Traffic Problems at Jeepney Stops and Proposals for the Development of a Better Jeepney Stop Policy

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Abstract: The jeepney stop environment poses a persistent challenge to traffic policymakers and enforcers due to traffic problems it brings about. The existing policy provides for the designation of jeepney stops and yet, the actual situation is far from what was intended by the regulation. Is there a need for a new policy? How should a better jeepney stop policy be developed? This paper presents the jeepney stop environment, its participants and their interactive relationships; and proposes the formulation of an improved policy, as well as the study plan required for its evaluation.

1. Problems Associated with the Jeepney Stop

It has often been said that jeepney stops affect the traffic congestion in the streets of Metro Manila. This observation is due to many situations occurring in the jeepney stop environment:

a. Vehicles maneuvering to evade queuing and merging jeepneys;

b. Jeepneys competing for better stop positions;

c. Jeepneys stopping in the middle of the road to load and/or unload passengers;

d. Passengers occupying the outer lane and reducing the usable road space for vehicles; etc.; that in effect constricts the flow of vehicles in the roadway.

Another problem (which can also be derived from the situations mentioned above) associated with jeepney stops concerns traffic safety. Note that risky maneuvers are frequently used by drivers especially when positioning their vehicles in traffic. In the case of jeepney drivers, cutting and speeding are often applied to bypass other vehicles. Minor accidents usually occur but most are not reported especially when such mishaps involve only jeepneys or very minor damages to other vehicles. Such problems identified with the jeepney stop may be described by a mechanism which is comprised mainly of the interactive relationships among drivers and passengers. These interactive relationships will be discussed later on with relative detail. At this point, it is necessary to state that the objectives of this paper are as follows:

1) To describe the situation at jeepney stops;

2) To discuss the interactive relationships among drivers and passengers;

3) To propose the development of an improved policy by discussing its requirements;

4) To discuss the study program required for the evaluation of a suitable jeepney stop policy.

2. General Characteristics of Filipino Traffic Participants

2.1 Drivers

Personality is a word which is often associated with the driver. Driver personality is considered as an integral part of a framework called the Human-Vehicle-Environment Operating System as shown in Fig. 1. This system considers factors which may be inputted to the driver for him to consider in decision making before actually acting as a response to the input.

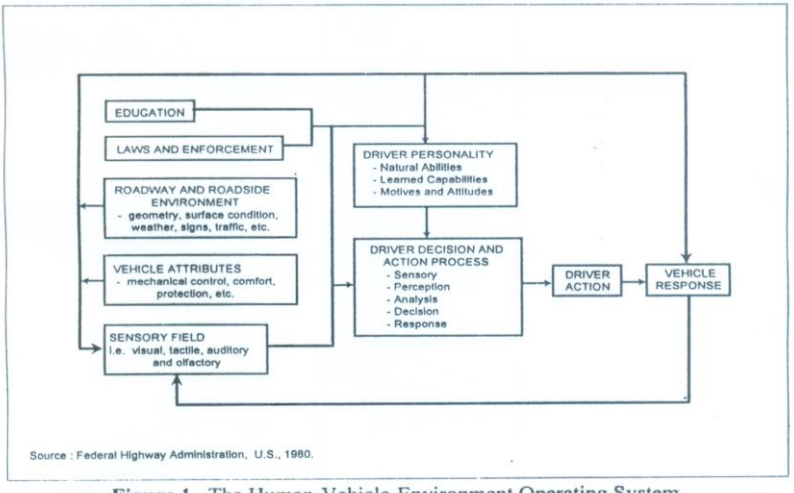


Figure 1. The Human-Vehicle-Environment Operating System.

Driver personality may be divided into three major areas, namely, natural abilities, learned capabilities and motives and attitudes. Natural abilities include the senses, intelligence and the person's health and compose the basics by which the driver has to start with. Learned capabilities include the person's knowledge-base, skills and habits. These abilities may be acquired through study and practice. Motives and attitudes are traits which describe how a driver behaves. These include emotional factors which may be difficult to evaluate. If one is

to examine the Filipino driver based on the three areas of personality mentioned above, he may come up with the observations on Table 1.

Table 1. A profile of the Filipino driver based on the three parts of driver.personality.

