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FORMULATE AND EVALUATE TRANSPORTATION INFRASTRUCTURE FACILITIES AND TRAFFIC SIGNS AT INTERSECTIONS

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ABSTRACT

Transportation modeling in the concept of movement generation is connecting one characteristic with other characteristics. Such as socio-economic characteristics with movement behavior from one zone to another. The transportation system is a form of interrelatedness between actors within its scope such as users, goods, infrastructure and facilities together, both natural and planned. This system aims to coordinate movement with components that use the media in a measurable transportation process. Formulate and evaluate transportation infrastructure facilities and traffic signs at intersections so that the right way to make decisions is based on the criteria set out in the research methodology. From the five research points and based on the SWOT analysis, the selected criteria with factors were obtained. that the Bogor city government and the Bogor district government have a Strength-Opportunity (SO) strategy of 7,156 so that this most powerful concept is the driving force for establishing a good city concept, that it can optimize the development of transportation infrastructure and the TULLAK area to meet transportation needs between regions and support regional development. There is a synchronization of the transportation sector in regional development and economic development and the development of existing transportation networks in the area based on the potential geographic location and natural resources of the city of Bogor and Bogor district by looking at opportunities from the transportation sector and tourism sector.

Keywords: evaluate, transportation, intersections, strategy, SWOT.

1. INTRODUCTION

Traffic in the city of Bogor is quite high. With this density level, the city of Bogor is classified as the second most congested city after DKI Jakarta (Based on this criterion the author provides a real picture of the current condition of Bogor. The description of Bogor city traffic can be taken into consideration in making policies regarding transportation [1, 2].

Transportation modeling examines the engineering of motorized vehicle traffic that impacts the activities of road users, both on straight roads, turning roads, and roads with smooth surfaces. Including road conditions with rough surfaces, concrete roads / rigid pavement on driving safety. The development of the transportation model describes the real condition of the current transportation system and plans for developing the system in the future. In principle, the description of the transportation system model for concept development in an integrated, directed manner with the characteristics of the movement of both passengers and goods [3-8].

Transportation modeling in the concept of movement generation is connecting one characteristic with other characteristics. Such as socio-economic characteristics with movement behavior from one zone to another. So that the movement pattern with the various characteristics above is based on the movement pattern in the city transportation system. This pattern is described in the form of movement flows, namely motor vehicles, passenger transportation and freight transportation. This movement starts from a zone to a destination zone in a certain time. The sustainable transportation system is the accessibility of these service users [9], [10]. This system involves three components that are integrated and related to each other, namely accessibility, equity and environmental impact. This concept is based on accessibility by planning a transportation network with a pattern of diversity of transportation modes with a level of interconnected interaction [11]. Improving tourism services affects people's travel from their original location to tourist attractions so that this increase will have an increased economic impact [12]. By utilizing the equitable distribution of development between regions, it will increase efficiency and productivity using land area economic principles, especially land suitability and locational rent [13].

The pattern of life of people moving from villages to cities causes the degradation of rural residents, so it is feared that there will be uncontrolled urbanization, resulting in an imbalance of border areas in accommodating urban residents. This situation is also driven by errors in the arrangement and design of development programs and projects that have an impact on the process of impoverishment of these rural communities. Reduction and taking/deprivation of the rights of local communal residents in access to control and use of land which was driven by the error of the government program, made the foundation that became the main (political) power in rural communities lost [14].

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The movement of people and goods is followed by movement to and from the city center and transition areas. This is due to the spatial development pattern of Bogor City which is concentrated in the center, while in the outskirts it is dominant with residential/settlement areas. The hierarchy of the city of Bogor was studied by scalogram analysis. Scalogram analysis is used to determine the level of development of an area based on social, economic activities, and to identify the level of regional capability and population accessibility to service centers. Based on the scalogram analysis, the highest hierarchies tend to be in the city center then spread to the suburbs tend to be lower hierarchies [15].

Efforts to organize transportation with the concept of equality between all levels of society. Movement in the transportation system is the physical movement of people and goods using or without means of transportation. The transportation system is a form of interrelatedness between actors within its scope such as users, goods, infrastructure and facilities together, both natural and planned. This system aims to coordinate movement with components that use the media in a measurable transportation process. Achievement of the process of transportation of passengers and goods as optimally as possible in a certain space and time taking into account several factors such as safety, comfort, smoothness, time and cost efficiency according to these needs [16-22]. The balance and the need for transportation facilities and infrastructure in achieving their goals are the real movements of each user. The process that surrounds the movement of users is with different characteristics, especially on the purpose of traveling, transportation costs and time used. The transportation system uses the main components, namely spatial configuration, transportation technology and institutional systems [23-28].

Indicators of poor traffic services can be seen from the low speed of travel, the average length of the queue, the length of travel time and the high side barriers of traffic along the road. If these conditions are not anticipated early, it is feared that sooner or later a city will experience total congestion and become an unattractive city and be avoided by road users as well as the burden on the city community which is spent on travel needs [29-31].

