A Comparative Study of Advertising Legibility by Three Local Governments in Yogyakarta Urban Areas, Indonesia

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Abstract

Although some local governments in Indonesia have made special regulations for advertisements, problems related to advertisement arrangement are still a major topic in the society. Outdoor advertisements as product promotion must be visibly and legibly organized for rapid understanding. Legibility can be used to identify the values associated with advertisements, which gives technical standard for its regulation. The objectives of this research are 1) to analyze how advertisement arrangement is implemented on the viewpoint of legibility in Yogyakarta urban areas and 2) to identify what instruments must be taken into account to increase advertising arrangement quality. This research shows that 1) There are almost no significant differences of advertising condition in the three different municipalities of Yogyakarta, Sleman and Bantul, 2) When the guidance control is good, it results in a good physical condition, 3) Legibility instruments such as average ads per building, board size, character size, advertising setback and height are found to provide significant contributions to advertising condition. Thus, a general advertising approach should regulate those physical characteristics through objective terms, and 4) Even though the density of advertisements is high, if they are well managed, the legibility condition remains high.

Keywords: Indonesia, Advertising, Regulation, Legibility

1. Introduction

Yogyakarta urban areas in Indonesia began from the growth of Yogyakarta Municipality, which crossed the administration boundary into Sleman and Bantul Regencies. This extension of urban areas, called Yogyakarta Urban Agglomeration, covered about 2,000,000 inhabitants in 2010[1]. During this expansion, commercial buildings in the downtowns created the urban image for the area. The commercial areas along the roads are loaded with business advertisements, and unremarkable advertisements dominate the landscape. The forms, color, and light of advertisements are bold and large, creating a "roadside architecture" appearance that encourages liveliness[2].

Advertising in Yogyakarta urban areas, especially along major retail streets in the downtown area are quite complex. Old advertisements often remain, even after new advertisements are launched. On the other hand, to attract customers, business practices compete with quite literally and emphasize images on their advertisements. These images attract customers and fill the streetscape with various shapes and images. But this enormous advertising diversity is not balanced; with proper guidance and advertisement control, advertisements could be enhanced for user satisfaction and ideal appearance. Currently, the growth of advertisements has become somewhat unarranged and unsightly.

The high density of advertisements and their irregularities get much attention from various parties. A legislative council member of Sleman Regency, Farchan Hariem states that a concrete action is needed to reorganize these advertisement irregularities. Meanwhile, the Head of the Indonesia Advertising Company Association, Eddy Purjanto, has said that government policy does not yet accommodate the dramatic growth of advertising, which is becoming a tool of innovation and economic development[3].

In March 2007, the national government launched Decision of Public Work Minister No. 06/PRT/M/2007 about General Guidelines for Building Arrangement and Environment Plan. According to this regulation, streetscape planning needs to consider both physical and nonphysical design elements to form a human-scale public space environment, in an effort to strengthen the character of the larger design block. Elements of streetscape planning, including advertisements, need to be considered along with the principles of environment quality arrangement such as: a) Informative and easy orientation and b) Proper planning for appropriate user.

These two planning principles provide guidance for quality mass communication. Advertisement as one of the streetscape elements has a function to inform and transform product information by creating an image for the product that goes beyond convenience facts[4]. Therefore, outdoor advertisements must be visibly and legibly organized for rapid understanding. In this case, if advertisement arrangement is high in density, the observer's distance of vision toward advertisements is shorter. This means the legibility of advertisements is small. In this paper, legibility is defined as "a viewer's ability to comprehend symbols and letters, or how clearly an advertisement can be seen and read by drivers with normal vision"[5]. Among several approaches in assessing user perception, legibility can be used to identify the values associated with advertisements as objects[6]. This definition of legibility can also be used by local governments to set technical provisions on advertising regulation. Advertising legibility depends on many characteristics, such as letter height, board size, advertisement setback and advertisement height. The theoretical background of legibility will be discussed in section 2.3.

At the local level, the governments in Yogyakarta urban areas, Yogyakarta Municipality, Sleman and Bantul Regencies all have advertising regulations. But technical standards for manual guidance are different in every administration. Although some Indonesian local governments (Municipality and Regency, hereafter referred as municipality) have made advertisement regulations based on the national law, the problems related to advertisement arrangement should still be seriously discussed. In reality, uncontrolled advertisement arrangements still dominate landscape. They harm legibility, decrease informative function and are inconvenient for the street users' perception. These problems are occurring because of poorly managed placement (user scale and proportion). Many questions emerge due to these problems, such as:

1) How is advertisement arrangement implemented by three municipalities in Yogyakarta urban areas?
2) What instruments must be taken into account to increase advertisement arrangement quality for technical provision of local advertising regulations?

