THE OPERATIONAL PERFORMANCE OF SCHOOL BUS IN A PRIVATE SCHOOL IN DEPOK, WEST JAVA, INDONESIA

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ABSTRACT

In Indonesia school transport provision is limited. Usually school transport is operated by the school management or third party. This paper discusses operational performance of school bus service in a school in Cinere, Depok, West Java consisting of play group, kindergarten and elementary/ junior high/ schools. Main users of services were younger students. School bus fleet consists of 16 minibuses serving students from wide range of residence origins. The service considers shortest route, travel time and number of students to be serviced in the fleet management. It becomes more complex because school time is varied between education levels, especially driving home schedule. Observations were made on four routes. A surveyor followed each bus and recorded, travel distance, travel time, waiting time at each residence. Questionnaires were distributed to parents, asking their socio-economic data and their perceptions on the service quality. Some statistical analysis were carried out to evaluate operational performance.

1. INTRODUCTION

School transport is a serious problem in Indonesia. This is not only because very limited school buses are provided, but because public transport is still very poor in terms of frequency and scope of services, safety and comfort. Therefore, in a private school, the role of management to provide school transport is very important. Usually the school transport system consists of several minibuses operated either by the school management or by the third party. This paper discusses the operational performance of school bus service in Dian Didaktika Islamic School in Cinere, Depok City, West Java. Depok City is located in the Southern part of the Greater Jakarta. The school itself consists of various levels of education, i.e. play group, kindergarten, elementary school, junior high school and high school. The main users of the services were play group, kindergarten and elementary school students. The school bus fleet consists of about 25 buses serving students living not only in nearby residences but also students living quite remote from the school. Therefore the service considers the relatively shortest route, travel time and number of students to be serviced in their fleet management. The fleet management become more complex because the school time for different levels of education are different. This implies especially to the transportation of the students from school to their homes. This paper will discuss the operational performance of school bus services in a private school in Cinere, Depok City, West Java Province.

2. LITERATURE REVIEW

Bowerman et al (1995) used three criteria in evaluating the provision of public goods developed by Savas (1978), i.e. efficiency, effectiveness and equity to carry out urban school bus routing in Ontario, Canada. Efficiency means that it should be cost effective. As operation cost per km travelled was higher than the capital cost a solution with fewer routes would be preferred. Effectiveness means whether bus transportation is available to all eligible students and whether the level of service is acceptable to the public. Equity means all students on the same route travel on a school bus approximately the same length of time.

According to the Director General of Land Transportation Decree No. SK.967/AJ.202/DRJD/2007, there are several requirements regarding school bus fleet and operation in Indonesia as follows:
- Transporting students from a particular school or group of schools located close to each other.
- Operated in a fixed schedule and a fix route determined by the school management.
- Using bus or passenger car.
- Registered as private vehicle.
- Travel time less than 90 minutes.
- Well ventilated or air conditioned.
- Under regular maintenance.
- Clearly indicated as a school transportation

3. METHODOLOGY

From 16 minibus routes operated as school transport of Dian Didaktika students, 4 routes were observed. They were selected to represent different origins of student residence. The services of 4 routes are presented in Table 1 and Figure 1. It can be seen that green route covers nearby Southern area and the blue route covers nearby Northern area. Although relatively short, the blue route was passing a considerably congested road corridor. Purple route that cover Southwestern area was longer than the first two routes. The Orange route that cover Southeastern area was the longest. The rest 12 routes not covered in this paper were spread between the observed routes.

Table 1. The Observed School Transport Routes

Minibus No.	Route Color	Level of Education of Students	Route	Length (Km)
A1	green	elementary school	Graha Cinere, Cinere Block J	8.1
B6	blue	elementary/ junior high school	Cinere Blocks A & B, Puri Cinere, Bukit Cinere Indah	10.3
C14	orange	kindergarten/ elementary school	Sawangan and Krukut	18.8
E16	purple	playgroup/ kindergarten/ elementary school	Ciputat, Pondok Cabe, Lereng Indah	17.9

Figure 1. The Observed School Transport Routes

Due to the difference in route length and due to difference of school time (start and finish time) of different combination of education level of students to be transported the operational pattern of each route was in detail different especially the travel distance and travel time. However some observed variables were relatively comparable, i.e. stopping time in the students residences both during morning pick up and during morning/ afternoon delivery, travel speed, etc.

A surveyor riding a motorcycle was following 5 to 10 meters behind a minibus on a selected route. Travel distance, arrival/ departure time and stopping time were recorded in every stopping points for pick up/ deliver the students until arrival on the last destination. Later on the travel time and travel speed can be calculated. Each route was observed three times in 3 different normal working days.

