

# A PROPOSAL TO IMPROVE SHIFT WORK BASED ON TOLL COLLECTOR MANAGEMENT SATISFACTION SURVEY: Case Study at PT. Jasa Marga, Purbaleunyi Branch Office

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**Abstract.** PT Jasa Marga always strives to improve its services to meet quality objectives: smooth, safe, and comfortable. This research aims to measure the employee satisfaction who work at highway collection division in PT. Jasa Marga, Purbaleunyi branch office. The consideration is because of the shift hours that currently divided in three shift in each 8 hours (for 24 hours), meanwhile they work in highway gate which having many pollution, and also there are many consideration such as social life, working tools, etc. This research shows that employees weren't satisfied enough with the current shift work system. Employees still have consideration in workload, system shift, employee healthiness, compensation, and manual tools for the transaction. Considering the result, the possible option is redesign the shift work system to four shifts in each 6 hours.

**Keywords:** employee satisfaction, shift work, man power planning, automatic transaction.

## 1. Introduction

PT Jasa Marga (Persero) is one of operator and also pioneer of toll undertaking in Indonesia. PT. Jasa Marga is still becoming main toll operator by operating 76.2% out of the whole toll's length in Indonesia. This company operates toll network in Indonesia and keeps all the toll road under its corporation functioning well. PT Jasa Marga cooperates with other parties in building new toll road, increasing toll facilities, and other things that can maximalize its utilities to the toll users.

PT. Jasa Marga has ten branch offices in Indonesia. Purbaleunyi is one of the PT. Jasa Marga's branch offices. Currently, the Purbaleunyi branch office is on the fifth position that generates the biggest traffic volume and revenue. Purbaleunyi branch office is located in Bandung, more specific in Pasteur. It manages twelve toll gates in several locations, which are: Sadang, Jatiluhur, Padalarang barat, Padalarang, Baros 1, Baros 2, Pasteur, Pasir Koja, Kopo, Moh. Toha, Buah batu, and Cileunyi. Currently, toll collective management division has 42 number of employee that consists of three components which are administration, toll collector and head of toll collector shift (PT. Jasa Marga, 2005).

Purbaleunyi branch office is the first branch office that implement new technology which are semi-automatic integrated that called swalayan service, it occurred just for toll gate entrance and smart card as a tools for the exit and entrance gate. Purbaleunyi branch office has ten ticket booths in Pasteur gate. In entrance gates, there are already three ticket booths that operate semi-automatic integrated system. So, currently, in the entrance gate of Pasteur it appears the inscription of 'swalayan ticket booth'. In exit gate, Purbaleunyi branch office not yet implements any transactions system, but they use the smart-card system to simplify the toll collector job in order to create internal efficiency and increase the customer service.

It is important to measure the satisfaction that employees get since working in PT. Jasa Marga Purbaleunyi branch office, as the toll collective management division. It because of the shift hours that divided in three shift in each 8 hours (for 24 hours), meanwhile they work in highway gate which having many pollution, and also there are many consideration such as social life, working tools, etc that will influence the employees productivity.

*"Shift hours will affect employee adversely. It interferes with time-oriented bodily functions, such as digestion, sleeping, and elimination. Rotating shift work particularly affects personal and family lives*

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*and social participation, adversely*<sup>3</sup>.

So, it is important in considering the employee satisfaction with emphasizing on the shift work. Shift work could affect many aspects in individual for the employees and as the impact it will influence the company itself for the productivity, effectiveness, efficiency and performance (Baron and Armstrong 2007, Dessler 2005, and Wayne 2006). In other side, the company strategic plan is to implement the alternative of highway gate transaction management that consists of semi-automatic integrated system and automatic system by using smart card. The semi-automatic integrated system is the transaction of taking the highway card and the payment transaction using smart card but still need human for the transaction. In the future, PT. Jasa Marga has planned to implement the automatic transaction which is the transaction that didn't need human assisting. This option could create several decisions for employees. It could make easier for employee to work and also it could create the possibility that will impact the reduction or escalation number of employee.

