

AN ANALYSIS OF THE PERCEIVED LIVEABILITY INDEX WITH THE USE OF ADJUSTED AND WEIGHTED ASPECTS BASED ON A MULTI-STAKEHOLDER PERSPECTIVE IN THE INDONESIAN CITY OF BALIKPAPAN

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ABSTRACT

Motives: Dynamic strategic issues have raised concerns about perceived liveability measurements to maintain a high quality of life that affects the residents' wellbeing. Liveability aspects and indicators should be adjusted to accurately identify local issues and living conditions, and to promote community participation. Rigorous research methods with more representative samples are required to improve the accuracy of perceived liveability analyses in a specific context.

Aim: The aim of this study was to measure the perceived liveability index in the Indonesian city of Balikpapan. The economic development of Balikpapan relies heavily on natural resources, and the city will be affected by the government's plan to relocate the Indonesian capital. A survey involving both quantitative and qualitative methods was conducted to analyse perceived liveability in Balikpapan. The aspects and indicators of perceived liveability were adjusted and weighted based on a multi-stakeholder perspective to accurately represent the interests of all stakeholders when calculating the perceived liveability index using the Analytic Hierarchy Process (AHP). A content analysis of open-ended responses was carried out to analyse the feedback and the problems experienced by Balikpapan residents. The developed approach contributed to a better understanding of the residents' opinions regarding the quality of life in the city.

Results: Eight aspects of perceived liveability consisting of 51-item indicators were defined in this study. These aspects were arranged in the following descending order based on the values of the

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assigned weights: (1) access to basic utilities, (2) environment and health, (3) social development and security, (4) economy, (5) utility, (6) transport, (7) spatial development, and (8) recreation, culture, and public spaces. The analysis revealed that industrial and urban development in the eastern part of the city is inversely proportional to the perceived liveability index. In turn, urban development plans in the northern part of the city offer better prospects for new urban residents, economic actors, and stakeholders in the future residential design. The two major factors of perceived liveability, namely cleanliness and safety, indicate that the city effectively accommodates the needs of the existing residents, as well as potential migrants. Floods and poor road quality were identified as the most pressing problems in the city. According to the residents, economic problems and job insecurity were the main consequences of the COVID-19 pandemic. The results of this study can assist the local authorities in enhancing the capacity of urban policies or levels of policy implementation to meet the needs of local residents.

Keywords: perceived liveability index, Balikpapan, Analytic Hierarchy Process

INTRODUCTION

Liveability measurement is essential in guiding toward appropriate directive policy. It assists the government in ensuring that the direction of the development policies is in line with the resident's aspiration globally in creating the liveable cities (Lowe et al., 2020). Various approaches have been employed in measuring liveability index from physical aspects and facility access to the shifting trend towards the socio-impact and environment dimension of rising urbanization. In the last study concerns of liveability, there is a significant role of participation and intervention community in urban governance to best improve the community wellbeing (Zhan et al., 2018; Paul & Sen, 2020; Sep & Kyong, 2020); with emphasizing on the significant impact of the Coronavirus pandemic on the quality of life in almost all cities around the world (Nieuwenhuijsen, 2021). However, the study on perceived liveability with a multi-stakeholder community perspective in weighting aspects, particularly in Indonesia, is still lacking. Drawing on a more rigorous method of survey-based study with transparently justifying the weight of aspects in stakeholder participatory practice, this study investigates perceived liveability of Balikpapan City, Indonesia – a natural resource-based city that faces the potential effect of the relocation of Indonesian capital policy.

There are various references in assessing the liveability of the city which are globally trusted

as a valid, reliable, and knowledgeable index, e.g., The Economist Intelligence Unit (EIU) Global Liveability Index, Mercer Quality of Living (QoL) Survey, Better Life Index (BLI) conducted by Economic Co-operation and Development (OECD), Numbeo's Quality of Life Index, and Monocle's Quality of Life Survey (Paul & Sen, 2020). The liveability indexes were calculated based on objective-secondary data and were reviewed from the researcher's perspective. The indices are mostly based on measurable and reproducible factors to compare various area's situations and their development objectively. While the perceived liveability addresses the subjective nature of people assessments of areas condition (Namazi-Rad et al., 2015).

In Indonesian context, the Indonesian Association of Planners (IAP) developed a perceived-based survey of liveability, i.e., "Indonesian Most Liveable City Index (MLCI)", as an attempt to recognize the liveability level of the city in Indonesia. It portrayed the level of city's comfortable environment and atmosphere as a place to live and work, as seen both physically (infrastructure, urban facilities, spatial planning, and so on) and non-physically (social and economic factors) (Indonesian Association of Planners (IAP), 2021). The building aspects of the MLCI index included seven availabilities, namely, (a) basic needs, (b) public and social facilities, (c) public space, (d) safety and security, (e) environmental quality, (f) social-economic and cultural infrastructures, and (e) community participation. As noticeable shifting

trend in the existing liveability approaches (Paul & Sen, 2020), particularly in the East country, MLCI aspects and indicators were also considering the socio-economic impacts of rising urbanization within cities. The MLCI index became a benchmark for the quality of life of city residents in Indonesia and has been widely used as a reference in assessing liveability and formulating local government policies (Surjono et al., 2021; Hardiansyah, 2014; Titisari Danielaini et al., 2019). It resulted in the list of most perceived-liveable cities in Indonesia in 2009, 2011, 2014, and 2017.

Though the index is considered quite effective for comparing several cities as its consistency in technical analysis, however, due to the small sample size in the MLCI survey (i.e., about 100 samples in every city-targeted of the survey), the MLCI survey is not deep enough to capture the liveability of a specific city.

Whereas the liveability is multi-stakeholder in determining aspects priority as well as depending on resident perspective (Paul & Sen, 2020; Sep & Kyong, 2020; Onnom et al., 2018). Therefore, adjustment of aspects and indicators was necessary to obtain more specific aspects regarding local issues, contemporary conditions, and better multi-stakeholder community participation. A more rigorous method of survey with better sample representativeness is required to get a better understanding of perceived liveability in the specific context.

In the developing urban city, the transformation challenges and other strategic issues have led to a growing concern regarding the problems of the future and for the well-being of dwellers (Tannerfeldt & Ljung, 2006; Loorbach & Shiroyama, 2016; Ekhaese & Asinobi, 2022). Balikpapan City, an urban city

