop, etc.)	1 Floor	√
		2 Floor	√
		>2 Floor	-
3.	Evacuation Route Condition	Bad	-
		Moderate	√
		Good	-
4.	Meeting Point Conditions	Bad	-
		Moderate	√
		Good	-

Source: analysis results, 2020

It is known by the table above that Sayang Heulang Beach's readiness for disasters is still minimal. The large parking area can also be used as a gathering point during a disaster, but there are no signs to indicate this. The evacuation route mentioned above is the access point entering the Sayang Heulang Beach area. The average buildings around Sayang Heulang Beach consist of 1 and 2 floors, making it easier for tourists and local communities to evacuate during a disaster. The construction that is being carried out on Sayang Heulang Beach is the construction of sidewalk facilities and roads around the coast. The development is part of the Detail Engineering Design (DED) of Sayang Heulang Beach which was published by the Regional Development Planning Agency (Bappeda) of Garut Regency. Moreover, there are already some previous research related to the abration/beach erotion that can be applicable for disaster mitigation on Sayang Heulang Beach Tourism Area as follow:

Table 3 Structural and Non-Structural Disaster Mitigation of Sayang Heulang Beach Tourism Destinations

Structural Disaster Mitigation	Non Structural Disaster Mitigation
Construction of breakwaters	The establishment of the professional volunteers unit for water based disaster mitigation/Tirta Tourism Rescue Agency (BALAWISTA) on Sayang Heulang Beach
Preservation of mangrove forests on Sayang Heulang Beach with the main mangrove plant (Rhizophora sp)	Disaster response training for Balawista volunteers and local communities by the Local Government
The division of the Sayang Heulang Beach Tourism Area into a tourism zone and a coastal natural conservation zone	Installation of billboardsor signs regarding disaster warning and mitigation at each tourist gathering point
Construction of disaster-related supporting facilities such as evacuation signs, gathering points, early warning systems, and evacuation places.	The reintroduction of local wisdom that is trusted by the community to maintain the sustainability of nature and community preparedness at Sayang Heulang Beach
Development of an information center and coastal guard post	

Source: analysis results, 2020

Conclusions

The carrying capacity of the area for every tourist activities must be considered carefully in the management of the Sayang Heulang Beach tourism area. It is need to be done to obtain sustainable tourism management, so that it can preserve the beauty of Sayang Heulang Beach tourism area. From the identification of

vulnerability and threat of damage to coastal erosion through physical condition parameters, the tourist area of Sayang Heulang Beach has a poor carrying capacity as an adaptation to coastal erosion. There are 3 main factors that cause that conditions, such as: (1) shoreline changes; (2) land use; and (3) the width of the green belt. Changes in the coastline increase every year which makes this area vulnerable to abrasion. Moreover, land use whose function is dominated by supporting tourist activities in the tourist area of Sayang Heulang Beach is not supported by the existence of green belts in the form of plants and facilities that play a role in adapting efforts to prevent coastal erosion disasters.

Furthermore, a proper tourism area management plan is to apply the results of each area's carrying capacity to the number of tourists who come; zoning management for each land use in the tourist area; and increasing the width of the green belt which serves to prevent and protect tourist areas from the threat of coastal erosion. The high risk of abrasion and extreme waves urge the tourism stakeholders at Sayang Heulang Beach have to plan tourism development based on appropriate disaster mitigation. Tourism development strategies that can be use based on structural disaster mitigation are: tourism zones (construction of information centers, coastal guard posts, evacuation signs, gathering points and evacuation points) and coastal natural conservation zones (development of breakwaters and preservation of mangrove forests). Moreover, tourism development with non-structural mitigation can be realized by establishing BALAWISTA, disaster response training, installing disaster information signs, and reviving stories of local wisdom that are believed by the local community.

9.3 The effect of Technology Implementation on Middle-Term Economic Growth of Indonesia (Dynamic Modelling based on Input-Output Table Approach)

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Introduction

Indonesia's relatively low economic growth, low level of per capita income, slow economic recovery and problems with income distribution have put Indonesia behind ASEAN countries. Therefore, Indonesia needs a major breakthrough. Regarding the importance of these efforts, Simon Kuznet (in Jhingan, 2000: 72-84), states that the widespread and efficient use of technology and institutional adjustments are very important factors in economic growth. This research is intended to contribute to efforts to obtain these breakthroughs. Indonesia's economic growth over the last few years can be seen in the chart below.