According to both conditions above, PT. Jasa Marga, Purbaleunyi branch office will face the human resource difficulty. As the research questions, with the output of employee satisfaction analysis and the recommendation for personnel planning about number of personnel needed. The analysis will be focus on:

- **Highway shift work**

What the output of employee satisfaction survey? Are the current shift hour have given employee satisfaction, related to company's goods and employee need as an individual? What is the ideal new shift work? Is there any increasing or decreasing in the number of people?

- **Technology**

Can the implementation of new technology solve/ support employee satisfaction? With the new technology, how the shift will be? What are the consequences in implementing the new technology? Compare with the manual system, is it more effective or not related with the personnel planning?

In additional, within the analysis of employee effectiveness, ratio of highway length : employee amount = 1: 12. While, as a comparison, the ratio of highway length : employee amount in Malaysia is 1: 3 and in South Korea is 1: 2.3. In fact, this comparison ratio could be influenced by many factors, such as, government regulation, technology, management, system work for toll collector gate, etc. The ratio number above represent that numbers of employee in PT. Jasa Marga were in big amount. In one side, it could be assume that PT. Jasa Marga put into action about their corporate function, as the social and economic function. In other side, it is important to have a target of employee efficiency, PT. Jasa Marga have target to decrease number of ratio.

## **2. Research Methodology**

The process of this research begins with the informal discussion in PT. Jasa Marga to find what are the current issues or problems present. Following information's about the current issue, it continued by the analysis to decide the research project. Then, continued by the data collection in PT. Jasa Marga Purbaleunyi branch office. In the data collection, confirmation of a data is very important. Consequently the data collection also complicated by the informal discussion. Figure 1 shows the research methodology.

The data collection resources are came from the primary data. Primary data is data that come out directly from the resource, it written and observed for the first time. The primary data in this research were come from:

- a. Discussion or interview
- b. Data collections

The primary data is the quantitative data that will be use in analysis, vehicle volume (data lalu lintas). The other data is the supporting data for the analysis.

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<sup>3</sup> Glueck, William F., 1978: 124

c. Questionnaire

The questionnaire also pointed to toll collective division. It will find about the employees perspective regarding to the satisfaction of their job, in the perception of shift work and new technology. In deciding the number of respondents, it not uses any specific approach, because there are small numbers of employee in the toll management collective division which are just 42 people. The questionnaire will be distributed in the target of response rate in up to 60%. Because studies with a poor response rate (<60%) are likely to be biased. The questionnaire scales are 1-5. In detail the scales are: 1- strongly disagrees, 2- midly disagree, 3- not sure, 4- agree, 5- strongly agree.