The purpose of this study is to formulate and evaluate transportation infrastructure facilities and traffic signs at intersections so that the right way to make decisions is based on the criteria set out in the research methodology.

2. RESEARCH AND METHODS

Data retrieval using an expert system/expert by taking several criteria included in it.

a. Expertise/expertise at the academic level/researcher as many as two people
b. Expertise/expertise as a policy maker (decision maker) as many as two people.
c. Special expertise/skills such as an expert in the field of transportation in this case the Indonesian Transportation Society/MTI as many as one person.

In the following, the research locations are located at three intersection points in the city of Bogor and Bogor district as shown in Figure-1 below.

Figure-1. Research location.

Next, the research flow chart is presented. This research flow chart is determined based on complete data in the field by collecting as much data as possible to complete this qualitative research, so that the results obtained are getting closer to the criteria that have been set. The research flow chart is shown in Figure-2 below.

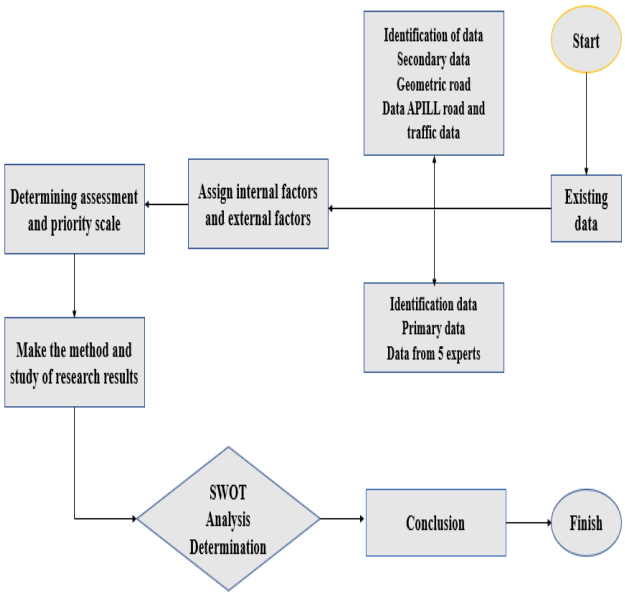

Figure-2. Research flow chart.

Respondent's Identity

Before going further and implementing transportation infrastructure in the research area. Because the 2 intersection locations that must be investigated are in the administrative area of the Bogor district, namely the

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three-arm signaled intersection of the Salabenda intersection in Kemang district, the four-arm signaled intersection of the Ciawi intersection, while the other 3 locations are in the administrative area of the city of Bogor, namely the four-arm signaled intersection of the Semplak intersection in the district of West Bogor, the three-arm signaled intersection of the Bubulak intersection in the West Bogor sub-district and the three-arm signaled POMAD intersection in the North Bogor sub-district. The survey conducted was an expert system survey involving 2 academics and 2 government officials, namely one person from the Bogor City Road Transport Traffic Service and one person from the Bogor City Transportation Service and 1 person from an expert, namely the Indonesian Transportation Society/MTI.

As existing data by identifying the initial infrastructure including stops and traffic signs around the intersection, it is shown in Table-1 and Table-2 below.

Table-1. Identify the infrastructure of the shelter conditions at each signal intersection.

No	Signal intersections	Shelter locations	Shelter conditions	By the rule
1	Salabenda	KH Sholeh skandar Rd. to Parung Rd.	Nothing	Not as expected
	Intersection	Atang Sanjaya Rd. to KH Dholeh Iskandar Rd.	Nothing	Not as expected
		Parung Rd. to Bogor highway.	Nothing	Not as expected
2	Semplak	KH Abdulah bin Nuh Rd. to SP Yasmin Rd.	Yes	Yes
	Intersection	KH Abdulah bin Nuh Rd. to Laladon Rd.	Nothing	Not as expected
		Kpt Semeru Rd. to Merdeka Rd.	Nothing	Not as expected
		Kpt Semeru Rd. to Atang Sanjaya Rd.	Nothing	Not as expected
3	Bubulak	KH Abdulah bin Nuh Rd. to SP Yasmin Rd.	Nothing	Not as expected
	Intersection	Dramaga Rd. to IPB Dramaga Rd.	Nothing	Not as expected
		Dramaga Rd. to Ciomas Rd.	Nothing	Not as expected
4	POMAD	Bogor highway. to Jambu Dua Rd.	Nothing	Not as expected
	Intersection	Bogor highway. to SP Sentul Rd.	Nothing	Not as expected
		Tanah Baru Rd. to Perumahan Tanah Baru Rd.	Nothing	Not as expected
		Tanah Baru Rd. to Asrama POMAD Rd.	Nothing	Not as expected
5	Ciawi Intersection	Tajur highway to SP Sukasari Rd.	Yes	Not as expected
		Tajur highway. to SP Gadog Rd.	Nothing	Not as expected
		Sukabumi highway. to SP Lido Rd.	Nothing	Not as expected
		Sukabumi highway. to Tollroad Jagorawi.	Nothing	Not as expected

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Table-2. Identification of traffic signs at signalized intersections.