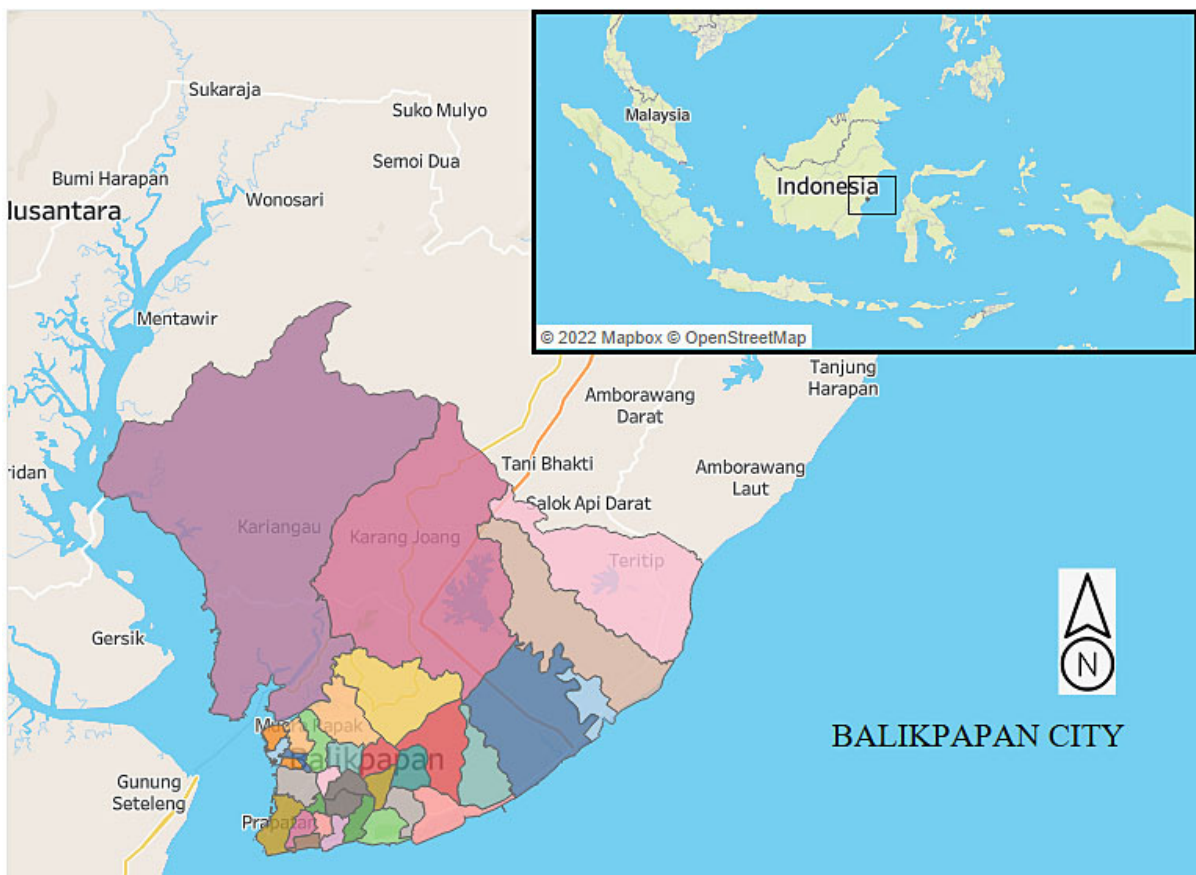


Fig. 1. The Map of Balikpapan City which consists of thirty-four urban villages
Source: own preparation based on Author (2021).

located in East Kalimantan of Indonesia (as shown in Figure 1), is an example of an urban city that is facing a transformation issue toward a post-natural resource industry era in the future (Tarigan et al., 2017). In addition, in the current issue, the city will become a buffer zone and a city-gateway into Indonesia's new capital in East Kalimantan (Bloomberg, 2021). Indonesia's national strategic policy regarding the relocation of the capital city of Indonesia from Java island to East Kalimantan, located nearly 70 km from the Balikpapan City (as shown in Figure 2), could impact on increasingly issues related quality of life of Balikpapan residents as well as on the resilience of the city community in the future (Van Leynseele & Bontje, 2019; Wardhana, 2021).

In this study, a survey-based study would be conducted to measure the perceived liveability index based on transparently justifying the weight of aspects with related stakeholder participatory practice, i.e., the Analytical Hierarchy Process (AHP). A quantitative content analysis of open-ended responses would be undertaken to analyse the feedback and the problem experienced by resident while living in Balikpapan City. The two such works of analysis are arguably able to provide a more comprehensive understanding

of the population's feedback to their life quality related the current issues. The subjective nature of liveability in this study will complement the perspective of urban development in the previous study such as Tarigan et al. (2017), which based on qualitative-objective data, in the context of Balikpapan City. It is argued that none of the previous studies considers the liveability of the city in the setting of facing the issue of transformation toward the post-natural resource industry era and getting the impact of strategic policy such as relocation of the capital city. Thus, using Balikpapan City-Indonesia as a case study, this study developed aspects and indicators of liveability, with weighing each aspect based on a multi-stakeholder perspective, representing all parties' interests in calculating the perceived liveability index. Analytical Hierarchy Process (AHP) (Saaty, 1980; Saaty, 2002) is potentially employed in this study as a decision support system to get the weight of value of each defined aspect in measuring the liveability index. It is widely used as a systematic approach in defining stakeholder goals and preferences in the solution process of multi-criteria and multi-stakeholder decision problems (Harker & Vargas, 1987).



Fig. 2. Balikpapan and New Indonesia Capital Location

Source: own compilation based on the document of <http://chinadialogue.net>.

THE STUDY AREA

Balikpapan city has been supported by the oil and coal mining industry for many decades. It has resulted in the growth of labor demand, and migration of people from across the regions (Tarigan et al., 2017; Afkarina et al., 2019; Karim et al., 2019). The oil refinery of the Indonesia state-owned oil company (i.e., *PT Pertamina*) situated in the city (as shown in Figure 3) has a capacity of 260 million barrels per day, which is equivalent to 25% of the national capacity – as the second largest refinery in Indonesia (BP, 2019). While coal mining industry in East Kalimantan contributed at least 65% from total coal industry in Indonesia (Afkarina et al., 2019). The presence of several large

companies related to the oil and mining industry in the city has increased the number of middle and upper-class people living there. Therefore, Balikpapan has transformed into an urban city as well as a center for the service industry (Kozłowski et al., 2021) which has improved the quality of infrastructure and investments in various strategic projects as a result of the natural resource-based business in East Kalimantan. However, as the natural-based city, Balikpapan faces its own challenges in adapting its economic activities to the post-oil industry era in the future.

As discussed in previous empirical studies (Moser et al., 2015; Woodworth, 2015; Deng et al., 2018; Su & Qian, 2020), the natural resource-based cities, after going rapidly in their economy, will one day