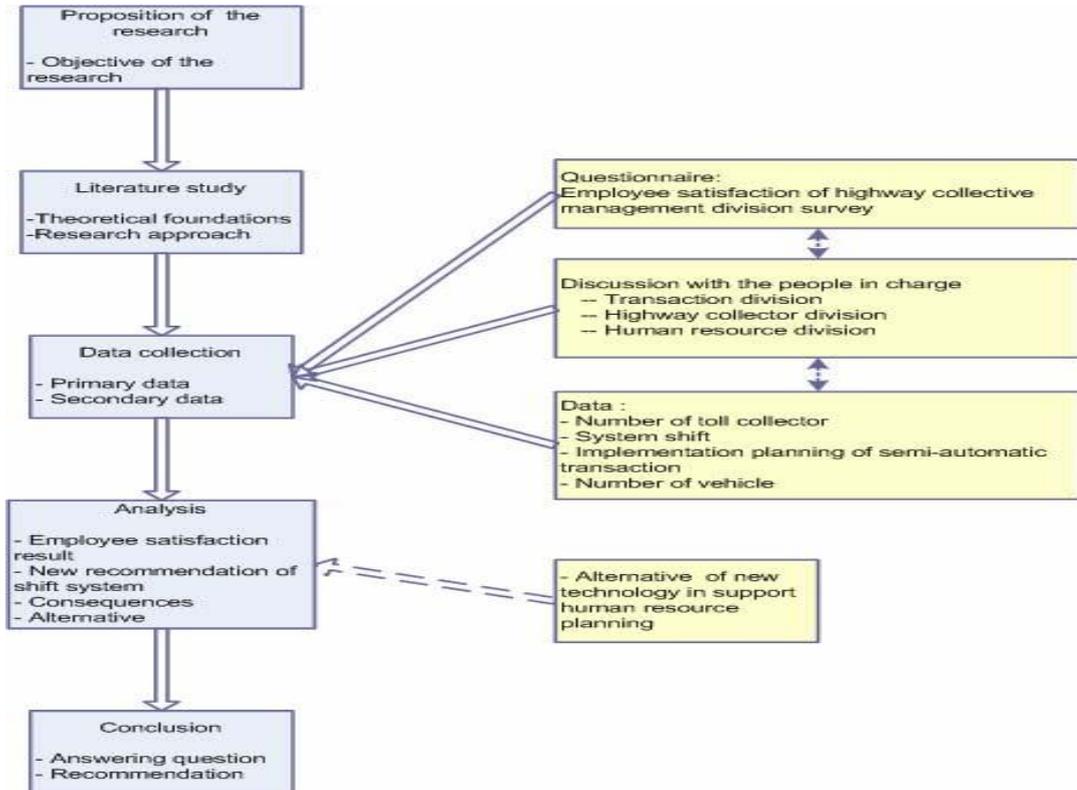


Figure 1. Research methodology

The analysis model or analysis flow will begin from the employee satisfaction survey, and then if the result is bad it will continue with the redesign of new shift hour system. Together with the new system, it also result the personnel needed estimation and it will continued by the recommendation of personnel action, as an example, outsourcing. Considering the new technology which is automatic transaction, this technology could be the alternative in support the personnel planning actions. It will create consequences that need to be considering also.

**2.1. Standard calculation of toll division collector needed**

To calculate the number of personnel in toll division management, especially for the toll collector positions, PT. Jasa Marga have their own calculation based on number of vehicle that passed the toll gate. The number of operation gate will be calculating with the formula below.

$$GO = \frac{\lambda N}{(3600 / \beta)} \tag{Eq. 1}$$

Note:

N : Vehicle volume transaction an hour

λ : Conversion factor, from the number of vehicle came with number of vehicle serviced

β : Gate service moment (time), is a function from type of vehicle and payment nominal

Conversion factor ( $\lambda$ ) made in 3 type based on gate transaction type

- Entrance gate : 1.08
- Exit gate : 1.20

The value of gate service moment ( $\beta$ ) depends on the types of vehicle and gate. In this paper, it assume based on the average of vehicle volume, the gate service moment are 6.969 for the entrance gate and 11.781 for the exit gate. This number are based on the average proportion of vehicle number which are, type 1 – 95%, type 2A – 5%, and type B – 0%. This average number takes from the everyday proportion number of vehicle.

#### *Toll collector needed*

The formula for calculate number of toll collector is:

$$- \text{PTG} = \frac{\sum_{i=n} [(P_I \times Kf_I) + (J_{(i-n)} \times Kf_{(i-n)})] + [(P_{II} \times Kf_{II}) + (J_{(i-n)} \times Kf_{(i-n)})] + [(P_{III} \times Kf_{III}) + (J_{(i-n)} \times Kf_{(i-n)})] \times 7}{C} \quad (\text{Eq. 2})$$

$$- \text{PTG}_{aj} = \text{PTG} \times (1 + b) \quad (\text{Eq. 3})$$

Note:

PTG : Toll collector needed a day

$P_{I/II/III}$  : Number of operations gate needed continually each shift in a day. (From the number of vehicle before)

$Kf_{I/II/III}$  : Conversion factor

$J_{(i-n)}$  : Operation gate needed in back up (*jadwal gantung*)

$Kf_{(i-n)}$  : coefficient factor for toll collector in back up (*jadwal gantung*)

C : Work hour in one week, 40 hour/ week

PTG<sub>aj</sub> : Toll collector needed in a day (adjustment)

b : 0.05, safety factor, used if gate available < gate operations

#### *Personnel needed for day off consideration*

$$\text{Day off factor: } 0.05 \times \text{PTG}_{aj} \quad (\text{Eq. 4})$$

### 3. Data and Analysis

#### 3.1. Existing Condition of Work System

From the data collection and questionnaire analysis above, we could see that there are two conditions faced by PT. Jasa Marga – Purbaleunyi branch office face. First is the issue of employee satisfaction and second is the planning of automatic gate transaction.