No	Signal intersections	Zebra crossing	APILL	Road markings	Signs	Kansteen and channels	Road safety
1	Salabenda Intersection						
	KH Sholeh skandar Rd. to Parung Rd.	Nothing	Yes	Yes	Nothing	Yes	Yes
	Atang Sanjaya Rd. to KH Dholeh Iskandar Rd.	Nothing	Yes	Nothing	Nothing	Yes	Yes
	Parung Rd. to Bogor highway.	Nothing	Yes	Nothing	Nothing	Yes	Yes
2	Semplak Intersection						
	KH Abdulah bin Nuh Rd. to SP Yasmin Rd.	Yes	Yes	Yes	Yes	Yes	Yes
	KH Abdulah bin Nuh Rd. to Laladon Rd.	Yes	Yes	Yes	Yes	Yes	Yes
	Kpt Semeru Rd. to Merdeka Rd.	Nothing	Yes	Yes	Yes	Yes	Yes
	Kpt Semeru Rd. to Atang Sanjaya Rd.	Nothing	Yes	Yes	Yes	Yes	Yes
3	Bubulak Intersection						
	KH Abdulah bin Nuh Rd. to SP Yasmin Rd.	Nothing	Yes/trouble	Nothing	Nothing	Nothing	Yes
	Dramaga Rd. to IPB Dramaga Rd.	Nothing	Yes/trouble	Nothing	Nothing	Nothing	Yes
	Dramaga Rd. to Ciomas Rd.	Nothing	Yes/trouble	Nothing	Nothing	Nothing	Yes
4	POMAD Intersection						
	Bogor highway. to Jambu Dua Rd.	Yes	Yes	Nothing	Yes	Nothing	Yes
	Bogor highway. to SP Sentul Rd.	Yes	Yes	Nothing	Yes	Nothing	Yes
	Tanah Baru Rd. to Perumahan Tanah Baru Rd.	Nothing	Yes	Nothing	Yes	Nothing	Yes
	Tanah Baru. Rd to Asrama POMAD Rd.	Nothing	Yes	Nothing	Yes	Nothing	Yes
5	Ciawi Intersection						
	Tajur highway. to SP Sukasari Rd.	Nothing	Yes	Nothing	Yes	Yes	Yes
	Tajur highway. to SP Gadog Rd.	Nothing	Yes	Nothing	Yes	Yes	Yes
	Sukabumi highway. to SP Lido Rd.	Nothing	Yes	Nothing	Yes	Yes	Yes
	Sukabumi highway. to Tollroad Jagorawi.	Nothing	Yes	Nothing	Yes	Yes	Yes

In formulating and assessing the condition of the infrastructure at the intersection, it is described in the form of identification at each intersection point studied so that a determination is made beforehand. The determination in question is the extent to which the role of the intersection has a positive and negative impact so that it can support the program of determining and protecting users in the context of rearranging the functions of public facilities according to their designation. The designation of public facilities in the city of Bogor and Bogor district expects the public to care about the actual conditions.

The initial data that has been collected is data on the condition of the bus stop so that the results are not satisfactory to all parties. The next step is 1). identifying primary data and secondary data using the SWOT method, 2) weighting or scoring for each SWOT component, 3) making a matrix to facilitate SWOT analysis, namely by weighting a SWOT analysis so that the magnitude of each SWOT can be known, 4) analyzing calculation results with the matrix, 5) conclude the results of the analysis using the SWOT method.

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Furthermore, the identification of internal and external factors is carried out by dividing the form of the indicator model identified as below.

Internal Factors

1. Strengths:
a. Transport system policy and planning prioritizing maintenance of existing traffic signs,
b. Land transportation is the most dominant mode of transportation and is used by the community to carry out every activity from to a place for activities,
c. Having a close integration with the sea transportation network system and air transportation system,
d. It really supports the smooth distribution of people and goods throughout the mainland,
e. Rehabilitation of infrastructure facilities at intersections to support land transportation mobility,
f. Transport system policy and planning will promote operational and management improvements,
g. Transportation is a vital sector of every development process carried out and is the lifeblood of the economic process.

2. Weaknesses:
a. Lots of traffic signs that don't work properly,
b. High side barriers at every intersection and heavy traffic areas,
c. Discipline for drivers, passengers, and pedestrians is still lacking,
d. Congestion causes very high social costs,
e. The number of public transportation within the city and outside the city is out of control,
f. How to drive a vehicle carelessly and can endanger the safety of other road users?
g. Lack of assurance of the need for a sense of security, the need for punctuality, the need for long trips experienced by public transport users.