Natural Abilities	Learned Capabilities	Motives and Attitudes
☞ Makes full use of what he has been endowed; - Jeepney and taxi drivers are very good judges of space and motion. - Jeepney drivers are able to see clearly despite narrow windshields and operate well despite crouched positions.	☞ Has good control of his vehicle, is skillful but reckless; - Filipino drivers can bypass traffic jams by applying 'risky' maneuvers like frequent cutting and overtaking; - Jeepney drivers are able to maintain their attention on the road while getting the fares of passengers who are behind him; ☞ Knowledgeable of traffic rules but disregards them as he drives; ☞ Knowledgeable of Metro Manila's road network; - Applies this to avoid traffic jams in major roads or regular routes;	☞ Desire to earn a living; - Public transport drivers drive the way they do to be able to earn more (e.g. the more trips they make the better). Therefore, they will try their best to cut travel time as well as take the maximum number of passengers, even to the extent of making reckless maneuvers and improper stops. ☞ Desire to show-off - One form is to impress fellow drivers of his skills as well as his vehicle; - Another is to impress passengers (particularly females and male teens) of their driving skill. → This desire often leads to races and the taking of unnecessary chances.

2.2 Passengers

Commuters in first world nations typically troop to the bus stops nearest their origins in order for them to catch their regular bus rides. This is true unless they take rail-based trips, their destinations are within walking distance or for whatever reason, it is not necessary for them to take the scheduled bus. Note that in these countries it is only at designated stops where public transport may load and unload passengers.

While walking to the bus stop is common in the cities of other countries, it is not the norm in the Philippines, particularly in Metro Manila. The Filipino commuter is provided with a public transport system which allows him to walk to a convenient spot on the side of a street and board a vehicle. It is with respect to this public transport system that the personality of the local passenger has come to evolve.

There is no single word to describe the Filipino commuter's personality except, perhaps, *versatile*. Versatile because he can easily shift from one temperament to another. He can be a polite and disciplined passenger (i.e. one who boards and alights at the designated stops) in one ride but become a rude and irritating person in another. This personality will be illustrated in the succeeding sections of this paper.

3. Existing Regulation Concerning the Jeepney Stop

The location of jeepney stops in Metro Manila's roads have been established. However, the actual situation shows that the current jeepney stop policy is either unknown or disregarded for many reasons. At present, the designation of jeepney stops in Metro Manila follows three rules of thumb (see Figure 2):

1) Stops should be placed at a distance of at least 30 meters from an intersection.
2) The distance between stops at mid blocks should be at least 30 meters.
3) Stop sections for major stops should be at least 30 meters long.

The basis for such policy is unknown except that it has been applied for many years with some modifications. The first rule and third rules are reasonable and may be easily verified through surveys. The second rule, however, is questionable because the minimum length of thirty meters is very short and therefore, stops with such intervals may as well be termed as free stops.

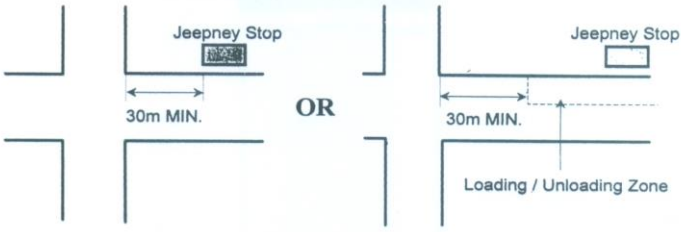
Overall, there are two problems with respect to the present jeepney stop policy. First, the regulation is quite bureaucratic because there are no traceable documents or studies supporting it and only a few, if any at all, knows the existence of such policy. Second, the regulation is too uniform, considering that there are no studies to validate its merits, that it neglects important factors such as road characteristics, traffic condition and the demand for jeepneys. If only for these two problems, then it can be asserted that the current jeepney stop policy is ineffective. Consequently, its use must be continued only until a better policy is formulated.

4. Interactive Relationships Among Traffic Participants at Jeepney Stops

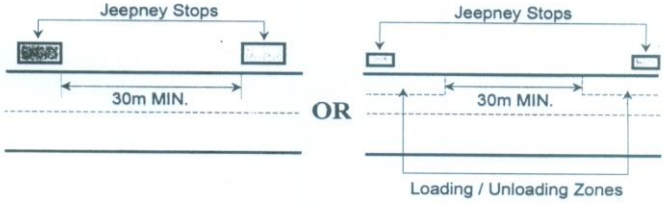
4.1 Defining Conflict in the Interactive Relationships