Based on data in Pasteur gate, currently the maximal working capacity as toll collector is 86,96%, while in fact the working capacity as toll collector is 84,66% (LAPI-ITB, 2004). We can see that, it have 1,2% gap which is the excess of working capacity conversion. It means that, the number of employees should be decreased to get the company more efficient. For example, in simple way, if currently the toll collectors are 34 people, than it could be decreased to 32 people. Moreover, PT. Jasa Marga is in the process to implement their new technology, which is semi-automatic integrated system and it will be continuous by automatic transaction system. So, it can assume that PT. Jasa Marga could make more efficient in managing the number of employees in their operation to meet the quality policy, which are:

- Motivate all employees to always improve their skills and expertise as well as to always be responsible and orderly to satisfy the customers.
- Improving the system and work environment continuously to be more effective and efficient

to assist the achievement of quality services.

Basically, the working system of the three functions in toll management collective divisions (administration, toll collector and head of toll collector shift) is equivalent, it divides in the schedule of three shifts each is 8 hours which are:

- Shift 1: 06.00am - 02.00pm,
- Shift 2: 02.00pm - 10.00pm, and
- Shift 3: 10.00pm - 06.00am.

In average, all of the employees in the toll collective management division are fairly distributed in the three shifts, excluding women. They will be rotated to one shift to another. For example, in Monday A will work in the shift 1, but in Wednesday he/she can be work for shift 2. The basic concept for shift scheduling is 4/2, means that 4 days work and 2 days rest. Women are excluding for the entire shift schedule, usually they work only in the shift 1 and 2. This consideration is actually based on safety factor.

### 3.2. The Questionnaire Result on Employee Satisfaction

The questionnaire result shows the average of satisfactory level towards each variables of shift work as described in Figure 1.