Therefore, this research aims to analyze the implementation of advertising regulation and physical characteristics in relation to legibility in three municipalities: Yogyakarta, Sleman and Bantul. These entities serve as regulators of advertising practice and control. Thus, the research objectives are:

1) To analyze advertisement arrangement related to legibility within Yogyakarta urban areas.
2) To identify what factors must be taken into account to increase advertising arrangement quality, which can define technical provisions for local advertising regulations.

This research is based on the premise that users' satisfaction is influenced by the physical advertising characteristics and advertising controls by the local governments. User perception and evaluation of physical condition can be relevant indicators of advertising performance. In terms of the methodology, a combination of questionnaires and physical field survey is adopted.

2. Background
2.1. Regulation Background

The technical provisions for advertising are different in each of the three municipalities. The differences are based on technical guidance, technical qualifications and the depth of explanation. Table 1 shows the advertising regulation conditions of the three municipalities.

Table 1: Advertising Regulation Conditions of Three Municipalities

Government	Yogyakarta Municipality	Sleman Regency	Bantul Regency
Technical guidance	Local guidance	Local guidance	National Regulation
Substance of technical qualification	Size, Number, Setback and Height	Size, Height	Size
Ad placement	Pictorial description/map of detail	None	None

2.1.1. Yogyakarta Municipality
Yogyakarta Municipality's advertising technical provision is Mayor Regulation No. 26 of 2010, which is regarding Advertisement Master Plan and Visual Aid. This municipality has only one technical regulation, which includes general guidance for advertising implementation and explains details for every road section. This technical guidance about advertisement placement along roads is also demonstrated by pictorial description/maps. Technical qualification is stated by size, number, height, placement, and other standards such as color and its social bearing. Here, the substances of technical qualification are size, number, height and setback as is listed by Table 1.

2.1.2. Sleman Regency
Sleman Regency has issued four regulations of advertising guidance, but there are only two regulations related to technical provisions. Others are regarding administration aspects, such as taxes and the administration process. Technical provisions are stated by Regent Decision No. 70/Kep.KDH/A/2003 about Advertisement Spots and Head of Public Work Department Decision No. 188/1981/2007. However, these two regulations do not provide further details about implementation. They give general descriptions about what the regulation dictates, but no explanation about how to reach it. Technical qualifications stated are size, height, lighting, construction and material. It also states that advertisements must be readable by the user from a distance of 150 m, but it does not state certain technical descriptions about how to achieve that readable distance. Briefly, the substances of technical qualification are size and height as shown in Table 1.

2.1.3. Bantul Regency

Bantul Regency has Regent Regulation No. 38 of 2009 about Advertisement Permit and Regent Regulation No. 37 of 2009 regarding taxes from advertisement. Both focus on procedure and administrative implementation. They don't stipulate any technical provisions, but only state the limitation of board size (more than 4 m^2) that tax is put into effect. Currently, the judgment about whether an advertisement can be erected or not are based on the national laws. One example of National law is Public Work Minister No. 06/PRT/M/2007 about General Guidelines for Building Arrangement and Environment Plan.

2.2. Streetscape Actual Background

Based on the Governor Decision of Yogyakarta Province No. 100/KEP/2007, there are nine national and provincial roads in Yogyakarta Province. The urban area mostly exists within the ring road area. Almost all land use in Yogyakarta's urban downtown street corridor is dominated by commercial activity. The normal traffic average velocity for arterial roads in the urban area is about 60 km per hour and about 40 km per hour in peak traffic times. In this research, the peak traffic time velocity is used to analyze the indices related to legibility, which are height of character along with boards' setback and height position (described in 2.3).

The outdoor advertising in Yogyakarta's urban area can be in the form of poster, placard, fascia sign, canopy signs, boards, flag advertisements, price displays or billboard. They can be hung by a pole or attached to a building's wall or roof.

2.3. Theoretical Background

This research compares actual advertising conditions (the implementation) and their regulations. The variable used to investigate the real condition and the implementation of local advertising regulation is legibility. Legibility has many instruments, but this paper focuses on five instruments: density, average ads per building, setback and height, board size and character size. These instruments are used based on the following reasons. Table 2 shows the variables and its instruments within this research.

Table 2: Research Variable and Instruments

Research Objective	Variable	Instruments	Data Source
1st Objective To analyze advertisement arrangement related to legibility within Yogyakarta urban areas.(real condition/ implementation)	Legibility (Y)	1. Density (X1) 2. Average ads/ building (X2) 3. Setback and Height (X3) 4. Board Size (X4) 5. Character size (X5)	Physical condition: • User Perception/Xper (Questionnaire) • Field survey/Xphy
2nd Objective To identify what factors must be taken into account to increase advertising arrangement quality, which can define technical provisions for local advertising regulations. (within regulation texts)	Informative and easy orientation Proper planning for appropriate user	1. Board size 2. Character size 1. Setback 2. Height 3. Average ads/ building 4. Density.	Legal texts

The first objective shows the advertising condition based on five legibility instruments. The number of commercial signs, percentage of street covered by the advertisement, and square meters of signs per linear street meter are factors that can increase complexity[7]. This complexity influences the legibility. Here, those three instruments are described as density and average ads per building. Setback,

height, board size and character size are based on Guidelines On-Premise Sign Standards by USSC (US Sign Council) in 2003[8].

