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ASSESSMENT OF TRANSPORT TERMINAL OPERATION WITH RESPECT TO VEHICLE ASSIGNMENT AND PASSENGERS' PERCEPTION: CASE STUDY AT JIMMA BUS TERMINAL

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ABSTRACT

Movements of people, goods and information have always been fundamental components of human societies. Transport system is one of the most essential services and a vital force for determining the upward direction of development. To achieve the desired transportation balance and the system to be effective and efficient, it is essential to provide organized facilities in all parts of the system. One such facility is a bus terminal. This research primarily focused on assessments of transport terminal operation with respect to vehicle assignment and passengers' perception regarding to the service given in the terminal. Descriptive cross sectional study research type is used to identify problems in the area. Desk study was used to check vehicles' data from terminal and questionnaires were distributed to passengers to analyze their level of satisfaction regarding to internal facilities of the terminal. In order to carry out this research, similar researches as a literature review were reviewed and different books and documents written on the subject matter from internet and library were also reviewed. Finally, in this research, IBM SPSS version 20 is used to develop regression model for vehicle assignment in order to have proportional distribution of vehicles through the routes. And Microsoft Excel was used to represent data by chart and in addition AUTOCAD 2007 was used to visualize the bus terminal. Based on finding of this thesis it is indicated that there was unproportioned vehicle assignment throughout the route. In addition, there were also problems such as insufficient vehicles, absence of route information, issue of theft and discomfort of terminal to passsengers is available in terminal and passengers were not satisfied regarding to service given in the area. Therefore, to get proportional distribution

of vehicles, such regression model was developed Y=21.487+0.017*No. passenger, for routes categorized under short distance routes, Y=16.363+0.066*No. passen-0.707*N. seat, for medium distance routes and Y=42.789-0.632*No. seats for long distance routes, where Y stands for number of predicted vehicles and accuracy of model depends on R values in the output table and vary from 0.3-1.0 for best correlation. Finally, internal facilities should have to provide to solve mentioned problems in the terminal.

KEYWORDS: Transport system, vehicle assignment, passengers.

INTRODUCTION

For as long as the human race has existed, transportation has played a significant role by facilitating trade, commerce, conquest, and social interaction, while consuming a considerable portion of time and resources. The essence of urban planning is to provide adequate and equitable service to all groups. Murray et al., (1998) stated, Transport service has influence impact on regional patterns of development, economic viability, and environmental impacts and on maintaining socially acceptable levels of quality of life. Transport is an absolutely necessary means to an end and allows people to carry out the diverse range of activities that make up daily life (Hanson, 1995).

The transport system improves the social, economic, industrial, commercial progress and transfers the society into an organized one. It is one of the most essential services, vital force for determining the direction of development. To achieve the desired transportation balance and the system to be efficient, it is essential to provide organized facilities in the system, one such facility is a bus terminal. A bus terminal is the point at the start/end of a transport route, where the vehicles stop, reverse and wait, before departing on the return journey. It also serves as a station for passengers to board and alight. Evidently, at a bus terminal, parameters addressing passenger and operator requirements overlap. It is the site for interchange between large volume of bus and passenger traffic. This demands that the facilities at a bus terminal be planned systematically and that user requirements are addressed in such planning, or else the lack of an efficient and functional environment will lead to friction, ultimately compromising the attractiveness of the bus system (Rodriguez, 2012).

The aim of this study is to assess operation in bus terminal in case of Jimma, Ethiopia. It is specifically focus on current situation of the terminal such as, way of vehicle assignment to

respective route, conformity of terminal for passenger, safety and security concern are also other issue in the study.

OBJECTIVES OF THE STUDY

General Objective

The general objective of this research was to assess transport terminals operation with respect to vehicles assignment and passengers' perception in Jimma Bus Terminal.

Specific objectives

- To investigate proportionality of vehicle assignment throughout all routes.
- To assess passengers level of satisfaction regarding to service given in the terminal.
- To develop vehicle assignment model and recommend possible remedial solution for the problems identified.