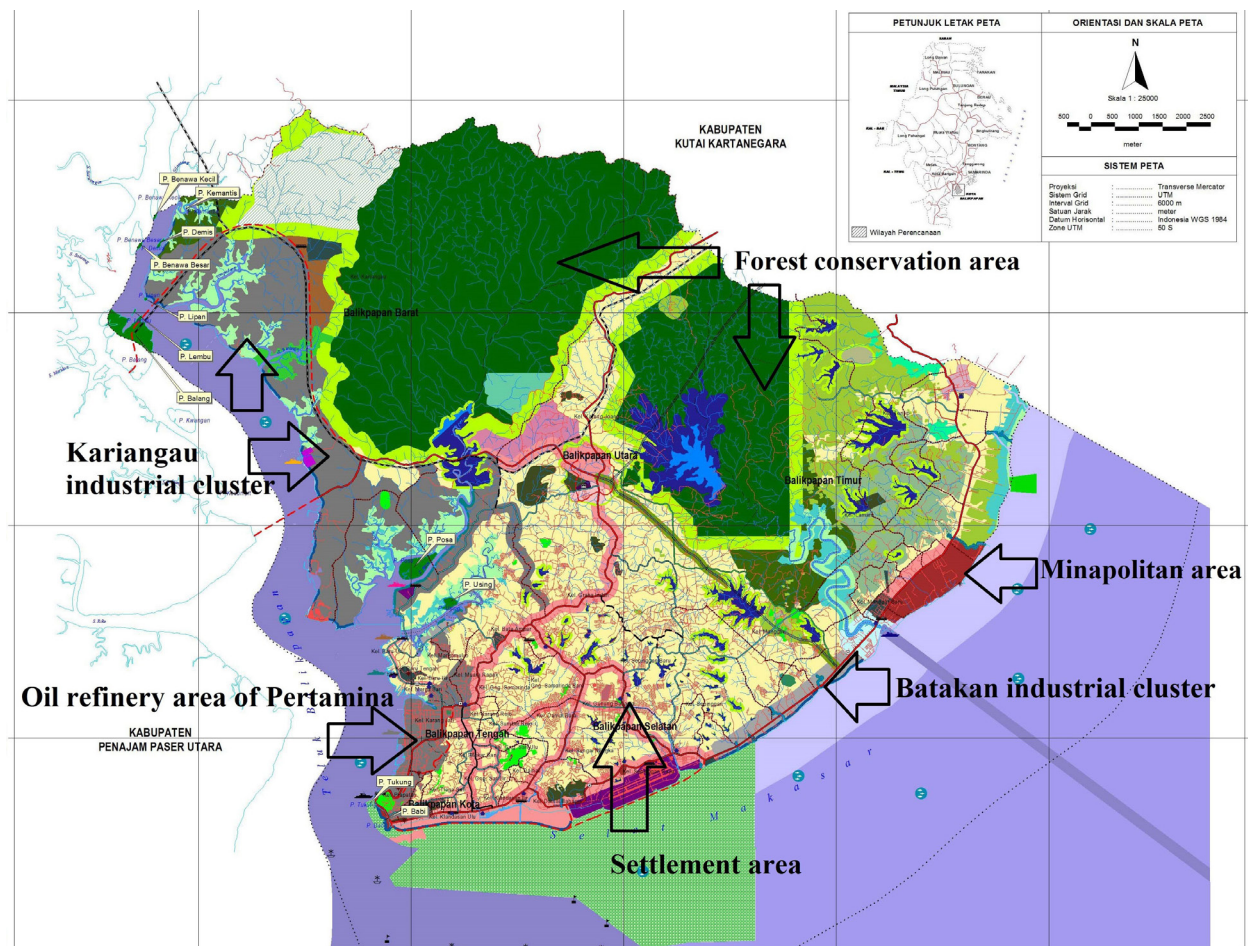


Fig. 3. Balikpapan’s land use 2012–2023

Source: own compilation based on the document of Regional Development Planning Board of Balikpapan City (2012).

experience a period of peak business and then decline in line with the decrease of their limited natural resources. A study on the readiness of transformation towards the post-natural resources industry era of the resources-based city was carried out by Tarigan et al. (2017) in the context of the Balikpapan City. Several recommendations from such study resulted from qualitative methods that focused solidly on three main factors underlying transformation, namely public policies and regulations, urban infrastructure, and knowledge creation and utilization (Tarigan et al., 2017). However, the life quality of residents has never been discussed regarding the issue.

Meanwhile, the relocation of Indonesia's capital to East Kalimantan is an issue that needs to be anticipated regarding that Balikpapan is expected to be a buffer zones for big relocation project. It is known that Balikpapan will be the nearest city and the gateway for people, goods, and services to build the capital city (Wardhana, 2021). The strategic policy of relocating Indonesia's capital to East Kalimantan increases the complexity of the variables in the study of the life quality of the city. Therefore, this study contributes to the empirical study of city-profile experiencing the transformation toward the post-oil industry era and getting the effect of relocation of capital city through resident's perspective.

METHODOLOGY

Data collection

The study was designed as a survey-based study. It used the Open Data Kit (ODK) app, which was installed on the enumerators' mobile devices and connected directly to ONA's server service (<http://ona.io>, date of access: May–September 2021), to collect data. The sample was taken randomly from all registered households in Balikpapan City by an on-site survey with a self-administered questionnaire to obtain both quantitative and qualitative data. The quantitative data, in the form of 51-items of close-ended responses, was collected from a close-ended questionnaire. While the qualitative one, in the form of 3-items of open-ended responses, was collected from an

open-ended questionnaire. Other complementary data, like how long it took to fill out the questionnaire, the respondent's geolocation, and the respondent-surveyor of selfie photos, were also collected and analyzed to make sure the data was valid. The spatial distribution of respondents was ensured with the geotagged sample provided by the technology in this study (El-Shamaa & Biradar, 2018). The survey was carried out for four months, from May 2021 to August 2021, involving twenty-five trained enumerators.

Instrument development

In developing the questionnaire to measure perceived liveability index, a Focus Group Discussion (FGD) was conducted involving representation of related expertise and practitioners as participants, i.e., academics, Regional Development Planning Board of Balikpapan City (*BAPPEDA Kota Balikpapan*), and Regional People's Representative Council. It used purposive sampling in selecting participant representative of FGD. The 28-item indicators of Most Livable City Index (MLCI) compiled by the Indonesian Association of Planners/IAP (2021) was proposed as a base-point of in-dept discussion. Guided by the rule of discussion shown in Appendix A, the aforementioned representatives discussed liveability indices, initially related to MLCI and then its relevancy to the context of Balikpapan City. The discussion was intended to know the extent to which the MLCI scale can represent all residents' interests related to local issues and contemporary conditions within the city, as well as to uncover the liveability aspects and indicators that were not accommodated in the scale. All opinions from participants were tabulated and subjectively reviewed using note-base analysis (Krueger & Casey, 2014), leading to the new, detailed, and improved aspects/indicators, as presented in Appendix B. Eight aspects consisting of 51-item indicators were finally defined as final questionnaire, namely, (a) economy, (b) spatial, (c) environment and health, (d) transportation, (e) social and security, (f) utility, (g) recreation, culture, and public space, and (h) basic need access, as presented its indicators in detail in Appendix A.

The questionnaire, which took approximately 20 minutes to complete, consisted of three question segments: (a) the demographic data of respondents, (b) a 51-item close-ended attributes of liveability, and (c) a 3-item open-ended questions. The positive sentences were presented in close-ended attributes, for example “I am satisfied with the quality of government administration services”. The instrument used a five-point Likert scale to measure the liveability index. Its scale ranged from 1 which represented strongly disagree to 5 for strongly agree. The 3-item open-ended questions, which were intended to obtain opinions and problems faced by respondents in a snapshot manner, were as follows:

Q1: what make you comfortable living in Balikpapan City;

Q2: what problems did you experience while living in Balikpapan City;

Q3: what is the impact of the Covid-19 pandemic on your life while living in Balikpapan City.

Questionnaires created and installed in the ODK application were first piloted to ten FGD participants representatives to get feedback regarding the ease of data collection and the content validity of all item attributes. Based on FGD and piloted instrument, several editorial improvements were made to ensure the visibility of the application in data collection and the content validity of the questionnaire.

Population and sampling

Balikpapan city had a population of 672,878 as of 2021, which comprised 236,25 households (BPS-Statistics Indonesia, 2021). It was divided into six districts and thirty-four urban villages. The sample was designed to be representative of all households in Balikpapan City and in many ways resembled the general characteristics of population. Whereas respondents were taken proportionally from all urban villages area in Balikpapan City, or near proportionally, where every household was represented by one respondent only. The eligibility of respondents in this study met several criteria, i.e.:

1. Balikpapan City residents who were 17 years old minimum.

2. High school diploma or equivalent minimum.

3. Not a state civil apparatus.

Lived or settled in Balikpapan City for at least two years.

Data Analysisist

Descriptive analysis and its visualization were carried out first to present the analysis of sample representation. A one-sample chi-square test utilizing SPSS would be carried out in an attempt to ensure the representativeness of the sample statistically in terms of the distribution of respondents across thirty-four urban villages. Both quantitative and qualitative methods were included in the data analysis in this study. In the quantitative method, close-ended responses were analyzed by calculating the liveability index with a weighting aspect based on stakeholder perspective, utilizing the Analytical Hierarchy Process (AHP) (Saaty, 1980). The technique is a common support system that countenances and quantifies an authority’s or expert’s opinions in the configuration of weights (Onnom et al., 2018). It can be used to define stakeholder preferences and directly measure inconsistencies in a participant’s judgments. Arguably, weighting aspects based on AHP would be able to provide recommendations that were more accommodating to various stakeholder.