The second objective shows how advertising conditions are influenced by local regulations. The regulation is measured by two instruments, based on principles of environment quality arrangement in Decision of Public Work Minister No. 06/PRT/M/2007. Those principles are regarding such as informative and easy orientation and proper planning for the users.

The instruments working for this research are explained below.

2.3.1. Advertising Density and Average Ads/Building

Density reflects the number of signs located within a specified linear distance in roadside areas and their relation to effective delivery of informational messages on the adjacent highway[9]. When the average number of advertisements located in every building (ads/building) is high, information transferred will be low.

2.3.2. Setback and Height Index

To know the height of the character, the viewer distance is needed. It can be found from D as shown by Equation (1).

$$D = VRT \; v \tag{1}$$

Where VRT is viewer reaction time (sec) and v is vehicle velocity (m/sec)

Equations (2) and (3) show setback and height of advertisement, respectively. Here, the cone of driver vision in downtown streets is $20º$[10]. If any advertisements are located outside the cone, the advertisement cannot be seen by the driver. The driver is measured as looking forward at a 5º position, whereas 1.15 defines the height of the eye during driving[11].

Figure 1: Advertisement Setbacks and Height Consideration
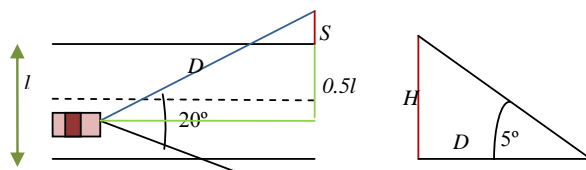
$$S = D \tan 10º - 0.5l \tag{2}$$
$$H = D \sin 5º + 1.15 \tag{3}$$

Where S is advertisement setback (m), l is street width (m) and H is advertisement height (m).

2.3.3. Boards Size

Ideally, the advertisement's background space should be less than 60 percent of the advertisement board size with a maximum of thirty characters for optimum information gathering. Based on this concept, the board size can be calculated by Equation (4).

$$A = \frac{(VRT.v)^2}{1.720} \tag{4}$$

Where A is board size (m²) and 1.720 is the fixed value determined by USSC standard[12].

2.3.4. Character Size (D/h)

In arterial streets where automobiles become dominant factors, legibility is determined by the distance from which a driver can recognize the letter, or the viewer reaction distance. Here, D/h can be applied to know how material (character) can be read with high accuracy. D is viewer reaction distance (VRD) (m), where h is normal height of the character (cm). Based on USSC, D/h average value is 9.14 m (30

ft.). This average is only a generalization for the legibility needs of the character, because any specific conditions (for example: lighting, color contrast or letter type) need their own D/h.

3. Method
3.1. Field Physical Survey

Figure 2 shows the six arterial street sections chosen as samples from the three municipalities. Criteria for samples were:

     a. The street sections have 80 percent or more of their building's activities related to commercial activities.
     b. The samples were taken from ring road areas because these places have similar characteristics as the commercial streets within the urban agglomeration area.

     One sample section was captured in one longitudinal section; each is approximately 122-137 m in length, as shown in Table 3. Both Magelang and Solo (Sleman section) arterial roads are located in Sleman Regency (S), whereas Parangtritis (Yogyakarta section) collector road and Solo (Yogyakarta Section) arterial road are located in Yogyakarta Municipality (Yo). Parangtritis (Bantul section) collector road and Wates arterial road are located in Bantul Regency (B).

Figure 2: Yogyakarta Urban Map and Sample Sections
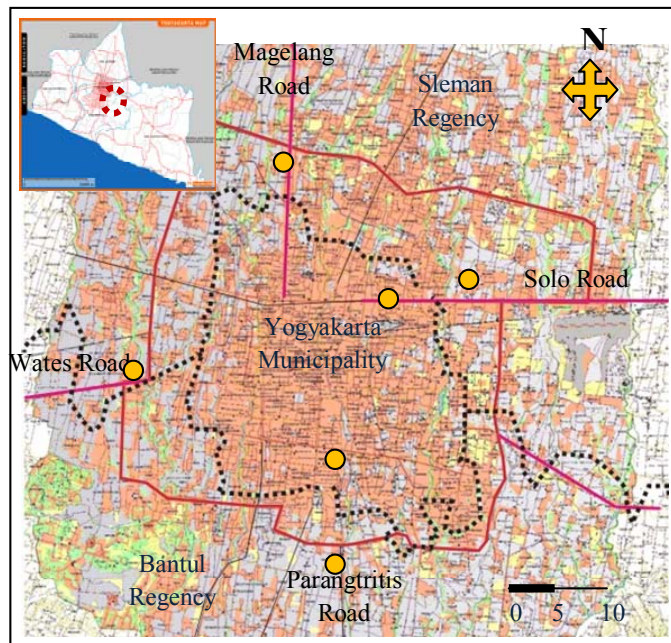
Table 3:   Street Sections Sample