METHODOLOGY

Descriptive design was used in this study with qualitative and quantitative data type collected from questionnaires, interviews and observations as primary data, data from terminal management team was used as secondary data. Based on sample size determined above, 79 number of passenger were selected from selected terminal for distributing questionnaire. To get representative sampling, passengers to every 28^{th} route operating from this terminal was selected using systematic sampling technique and on average 3 passengers was randomly selected from each of these routes. Finally, 5 representative officials and 3 representatives of non-governmental association from JBT were selected using purposive sampling technique to get some fact about status of service. And questionnaires for passengers was in the form of interview since they were ready to journey. On the other hand, in order to get proportional vehicle assignment throughout the routes, vehicle assignment model was developed using SPSS software. Finally, AUTOCAD 2007 was used to visualize a way of vehicles standing in the terminal. In the analysis, both quantitative and qualitative data approach were used to analyze collected data.

Table 1: Summary of table including routes information in the terminal.

No.	Starting	Destination	Distance in KM	No. of vehicle assigned daily/schedule of terminal
1	Jimma	Chida	84	0
2	Jimma	Teppi	245	3
3	Jimma	Mizan	230	3
4	Jimma	Nekemte	237	3
5	Jimma	Mettu	259	3
6	Jimma	Tercha	164	15
7	Jimma	Saja	117	9
8	Jimma	Sokoru	100	18
9	Jimma	Mole	37	19
10	Jimma	Bilda	21	0
11	Jimma	Dedo	20	23
12	Jimma	Shebe	52	58
13	Jimma	Seka	20	37
14	Jimma	Gojeb	79	0
15	Jimma	Limmu	88	16
16	Jimma	Yebu	20	24
17	Jimma	Serbo	20	22
18	Jimma	Bedele	142	29
19	Jimma	Welkite	188	74
20	Jimma	Bonga	115	40
21	Jimma	Asendabo	54	63
22	Jimma	Agaro	45	49
23	Jimma	Ako	88	0
24	Jimma	Sentema	33	0
25	Jimma	Deneba	87	0
26	Jimma	Babu	33	0
27	Jimma	Atinago	53	0
28	Jimma	Nada	67	0

Source: Jimma bus terminal transport office

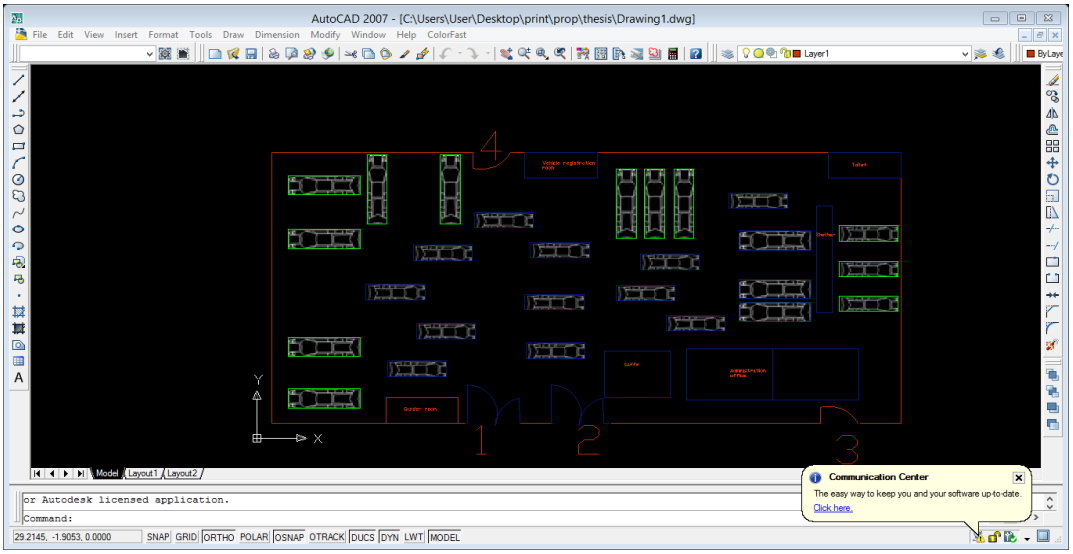

Figure 1: Top view of the terminal (prepared by researcher).