Methodology

The model design used in this study is to follow the basic framework of the Input-Output Table model. The focus of the model design is mainly on intermediate inputs in a fixed-proportions production system.

The object of this research is a) Use of the Leontief Technology Coefficient Matrix from the Input-Output Table as a measure of the level of technology application to analyze its effect on Indonesia's economic growth. b). Leontief technology coefficient as variable. In most studies based on Input-Output Tables, this coefficient is treated constantly. However, in this study the technology coefficient is analyzed dynamically.

The research materials used are a) main data; namely the Indonesian Input-Output Table data from the Indonesian Central Statistics Agency (BPS) starting in 2000,2005,2010,2015. b) Supporting Data, namely data on Indonesia's GDP by sector from 200-2015 produced by BPS.

RESULTS

The results showed that the application of technology had an effect on Indonesia's economic growth from 2000-20015, although the effect of technology application was very small. During 2000-2015 the Indonesian economy experienced a decline in the application of technology and tended to move away from the production possibility frontier. Economic growth occurred during the period of time. This is due more to the increase in demand for output than by the relatively small role of technology. The trend in the application of technology in the Indonesian economy, in the short term leads to progress, but in the medium term it will tend to continue to experience a setback. mastery of technology, namely the processing industry sector that provides input for the agricultural sector, the processing industry itself, the utility sector and for the service sector as well as efforts to master technology in the mining and soil excavation sector. Simulation efforts to master the technology can encourage higher economic growth. The average contribution of the effect of efforts to master technology on Indonesia's economic growth is 22% and tends to increase.

DISCUSSION

Follow-up efforts to master technology in key sectors for Indonesia's economic growth in the medium term are very important. Steps must be consolidated properly. These efforts can be taken through determining the right direction of mastery of technology as a breakthrough step, coordination of implementation and financing of R&D D, increasing the R & D to GDP ratio and strengthening the technology development path.

Efforts to master technology in the processing industry sector as a key sector can be facilitated by the Government by encouraging mastery of materials /

materials technology, reverse engineering, and the use of appropriate technology through providing innovation incentives to speed up the diffusion process.

In addition to the aforementioned key sectors, the next effort to master technology is the application of technology in the service sector. This sector supports the economy on a large enough scale, namely supporting the mining-mining sector, the processing industry sector, the service sector itself and the agricultural sector.

Efforts to develop technology in the medium term are to build human resources, especially higher education with an orientation to future needs trends.

Technological efforts must be carried out continuously and in sectors that provide high leverage. This sector can change according to a certain period in accordance with the development and needs of technology application in the medium term.

Research on the application of technology based on the Leontief IO table can be developed with other methods such as: Computable General Equilibrium (CGE), Social Accounting Matrices (SAM) assisted by econometric models, so as to provide a better explanation of the application of General Theory Equilibrium.

Knowledge and information at the micro level developed from this model can be important information for the Indonesian business / business world in the future. It is estimated that the institutional economy and industrial economy approach can provide a more precise explanation.

CONCLUSION

1. The application of technology has an effect on Indonesia's economic growth from 2000-2005, based on the panel data regression model. However, there are no specific differences between sectors. The factor that distinguishes the magnitude of the influence of technology on economic growth is the variation in time (years). Fundamental changes in the economy as well as government policies during this period were responded with a relatively similar pattern by the economic sectors.
2. Based on the mechanistic model of the Input-Output table, the application of technology has different effects on the growth of the Indonesian economic sector. The effect of advancing technology application on economic growth is relatively prominent and consistent throughout the research period is the food-beverage processing industry sector. Other than the food and beverage industry and the oil and gas industry is the building / construction sector.
3. During 2000-2015 the Indonesian economy experienced a decline in the application of technology. The economic growth that occurred during that

period was more due to an increase in demand for output than the application of technology. At the current level of technology application, the Indonesian economy tends to move away from the production possibility frontier. which is characterized by actual GDP is lower than potential GDP.