External Factors

1. Opportunities:
a. TULLAK integrated area (South Sentul and Bubulak),
b. The development of development in the city of Bogor is in line with the development of the transportation and tourism system,
c. The geographical location of the city of Bogor and the adjacent district of Bogor,
d. Bus operation Ciawi-Bubulak mass public transportation, Bubulak-Sholeh Iskandar-Baranangsiang,
e. Potential natural resources of Bogor regency and Bogor city in the development of transportation and tourism sector.

2. Threats:
a. The number of violations and traffic accidents,
b. The easier the process of owning a private vehicle, both a car and a motorcycle,
c. Migration pressure from rural to urban areas and the development of the city of Bogor itself,
d. Rising land prices in the center of Bogor,
e. The opening of a new shopping center adds to congestion on certain roads resulting in the nearest intersection,
f. Availability of funding for transportation system development.

Rating 1 = Strongly Disagree
Rating 2 = Disagree
Rating 3 = Neutral
Rating 4 = Agree
Rating 5 = Strongly Agree

Letter A = Priority is not important for strategy
Letter B = Priority is less important for strategy
Letter C = Important priority for strategy
Letter D = Very important priority for strategy

The following shows the factors of internal and external interests that influence each assessment of the weights to be completed. It is illustrated in Table-3 below.

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Table-3. Factors for assessing internal and external interests.

No	Factors	Appraisal					Interest			
	Internal factors									
	Strength (S)									
1	Transport system policy and planning prioritizing maintenance of existing traffic signs.	1	2	3	4	5	A	B	C	D
2	Land transportation is the most dominant mode of transportation and is used by the community to carry out every activity from to a place for activities.	1	2	3	4	5	A	B	C	D
3	Having a close integration with the sea transportation network system and air transportation system.	1	2	3	4	5	A	B	C	D
4	It really supports the smooth distribution of people and goods throughout the mainland.	1	2	3	4	5	A	B	C	D
5	Rehabilitation of infrastructure facilities at intersections to support land transportation mobility	1	2	3	4	5	A	B	C	D
6	Transport system policy and planning will promote operational and management improvements.	1	2	3	4	5	A	B	C	D
7	Transportation is a vital sector of every development process carried out and is the lifeblood of the economic process.	1	2	3	4	5	A	B	C	D
	Weaknesses (W)									
1	Lots of traffic signs that don't work properly.	1	2	3	4	5	A	B	C	D
2	High side barriers at every intersection and heavy traffic areas.	1	2	3	4	5	A	B	C	D
3	Discipline for drivers, passengers, and pedestrians is still lacking.	1	2	3	4	5	A	B	C	D
4	Congestion causes very high social costs.	1	2	3	4	5	A	B	C	D
5	The number of public transportation within the city and outside the city is high.	1	2	3	4	5	A	B	C	D
6	How to drive a vehicle carelessly and can endanger the safety of other road users.	1	2	3	4	5	A	B	C	D
7	Lack of assurance of the need for a sense of security, the need for punctuality, the need for long trips experienced by public transport users.	1	2	3	4	5	A	B	C	D
	External factors									
	Opportunities (O)									
1	TULLAK integrated area (South Sentul and Bubulak).	1	2	3	4	5	A	B	C	D
2	The development of development in the city of Bogor is in line with the development of the transportation and tourism system.	1	2	3	4	5	A	B	C	D
3	The geographical location of the city of Bogor and the adjacent district of Bogor.	1	2	3	4	5	A	B	C	D
4	Bus operation Ciawi-Bubulak mass public transportation, Bubulak-Sholeh Iskandar-Baranangsiang.	1	2	3	4	5	A	B	C	D
5	Potential natural resources of Bogor regency and Bogor city in the development of transportation and tourism sector.	1	2	3	4	5	A	B	C	D
	Threats (T)									
1	The number of violations and traffic accidents.	1	2	3	4	5	A	B	C	D
2	The easier the process of owning a private vehicle, either a car or a motorcycle.	1	2	3	4	5	A	B	C	D
3	The pressure of rural to urban migration and the development of the city of Bogor itself.	1	2	3	4	5	A	B	C	D
4	Rising land prices in the city center.	1	2	3	4	5	A	B	C	D
5	The opening of a new shopping center adds to congestion on certain roads, resulting in the nearest intersection.	1	2	3	4	5	A	B	C	D
6	Availability of funding for transportation system development	1	2	3	4	5	A	B	C	D

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3. RESULTS AND DISCUSSIONS

The Results of the Assessment of the Strength Indicator

The results of the assessment based on strengths have been submitted to experts to assess how important activities are in supporting the concept of structuring traffic engineering and transportation systems. Next, the results of the assessment of the strength of the weight factor are presented in table 4 of the strength of the weight with the rating in Table-5 below.