Based on sample size determined in Chapter Three, 79 survey questionnaires were distributed to passenger of JBT. However, from total 79 survey questionnaire, nine (9) were not fully and correctly answered and five (5) were not turned back. As a result, data presentation and analysis is based on response of 65 passengers.

The researcher got number of passengers by multiplying number of vehicles registered while exiting from the terminal by their number of seat in each vehicle for each respective routes. Number of seats for vehicles vary from routes and summarized as follows. It is assumed that there is no overloading in each vehicle counted.

Table 2: Summary of table for number of seats in vehicles.

City	Number of seats			
	13-14(M.bus)	24-28	29-44	60-63(Bus)
Agaro	*			
Yebu	*			
Serbo	*			
Asenadabo	*			
Seka	*			
Shebe	*			
Deneba	*			
Wolkite	*			
Gojeb	*			
Bilida	*			
Bedele	*			
Limmu	*			
Bonga	*			
Saja	*			
Sokoru	*			
Sentema	*			
Babu	*			
Mole		*		
Ako		*		
Sentema		*		
Dedo		*		
Chida		*		
Tercha			*	
Ako			*	
Atinago			*	
Teppi				*
Nekemte				*
Mizan				*
Mettu				*

Source: Jimma bus terminal transport office

RESULT OF DESK STUDY

Vehicle Supply and Demand of Passengers

A. Average number of trip of vehicles per day

In order to know as assigned vehicles is balanced with number of passengers, the researcher take the one week days' data of vehicles trip registered at the exit and determine average of vehicles out going from the terminal per day. And then after comparing with number of vehicles proposed for a day in order to compare demand and supply of vehicles per day and following data is found. Here under, vehicles going to 22 routes were selected as a case-1 since daily trip available and for the rest six routes vehicles were exit once a week and that's is explained as case-2 in the analysis.

CASE-1

Table 3: One week's data of vehicles trip in each day.

Data of vehicles exit from terminal in date of 17/11/2009 -23/11/2009									
		No. of vehicle trip							
No.	**Destination**	**17/11/09**	**18/11/09**	**19/11/09**	**20/11/09**	**21/11/09**	**22/11/09**	**23/11/09**	**Average/day**
1	Agaro	169	125	113	102	115	117	101	120
2	Yebu	27	36	38	25	30	29	24	30
3	Serbo	63	20	27	27	26	25	19	30
4	Asendabo	55	56	55	39	46	51	38	49
5	Shebe	20	23	16	24	23	21	14	20
6	Gojeb	39	38	27	24	27	25	19	28
7	Welkite	25	54	24	31	29	32	25	31
8	Bonga	45	56	43	42	45	44	35	44
9	Bedele	31	33	27	29	31	32	25	30
1	Limmu	38	27	29	22	31	28	21	28
11	Seka	36	20	28	31	28	29	19	27
12	Sokoru	10	5	15	7	8	9	4	8
13	Saja	10	8	4	3	5	5	2	7
14	Bilda	13	25	12	12	16	14	11	15
15	Tercha	2	2	4	5	4	5	3	4
16	Mole	10	7	8	8	8	9	5	9
17	Dedo	14	14	17	24	18	13	11	18
18	Chida	1	1	1	4	3	1	1	2
19	Teppi	1	1	2	4	2	3	2	2
20	Mizan	2	1	1	3	1	2	1	2
21	Nekemte	1	1	2	1	1	1	1	2
22	Mettu	1	1	3	2	2	3	2	2
	Total	613	554	496	469	499	498	383	508

Source: Existing data from Jimma bus terminal

From the above table, we have seen that minimum number of vehicles released from the terminal is 2 and maximum number of vehicles trip exit from the terminal is 120.

As observed from the above table, maximum numbers of passengers were traveled along Agaro relative to other routes. And the next largest trips with respect to other were along Asendabo route and it continues as their descending order such as Bonga, welkite, Bedele, Serbo, yebu, Limmu, Gojeb, and Seka routes.