The involved participants of AHP in the participatory process were consisting of various related stakeholder representatives, i.e., Regional People’s Representative Council, Regional Government Agencies, Balikpapan Representative Office of The Central Bank of Indonesia, Regional-own Enterprise, Departmental Police, Military District Command, and Academic Institution. The AHP questionnaires were officially administered to all said institutions to get representative’s view in determining the level of contribution of each aspect in measuring the liveability index. The Pairwise Comparison Matrixes (PMC) were then resulted from all participants. The calculation of weight from each PMC was assisted by a AHP calculation software (a web system software, i.e., <http://www.isc.senshu-u.ac.jp/~thc0456/EAHP/AHPweb.html>, accessed at 8 December 2021).

Only Consistency Ratio (CR) of greater than 0.1 would be accepted to be further used (Saaty, 2002). Next, all resulted weights from participants would be averaged to unify determination making. The perceived liveability index was then calculated in formula as follow.

$$\text{Perceived Liveability Index} = \frac{(\sum_{k=1}^8 [\bar{S}_k \cdot W_k])}{5} \times 100\% \quad (1)$$

Where: \bar{S}_k an average score of each aspect, and W_k : weight of each aspect.

One-way ANOVA was used to test whether there were any significant differences between the liveability indexes in thirty-four urban villages. We presented the distribution of index values of each urban village in the Balikpapan City in the form of geospatial visualization to be analyzed in the spatial perspective.

In the qualitative method, the qualitative data in the form of open-ended responses, after being translated from the Indonesian language into English, were analysed by identifying main keywords and searching for code references using NVivo 12 software. With summative content analysis approach, code references were sought by interpreting the underlining context (Hsieh & Shannon, 2005). As it was argued, it is the most suitable approach as responses data were in short sentence formats (Feng & Behar-Horenstein, 2019). The two analysis findings, emerging from quantitative and qualitative methods, were then elaborated to present further discussion.

RESULTS AND DISCUSSION

Representation of Sample

Of the 1,435 collected respondents, 1,256 met the quality control criteria of samples and were further used in data analysis. The quality control was carried out through several filtering stages, i.e.,

1. The duration of filling out the questionnaire is > 10 minutes.
2. The variance of the scores for each item-attribute was not zero.
3. Surveyor-respondent selfie data was validated.

The number of samples had a margin error of 2.76 with a confidence level of 95% (Krejcie & Morgan, 1970). A comparison summary of the sample and population demographic is presented in Table 1, showing that the sample is relatively proportional to the demographic of the population.

Table 1. Summery analysis of the sample and 2020 Indonesian Census Data

Sample of Study		Census 2020*	
Sex			
Male	624 (50.3%)	Male	352,802 (51.3%)
Female	632 (49.7%)	Female	335,516 (48.7%)
Age			
17–20	67 (5.3%)	17–20	56,485 (10.9%)
20–29	328 (26.1%)	20–29	118,614 (23.0%)
30–39	322 (25.6%)	30–39	114,652 (22.2%)
40–49	245 (19.5%)	40–49	98,745 (19.1%)
50–59	196 (15.6%)	50–59	69,123 (13.4%)
>60	98 (7.8%)	>60	59,158 (11.4%)
Education level			
Senior high school	1,045 (83.2%)	Senior high school	222,670 (73%)
D1/D2 Diploma	21 (1.7%)	College	83,333 (27%)
Bachelor's degree	182 (14.5%)		
Master's degree	7 (0.6%)		
Doctor Degree	1 (0.1%)		
Employment			
Working	793 (63.1%)	Working	282,258 (57.2%)
Unemployment	19 (1.5%)	Unemployment	27,911 (5.7%)
Attending school/ college	96 (7.6%)	Attending school/ college	40,531 (8.2%)
Housekeeping/ family worker	313 (24.9%)	Housekeeping/ family worker	123,153 (24.9%)
Others	35 (2.8%)	Others	19,227 (3.9%)

Note: *2020 Census Data of Balikpapan City (BPS-Statistics Indonesia, 2021).

Source: own preparation based on Author (2021).

The geolocation distribution of respondents presented in Figure 4 shows that the sample overview is evenly, or near to evenly, spread over the settlement area of Balikpapan City. While Figure 5 illustrates the

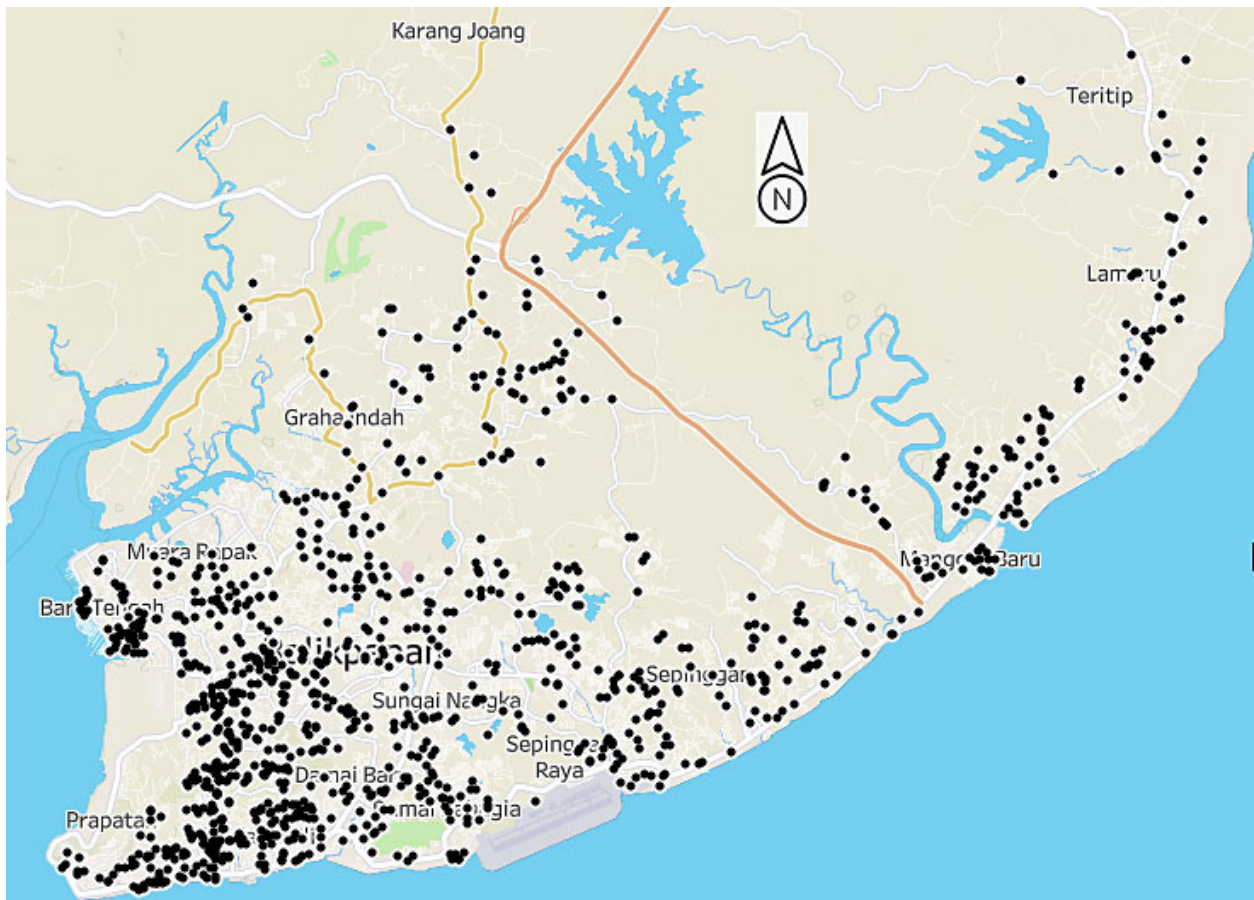


Fig. 4. The 1,256 geotagged respondent of survey (served in <http://ona.io>)
Source: own preparation based on Author (2021).