Table-4. The results of the assessment of the strength indicator.

No	Factors	Respondent					Average value	Score
		1	2	3	4	5		
1	Transport system policy and planning prioritizing maintenance of existing traffic signs.	4	4	4	5	5	4.4	0.140
2	Land transportation is the most dominant mode of transportation and is used by the community to carry out every activity from to a place for activities.	5	5	4	5	4	4.6	0.146
3	Having a close integration with the sea transportation network system and air transportation system.	4	5	4	4	5	4.4	0.140
4	It really supports the smooth distribution of people and goods throughout the mainland.	4	4	4	4	5	4.2	0.134
5	Rehabilitation of infrastructure facilities at intersections to support land transportation mobility.	5	4	4	4	5	4.4	0.140
6	Transport system policy and planning will promote operational and management improvements.	5	4	5	5	5	4.8	0.153
7	Transportation is a vital sector of every development process carried out and is the lifeblood of the economic process.	4	5	4	5	5	4.6	0.146
							31.4	

Table-5. The results of the assessment of the strength indicator with a rating.

No	Factors	Respondent					Average value	Score x Rating
		1	2	3	4	5		
1	Transport system policy and planning prioritizing maintenance of existing traffic signs.	4	4	4	4	3	**3.8**	0.532
2	Land transportation is the most dominant mode of transportation and is used by the community to carry out every activity from to a place for activities.	4	4	3	4	4	**3.8**	0.557
3	Having a close integration with the sea transportation network system and air transportation system.	4	3	4	4	3	**3.6**	0.504
4	It really supports the smooth distribution of people and goods throughout the mainland.	3	4	4	4	4	**3.8**	0.508
5	Rehabilitation of infrastructure facilities at intersections to support land transportation mobility.	4	4	4	4	4	**4**	0.561
6	Transport system policy and planning will promote operational and management improvements.	4	4	4	4	4	**4**	0.611
7	Transportation is a vital sector of every development process carried out and is the lifeblood of the economic process.	4	3	4	4	4	**3.8**	0.557
								3.831

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Result of Weaknesses Indicator

The results of the assessment are based on weaknesses that have been submitted to experts to assess how important activities are in supporting the concept of structuring traffic engineering and transportation systems. Next, the results of the assessment of the weight weakness factor are presented in Table-6 and the weight weakness with the rating in Table-7 below.

Table-6. Weakness indicator assessment results.

8	**Lots of traffic signs that don't work properly.**	**4**	**5**	**5**	**5**		**4**	**4.6**	**0.139**
9	High side barriers at every intersection and heavy traffic areas.	4	5	5	4		5	4.6	0.139
10	Discipline for drivers, passengers, and pedestrians is still lacking.	4	5	5	5		5	4.8	0.145
11	Congestion causes very high social costs.	5	4	4	5		5	4.6	0.139
12	The number of public transportation within the city and outside the city is high.	5	5	4	5		5	4.8	0.145
13	How to drive a vehicle carelessly and can endanger the safety of other road users.	5	4	5	5		5	4.8	0.145
14	Lack of assurance of the need for a sense of security, the need for punctuality, the need for long trips experienced by public transport users.	4	5	5	5		5	4.8	0.145
								33	

Table-7. Weakness indicator assessment results with rating indicator.

8	**Lots of traffic signs that don't work properly**	**3**	**3**	**3**	**3**	**2**	**2.8**	**0.390**
9	High side barriers at every intersection and heavy traffic areas.	3	3	3	3	2	2.8	0.390
10	Discipline for drivers, passengers, and pedestrians is still lacking.	3	3	3	4	2	3	0.436
11	Congestion causes very high social costs.	3	3	3	3	3	3	0.418
12	The number of public transportation within the city and outside the city is high.	2	2	2	3	2	2.2	0.320
13	How to drive a vehicle carelessly and can endanger the safety of other road users.	3	2	2	3	2	2.4	0.349
14	Lack of assurance of the need for a sense of security, the need for punctuality, the need for long trips experienced by public transport users.	3	3	2	3	4	3	0.436
								2.741

The Results of the Assessment of the Opportunity Indicator

The results of the assessment are based on the opportunities that have been submitted to experts to assess how important activities are in supporting the concept of structuring traffic engineering and transportation systems. Next, the results of the assessment of the weight opportunity factor are presented in Table-8 and the opportunity with a rating in Table-9 below.

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Table-8. The results of the assessment of the weight opportunity indicator.