Literature such as short stories and novels contain an essential element termed as conflict. It is this element which gives life to story because it weaves the other elements together. Conflict may come in many forms such as man vs. man, man vs. nature and man vs. himself. The identification and classification of conflicts within a story permits the analysis and understanding of the story. As a result, this allows for the creation of critiques and the development or improvement of style and form. For the purposes of this paper, conflicts in literature will be used loosely to identify the interactions in the jeepney stop environment. The meaning of the term conflict used in this paper should be differentiated from its usual connotation in traffic engineering. Conflict in this case will not be limited to competition and opposition between two parties, with only one objective in mind. It will also include the

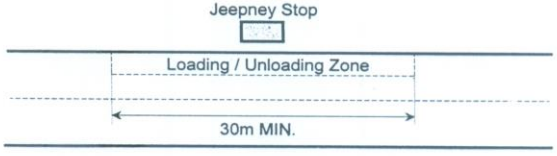
1. At least 30 meters from an intersection



2. At least 30 meters apart at midblock.



3. Length of stopping sections at least 30 meters



Source : Traffic Engineering Center

Figure 2. Three rules for the designation of jeepney stops.

struggle among groups with entirely different purposes. In this struggle, the parties involved influence one another into doing one endeavor. This concept will be clarified in the succeeding sections.

There are at least four conflicts present at the jeepney stop environment. Among them are as follows:

1. Driver vs. Driver
2. Jeepney Driver vs. Jeepney Driver
3. Jeepney Driver vs. Passenger
4. Passenger vs. Passenger

4.2 Driver vs. Driver

Driver vs. driver can be observed throughout the road section but concentration occurs especially at sections where jeepneys attempt either to separate from (i.e. with an intention to stop) or merge with (i.e. from the jeepney stop) through traffic. This conflict involves the drivers' use of risky maneuvers such as cutting, overtaking and speeding, in outdoing each other on the road for space and path. The interaction among drivers is a display of cunning and deliberate risk taking. For an illustration of the interaction among drivers, please refer to Figure 3.

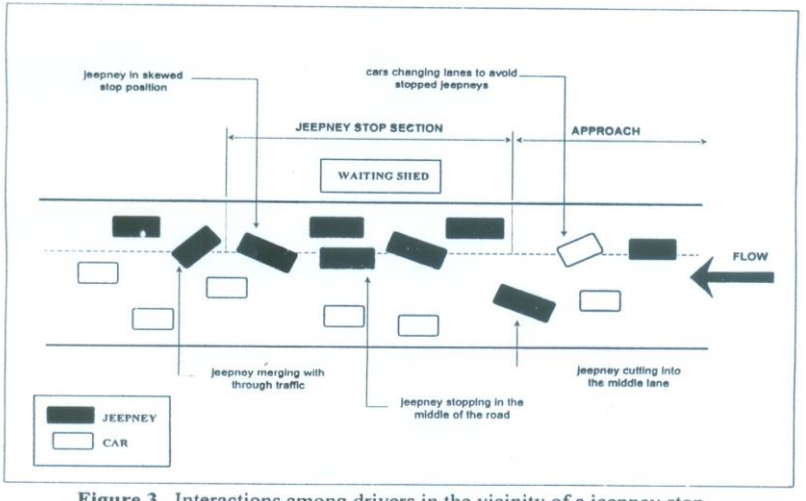


Figure 3. Interactions among drivers in the vicinity of a jeepney stop.

4.3 Jeepney Driver vs. Jeepney Driver

This type of interactive relationship occurs primarily within the jeepney stop area but may be observed as evolving at the approach to the stop section.. It may be identified as the competition among jeepney drivers in order for their jeepneys to secure the best stop position (i.e. where the most passengers are located and where the jeepney can get out immediately with relative ease). This conflict also involves the use of risky maneuvers. As a consequence of this conflict, the traffic flow in the vicinity of jeepney stops are usually constricted as jeepney drivers try to outdo one another, by stopping in skewed positions as well as in the middle of the road.

4.4 Jeepney Driver vs. Passenger

Jeepney driver vs. passenger has two aspects: on-board and on-street. On-board interaction involves a passenger or a group of passengers riding the jeepney, who want to alight at a particular location which is not necessarily a designated stop section. For clarity, on-board interaction may be described in the following scenarios:

Scenario A
A passenger tells the driver that he wants to get down at a particular location.[1] The driver either refuses, saying that it is illegal for him to stop there, or fails to notice for some reason (e.g. loud music inside the jeepney). The passenger insists and the driver finally stops the jeepney. Oftentimes, there is an exchange of invectives between the driver and the passenger. If the driver is coolheaded, he will maneuver to stop in an orderly manner at a designated section, else he will stop immediately regardless of his position on the road.[2]

Scenario B
The driver asks his passengers if anyone will alight at a particular stop. No one answers and the driver does not steer for a stop. But, as the jeepney passes the common stopping section, a passenger suddenly tells the driver to stop. This scenario then reverts to a situation with results similar to that of Scenario A.