4. Developments in the application of technology that occurred during 2000-2015, related to the situation and Government policies towards these economic sectors. In the early 2000s, advances in technology application and development in the agricultural sector were driven by modernization of mechanical, biological and chemical technology as well as other policy support. which is integrative and strategic from the Government, but then tends to get less attention. The mining sector experiences a decline in the application of technology due to weaknesses in exploration technology and the mining investment climate is not supportive. The application of technology in the manufacturing sector develops because it is driven by foreign investment, protection, substitution imports, efforts to transfer technology and technology development. The utility sector is relatively dependent on the processing industry sector and the progress of technology application in it is relatively slow. In the service sector there is a decline in the application of technology.
5. The application of technology in the mining and processing sector will rapidly decline. The application of technology in the processing industry sector will still feel progress in the short term. However, in the long term it will lead to setbacks to the long term, as well as the service sector.
6. In the medium term, the trend of deteriorating technology application in the Indonesian economic sector can neutralize the potential for economic growth originating from output demand, thereby bringing Indonesia's economy back to slow growth and stagnation.
7. To achieve high economic growth within limited technological resources, it is determined that the key sectors that need efforts to master technology, namely the processing industry sector that provides input for the agricultural sector, the processing industry itself, the utility sector, and the service sector as well as efforts to master inter-technology mining and excavation sector itself. Efforts to master this technology will encourage higher economic growth. The average contribution of the effect of technological mastery efforts on Indonesia's economic growth is 22% and tends to increase. Efforts to master technology in key sectors will have different effects on economic sector growth according to sector characteristics and technology diffusion processes. The biggest effect is on the growth of the utility sector. (36%), in the processing industry (34%) and the service sector (16%). The smallest effect was in the agricultural sector (8%) and the mining and quarrying sector (9%).

9.4 The Effect Of Spatial Variables On The Online Shopping Channel Choices During The Covid-19 Pandemic: An Evidence From Jabodetabek, Indonesia.

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Introduction

The covid-19 outbreak in Indonesia occurred since the first case was confirmed in early March 2020 in Jakarta. Then, covid-19 cases in Jakarta spread to neighboring areas including Bogor, Depok, Tangerang and Bekasi. Later, Jakarta, Bogor, Depok, Tangerang, and Bekasi shorten as Jabodetabek, were become an epicenter of the spread of Covid-19 in Indonesia.

Responding to the Covid-19 outbreak, the government then enacted a large-scale governing PSBB that was enforced in various areas that required high covid-19 cases or the red zone. Regulations Regarding PSBB Regulations in PP No. 21/2020, Keppres No. 11/2020, and PMK No. 9/2020. The Jabodetabek area carries out the PSBB at almost the same time around March to June.

The regulations defined PSBB as a limitation of certain activities of residents in an area suspected of being infected with Covid-19 to prevent the possibility of spreading Covid-19. The implementation of large-scale social restrictions includes a. closure of the school and workplace; b. restrictions on religious activities; c. restrictions on activities in public places or facilities; d. restrictions on social and cultural activities; e. restrictions on modes of transportation; and f. restrictions on other activities specifically related to defense and security aspects.

The enforcement of social distancing, lockdowns and other measures in response to the COVID-19 pandemic has led consumers to ramp up online shopping, social media use, internet telephony and teleconferencing, and streaming of videos and films (WTO, 2020).

Research Methods

The method used is logit regression where the dependent variable is the choice of offline or online shopping channels. Data obtained from the questionnaires for consumers of electronics of 1464 respondents. The data was obtained through a

questionnaire asked to consumers of electronics in the Jakarta, Bogor, Depok, Tangerang, Bekasi (Jabodetabek) in the period March to May 2020.

Findings and Discussion

1. Online and Offline Shopping Channel Choices Before and During Covid-19 Pandemic

The results of the descriptive analysis show that there was a jump in the choice of shopping channels for before and during the pandemic. Since pandemic covid-19, respondents have switched shopping channel choices from offline to online significantly. The choice of shopping changed from online to offline occurs on both searching and purchasing stages.

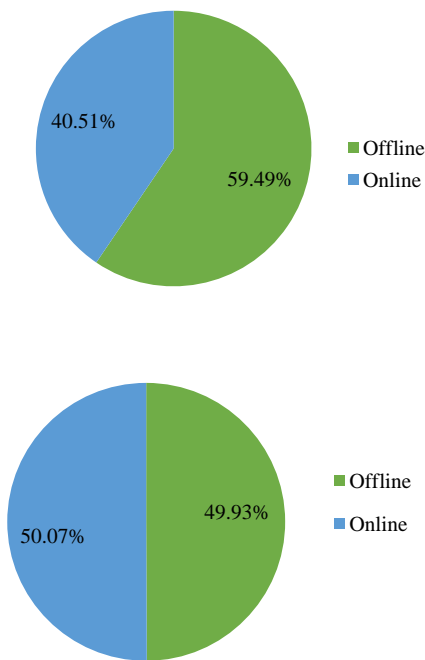


Figure 1. Offline and Online Channel Choice on the Searching Stage

On the searching stage, there were respondents changed shopping channel from offline to online. Before the pandemic, the respondents searching offline were more than respondents searching online. The respondents searching offline 59.49%, while respondents searching online 40.51%. During the pandemic, the

respondents searching offline were less than respondents searching online. The respondents searching offline 49.93% while respondent searching online 50.07%. It is estimated that 9.56% of respondents have switched from offline to online channel at the searching stage since the pandemic (Figure 1).