15	**TULLAK integrated area (South Sentul and Bubulak).**	**3**	**5**	**4**	**4**	**5**	**4.2**	**0.191**
16	The development of development in the city of Bogor is in line with the development of the transportation and tourism system.	5	5	4	5	5	4.8	0.218
17	The geographical location of the city of Bogor and the adjacent district of Bogor.	4	4	4	4	5	4.2	0.191
18	Bus operation Ciawi-Bubulak mass public transportation, Bubulak-Sholeh Iskandar-Baranangsiang.	4	5	4	4	4	4.2	0.191
19	Potential natural resources of Bogor regency and Bogor city in the development of transportation and tourism sector.	5	4	4	5	5	4.6	0.209
							22	

Table-9. The results of the opportunity indicator assessment with a rating.

15	**TULLAK integrated area (South Sentul and Bubulak).**	**4**	**4**	**3**	**4**	**4**	**3.8**	**0.725**
16	The development of development in the city of Bogor is in line with the development of the transportation and tourism system.	3	4	3	4	4	3.6	0.785
17	The geographical location of the city of Bogor and the adjacent district of Bogor.	3	3	3	3	2	2.8	0.535
18	Bus operation Ciawi-Bubulak mass public transportation, Bubulak-Sholeh Iskandar-Baranangsiang.	3	3	3	3	4	3.2	0.611
19	Potential natural resources of Bogor regency and Bogor city in the development of transportation and tourism sector.	3	3	4	3	3	3.2	0.669
								3.325

The Results of the Assessment of the Threat Indicator

The results of the assessment are based on threats that have been submitted to experts to assess how important activities are in supporting the concept of structuring traffic engineering and transportation systems. Next, the results of the assessment of the weight threat factor are presented in table 10 and the threat with a rating in Table-10 below.

Table-10. The results of the assessment of the weight threat indicator.

20	**The number of violations and traffic accidents.**	**4**	**3**	**3**	**4**	**2**	**3.2**	**0.160**
21	The easier the process of owning a private vehicle, either a car or a motorcycle.	3	3	3	4	3	3.2	0.160
22	The pressure of rural to urban migration and the development of the city of Bogor itself.	3	4	4	4	4	3.8	0.190
23	Rising land prices in the city center.	4	3	4	4	5	4	0.200
24	The opening of a new shopping center adds to congestion on certain roads, resulting in the nearest intersection.	4	3	3	3	4	3.4	0.170
25	Availability of funding for transportation system development	2	2	3	3	2	2.4	0.120
							20	

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Table-11. Threat indicator assessment results with rating.

20	**The number of violations and traffic accidents.**	**3**	**2**	**2**	**3**	**3**	**2.6**	**0.416**
21	The easier the process of owning a private vehicle, either a car or a motorcycle.	3	3	2	2	3	2.6	0.416
22	The pressure of rural to urban migration and the development of the city of Bogor itself.	3	2	3	3	2	2.6	0.494
23	Rising land prices in the city center.	3	3	3	3	3	3	0.600
24	The opening of a new shopping center adds to congestion on certain roads, resulting in the nearest intersection.	3	3	3	3	3	3	0.510
25	Availability of funding for transportation system development	4	4	5	4	4	4.2	0.504
								2.940

Furthermore, it is shown the relationship between internal factors and external factors in determining the mission success factor as a strategic factor or key success factor, it is necessary to assess all the key factors that have been identified. By paying attention to internal and external factors in determining policies and evaluating transportation infrastructure facilities and traffic signs at each signalized intersection in the research location of Bogor City and Bogor Regency, it produces a qualitative assessment using a rating scale from 1 to 5, 1 the value is very bad and 5 is very good value. While the value scale uses the interrelationships and urgency of support with the function of interrelationships between internal factors and external factors, namely the letters A to D with A meaning that priority is not important for strategy and D is a very important priority for strategy as shown in Table-12 below.

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Tabel-12. Matrik factor internal dengan factor external.

IFAS / EFAS	No.	Strengths	No	Weaknesses
	1	Transport system policy and planning prioritizing maintenance of existing traffic signs.	1	Lots of traffic signs that don't work properly.
	2	Land transportation is the most dominant mode of transportation and is used by the community to carry out every activity from to a place for activities.	2	High side barriers at every intersection and heavy traffic areas.
	3	Having a close integration with the sea transportation network system and air transportation system.	3	Discipline for drivers, passengers, and pedestrians is still lacking.
	4	It really supports the smooth distribution of people and goods throughout the mainland.	4	Congestion causes very high social costs.
	5	Rehabilitation of infrastructure facilities at intersections to support land transportation mobility.	5	The number of public transportation within the city and outside the city is high.
	6	Transport system policy and planning will promote operational and management improvements.	6	How to drive a vehicle carelessly and can endanger the safety of other road users.
	7	Transportation is a vital sector of every development process carried out and is the lifeblood of the economic process.	7	Lack of assurance of the need for a sense of security, the need for punctuality, the need for long trips experienced by public transport users.
		Core = 3.831		**Score = 2.741**
No	**Opportunities**	**Strategy SO =** 7.156		**Strategy WO = 5**.796
1	TULLAK integrated area (South Sentul and Bubulak).	Optimizing the development of transportation infrastructure and the TULLAK area to meet transportation needs between regions and support regional development.		Inter-regional transportation planning in order to reduce accessibility gaps, in an integrated, integrated manner and in accordance with regional characteristics.
2	The development of development in the city of Bogor is in line with the development of the transportation and tourism system.	Synchronization of transportation sector policies in regional development and economic development.		Transport policy by considering strategic environmental research.
3	The geographical location of the city of Bogor and the adjacent district of Bogor.	Development of existing transportation networks in the region, based on the potential geographic location and natural resources of the region by looking at opportunities from the transportation sector and tourism sector.		Improving the quality of human resources/HR, as well as socialization to increase the level of public understanding of the development of the transportation sector.
4	Bus operation Ciawi-Bubulak mass public transportation, Bubulak-Sholeh Iskandar-Baranangsiang.			Increased discipline for passenger drivers and pedestrians/road pedestrians.
5	Potential natural resources of Bogor regency and Bogor city			Balancing the percentage of procurement of the number of vehicles.