Road	Sample Length (m)	Number of Ads	Number of Buildings
Magelang(S)	125	76	12
Parangtritis(B)	130	58	8
Solo(S)	122	57	15
Parangtritis(Yo)	130	56	19
Wates(B)	135	55	20
Solo(Yo)	137	57	10

Note: Yo = Yogyakarta, S = Sleman, B = Bantul

3.2. User Perception Survey

The physical settings can be hatched in mental perception. Several ordinary people can have the same perception about a place, or otherwise, one community could have several different perceptions. The identity of a place is multisensory, but in some cases one or more sense perceptions may be dominant[13].

In this research, questionnaires were used to analyze people's perceptions toward legibility. Based on Slovin, questionnaire respondents' minimum necessity for this research is:

$$Q = N/(1 + N.e.e)$$
$$= 2{,}000{,}000/(1+ (2{,}000{,}000.\ 0.1.\ 0.1)$$
$$= 100 \text{ questionnaires.}$$

Here, N is 2,000,000 (the population of Yogyakarta urban agglomeration inhabitants). During the data collection process, 35 questionnaires were distributed in each municipality. In total, 105 questionnaires were distributed. The photographs of street sections were shown in the questionnaire (Figures 3, 4, and 5). The photographs were used to make respondents clearly understand the concerned sections. Multiple choice questions were arranged in Likert scale and scored with 5 as the most legible and 1 as the least.

Figure 3: Solo(S) and Magelang(S) Street Section Condition in Sleman Regency

Figure 4: Parangtritis(Yo) and Solo(Yo) Road Section Condition in Yogyakarta Municipality

Figure 5: Wates(B) and Parangtritis(B) Road Section Condition in Bantul Regency

Perceptional questions in the questionnaire regarding legibility instruments (density, average ads per building, setback and height, board size and character size) were made for every street section. At the end of the questionnaire was a question about overall legibility (Y). Questionnaires also evaluated user perceptions by asking the respondent to rank the streets from the most legible to the least.

Tables 4, 5 and 6 show the attribution of the respondents. Table 4 shows the age composition. In terms of age, 8.57 percent of respondents are more than 43 years old and the remaining 91.4 percent are under 43 years old. In relation to gender as shown in Table 5, 53.33 percent are male and 46.67 percent are female. Based on occupation in Table 6, respondents are comprised of student (20.95%), private enterprise (17.14%), government officer (9.52%); the largest composition was employers (48%) who serve as workers in the shops or businesses in the Yogyakarta urban area. This data is shown in Table 6. Thus, the respondents' demographics show that this questionnaire survey can reflect the actual population of urban area residents.

Table 4: Age Group of Users Who Answered Questionnaire

Age	Yogyakarta		Bantul		Sleman		Total	
17 - 29	10	28.57%	19	54.29%	18	51.43%	47	44.76%
30 - 42	23	65.71%	13	37.14%	13	37.14%	49	46.67%
43 - 55	2	5.71%	3	8.57%	3	8.57%	8	7.62%
More than 55	0	0.00%	0	0.00%	1	2.86%	1	0.95%

Table 5: Gender Group of Users Who Answered Questionnaire

Gender	Yogyakarta		Bantul		Sleman		Total	
Female	14	40.00%	16	45.71%	19	45.71%	49	46.67%
Male	21	60.00%	19	54.29%	16	54.29%	56	53.33%

Table 6: Occupancy Group of Users Who Answered Questionnaire

Occupancy	Yogyakarta		Bantul		Sleman		Total	
Private enterpriser	6	17.14%	5	14.29%	7	20.00%	18	17.14%
Government officer	6	17.14%	2	5.71%	2	5.71%	10	9.52%
Lecturer	3	8.57%	0	0.00%	2	5.71%	5	4.76%
Pensioner	0	0.00%	0	0.00%	1	2.86%	1	0.95%
Dentist and nurse	0	0.00%	0	0.00%	2	5.71%	2	1.90%
Student	5	14.29%	9	25.71%	8	22.86%	22	20.95%
House wife	3	8.57%	0	0.00%	2	5.71%	5	4.76
Teacher	0	0.00%	1	2.86%	0	0.00%	1	0.95%
Banker	3	8.57%	4	11.43%	0	0.00%	7	6.67%
Employer	7	20.00%	10	28.57%	8	22.86%	25	23.81%
Do not answer	2	5.71%	4	11.43%	3	8.57%	9	8.57%