On-street interaction involves commuters waiting for a ride and drivers whose attention is focused on picking-up passengers. The distribution of passengers along the streets influence the drivers because they become a major factor to consider especially when one is to take note of the motivation aspect of the jeepney drivers' personality. Looking back to Table 1, it was

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[1] A passenger can tell a driver that he wants to alight in 6 ways:
1) By speaking to him (e.g. "Para", "Sa tabi lang", etc.);
2) By whistling loudly to catch his attention;
3) By banging the ceiling of the jeepney;
4) By pulling a string hanging by the ceiling which turns on either a light or a buzzer near the driver;
5) By pushing a button near the ceiling handles which functions like the string in number four; and
6) By using the combination of any of the five ways above.

Note, however, that the first 3 ways are the most common since most jeepneys are not equipped with the mechanisms in 4 and 5.

[2] A good number of jeepney drivers refuse to heed whistles and banging of the ceiling. Some will even castigate passengers complaining of loud music. These drivers will most probably stop in an awkward manner, blocking other vehicles on the road, and often, at a section away from where the passenger wants to alight.

assumed that the primary motive of the jeepney driver is to earn as much as possible.[3] Therefore following this presumption, one may conclude that it is very probable for a driver to stop for a passenger or a group of passengers waiving at him, regardless of whether these people are waiting at an undesignated or restricted section.

4.5 Passenger vs. Passenger

Interaction between passengers occurs when a group of commuters at a particular location, which is not necessarily a designated stop, influences another group such that the latter group will move towards the former group's position with the idea that they can have a better chance of getting a ride there. It begins when a group of commuters waiting for a jeepney, observe that another group is successful in getting a ride at a location adjacent to where the former are waiting. The first group will then move toward that position thinking that by doing so, they will have an improved chance of getting a ride. This process, illustrated in Fig. 4, is repeated many times for different people until passengers are distributed almost evenly along a street. At this point, it is evident that many of these people are actually waiting at locations not designated for loading and unloading. What follows is the on-street interaction between drivers and passengers discussed earlier.

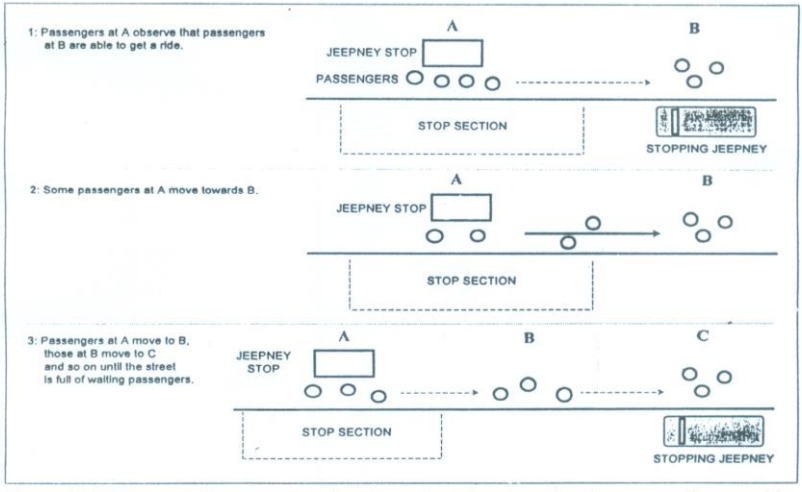

Figure 4. Movement of passengers to locations where they perceive they can easily get a ride.

[3] This may provide the reason for the usual practice of letting some passengers hang by the jeepney entrance (sabit), which is considered a safety hazard.

5. Proposals for the Development of a Better Jeepney Stop Policy

5.1 Why Study the Jeepney Stop Environment?

The jeepney stop environment is composed of many elements which are intrinsic to the Filipino. While it is true that many studies have been made in other countries concerning public transport terminals and loading/unloading facilities, it is also a fact that most, if not all, of these studies concern the bus. The usual practice in the Philippines is to adapt a foreign set of policy or criteria and implement it on the nation's systems, regardless of whether they are suitable or not. If one is to ask the question of applicability, then maybe that person should also ask if the Filipino personality is the same as an American's or a Japanese. The Filipino is definitely a different person with a different set of values and a different line of thinking. For instance, the behavior of the typical Filipino is very much different from his foreign counterparts. Local drivers (especially those of public transport vehicles) are known to take more chances or risks while passengers are generally stubborn and often unruly. Therefore, while it may not be necessary to consider passenger behavior in other countries' studies, it is only appropriate that it be included in Philippine researches. The development of policies which are suitable to the Filipino should be pursued for this may well be the best approach to solving the nation's traffic problems.