CASE-2

Data of the remaining six routes having trips twice a week namely Nada, Ako, Babu, Deneba, Sentema and Atinago is analysed as follows. From the table we have observed that maximum number of vehicle trip per week was along Nada. But, for these routes there were not specified number of vehicles in monthly schedule of the terminal.

Table 4: Vehicles trip per week for six routes.

	Ako	Atinago	Babu	Deneba	Nada	Sentema
Vehicle	1	3	4	3	6	1

B. Vehicles Supplied from the Terminal per Day

Based on the result found in desk study, the following table contains number of vehicles assigned per day as per monthly schedule of the terminal.

Table 5: Number of existing vehicles in schedule of the terminal per day.

No.	Destination	N. Veh. Assigend
1	Gojeb	0
2	Bilda	0
3	Chida	0
4	teppi	3
5	Mizan	3
6	Nekemte	3
7	Mettu	3
8	Saja	9
9	Tercha	15
10	Limmu	16
11	Sokoru	18
12	Mole	19
13	Serbo	22
14	Dedo	23
15	Yebu	24
16	Bedele	29
17	Seka	37

18	Bonga	40
19	Agaro	49
20	Shebe	58
21	Asendabo	63
22	Welkite	74
	total	508

Source: Jimma bus terminal transport office

From above data we have observed that number of vehicles assigned for routes such Agaro, yebu, Limmu, Serbo and Saja needs additional number of vehicles per day according to their trip. On the other hand, number of vehicles assigned for routes such as shabe, Seka, Welkite, Mole, Asendabo, and Tercha are excess beyond the demand of passengers. However, there is number of passengers go along routes such as Chida, Gojeb and Bilida, there were not specified number of vehicles decided for those route in monthly schedule is the terminal. As the workers there said vehicles for those mentioned route as well as along shortage of vehicles, vehicle assigner would divert vehicles assigned to other routes by adding percentage of payment from 35%-50% to passengers beyond normal price. Vehicles assigned for remaining routes are fair. Generally, vehicle distribution in the terminal is not uniform throughout every route according to data we observed.

Solution

This research has assessed transport terminal operation with respect to vehicle assignment and passenger's perception at Jimma bus terminal.

The study was mainly focus on investigating proportionality of vehicle assignment throughout the routes. As the result from the desk study data indicates, there was variation in vehicle assignment to the routes. For instance, average number of passengers travel along Welkite was 462, but vehicles assigned for Welkite from the terminal were 74. In the other hand, average numbers of passenger per day along Gojeb route were 451, but there was no existing number of vehicles in monthly schedule of the terminal. This indicates that as there is no proportional assignment of vehicles throughout the routes. Therefore, from linear regression result the equation developed to get uniform distribution of vehicles, Y=21.487+0.017*No. passenger, for routes categorized under short distance routes, Y=16.363+0.066*No. passen-0.707*N. seat, for medium distance routes and Y=42.789-0.632*No. seats for long distance routes based on this thesis.

On the other hand, to identify problems related to transport service given to passengers and assess their level of satisfaction, the most common issues were responded by passengers. Such risen issues were, based on the availability of sufficient number of vehicles, availability of route information board in the terminal, security in the terminal and comfort of the terminal regarding to availability of seat in the terminal under shelter and cleanliness of the terminal. From the problems identified, respondents were asked about their level of satisfaction and agreement and based on availability of sufficient vehicles, 56.9% of them were satisfied, 15.3% dissatisfied and 27.8% were in between. Regarding to availability of route information board in the area, 18.4% were satisfied, 55.4% were dissatisfied and 26.2 of them were having average level of satisfaction. Based on security of the terminal 41.6% of passengers were satisfied, 32.2 % were dissatisfied and 26.2% of them have average level of satisfaction. Finally, regarding to comfort of terminal, concerning to availability of seat in terminal under shelter 14.4% of passengers were satisfied, 61.6% of them were dissatisfied and 20% of them were averagely satisfied and regarding to cleanliness of the terminal, 13.8% of them were agreed, and 69.3% of them were disagreed and 16.9% of them were in average with cleanliness of the terminal.

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