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	in the development of transportation and tourism sector.				
					Minimize the level of congestion with APILL traffic signs.
	Score = 3.325				
No	**Threats**		**Strategy ST = 6.771**		**Strategy WT = 5.681**
1	The number of violations and traffic accidents.		Regional transportation policies that create opportunities and interest in transportation sector investment.		Minimize conflicts of interest in spatial planning through realignment of regional spatial planning in accordance with the conditions, carrying capacity and characteristics of the region.
2	The easier the process of owning a private vehicle, either a car or a motorcycle.		Regional development and management in accordance with the carrying capacity of the region.		Improving the function of traffic signs, minimizing side barriers on each shoulder of the road to reduce congestion and increasing discipline in motorized vehicle ownership and tightening ownership of driving licenses/driver's licenses.
3	The pressure of rural to urban migration and the development of the city of Bogor itself.		Maximizing the development of the road network by optimizing the distribution of passenger and goods transport to feeder transport (transport between environments).		Increase the need for security, the need for punctuality, the need for long trips to increase the number of tourist visits in the development of the transportation and tourism sector in service to the community.
4	Rising land prices in the city center.		Maximizing modal integration to access new road networks.		
5	The opening of a new shopping center adds to congestion on certain roads, resulting in the nearest intersection.				
6	Availability of funding for transportation system development				
	Score = 2.940				

Based on the results of the assessment of the success factors in table 16 above, it can be identified the key success factors based on the highest Total Weight Value (TWB) of each factor. These factors are the value of TWB from all components of internal and external factors, the values obtained are as follows:

a. Value of TWB Internal Factor Strength (S) = 3.831
b. Value of TWB External Factor Opportunity (O) = 3.325
c. Value of TWB External Threat Factor (T) = 2,940
d. Value of TWB Internal Factor of Weakness (W) = 2.741

Furthermore, the calculation results obtained the results of Strengths, Weaknesses, Opportunities and Threats. These values are then entered in the power map image, so that a line is obtained that describes the strategies that can be taken. In the figure it will be seen that in evaluating transportation infrastructure facilities and traffic signs in the Bogor district and Bogor city by maintaining the strength of internal factors and taking advantage of opportunities as much as possible and minimizing threats by suppressing weaknesses. Furthermore, the weighted value of each SWOT strategy analysis is shown as Table-13 below.

Table-13. Calculation of the value weight of the SWOT strategy.

No	Strategy	Value weight
1	Strenghts (S)	3.831
2	Weaknesses (W)	2.741
3	Opportunities (O)	3.325
4	Threats (T)	2.940

Table-13 above shows the strategy that has the highest value weight, namely the Strengths - Opportunities strategy. To determine the position of the quadrant based on the value of the factors that are entered into the X axis

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and Y axis. This means that the strength of the internal factors by suppressing the weakness.

X Axis = Strengths – Weaknesses
= 3,831 – 2,741
= 1,090
Y Axis = Opportunities – Threats
= 3.325 – 2.940
= 0.385

Strengths and opportunities are positive so it can be concluded that strengths and weaknesses produce positive values. Furthermore, the diagram of the results of the SWOT analysis is shown in Figure-3 below.