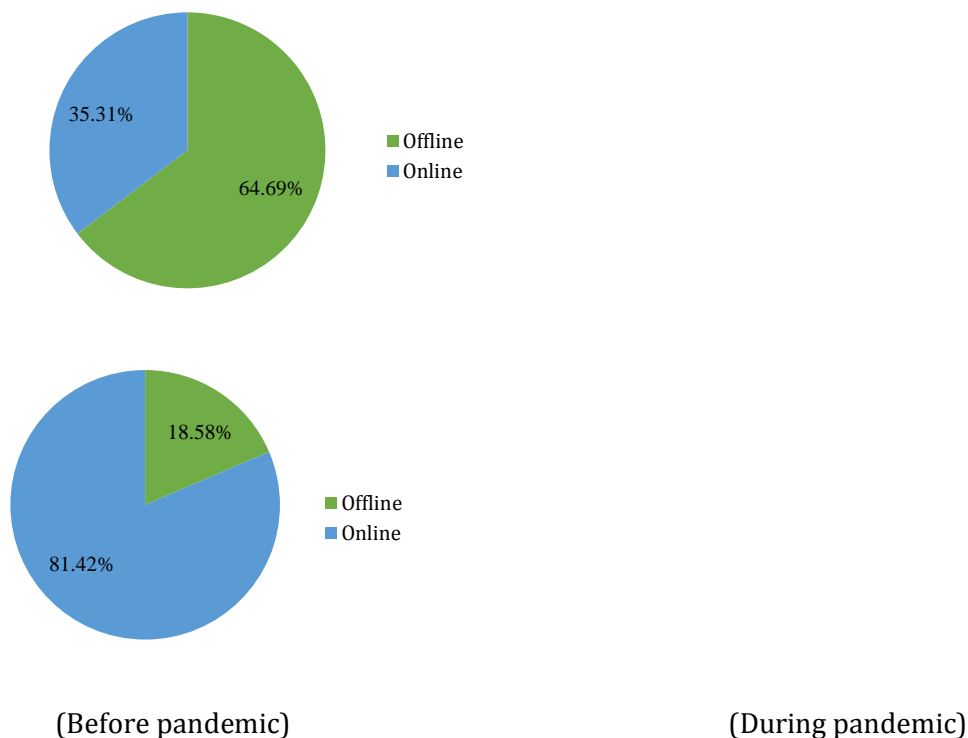


Table 2 Offline and Online Channel Choice on the Purchasing Stage

On the purchasing stage, there were respondents changed shopping channel from offline to online. Before the pandemic, the respondents purchasing offline were more than respondents purchasing online. The respondents purchasing offline 64.69%, while respondents purchasing online 35.31%. During the pandemic, the respondents purchasing offline were less than respondents purchasing online. The respondents purchasing offline 18.58% while respondent purchasing online 81.42%. It is estimated that 46.11% of respondents have switched from offline to online at the purchasing stage since the pandemic (Figure 2).

2. The Effect of Spatial Variables on the Online Shopping Channel Choices
In the period before pandemic, spatial variables which significant was distance. The coefficient of distance is positive with a value of 0.117. The positive value of

coefficient of distance means that the greater distance the greater the probability of online searching. Meanwhile, the control variables which significant are gender and internet experience.

In the period during pandemic, no spatial variable has a significant effect on the online channel choice. Meanwhile, almost all control variables, except age, have a significant effect on the online channel choice.

In the period before pandemic, spatial variables which significant are distance, delivery cost, and interaction of delivery cost and delivery time. The coefficient of delivery cost is negative with a value of -0.121. The negative value of coefficient of delivery cost means that the greater the delivery cost the smaller the probability of online purchasing.

In the period during pandemic, no spatial variable has a significant effect on the online channel choice. Meanwhile, the control variables which significant are income, internet experience, and time pressure.

Conclusions

On the searching stage, there are changes in the effect of spatial variables, namely distance, for before and during the pandemic. Before the pandemic, the effect of spatial variables on the online channel choices is significant. However, during the pandemic the effect of spatial variables on the online channel choices is not significant.