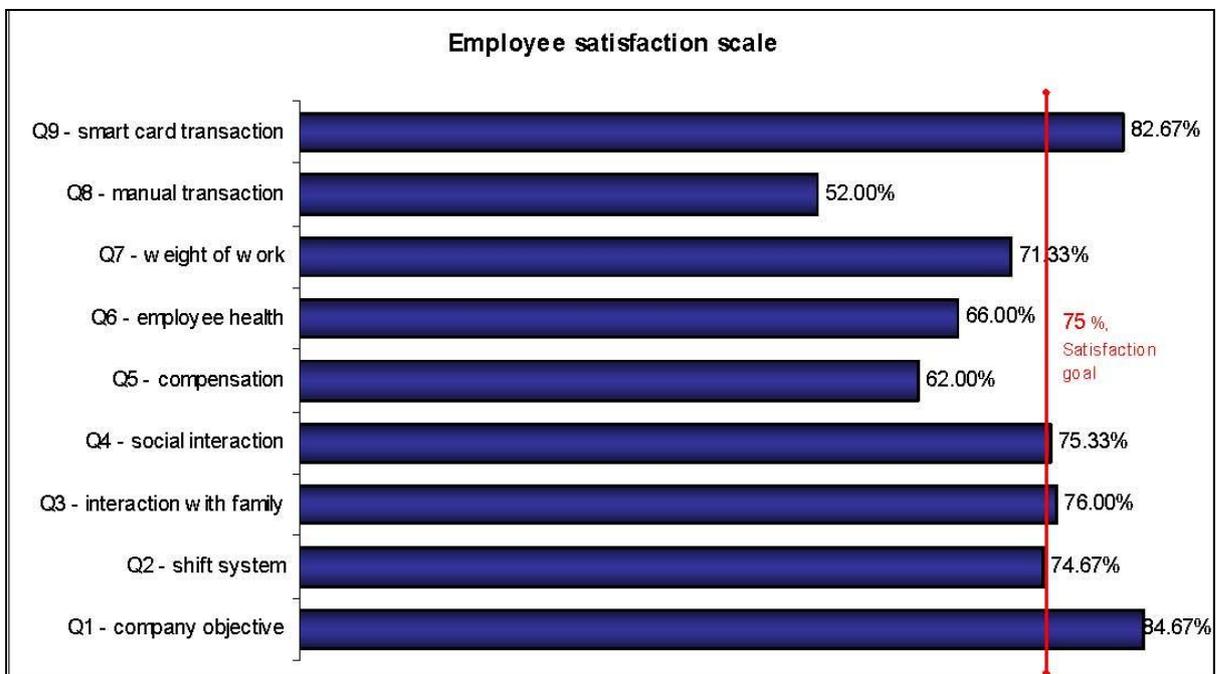


Figure 1. Employees satisfactions

Figure 1 shows that in general employees were not sure that they were satisfied with the current working system. If we breakdown the question to healthiness factor, compensation, interaction, etc. employee would consider in more specific about what things that actually make them not really satisfied. In this questionnaire we can see that they still have consideration in weight of work, shift work, employee healthiness, compensation, and manual tools for the transaction. From this consideration on employee opinion, there are several options that could be done in this problem related with the new technology, which are:

- Redesign the new shift work system to be more flexible  
Consequence: could be adding more people, it will not be efficient
- Increase the compensation  
Consequence: increasing the labor cost, it will not be efficient
- Use new technology to support the employees job  
Consequences: new technology will support the employees' job, but also could make employees cut down.

### 3.3. Man Power Planning for Automatic Gate Transaction Option

PT. Jasa Marga - Purbaleunyi branch office have some targets in 2007, which are to implement minimal two *swalayan* ticket booths for entrance gate in each gate locations, and they should also have implemented this new technology minimal one ticket booth of automatic transaction in each location in this year. Currently, in Pasteur gate, the first branch which implement semi-automatic transaction gate (there are already 3 ticket booths for the entrance gate), it called *swalayan* gate or internally called GTO (gerbang tanpa orang).

Based on the automatic planning that will be implementing this year, PT. Jasa Marga should redesign the personnel planning to meet the number of people needed. With the automatic transaction plan this year which are three *swalayan* gates for entrance toll gate and three *swalayan* – automatic transactions for exit toll gate.

Using the flexi time concept and also considering the employee satisfaction rate, the system should still use the shift work schedule of 4 shifts with each 6 work hours. In the automatic transaction shift there are 3 automatic ticket booths that will be implementing in each gate. These three ticket booths are calculate as one number, means that 3 automatic ticket booths = 1 ticket boots. The reasons of this assumption are: first, the automatic ticket booths will not be close for 24 hours, except under urgent situation; second, 3 automatic ticket boots are guarded by one person. So, in the calculation table it has 1 operational ticket booth that means 3 automatic ticket booths. For example, 3 operation ticket boots means the active ticket boots are 5, 3 automatic ticket booths (as 1 ticket booths) plus 2 manual ticket booths.

Furthermore, explaining about the number of GO in shift 4, that there are 1 number of operational ticket boot in GO operational ticket boots. So, even though the operational ticket booths required just 1, it has to be 2 ticket boots (1 ticket booth is the 3 automatic ticket boots) that should be active. As the result, Table 1 is shown the total number of personnel needed facing the new technology which is automatic transaction.

Table 1. Personnel Needed of Automatic Transaction

Automatic transaction	Personnel needed	
	a day	total
- Total toll collector	26	26
- KSPT - head of toll collector	2 - 4	5
- TU - administration	2 - 4	4
- FC - day off factor	1.45	2
<b>Total toll collector division</b>		<b>37</b>

From Table 1 it can be seen that the numbers of personnel needed are decreasing. It means that with the new technology, PT. Jasa Marga Purbaleunyi branch office will meet the surplus condition of employee. As already explain before, the decreasing number of employees are the consequences of a change. In this condition decreasing number of employees was influenced by the redesign of new system and the new technological aspects.

## 4. Conclusion

1. In general, employee satisfaction is still in below. Employee still have considerations in weight of work, shift work, employee healthiness, compensation, and manual tools.
2. It show that employee in toll collection management division not satisfies with the shift work.
3. Based on that reason, the ideal shift work considered to 4 shifts with each 6 hours. This new shift work will decrease the weight of work and shift hours, increase or more controlling employee healthiness and balance or equal with the compensation that employees get.
4. In the new technology implementation, it would reduce 5 people of employee as the consequences.

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