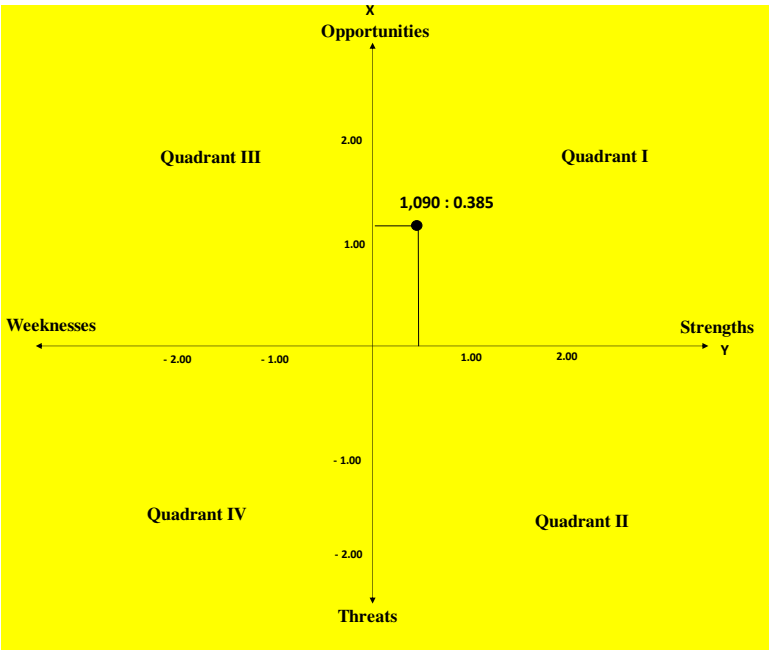

Figure-3. SWOT analysis results.

Calculation with the weighted value of the SWOT strategy obtained the highest Strengths-Opportunities (SO) with a value of 7.156 and then the second strategy is Strengths-Threats (ST) with a value of 6.711. The next value with strategy number three Weaknesses - Opportunities (WO) of 5.796 and the last strategy number four with Weaknesses - Threats (WT) of 5.681. The results of this weight calculation are shown in Table-14 below.

Table-14. SWOT strategy value weight calculation.

No	Strategy	Value weight
1	Strengths - Opportunities (SO)	3.831+ 3.325= 7.156
2	Strengths - Threats (ST)	3.831+ 2.940= 6.771
3	Weaknesses - Opportunities (WO)	2.741+ 3.325= 5.796
4	Weaknesses - Threats (WT)	2.741+ 2.940= 5.681

Research Discussion

The results and discussion of the SWOT analysis in table 14 show that the Bogor city government and the Bogor district government have a Strengths-Opportunities (SO) strategy of 7,156 so that this most powerful concept is the driving force for establishing a good city concept, that can optimize the development of transportation infrastructure and the TULLAK area to meet the needs of inter-regional transportation and support regional development. There is a synchronization of the transportation sector in regional development and economic development and the development of existing transportation networks in the area based on the potential geographic location and natural resources of the city of Bogor and Bogor district by looking at opportunities from the transportation sector and tourism sector. Maintaining opportunities with the Weaknesses-Opportunities (WO) strategy of 5,796 sets the opportunity that inter-regional transportation planning to reduce accessibility gaps, in an integrated, integrated and in accordance with regional characteristics, transportation policies by considering strategic environmental research, improving the quality of human resources as well as socialization to increase the level of public understanding of the development of the

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transportation sector, increase the discipline of passenger drivers and pedestrians/road pedestrians, balance the percentage of procurement of vehicles, minimize the level of congestion with APILL arrangements.

While the second strategy with a weight of 6,771 establishes the concept of regional transportation policies that create opportunities and investment interests in the transportation sector. Regional development and management in accordance with the carrying capacity of the region. Maximizing the development of the road network by optimizing the distribution of passenger transport and freight transport to feeder transport (transport between environments). Maximize the integration of modes to access the new road network. Furthermore, with the Weaknesses-Threats strategy that minimizes conflicts of interest in spatial planning through realignment of regional spatial planning in accordance with the conditions, carrying capacity and characteristics of the region, improving the function of traffic signs, minimizing side barriers on each shoulder to reduce congestion and increasing discipline of motorized vehicle ownership and tightening the ownership of driving licenses/driving licenses, increasing the need for security, the need for punctuality, the need for long trips to increase the number of tourist visits in the development of the transportation and tourism sector in service to the community.

4. CONCLUSIONS

Based on the results and discussion above, it is concluded that what needs to be emphasized is the Strengths-Opportunities (SO) strategy of 7,156 meaning that the most dominant value is optimizing the development of transportation infrastructure and the TULLAK area to meet transportation needs between regions and support regional development. Synchronizing transportation sector policies in regional development and economic development and developing existing transportation networks in the region, based on the potential geographical location and natural resources of the region by looking at opportunities from the transportation sector and tourism sector. While for the opportunity for the Weaknesses-Opportunities (WO) strategy is to make inter-regional transportation planning in order to reduce the accessibility gap, in an integrated, integrated and in accordance with regional characteristics. Take advantage of transportation policy opportunities by considering strategic environmental research. Improving the quality of human resources/HR, as well as socialization to increase the level of public understanding of the development of the transportation sector. Improve the discipline of passenger drivers and pedestrians/road pedestrians. Balancing the percentage of procurement of the number of vehicles. Minimize the level of congestion with APILL settings.

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