On the purchasing stage, there are changes in the effect of spatial variables, including distance, delivery cost, and interaction of delivery cost and delivery time, for before and during the pandemic. Before the pandemic, the effect of spatial variables on the online channel choices is significant. However, during the pandemic the effect of spatial variables on the online channel choices is not significant.

9.5 Train connectivity Impact on West java Regional Economic Development

1. HEAD OF TEAM : Prof. Dr. Eng. Pradono

2. TEAM MEMBERS : M. Iqbal

Introduction:

Indonesia is developing trains as a means of mobility and connectivity both within the city and between cities. It was done both with new construction and the plan to revitalize the old network that was stopped service. One of the areas targeted for development is the province of West Java. Seeing the phenomenon of rapid railway network development in West Java, it is currently considered to be the right momentum to examine the effect of railway connectivity on regional economic growth in West Java. This paper tries to analyze the influence of connectivity on regional economic growth in spatial context in West Java Province

There has been a lot of empirical evidence to suggest that the availability of infrastructure has an influence on regional economic growth. Infrastructure is considered a catalyst in regional economic growth. However, many researchers forget or rule out the effects of heterogeneity that arises from the influence of infrastructure provision on regional economic growth based on differences in economic conditions between regions such as capital stock, human capital, and urbanization levels. Often infrastructure, in particular transportation infrastructure even widens the gap between the central region (core region) and periphery region.

In this report, it is considered as well the importance to analyze the influence of connectivity on regional economic growth in spatial context in West Java Province.

Methods:

This research was conducted using multiple linear regression analysis method by doing secondary data processing to measure the strength of the relationship between two variables namely bound variables (GDP per capita) with free variables (railway network connectivity) involving control variables, as well as showing the direction of the relationship between the two variables.

To analyze the heterogeneity effect of railway connectivity on regional economic growth in West Java Province by using multiple linear regression analysis approaches to panel data that covered 27 districts/cities in 2010-2018 (9 years). There are several variables used as analytical input variables such as GDP per capita (PDRBPKit) as bound variables, connectivity (connectivity) as free variables, and economic variables (Per capita Government Investment (invpi,t); Per capita Private Investment (invs,i,t); Human Capital (ipmi,t); Agricultural Contribution (pertaniani,t); Industrial Contribution (industrii,t); Service Contribution (jasait); and Population (population,t) as control variables.

In the analysis process, panel data from 2010 to 2018 is used as input using Spatial Durbin Model (HR) to estimate the existence of local effect and indirect (spillover effect).

Results and Discussion:

Based on the results of the analysis by adopting a model of connectivity influence from the development of high-speed rail (HSR) to economic growth obtained the value of connectivity coefficient of -0.0008 which is statistically significant. These results showed a negative influence of railway network connectivity on gdp perkapita. The results obtained show an example: that connectivity interactions with invp and invs are negative and significant. Connectivity with agricultural contributions is of positive and significant value.

The results obtained show an example: that connectivity interactions with invp and invs are negative and significant. Connectivity with agricultural contributions is of positive and significant value.

The results also showed that the coefficient of spatial weight matrix interaction with connectivity is negative and insignificant influence on regional economic growth. The results showed that the connectivity of the railway network only fostered a direct impact (local effect), namely the influence caused by increased local connectivity, but there was no spillover effect or spatial dependence effect of railway network connectivity on regional economic growth.

Conclusion:

The study reveals that using interaction model, increased connectivity between regions from the development of the railway network has a positive effect on regional economic growth in West Java. The effect of this connectivity and the effect of connectivity interaction factor with government investment is the overall effect of connectivity to the railway network.

The significant influence of connectivity that is not accompanied by a significant influence of spatial interaction of connectivity indicates that limited rail network connectivity only has a direct effect (local effect), i.e., influences driven by increased local connectivity, but does not have a spillover effect, i.e., influence driven by increased connectivity of the surrounding area (neighbors' connectivity).

9.6 Development and Capacity Building for Rural Productive Economic Business Groups and Village-Owned Enterprises during the Covid-19 Pandemic

- 3. **HEAD OF TEAM** : Deni Nugraha
- 4. **TEAM MEMBERS** : Edi Kusniadi

PRELIMINARY

In developing the rural economy, especially for the sustainability of micro and small businesses (MSEs) during the Covid-19 pandemic with its various problems, efforts directed at management adaptation and increasing the capacity of digitalization-based groups and business actors are very important. Based on the results of the survey by the Central Statistics Agency in 2020, that in adapting to business management during the pandemic, around 84% of MSEs admitted that there was a positive influence on the use of online media for marketing and business continuity. Therefore, in developing and recovering MSEs from a crisis, business actors need to be encouraged to immediately adapt to digital technology in carrying out the wheels of their business economic activities.