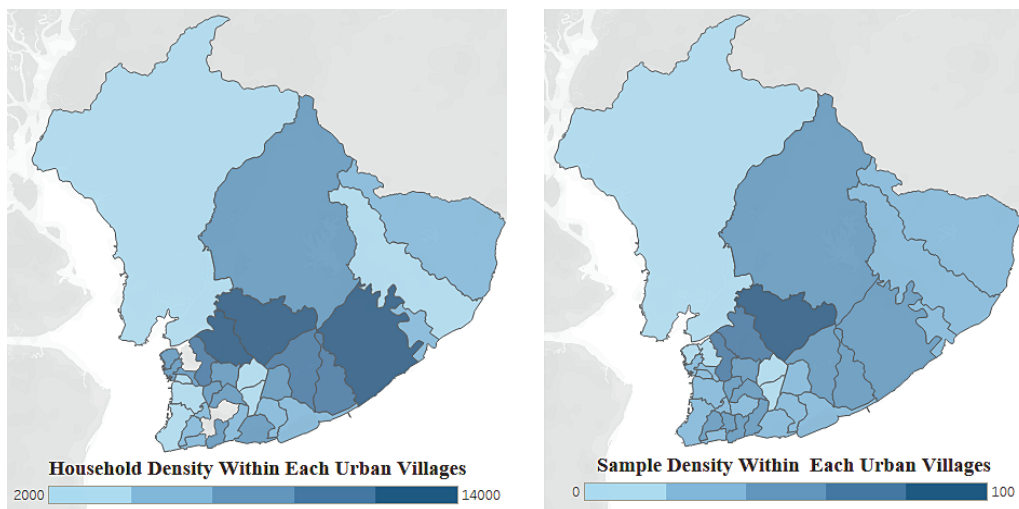


Fig. 5. The density maps of household (left) and number of sample (right) at Balikpapan City
Source: own preparation based on Author (2021).

sample and household density maps of the study area of Balikpapan City. It shows that numbers sampled in the areas with lower numbers of households are relatively less than those sampled in the areas with higher numbers of households, which mean that the samples are proportional to all households. The representativeness of the sample (n=1,256) to the population (N=672,878) in terms of the distribution of

respondents across thirty-four urban villages was tested using one-sample chi square test. The result indicated that the sample proportion of respondents by urban villages were not significantly different from the proportion of population by urban villages at p-value = 0.01 ($\chi^2(df = 33) = 54.345, \rho = 0.223$). Overall, the sample represented the population in this survey-based study.

Table 2. Recapitulation of aspect weighting based on AHP questionnaire

No.	Representatives	Aspect weighting (%)								CR [%]
		1	2	3	4	5	6	7	8	
1	Balikpapan regional people's representative council	6	6	12	8	15	10	19	24	10
2	Regional government agencies	10	20	20	11	7	17	5	10	10
3	Balikpapan regional people's representative council	12	11	16	13	7	12	12	15	8
4	Regional-own Enterprise Institution	12	9	18	9	9	10	7	25	7
5	Departmental police	12	10	13	9	20	14	9	14	7
6	Regional government agency	9	9	13	16	12	12	15	15	7
7	Regional government agency	13	7	22	14	14	6	6	18	7
8	Regional government agency	9	11	15	9	7	15	6	28	6
9	Regional government agency	13	12	15	8	12	13	9	18	6
10	Regional government agency	9	8	10	12	12	13	12	25	6
11	Regional government agencies	11	13	18	6	17	8	8	18	5
12	Departmental police	21	10	15	7	18	7	7	14	4
13	Regional-Own Enterprise Institution	11	17	21	12	12	11	5	11	4
14	Regional-own Enterprise Institution	12	13	17	15	11	13	9	10	4
15	Regional government agency	10	8	18	12	15	9	9	20	4
16	Regional government agency	16	8	12	12	17	13	7	16	3
17	Military District Command	17	13	15	6	23	10	10	8	3
18	Regional government agency	21	11	17	12	11	10	9	9	3
19	Regional government agency	12	7	14	9	19	14	9	15	3
20	Academic institution	17	13	16	10	13	11	9	9	2
21	Balikpapan Representative Office of The Central Bank of Indonesia	9	9	8	16	9	15	23	12	2
22	Academic institution	18	12	14	10	15	9	6	15	1
23	Regional government agency	9	15	15	8	20	8	8	16	1
24	Regional government agency	13	13	13	13	13	13	13	13	0
Averages		12.5	11	15.3	10.8	13.8	11.3	9.6	15.7	

Note: 1 = Economy, 2 = Spatial, 3 = Environment and Health, 4 = Transportation, 5 = Social and Security, 6 = Utility, 7 = Recreation, Culture, and Public Space, 8 = Basic Needs Access, CR = Consistency Ratio.

Source: own preparation based on Author (2021).

Aspect Weighting using The Analytical Hierarchy Process (AHP)

The Analytical Hierarchy Process (AHP) was employed in aspect weighting in calculating the liveability index. Fifty-three participants were involved purposively in filling out the AHP (Analytical Hierarchical Process) questionnaire, which consisted of a representative of several parties, as presented in Table 2. A website-based software then processed completed questionnaire responses to calculate the weight of eight aspects from each PMC in AHP models. Of the 53 administered questionnaires, 24 were valid and further processed for weighting recapitulation, as presented in Table 2. The rest was invalid due to uncompleted answers and a Consistency Ratio (CR) greater than 10 (Saaty, 2002).

It can be seen from Table 2 that there are eight aspects of perceived liveability in the descending order of weight value, namely, basic needs access (0.157); environment and health (0.153); social and security (0.138); economy (0.125); utility (0.113); transportation (0.108); spatial (0.11); and recreation, culture, and public space (0.96). The most important aspect considered by stakeholders is “Basic needs access”, which is directly related to the daily activities and community dependence of city residents (Zeng-Xian & Tak-Kee, 2016). This finding suggests that adjusting aspects in measuring liveability results in more specific attention regarding strategic issues and current conditions in the context of Balikpapan City.

The distribution of Perceived Liveability Index

The calculation of the perceived liveability index is carried out for each aspect and then for the total weighted score, as presented in Table 3. The economic aspect obtains the lowest index, i.e., 75.57, while the environmental and health obtained the highest index, i.e., 80.15. It can be seen that the perceived liveability index of Balikpapan City in 2021 is 78.48. Highlighting the index value in the spatial analysis perspective will give more meaning to a comparative analysis geographically. As such, the distribution

of the perceived liveability index in each urban village is then spatially visualized in this study, as presented in Figure 6.

Table 3. Construction of liveability index of Balikpapan City

Aspects	Score (S)	Weight (%) (W)	Weighted score (W*S)
Economy	3.776	12.5	0.472
Spatial	3.900	11	0.429
Environment and Health	4.007	15.3	0.613
Transportation,	3.946	10.8	0.426
Social and Security	3.958	13.8	0.546
Utility	3.835	11.3	0.433
Recreation, culture, and public space	3.971	9.6	0.381
Basic needs access	3.962	15.7	0.622
Total weighted score			3.923
Perceived Liveability Index			78.48

Source: own preparation based on Author (2021).

From the spatial analysis perspective, it can be seen in Figure 6 that there is a decreasing tendency of perceived liveability index toward the city’s east region, getting the index value of 70.69, and an increasing trend toward the north, reaching the index value of 91.75. The result of difference test using one-way ANOVA indicates that there are statistically significant differences of index value between thirty-four villages with P-value < 0.05.