5.2 Requirements of an Effective Jeepney Stop Policy

To develop an effective jeepney stop policy, it is essential to take note of the shortcomings of the present policy. In section three two problems were cited regarding credibility and uniformity. Based on these problems, we may formulate the fundamentals for the improvement of the current practice. The framework of an effective policy may be likened to a series of questions. The answers to these questions may be found only by fulfilling certain requirements. There are three basic questions under the framework. These are :

1. Should the stop be designated or free?
2. What would be the interval between designated stops?
3. How long should the stop section be?

The response to these questions necessitates the consideration of important factors such as road characteristics, traffic volume, jeepneys' stop positions, land use and the demand for jeepneys. These factors are the controlling variables which would ultimately decide whether jeepneys will be allowed to stop at any section along a roadway or restricted to load/unload at designated points. Questions two and three qualify as follow-ups to the first. But note that the dimensions (i.e. interval and stop lengths) required in these questions would be decided by the controlling variables.

If one is able to satisfactorily answer the three questions posed in the preceding paragraph., then he is able to solve the problems of the current policy. Yet, even with a plausible policy at hand, it would eventually be ineffectual unless disseminated for public knowledge and

enforced in the streets. This would be the final requirement for an effective jeepney stop policy - that the participants know the policy regulating the jeepney stop environment.

6. Study Plan for the Evaluation of a Jeepney Stop Policy

6.1 Evaluation Tools

6.1.1 Simulating the Jeepney Stop Environment

Computer simulation is an analytical tool commonly used by scientists to study a real system (e.g. vehicular traffic). It involves the creation of a model of the system of interest and the writing of a computer program which will approximate the system's behavior under variable conditions which may be applied by the user. The advantage of using computer simulation over other methods are shown in Table 2.

Table 2. Advantages and disadvantages of three different methods of evaluating real systems.

Method	Advantages	Disadvantages
1. Simulation	☑ Allows replication (repeatable) ☑ Can 'simulate' long periods of time in computer time ☑ Permits the variation of different conditions which are represented by controlling variables ☑ Can utilize non-standard probability distributions ☑ Can satisfactorily cope with dynamic or transient effects	☒ Producing useful results may be time consuming ☒ Realistic simulations may require complex and clumsy computer programs ☒ May be expensive as it requires skilled manpower to develop computer programs
2. Direct Experimentation	☑ Realistic ☑ Cost effective if done correctly under ideal conditions	☒ Replication is improbable (real world rarely permits the precise replication of an experiment) ☒ May turn out to be expensive due to the number of trials that have to be made to achieve general results, especially when errors are made during experimentation
3. Mathematical Modeling	☑ Minimal cost of development ☑ Permits replication	☒ May be cumbersome due to theoretical requirements ☒ Cannot cope with dynamic or transient effects
Derived from Pidd, 1988 (Ref. 2).		

Computer simulation offers the creation of a workable model where the controlling variables of a dynamic system, such as the jeepney stop environment, may be approximated through both stochastic and discrete methods. Those involved in the development should take care such that they will not come up with either a trivial program due to oversimplifying assumptions or, with the intention of creating a realistic program, one that includes too much variables that the program becomes too complex and therefore, very difficult to implement. A good program may allow the user to study the jeepney stop environment qualitatively and quantitatively, under different conditions where he can apply different rules to test different policies before finally deciding on which to apply in the actual system.

6.1.2 Discussing Simulation Results and Human Behavior

While simulation programs are able to quantify interactions in terms of probability distributions and apply these to test policies, academic discussion is another approach which can be used to supplement simulation as a final check for its results. Academic discussions of interactions may involve many prerequisites. One of these is the scientific observation of human behavior, such as the interactions described in section 4.

It is fortunate that behavioral science provides many research tactics which may be effectively used for the study of interactions. There are three major approaches for study, namely, clinical research, experimental research and correlational research. Clinical research involves naturalistic observation or the study of phenomena as they occur in the environment. It considers but a few individuals at a time. Experimental research involves the consideration of many variables (including their control) as well as many individuals at a time. Correlational research involves the establishment of relationships between variables and individuals. Most often, this approach utilizes questionnaires or surveys for its purposes.