Some of the problems and obstacles faced by MSEs, both internally and externally in transforming technology or digital platforms in business activities, include the readiness of consumers to use the internet, the limitations of telecommunication infrastructure used by business actors and limited knowledge in running online businesses (on-line). . To reduce the various obstacles faced and make it easier for groups or MSME business actors to adaptation to digital technology, of course, it needs services and support from various parties (stakeholders), both the Government through its Ministry and Research and Development, Higher Education, as well as communities and industries related to digital technology, both in in terms of increasing knowledge, skills, management and assistance of digital technology infrastructure.

In an effort to increase the capacity of groups and business actors (MSEs), especially those related to education and adaptation of digital technology and business management, the Bandung Institute of Technology through the Research, Community Service and Innovation (P3MI) Program carries out Community Service activities in collaboration with the Indonesian Entrepreneur Guide Association Bandung in the form of digital technology literacy training (digitizing MSEs) in product marketing development in Sukaratu Village, Darmaraja District, Sumedang Regency. Apart from being a form of support in accelerating the digital transformation program for MSEs, it is also an effort to

increase knowledge and literacy and accelerate the adaptation of digital technology for MSEs in the development and sustainability of sustainable businesses.

METHODOLOGY

In this community service activity to determine priority problems and implementation of activities carried out through a participatory approach and Focus Group Discussions (FGD) involving the community (actors and MSEs groups), BUMDES administrators and cadres, Village community empowerment assistants, and the Community and Village Empowerment Service Sumedang Regency.

The implementation of community service activities in an effort to increase the capacity of groups and rural production economic entrepreneurs during the Covid-19 pandemic with the topic of digital technology literacy in the development and continuity of Micro and Small Enterprises (MSEs), is carried out through the training method with the main participants being members of business groups (actors UMK) as well as BUMDES administrators and cadres

IMPLEMENTATION AND RESULTS OF ACTIVITIES

1. Focus Group Discussion (FGD) Activities

The FGD activity is one of the stages of community service activities carried out in an effort to discuss various problems faced and determine problem priorities and plan problem-solving solutions. The priority of problems and problem solving abilities from the FGD results is to increase the capacity of business actors in an effort to accelerate digital technology



Figure 1. FGD

transformation for business actors in developing businesses during the Covid 19 pandemic. The problem solving method used is the training method, with a focus on training materials, namely business management, management. groups, digital technology for the development of MSEs in the field of product marketing, the role of services and the support capacity of institutions in the field of digital technology.

2. Training Activities

The implementation of community service activities in the form of training was carried out at the Sukaratu Village Building, Darmaraja District, Sumedang Regency and the APWI Bandung Secretariat. On-site training activities are carried out through lectures and discussions with participants, namely members of rural economic business groups (MSEs) and representatives of BUMDES administrators / cadres with a total of 30 participants. This activity is carried out for 2 (two) days, for the first day the training activities are Digitalization of MSEs, Business Platform Models (Digital Technology), Business Management Synergy of BUMDES and UMK. On the second day, training materials on the study: The Support Capacity of PT Telkom in Digitalizing Rural MSEs, Product Packaging Design, Business Group Dynamics, and Rural Economic Empowerment Policies in Sumedang Regency.



Figure 2.
Training Phase I of Business Management and
Digital Technology Adaptation

The training method for digital technology application skills for business actors is carried out through hands-on activities with computer aids carried out at the APWI Bandung Secretariat with activity material on the MSME Business Platform

(digital technology). Activity participants are representatives of business groups.

The result of this service activity is the increase in digital technology literacy of rural MSEs so that they are able to encourage



adaptation and acceleration of digital technology transformation for MSEs in the sustainability and development of MSEs businesses in a sustainable manner, and it is the turn to finally improve the welfare of society and the rural economy.

CONCLUSION

In overcoming the impact of the Covid-19 pandemic on the sustainability of Micro and Small Businesses in rural areas, community service activities carried out by higher education institutions are directed at education and digital technology literacy, business development manifested in the form of training has a very important role in encouraging adaptation and accelerating transformation digital technology for MSEs in developing and sustaining MSEs that are sustainable,

Figure 3.
Phase II Training Activities for Platform
Development Practices