Based on Balikpapan’s land-use plan for 2012–2032, as presented in Figure 3, it can be seen that part of the city’s eastern area is an industrial area, namely the “Batakan Industry Area”, as well as a minapolitan area in another part. Several large companies related to the oil and mining industries were situated there. While the industrial area and urbanization development lead to the city’s east region (Irawanti et al., 2015), the declining index value has notably an in-line direction. That is, the industrial and urban development in the eastern region of Balikpapan City is inversely proportional to the perceived liveability index of the residents. It is important to further discuss if there is unaligned between the development of industrial areas, urbanization, and liveability. While

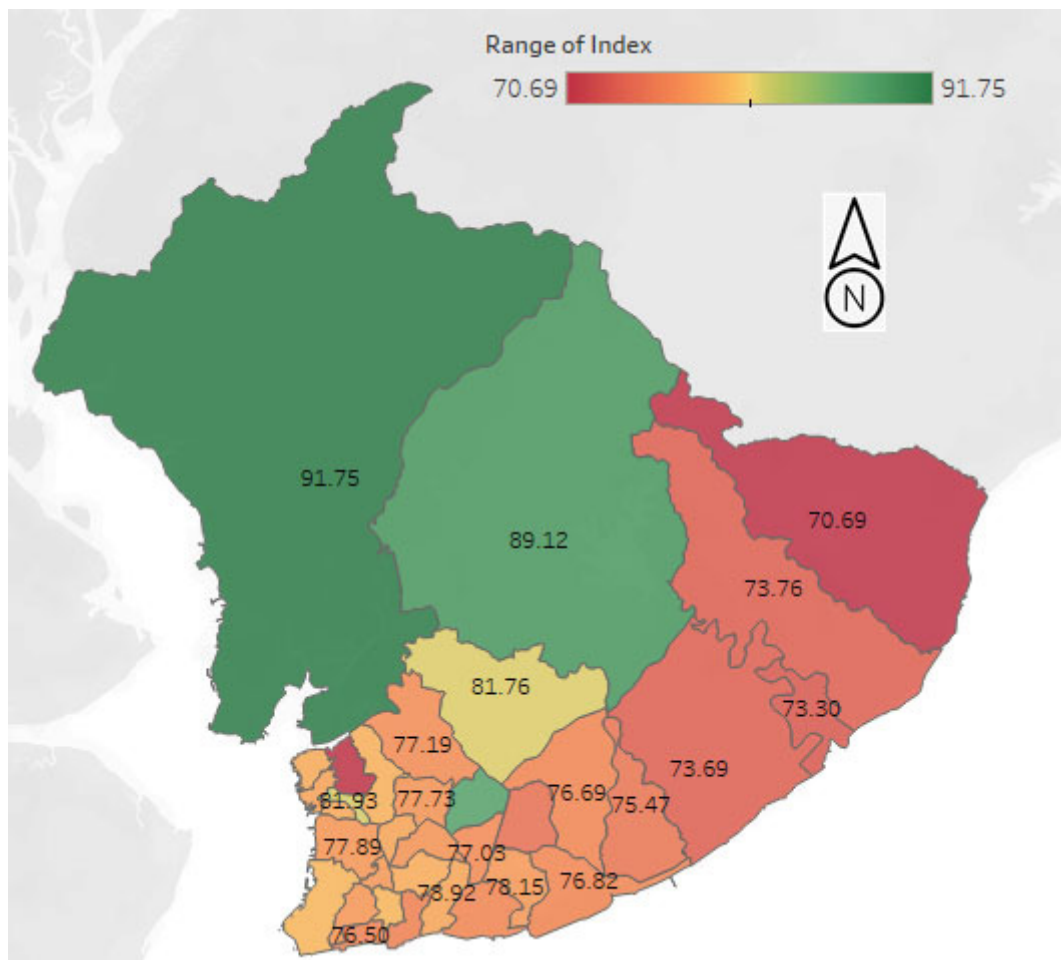


Fig. 6. The spatial difference of the Perceived Liveability Index among Urban Villages in Balikpapan City
Source: own preparation based on Author (2021).

the northern region, adjacent to green open space, is perceived as more livable and cleaner in air quality and environment.

This result reveals that the northern area of Balikpapan City provides a new hope for prospective urban residents, economic actor and stakeholders in the future residential designs. The Ministry of National Development Planning of Indonesia (*Kementerian Perencanaan Pembangunan Nasional Republik Indonesia/Bappenas*) stated that in the next few years, more than 235,000 army personnel and civil servants, including their families, will be relocated to the new Indonesian capital (Wardhana, 2021). An estimated 1.5 million residents, including economic actors,

will occupy the new Indonesian capital, which is only about 70 kilometers from the northern region of Balikpapan City (Cahyani, 2019). With the potential increasing number of settlements and possible economic development in the area, achieving a better-coordinated growth between sustainable development and high-index liveability has become particularly important (Marans, 2015; Yi, Jue, & Huan, 2021). In this regard, the spatial regulations regarding sustainable development and multi-stakeholder criteria of liveability should already be established and maintained such that the misalignment between the development of the area and its liveability can be avoided.

The Quantitative Content Analysis of Open-Ended Responses

In the quantitative content analysis of three open-ended responses, keywords of three or more letters with a weighted percentage of more than 5%, served as code in the coding reference. We visualized the result in a word cloud, and in a chart of the top five code references expressed by >70% of respondents, as shown in Figures 7–12.



Fig. 7. Word cloud of the 100-words most mentioned resulted from open-ended responses of Q1
 Source: own preparation based on Author (2021).



Fig. 9. Word cloud of the 100-words most mentioned resulted from open-ended responses of Q2
 Source: own preparation based on Author (2021).



Fig. 11. Word cloud of the 100-words most mentioned resulted from open-ended responses of Q3
 Source: own preparation based on Author (2021).

The word “clean” was the most frequently mentioned, i.e., 348 times when respondents were asked what makes for comfortable living in Balikpapan City (Q1). While the word “safe” had a frequency that was not much different, i.e., 347 times mentioned by respondents. The others such as “easy” 112, “friendly” 103, “people” 100, “environment” 95, “family” 92, and “job” 89 were not much different in number. When respondents were asked what problems they experienced while living in Balikpapan

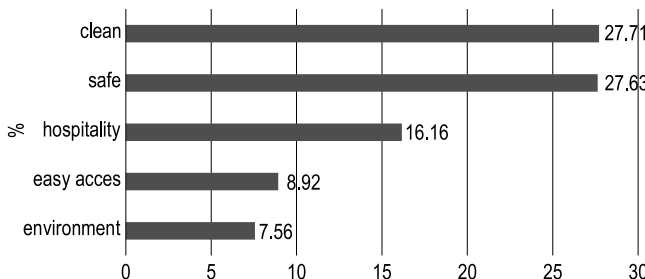


Fig. 8. Chart of top five code references from open-ended responses of Q1, expressed by >70% of respondents
 Source: own preparation based on Author (2021).

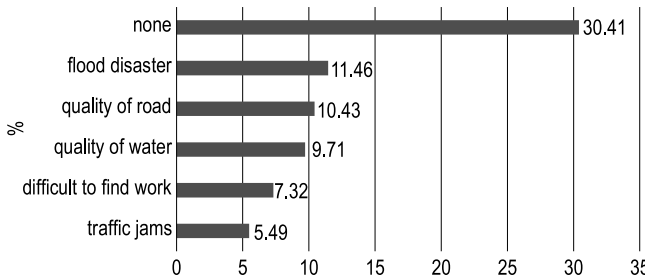


Fig. 10. Chart of top five code references from open-ended responses of Q2, expressed by >70% of respondents
 Source: own preparation based on Author (2021).

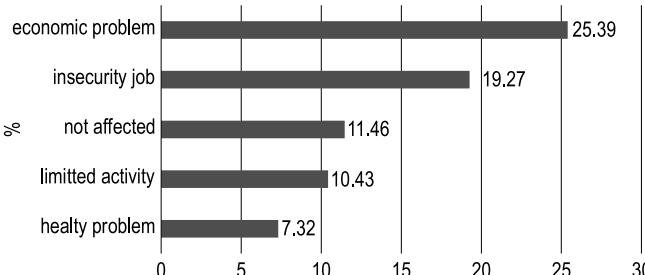


Fig. 12. Chart of top five code references from open-ended responses of Q3, expressed by >70% of respondents
 Source: own preparation based on Author (2021).