3.3. Method on Data Analysis

Physical data obtained on site is ratio data, while the questionnaire provides rank data. Differentiation between the two types of data provides the difference in treatment of analysis. Questionnaire (perception data) gives the value of instruments (Xper) and variable (Y) so the regression analysis can be applied. Meanwhile, the physical survey data only produces the value of the instruments (Xphy), which serves as an evaluation of advertising conditions from a technical point of view.

To achieve the first objective, a statistical test is performed by regression (to determine variables that work) and ranking score (to determine the implementation of advertising conditions in the three municipalities). Regression only uses the user perception data (Xper); ranking score uses physical data (Xphy) and also user perception (Xper) to compare the advertising condition. The rank is

scored based on a statistical test: z-test (physical data) and IQM (questionnaire data).The data are tabled by assigning a ranking score with 1 as the least legible and 5 as the most legible; these numbers are then compared to known advertisements implementation characteristics of the street sections. The statistical test to find the first objective during physical performance analysis is shown in Table 7.

The second goal is achieved through descriptive analysis to explain the rules that influence the advertising condition.

Table 4: Quantitative Test during Physical Performance Analysis

Measurement	Data Source		Statistical test
	Physic	Questionnaire	
Instruments in data presentation	Ratio	Interval	Correlation, z-test, one way ANOVA, IQM
Legibility condition	Statistical test of physic and questionnaire		Ranking score, regression

4. Data Analysis
4.1. Density

The statistic test of the density/ads on field observation (Table 8) shows there are no statistical differences among street sections (F = 0 less than F critical F = 3.10). The densest section is Magelang Road with 0.61 ads/m, while others have relatively the same density with about 0.43 ads/m. User perception suggests there are no differences on advertisement density because F = 0.13, which is less than F critical = 2.62. This means most people negatively evaluate the density of all the streetscapes, which can be seen from more than 50 respondents who said the street sections are "dense' and "very dense". People's perception states that the most densely advertised streetscape section is Solo(Yo) with the IQM 1.55 and the least densely is Wates(B) with the IQM of 2.49.

Table 5: Physical Performance (Xphy1) and User Perception by Density (Xper1)

Road	Density ads/m' (Xphy1)	Ranking Score	Density ads/m' (Xper1) (%)*)	IQM	
Magelang(S)	0.61	1	70.48	2.09	4
Parangtritis(B)	0.45	3	81.90	2.00	3
Solo(S)	0.46	2	62.86	2.17	5
Parangtritis(Yo)	0.43	4	83.81	2.00	2
Wates(B)	0.41	6	50.48	2.49	6
Solo(Yo)	0.42	5	70.48	1.55	1
ANOVA, correlation	F = 0.00, F critical = 3.10		F = 0.13, F critical = 2.62, ρ = 0.69		

*) 'Dense' and 'very dense' opinion from questionnaires

4.2. Average Ads/Building

Table 6: Physical Performance (Xphy2) and User Perception by Average Ads per Building (Xper2)

Road	Average ads per building (Xphy2)	Ranking Score	Perception (Xper2) (%) *)	IQM	
Magelang(S)	6.3	2	70.48	2.09	6
Parangtritis(B)	7.3	1	75.24	2.04	1
Solo(S)	3.8	3	71.43	2.08	2
Parangtritis(Yo)	2.9	5	71.43	2.08	4
Wates(B)	2.8	6	71.43	2.08	3
Solo(Yo)	5.7	4	71.43	2.08	5
ANOVA, correlation	F = 0.78, F critical = 4.39		F = 0.02, F critical = 2.62, ρ = 0.70		

*) 'Excessive' and 'many 'opinion from questionnaire

The statistic test on average ads per building is shown in Table 9. There are no statistical differences on average ads per building among street sections (F = 0.78 less than F critical F = 4.39). Parangtritis(B) has the most excessive number of advertisements (7.3 ads per building) in contrast to Wates(B) with 2.8 ads per building. Meanwhile, user perception shows that there are no statistical differences on average ads per building among street sections (F = 0.02 less than F critical = 2.62). It indicates that advertisement controls are not effectively implemented and the advertisements are disordered and excessive. The urban advertising is evaluated negatively by the majority of respondents (more than 70.48%). The IQM values are almost the same in every section, but Magelang(S) has the highest values, which correlates with its sufficiently higher number of ads per building than others.