Another, and perhaps equally important prerequisite of academic discussion is the venue for the activity. In this matter, the National Center for Transportation Studies of the University of the Philippines regularly holds Research Working Group (RWG) meetings where active discussions on research are undertaken. The RWG format provides an atmosphere where behavioral experts may be invited to join traffic engineers and planners in effectively deliberating the effects of different policies on the jeepney stop environment. Observations of the real system may either be undertaken by participants before meetings are held or, for a more interactive approach, be recorded beforehand on videotape which can then be viewed during the meetings. The results of simulation will also have to be made available for comparison and evaluation.

6.2 Scope of the Study

It is necessary to consider two important aspects of the jeepney stop, its influence on traffic flow and on passenger behavior. Influence on traffic flow involves the study of vehicular behavior within the jeepney stop environment given the physical characteristics of the road, traffic volume and other pertinent data with respect to traffic flow. Figure 5 shows the analytical flowchart for a jeepney stop's influence on traffic flow.

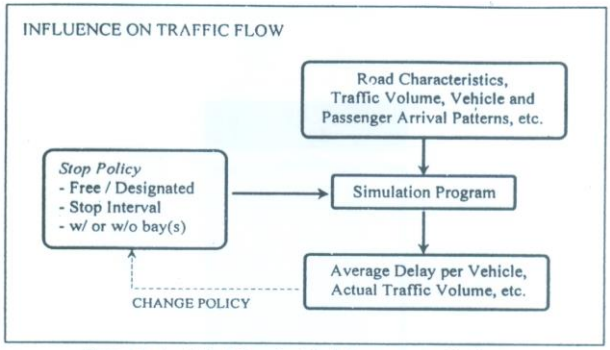

Figure 5. Analytical flowchart for influence on traffic flow.

The idea is to apply a preliminary stop policy and evaluate it using a method such as simulation (refer to section 6.1.1). The measures for evaluation may include the average delay per vehicle and the actual traffic volume allowed by the jeepney stop. This process of evaluation will be repeated for different policies. And in the end, an appropriate policy will be chosen after comparison with others using the evaluation measures.

The study of a stop's influence on passenger behavior may be done concurrently with that for traffic flow. This is because passenger behavior is not an entirely independent aspect of jeepney stops. Note that in sections 4.4 and 4.5, it was evident that the behavior of passengers ultimately affected traffic flow due to their influence on the jeepney driver's behavior. However, the evaluation of a stop's influence on passenger behavior may not be included in a simulation program except perhaps for a function defining the arrival and number of commuters who will actually board a jeepney. Due to its behavioral nature, influence on passenger behavior may be effectively taken up over the discussion table. Probable measures or topics for deliberation would include effects on ridership (if stops are to be designated) and the average walking distance for a commuter. The analytical flowchart for a jeepney stop's influence on passenger behavior is shown in Figure 6.

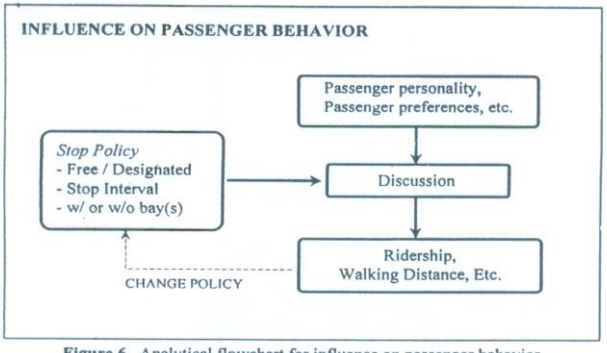

Figure 6. Analytical flowchart for influence on passenger behavior.

6.3 A Question of Enforcement

While this paper has been able to describe the major interactions in the jeepney stop environment, it was not able to discuss some which are definitely present and perhaps critical in the real system. These interactions are those which concern the influence of traffic enforcers on drivers and passengers. Note that the proper enforcement of traffic rules and regulations remains as the biggest stumbling block to any policy with respect to the jeepney stop, regardless of how much research was poured into the development of the latter. Therefore it is a necessity that the problem of enforcement is solved immediately.

At the moment, it can only be assumed that enforcement is ideal. Such is the case to consider in the development of a simulation program independent of a variable (i.e. enforcement), which could reduce the latter's efficiency in the evaluation of an appropriate policy for jeepney stops. The authors are optimistic that an effective policy may be developed in the future and this policy will include a criteria for the proper planning and design of jeepney stop facilities.

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