City (Q2), the word “none” was the most frequently mentioned, i.e., 382 times. The word “flood” was mentioned 144 times, reflecting the most problems experienced by respondents. Some more mentioned were “water” 131, “roads” 122, “job” 92, and “jams” 69. When respondents were asked about the coronavirus pandemic’s impact on their live in Balikpapan City (Q3), “economy/economic” was the most frequently mentioned, i.e., 319 times. Though the word “none” was mentioned 167 times by respondents, the other words were emerged such as “activity” 146, “work” 122, “income” 120, “job” 65, and “health” 64. The 100-words most mentioned from 3-item open-ended responses are visualized in a word cloud, as shown respectively in Figure 7, 9, and 11. While the charts shown in Figure 8, 10, and 12 reflect the top five code references from each open-ended response, expressed by >70% of respondents.

Regarding the factors that affect the comfortability of Balikpapan City resident, two major factors of perceived comfortability, i.e., cleanliness and safety,

lead to a positive signal that the city provides good hospitality, not only for the existing residents but also for new potential migrants (Magnini & Zehrer, 2021). In the perspective of dynamical urban living environment, the information of perceived liveability regarding the living environment comfortability will permit the policy maker in driving and evaluating the perspective plans improvement on more empirical bases (Polyakova et al., 2019; Kraff et al., 2020). However, since this empirical finding is based on the subjective nature of people’s assessments, it was not recommended that the condition that is not actually worthwhile attempt to bolster their perceived worth. The factual situation should be the main concern in improving perceptions towards a better level of satisfaction.

People perceive the drainage system as bad, particularly in the East Balikpapan area, as shown in Figure 10. Looking at the topography or contours of Balikpapan City, it can be found that the relief of the land surface in Balikpapan City tends to be wavy

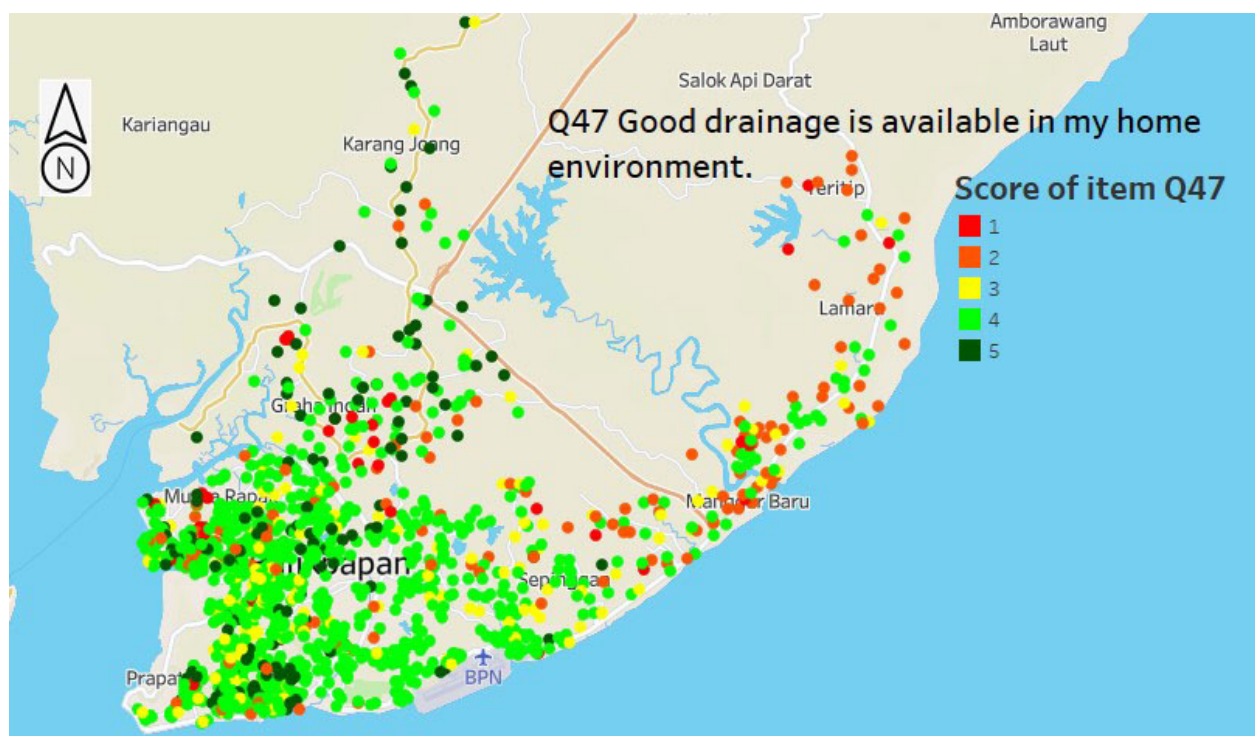


Fig. 13. One of the geotagged responses to the question related to the perceived drainage quality in Balikpapan City
 Source: own preparation based on Author (2021).

where there are basins in the middle of the city (BPS-Statistics Indonesia, 2021). Such conditions create a great potential for waterlogging when access to water from the basins in the middle of the city toward the sea is clogged. Besides that, population growth, land-use change, climate change, and urbanization are notably the key drivers of the flood vulnerability in Balikpapan city (Ariyaningsih et al., 2022). As a buffer zone for Indonesia's future capital city, Balikpapan's flood risk, which is the most common problem, should be taken very seriously by everyone who has a stake in the area.

Meanwhile, the top five perceived impacts of the COVID-19 pandemic felt by Balikpapan City residents are as follows: the economic problem; insecurity of jobs; not affected; limited activity; and health problems. This finding is in line with the significant change in the critical factors of residential sustainability regarding such a pandemic effect that there is a significant shift from environmental impact towards emphasizing on social and health aspects. The limited activity period due to the lockdown has also changed how the people and communities live, interact, and work, including how they address economic challenges such as insecurity of jobs, and built-environment challenges such as public space setting (Mohammed Salih & Hussein, 2021; Das et al., 2022). The ability of the local governments to respond to the aforementioned challenges will determine their success in building capacity towards sustainable urban transformation.

CONCLUSIONS

In an attempt to enhance the measurement technique of perceived liveability, a more rigorous survey method with a prominent sample representativeness was conducted in this study. Justifying the weight of aspects with stakeholder participatory practices of AHP was proposed as a systematic approach to defining stakeholder goals and preferences. The AHP assisted in formulating objective justification in weighting aspects of perceived liveability with stakeholder participatory practice. While a content analysis of open-ended responses was carried out to analyse

the feedback and problems experienced by a resident while living in the city. The two such works of analysis were arguably able to provide a more comprehensive understanding of the population's feedback on their life quality related to the current issue.

Eight aspects consisting of 51-item indicators were defined in this study, in the descending order of weight value: (1) basic needs access, (2) environment and health, (3) social and security, (4) economy, (5) utility, (6) transportation, (7) spatial, and (8) recreation, culture, and public space. The result shows that, spatially, the industrial and urban development in the eastern region of Balikpapan City is inversely proportional to the perceived liveability index of the residents. While the northern area of the city provided a new hope for prospective urban residents, economic actor and stakeholders in the future residential designs. The two major factors of perceived comfortability, i.e., cleanliness and safety, lead to a positive signal that the city provides good hospitality, not only for the existing residents but also for new potential migrants. Flood disasters and poor quality of roads were the most mentioned problems that should be seriously paid attention to. While the economic problem and insecurity of jobs were the most perceived impacts of the COVID-19 pandemic felt by residents.