4.3. Setback and Height

Table 10 shows the setback and height by using Equation (2) and (3) respecting the D/h.

Table 7:   Indicators of Legibility Instruments

Parameter	Equation	Result
D/h (USSC = 30 ft.)		9.14 m
Velocity (40 km/hour)		11.11 m/sec
VRT		9 sec
VRD	Equation(1)	100 m
Character height	D/h	10.94 cm (~11 cm)
Setback	Equation(2)	$17 - 0.5 \, \text{lm}$
Height	Equation(3)	9.85 m
Board size	Equation(4)	5.81 m^2

Based on the calculations in Table 10, the advertisements can only be seen by a driver if they are located within 9.85 m in height and $17 - 0.5l$ in setback. The height and setback condition of the street sections are described in Table 11.

Table 8:   Physical Performance (Xphy3) and User Perception by Setback and Height (Xper3)

Road	Setback (Xphy3 for setback)		Height (Xphy3 for height)		Perception Xper3 (%) *)	IQM	
	z-test	Ranking Score	z-test	Ranking Score			
Magelang(S)	-19.95	5	-32.85	6	65.71	2.19	6
Parangtritis(B)	-2.02	4	-20.29	3	74.29	2.02	2
Solo(S)	0.15	3	-21.63	4	77.14	2.00	1
Parangtritis(Yo)	-52.42	6	-27.83	5	68.57	2.13	5
Wates(B)	5.24	1	-17.76	2	68.57	2.13	4
Solo(Yo)	5.04	2	-16.22	1	71.43	2.08	3
ANOVA, correlation	**F = 37.45, F critical = 2.23**		**F = 3.21, F critical = 2.23**		**F = 1.54, F critical = 2.38, ρ = 0.71**		

*) 'Disordered' and 'very disordered ' opinion from questionnaire

There are statistical differences on setback condition (F = 37.45 is higher than F critical = 2.23). For setback, the biggest differences were seen between Parangtritis(Yo) (z-test = -52.42) and Wates(B) (z-test = 5.24). The z-test critical value is 1.64; streetscapes with setback conditions higher than their z critical are Wates(B) and Solo(Yo). These setback conditions are outside the viewer cone. There are also statistical differences on height condition (F = 3.21 is higher than F critical = 2.23). This difference mainly comes from Solo(Yo) and Magelang(S), which have z = -16.22 and -32.85, respectively. This means that Solo(Yo) and Magelang(S) have the highest number of advertisements outside the viewer cone.

There are no statistical differences of user perception based on setback and height between road section (F = 1.54 is less than F critical = 2.38). More than half of respondents (65.71%) negatively evaluated the setback and height. This means the setback and height of the advertisements on these streets is ineffectual. The higher the IQM value, the higher setback and height value approved. Although those streets have almost the same setback and height condition, IQM test shows that Magelang(S) is the most ordered (2.19) and Solo(S) (2.00) is the least ordered.

4.4. Board Size

With confidence level $\alpha = 0.5\%$ and z critical = -1.64, Table 12 shows that all of the z-test values are under -1.64. This means that board sizes are less than 5.81 m^2 (shown in Table 7) in all street sections. This statement is also supported by ANOVA (F = 2.11 is less than F critical = 2.24). This means that there are no significant differences between street sections regarding the board size condition. The higher z-test value is the better board size condition. From Table 12, we can see the most ordered board size condition is Wates(B) (-4.01) and the least ordered is Parangtritis(B) (-14.51).

Table 9:   Physical Performance (Xphy4) and User Perception for Boards' Size (Xper4)

Road	z-test (Xphy4)	Ranking Score	Perception (Xper4)(%) *)	IQM	
Magelang(S)	-14.07	2	41.90	2.79	6
Parangtritis(B)	-14.51	1	40.95	2.70	4
Solo(S)	-9.59	4	26.67	2.15	1
Parangtritis(Yo)	-12.68	3	38.10	2.58	2
Wates(B)	-4.01	6	38.10	2.60	3
Solo(Yo)	-8.29	5	26.67	2.72	5
ANOVA, correlation	**F = 2.11, F critical = 2.24**		**F = 0.02, F critical = 2.62, ρ = 0.82**		

*) 'Clear' and 'very clear' opinion from questionnaire

User perception shows that there are no differences between street sections (F = 0.00 is less than F critical = 2.62) for board size condition. Almost half of respondents negatively evaluated (less than 41.90 percent of respondents chose 'clear' or 'very clear') the board sizes, which means the board size condition is bad. Based on IQM, those streets have almost the same board size; Magelang(S) is the most ordered (2.79) and the least is Solo(S) (2.72).