Figure 2. Arrival of a School Transport in the School

45 questionnaires were distributed to the parent of the students and 30 of them are returned. The questions include:
- Characteristics of respondents, e.g.name, gender, age, education, status of residence, monthly income, name of the student, family relation with student (mother, grandfather, aunt, etc.)
- Perception on the school transport performance etc.:
    o reason for using the service
    o punctuality
    o driver and driver attendant attitudes
    o safety and convenience of the vehicle
    o willingness to pay
    o etc.

Collected data were than analyzed using t-test and Spearman correlation analysis, both using significant level of 0.05. Travel time, travel speed and stopping time were three variables to be evaluated. T-tests can be used whether there were statistically significant mean difference of each variables if grouped by day, route and type of travel (pick up or delivery). Descriptive statistics and Spearman correlation analysis were carried out to analyze questionnaires data. In general correlations were analyzed between characteristics of respondents and their perception on school transport performance.

4. THE RESULTS

All of observed routes comply to all requirements of the Director General of Land Transportation Decree No. SK.967/AJ.202/DRJD/2007. In terms of student pick up travel time all observations show travel time of less than 90 minutes (Table 2). However in student delivery time, there was one observation that exceeded 90 minutes (Table 3). It should be noted that this was because of additional trip back to school to pick up students who have just arrived from a field trip. Although starting school times were different between different education levels, but the differences were maximum 30 minutes (7.00 for elementary and junior high school and 7.30 for play group and kindergarten) and therefore the pick up process can be

carried out in a single period although the service might be a mix of 2 to 3 different education levels. More complicated services were for delivery process. There were 3 different periods of delivery starting at 11.15, 12.45 and 14.15 respectively. Students younger than the third grade of elementary school leaving at 11.15, 3rd to 6th grades students of elementary school leaving at 12.45 and junior high school students leaving at14.15. However combination of students to be delivered home at each period varied between days. In a particular day some 1st grade elementary school students might leave school at 12.45 because they attend some extra curriculum sessions (arts, sports, etc.). Some students might also be picked up by the parents or personal drivers for attending courses conducted beyond the school management. Therefore there were no attempt to compare any of travel time and travel speed (as the distance was also varied without any regular pattern) data of student delivery service. Instead only stopping time was evaluated for delivery services.

Table 2. Pick Up Travel Time

Minibus No.	TravelTime (h:mm:ss)			Route Length (Km)
	Minimum	Mean	Maximum	
A1	0:31:56	0:37:30	0:40:35	8.10
B6	0:40:37	0:45:01	0:49:45	10.30
C14	0:47:49	0:51:32	0:54:59	18.80
E16	1:02:05	1:04:27	1:07:08	17.90

Table 3. Delivery Travel Time

Minibus No.	Travel Time (h:mm:ss)								
	1st Period of Delivery			2nd Period of Delivery			3rd Period of Delivery		
	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Minimum
A1	-	-	-	0:26:59	0:32:15	0:42:06	0:25:36	0:27:11	0:28:45
B6	0:27:02	0:30:10	0:31:51	0:24:02	0:30:38	0:31:37	0:47:55	0:48:53	0:49:52
C14	-	-	-	1:19:32	1:26:06	1:32:39	0:56:44	0:56:44	0:56:44
E16	0:34:47	0:36:35	0:38:53	0:18:26	0:21:08	0:24:37	-	-	-

Table 4. shows the mean of stopping times and mean of travel speeds grouped by days. If the t-tests of mean difference of stopping times were conducted between pair of observation days, it was found that mean stopping time in Thursday was significantly shorter than in Monday and in Tuesday. Although the mean of stopping times in Thursday seems to be the highest, however it was calculated from a very limited number of sample and therefore low degree of freedom requiring very large difference to be statistically significant. None of the differences between mean of travel times from pairs of observation days were statistically significant. It suggests that at any working days, means of travel speeds were about the same (slightly above 15 km/h).

Table 5. shows the mean of stopping times and mean of travel speeds grouped by routes. If the t-tests of mean difference of stopping times were conducted between pair of observed routes, it was found that mean stopping time of minibus no. A1 was significantly shorter than other minibuses and mean stopping time of minibus no. B6 was significantly shorter than minibus no. C14. This implies that shorter routes tend to have shorter stopping time. As travel time in the shorter route will be shorter, students were picked up later compare to the other routes and therefore the students in these routes tend to be well prepared

before the school transport came. If the t-tests of mean difference of travel speeds were conducted between pair of observed routes, it was found that mean travel speed of minibus no. A1 was significantly shorter than other minibuses and mean travel speed of minibus no. A1 was significantly lower than minibuses no. C14 and no. E16, travel speeds of minibuses no. B6 and no.E16 were significantly lower than minibus no.C14 and. This implies that longer routes tend to run in higher speeds possibly because passed road network includes wider roads allowing for higher speeds whilst in the shorter routes local residential roads were passed and speed should be limited for the sake of safety.