This study arguably provides a more holistic perspective in understanding the aspirations of the residents regarding issues that affect the liveability index in the context of Balikpapan City. The distribution of index values provides information for policymakers to pay attention not only to the priority aspects of liveability but also to the priority area geographically. The data collection technique in this study produces prosperous data with broad potential for analysis to explore the study results.

The most frequently mentioned keywords in the open-ended responses data can be viewed as a proxy representing respondents' perspectives. Besides improving analytic rigour, utilizing the count and code features of NVivo was also considered capable of decreasing bias regarding miss-weighting, particularly in a large number of samples like this study. Thus, as a solid empirical finding, the results

obtained from this qualitative data analysis can be used as material for evaluation and policy projections to improve the efficiency and effectiveness of the government's budget in serving the aspirations of its citizens.

This survey-based study also followed the trend of evaluating the socioeconomic consequences of rising urbanization within cities. It contributes to the empirical study of city-profile experiencing strategic issues, i.e., the transformation toward the post-natural resources industry era and the effect of relocation of Indonesian capital city through resident's perspective. As stated early, capturing the liveability indices assists the government in ensuring that the direction of the development policies is in line with the resident's aspiration of creating liveable cities. Thus, the result of this study assists the capacity of urban policies or levels of policy implementation enhancement in accommodating the aspiration.

This study has limitations regarding that this study relies on responses from randomly selected residents and their satisfaction levels. Many questionnaire items in this study have a potential for bias responses because respondents possibly feel tired of understanding many questions. The representation of samples in this survey is based on the proportion of the population in each urban village, not taking into account the extent of the area. That is, the urban village areas with a low population density, i.e., the small number of residents in a very large area, result in less representative survey results from the perspective of spatial analysis. The data collection technique in this study is potentially rich with valid primary data, providing opportunities for wider analytical exploration in the next empirical study.

Author contributions: author/authors have given approval to the final version of the article. Authors contributed to this work as follows: Saiful Ghozi developed the study design, analysed and interpreted the data, also prepared draft of article, Ida Bagus Dharmawan collected the data, as a person in charge of external communication and FGD, Dessy Handa Sari analysed and interpreted the data, Tizar M. Bijaksana developed the conceptual base theory, also

revised the article critically for important intellectual content, Suheriah M. Devi analysed and interpreted the data.

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APPENDIX A

Moderator guide of the FGD

1. Greetings and thanks to all who attended the FGD discussion.
2. Presentation of the topic: “Indonesian Most Liveable City Index (MLCI)” indicators to measure liveability index in Balikpapan City.
3. Purpose of the session: to know the extent to which MLCI indicators can represent all residents’ interest, as well as to uncover the liveability aspects and indicator that were not accommodated in such adopted scales.
4. Explain discussion rule:
 - a) to be ensured that all participants already read the MLCI indicators as a base-point discussion.
 - b) at least one expression or opinion from each representative with no correct or incorrect expression or opinion regarding the MLCI scale.
 - c) one at a time, speaking as clearly as possible.
5. Tabulation of all opinions and summarize it into final aspects and indicators.
6. Ensuring the forum’s approval of the final aspects and indicators
7. Finally, closing the forum and thank everyone who took part in FGD.

APPENDIX B

Table 4. The aspects and indicators of perceived liveability index

Aspects	Indicator of MLCI	Indicators resulted from FGD	Empirical basis
1	2	3	4
Basic needs access	<ol style="list-style-type: none"> 1. Development information and community participation 2. Worship facilities 3. Education Facility 4. Health service quality 5. Facilities and access for people with special needs 6. Security facilities 7. Government administration facilities and public services. 	<ol style="list-style-type: none"> 1. Licensing procedure 2. Legal certainty of land ownership 3. Access to be directly involved in development (*1 MLCI 4. Ease of getting development information (*1 MLCI 5. Quality of religious services (*2 MLCI 6. Ease of getting educational services (*3 MLCI 7. Educational service quality (*3 MLCI 8. Ease of getting health services (*4 MLCI 9. Health service quality (*4 MLCI 10. Facilities and access for people with special needs (*5 MLCI 11. Quality of security services from the relevant authorities (*6 MLCI 12. Market service quality (including traditional and modern market) 13. Ease of getting government administration services (*7 MLCI 14. Quality of government administration services (*7 MLCI 	<ul style="list-style-type: none"> • Vela, Lerma, & Ikonomopoulos (2016); Lowe et al. (2020); Sep & Kyong (2020)
Economy	<ol style="list-style-type: none"> 8. Economy facility 9. City economy 10. Food sufficiency 	<ol style="list-style-type: none"> 15. Ease of getting a job 16. Ease of establishing a business (*8 MLCI 17. Affordable cost of living (*9 MLCI 18. Ease of getting groceries (*10 MLCI 19. Ease of getting food nutrition (*10 MLCI 	<ul style="list-style-type: none"> • (Li & Weng, 2007); Kraff et al. (2020)
Environment and health	<ol style="list-style-type: none"> 11. City health 12. City cleanliness 	<ol style="list-style-type: none"> 20. Environmental health (*11 MLCI 21. Air quality (*11 MLCI 22. Cleanliness of river water (*12 MLCI 23. City street cleanliness (*12 MLCI 	<ul style="list-style-type: none"> • (van Dorst, 2012); Titisari Danielaini et al. (2019); Zhan et al., (2018).
Recreation, culture, and public space	<ol style="list-style-type: none"> 13. City park facility 14. Recreational facility 15. Sport facility 16. Facility of art and culture activities 	<ol style="list-style-type: none"> 24. Access to city parks for all residents (*13 MLCI 25. Quality of city park (*13 MLCI 26. Facility and access of recreational activities (*14 MLCI 27. Quality of recreational activities (*14 MLCI 28. Facility and access of sport activities (*15 MLCI 29. Quality of sport facilities (*5 MLCI 30. Facility of art and culture activities (*16 MLCI 	<ul style="list-style-type: none"> • Tilaki, Abdullah, Bahauddin, & Marzbali (2014).
Social and security	<ol style="list-style-type: none"> 17. City politics 18. City safety 19. City security 	<ol style="list-style-type: none"> 31. Stability of the city from the demonstration (*17 MLCI 32. Freedom to express political rights and opinions (*17 MLCI 33. Sense of security against natural disasters (*18 MLCI 34. Quality of disaster/epidemic early warning (*18 MLCI 35. Sense of security and crime (*19 MLCI 	<ul style="list-style-type: none"> • Yudono et al. (2021) Ariyaningsih et al. (2022)

cont. Table 4

1	2	3	4
Spatial	20. Informal sector 21. Housing 22. City planning	36. Street vendor arrangement (*20 MLCI 37. Ease of owning a house (*21 MLCI 38. Physical quality of the house (*21 MLCI 39. City land use and utilization (*22 MLCI 40. The overall quality of city planning (*22 MLCI	• (Sofeska, 2017); Mansour, (2016)
Transportation	23. Facility of pedestrian path 24. Public transportation	41. Quality of the pedestrian path (*23 MLCI 42. City traffic quality 43. Physical quality of city roads 44. Facility and access of public transportation (*24 MLCI	• Yassin, (2019); Zhan et al. (2018)
Utility	25. Clean water management 26. Wastewater management and drainage 27. Telecommunication network 28. Electricity	45. Availability of clean water (*25 MLCI 46. Waste management of the city (*25 MLCI 47. Drainage quality (*26 MLCI 48. Availability of wastewater management (*26 MLCI 49. The quality of water resulted from wastewater management (*26 MLCI 50. Mobile phone signal quality (*27 MLCI 51. Quality of electrical resources and its services (*28 MLCI	• Titisari Danielaini et al. (2019)

Note: (* items detailed and improved from MLCI

Source: own preparation based on Author (2021).