4.5. Character Height

With z critical value = -1.64, Parangtritis(B) has the largest number of small or illegible character, which is less than 11 cm (z-test = -2.44) (see character height in Table 10). This means that this street has the lowest clarity of character size (Table 13). Other street sections have characters with sizes less than 12 cm. However, with z-test under -1.64, the character size does not influence the clarity of the whole street section. There are significant differences on advertisements density (F = 3.05 less than F critical F = 2.24). This condition occurs because there are different implementations of advertising control between Parangtritis(Yo) and Parangtritis(B).

Next, there are no significant differences on the perceptions of character height condition (F = 0.01 less than F critical = 2.62). People positively evaluated the character height, because more than 50 percent of respondents reported that the character size is clear or very clear (the average perception of Table 13 is 52.54%). This condition is also supported by the IQM values, which are about 3. Wates(B) shows the lowest condition (2.87), while Parangtritis(Yo) has the highest character clarity (3.79). This means that the characters are equally clear enough to see in almost the entire street.

Table 10: Physical Performance (Xphy5) and User Perception by Character Size (Xper5)

Road	z-test (Xphy5)	Score	Perception (Xper5)	IQM	
Magelang(S)	-1.13	3	53.33	3.19	5
Parangtritis(B)	-2.44	1	48.57	2.96	2
Solo(S)	-1.35	2	47.62	3.08	3
Parangtritis(Yo)	2.16	6	67.62	3.79	6
Wates(B)	1.80	5	46.67	2.87	1
Solo(Yo)	0.74	4	51.43	3.11	4
ANOVA, correlation	**F = 3.05, F critical = 2.24**		**F = 0.01, F critical = 2.62; ρ = 0.89**		

Note: 'clear' and 'very clear' opinion from questionnaire

5. Discussion
5.1. Comparison between Local Governments

The analyses result of advertisement arrangement related to legibility within Yogyakarta urban areas is summarized in Table 14. It shows the physical condition and user perception ranking score based on Tables 8 to 13. The scores are then summed to determine which streets have better advertising conditions. Yogyakarta Municipality ranks first (95 points) because it has a good physical condition which spreads across all street sections. Solo(Yo) and Parangtritis(Yo) have almost equal conditions in all instruments. Solo(Yo)was poorly ranked because advertisement setback and height received low scores from both field observation and user preference. Overall, the implementation of advertising regulation of Yogyakarta Municipality is better compared to the other two municipalities.

Magelang(S) gives a high contribution to advertising legibility in Sleman Regency compared to Solo(S) which has only 34 points. Magelang(S) received a high legibility score in almost all variables. Solo(S) is lacking on average ads per building, board size and character height. Although Magelang(S) is high in legibility, this condition is not duplicated by Solo(S). It means that the implementation of regulation is not working well in Sleman area. These divergent advertising conditions landed Sleman in the second position (85 points).

Table 11: The Score Gained by Street Sections

Physical condition / Street		Density	Average ads/Building	Height	Setback	Boards size	Character	User preference	Total	Total	By local government
Magelang(S)	Xphy	1	2	6	5	2	3	-	19	51	Yogyakarta = 95, Sleman = 85, Bantul = 76
	Xper	4	6	6		6	5	5	32		
Parangtritis(B)	Xphy	3	1	3	4	1	1	-	13	28	
	Xper	3	1	2		4	2	3	15		
Solo(S)	Xphy	2	3	4	3	4	2	-	18	34	
	Xper	5	2	1		1	3	4	16		
Parangtritis(Yo)	Xphy	4	5	5	6	3	6	-	29	50	
	Xper	2	4	5		2	6	2	21		
Wates(B)	Xphy	6	6	2	1	6	5	-	26	44	
	Xper	6	3	4		3	1	1	18		
Solo(Yo)	Xphy	5	4	1	2	5	4	-	21	45	
	Xper	1	5	3		5	4	6	24		

Bantul Regency is in third position (76 points). The lowest legibility is in Parangtritis(B), which gives a big contribution for the low legibility in Bantul Regency. This street is lacking in almost all legibility instruments. Not far from the conditions in Parangtritis(B), Wates(B) is better in some

variables, except for setback, height and also character height. Bantul government needs to be aware of this lack of advertising control.