Table 6. shows the mean of stopping times and mean of travel speeds grouped by period of services. If the t-tests of mean difference of stopping times were conducted between pair of period of services, it was found that mean stopping time of the 3rd period of delivery was significantly shorter than other period of services. This implies that in the 3rd period of delivery the parents or the servants were more ready to greet the students because most of them were done with their domestic duties. If the t-tests of mean difference of travel speeds were conducted between pair of period of services, it was found that mean travel speed of morning pick up was significantly lower than the 1st period of delivery. This implies that earlier services tend to run in lower speeds possibly because the road network was congested with the general morning peak hour traffic.

Table 4. Mean of Stopping Times and Travel Speeds Grouped by Days

Day	Mean Stopping Time (m:ss)	Mean Travel Speed (Km/h)
Monday	1:10	16.9
Tuesday	1:21	17.4
Wednesday	2:27	17.9
Thursday	0:46	15.2

Table 5. Mean of Stopping Times and Travel Speeds Grouped by Routes.

Minibus No.	Mean Stopping Time (m:ss)	Mean Travel Speed (Km/h)
A1	0:41	14.4
B6	1:08	16.6
C14	1:32	20.0
E16	1:56	16.9

Table 6. Mean of Stopping Times and Travel Speeds Grouped by Period of Service.

Period of Service	Mean Stopping Time (m:ss)	Mean Travel Speed (Km/h)
Morning Pick Up	1:31	15.6
1st Period of Delivery	1:04	18.1
2nd Period of Delivery	1:12	17.9
3rd Period of Delivery	0:34	17.5

From 30 returned questionnaires, most of the respondents (60%) were female. Possibly because traditionally children daily needs such as school transport is the responsibility of the mother. Most of the respondents were aged between 35 to 42 years old as most of the users of school transport were playgroup/ kindergarten/ elementary schools. 70% of the parents hold an undergraduate degree. This suggests that the respondents were well educated persons. Most of the respondents (90%) lived in their

own homes. This suggests that respondents were relatively established. Yearly income of 50% of the respondents were about US$ 7,200 and US$ 10,800. Monthly income of 37% of them were more than US$ 10,800. These were higher than national per capita Gross Regional Domestic product (GRDP). This suggests that most of the respondents were relatively wealthy. 97% of the respondents were parents of the students and therefore expected to be considerably close with the students.

Most of the respondents stated that they the students use the school transport services because the parents had no spare time to do this by themselves, to ensure punctuality of arrival at school and more practical. More than 80% of the respondents satisfied with the punctuality of pick up time and 97% of them satisfied with the punctuality of delivery time. 77 % of the respondents never heard of their children complaint of the drivers and driver attendants attitudes. More than 60% of the respondents felt that the safety and the convenience of the school transport were not satisfactory and therefore although they are relatively wealthy their perceived that the cost of the service was too high. However compared to the available public transport most of them (77%) thought that the school transport was still more safe and more convenient. Their main recommendations to the management improve the services were to renew the fleet, to install air condition in all vehicles.

From some statistical analysis of the questionnaires results using t-test and Spearman correlation, only few statistically significant results found, e.g.:
- Female parents were more concern regarding punctuality of the school transport services compare with male parents.
- The older the age of the parent the higher their expectation to the management to add air condition in every vehicles.
- The reduction of cost of school transport was more expected by the parents who pay less (due to shorter travel distance and due to non-air conditioned vehicle used).

5. CONCLUSIONS AND RECOMMENDATIONS

There are some important conclusions from this research, i.e.:
- All of observed routes comply to all requirements of the Director General of Land Transportation Decree No. SK.967/AJ.202/DRJD/2007. Although parents recognize that the school transport services were more safe an more convenient than the public transport, they thought that the safety and the convenience of the services can still be improved through fleet renewal and air conditioning of all vehicles.
- Shorter routes tend to have shorter stopping time. As travel time in the shorter route will be shorter, students were picked up later compare to the other routes and therefore the students in these routes tend to be well prepared before the school transport came.
- Earlier services tend to run in lower speeds possibly because the road network was congested with the general morning peak hour traffic.
- School transport was desperately needed by the parents because it was difficult for them especially to spare their morning time to deliver their children to school.

From the above conclusions, several recommendations could be made, i.e.:
- Every school should work together with the parents to provide appropriate school transport to ensure the punctuality of the student attendance. This will improve the quality of the overall education.
- The length of route should be limited to ensure convenience of the services. For longer route, it is recommended to limit number of students to be picked up/ delivered to decrease overall travel time and stopping time.

- School transport vehicles should be eligible to use high occupancy vehicle lane. In Jakarta case it should be eligible to use the busway.
- The government should encourage the provision of school transport in every school through national campaign on this matter.

6. ACKNOWLEDGEMENT

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