5.2. The Working Instruments

To identify what instruments must be taken into account to increase advertising arrangement, the quality user perception statistic test shows there are no differences between street sections in most instruments. Almost all user perceptions gave negative appraisal to the street sections, and only character height is evaluated positively. But the physical survey shows that there are differences in character height, setback and height.

$$Y = 0.31 + 0.03\ Xper1 + 0.12\ Xper2 + 0.12\ Xper3 + 0.09\ Xper4 + 0.56\ Xper5 \tag{6}$$

Table 12: Regression Coefficient

Model	Not standardized Coefficients		Standardized Coefficients	t	P value	Correlation
	Beta	Std. Error	Beta			
Constant	0.310	0.131		2.356	0.02	
Density (Xper1)	0.030	0.033	0.026	0.892	0.37	0.69
Average ads/building(Xper2)	0.123	0.043	0.112	2.884	0.00	0.70
Setback and Height(Xper3)	0.125	0.044	0.115	2.852	0.00	0.71
Board size(Xper4)	0.087	0.027	0.094	3.173	0.00	0.82
Character Size(Xper5)	0.562	0.028	0.592	19.961	0.00	0.89

*Dependent Variable: Legibility

Equation (6) shows the relation between Y (overall legibility based on perception) and Xper. The R^2 value of regression is 49.4 percent. This means that variation of the legibility as dependent on variable Y can be interpreted by the independent variable (Xper) as much as 49.4 percent. There are still 50.6 percent variation of the legibility cannot be explained by Xper, but it can be explained by other independent variables such as letter style, letter color and background color[14]. Based on the regression, character height (Xper5) has the biggest contribution to the legibility condition because it has a big coefficient (0.56), while other factors have relatively low contributions. There are significant contributions from average ads per building (Xper2), setback and height (Xper3), board size (Xper4), and character height (Xper5), as their P values are under 0.05 (see Table 15). Only density (Xper1) provides an insignificant contribution for legibility (P value > 0.05). To create an informative, easy orientation and proper planning for user environment, the advertising arrangement needs five instruments that are number (average ads/building), size (for boards and character) and placement (setback and height).

5.3. Regulation Texts

The previous analysis of Yogyakarta's urban advertising legibility conditions indicated a poorly evaluated condition based on user perception. This poor advertising condition occurred in almost all legibility instruments. These poor advertising conditions have resulted from local regulation that is not equipped with the technical documents to control advertising growth. Documents owned by the three municipalities can be seen in Table 16.

Table 13: Type of Advertising Regulation by the Municipalities

	Technical	Nontechnical
Yogyakarta Municipality	√	√
Sleman Regency	√	√
Bantul Regency	x	√

Note: nontechnical regulation means tax and permit administration. √ = has x = does not have

Table 16 shows that Yogyakarta Municipality has a relatively complete regulation compared to the other two governments. The detailed advertising regulations that influence advertising conditions can be explained as follows.

5.3.1. Yogyakarta Municipality
Yogyakarta Municipality already has technical guidance about advertising. This advertising regulation covers the indices that are size of boards, number (density and average ads/building), height, and placement (setback). However, the guidelines do not mention a recommended character size. The other indices have enough information to facilitate the 'proper planning for user' condition. This is why Yogyakarta Municipality ranks first in advertising conditions, as shown in Table 14.

5.3.2. Sleman Regency
Although Sleman has two technical regulations, they are not enough to provide informative, easy orientation and proper planning for user environment. Based on the results of physical and perception analysis, recommendations for technical instruments such as density, average ads per building, setback and character size are needed. More explicit explanation with details of certain locations for ideal advertising placement is needed. This regulation condition brings Sleman in the second rank, as shown in Table 14.

5.3.3. Bantul Regency
The advertising practice in Bantul Regency needs more attention, especially because technical provisions for advertising do not exist yet. The National regulations that are the standard operation on advertising arrangements are too broad to be implemented in real practice. To increase the effectiveness and positive perception of advertisements, the regulations need to be specified in more detail. The lack of regulation brings Bantul in the third rank in terms of advertisement arrangement, as shown in Table 14.

6. Conclusion
This paper analyzed the implementation of advertising regulation and physical characteristics in relation to legibility in Yogyakarta Municipality, Sleman Regency and Bantul Regency. The methods used were physical field survey and user perception data analysis to answer how advertisement arrangement relates to legibility in Yogyakarta urban areas. The main conclusion is summarized as follows:

1) Generally, there were almost no significant differences of advertising condition in the three municipalities despite differing levels of advertising guidance control:
    - Almost all user perceptions gave poor appraisal to all street sections; only character height was evaluated positively by users.
    - Physical survey clarified that there were differences only in character height, advertisement setback and advertisement height. However, user perception revealed that there are no significant differences in density, average ads per building, advertising setback and height, board size or character height.
2) Based on the regression analysis for user perception data, character height has the biggest contribution to legibility. The combination of average ads per building, setback and height, board size and character height are very important to legibility. Thus, advertising approaches should regulate physical characteristics of advertisements through average ads per building, board size, character size, setback and height.
3) The regression analysis also describes that only density gives insignificant contribution for legibility. This means that though the density of advertisements is high, if they are well managed, the legibility remains high

4) Based on the analysis of the three municipalities, proper guidance control provides a good physical condition. Yogyakarta Municipality, which has good guidance control, has a good physical condition compared to other municipalities.

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