Service Productivity Measurement and Improvement With Multi Factor Approach

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ABSTRACT

Gubeng Train Station is one of train stations in Indonesia managed by PT. KAI DAOP 8 Surabaya. As a public company that provides services on transportation, the company is responsible to increase service productivity (efficiency and effectiveness). In this case, productivity can be improved by reducing a high gap between what can be achieved by the company and what should be perceived by customers who use the services, as can be seen from the existing number of customer complaints about services in station ticket counter.However, measuring productivity in a service company is different to that in manufacturing.This study aims to determine the attributes of activities that have a significant effect on the service productivity. From measurement on service productivity using multi-factor method, we obtained existing productivity index is 71.60. And from the questionnaire we found out the existing attributes of the three main factors within the service productivity concept that significant affect the quality of service. First, attributes for the external efficiency are speed of service and hospitality operators. Second, attributes for the internal efficiency are training courses ticketing and ticketing systems training. While the third, the attributes for capacity efficiency are the operator confirmation to the customer for destination and ticket prices. With the known influential existing attributes and gaps which can be achieved using Servqual method measurement, improvement methods were proposed and the productivity index obtained after the improvements is76.20 with ROI of 0.101

Keywords: Internal Efficiency, External Efficiency,Capacity Efficiency, Service Productivity ,Servqual

1.Introduction

Traditionally, productivity is seen as the concept of efficiency (the amount of output in relation to the efforts or resources used), but productivity is now increasingly seen as a concept of efficiency and effectiveness. The effectiveness of a dynamic company, which meets the needs and expectations of customers (buyers / users of products and services), which is how companies create and offer the customer value. Measurement of productivity at a manufacturing company can be done using the general concept (output divided by input) [1] due to the resulting output is clear, can be measured and is assumed to remain despite the treatment given the changes in the input so that the development of methods to increase productivity can be done . While in the service context that assumption can not be done, with the change in the input are used that will affect the process undertaken thus affecting the final outcome of the service performed [2].

The existence of differences in the concept of service productivity in the resulting output of the differential treatment on the input causes the productivity measurement method of service requires a new approach to evaluate how efficiently and effectively input, process and output generated. The problem of mismatch in output that can be achieved with an output of perceived corporate customers are found in almost all companies that offer services in business processes. One of them occurred at the station ticket counter Gubeng PT. KAI DAOP 8 Surabaya, the discovered of difference between the expected services output with the service output perceived by customers.Used of ticket counter as the mainfocus because it is the part that will provide an overview of the entire service process that will be experienced by customers. Assessment of inputs provided by companies such as preparation before the service can not produce output as expected, it still marked by the many complaints from customers who entered the customer service department and a few complaints directly from customers to the operator on duty. The use of a given input on perceived service operators can not be done efficiently and effectively performing their duties in the service so as to produce output that does not satisfy customer desires. Therefore, it is very important for companies to pay more attention to these aspects as well as what factors can affect customer satisfaction ranging from how to set up the service, the service process and how to respond to feedback from customers to know the level of productivity has been achieved, so in future that can be constructed some improvement plan to increase productivity services that can be achieved.

Issues raised in this research is how to measure and improve productivity in the service sector by improving the efficiency of input, service process and the resulting output and the feedback that will occur by using the concept of service productivity with a multi-factor productivity that have been developed to model the productivity of service saccordingly so that development decisions can then be taken accordingly to reduce the gap between what is desired and prepared by the company with what is received or perceived by the customer on the service that then tire ticket counter PT. KAIDAOP8 Gubeng Station Surabaya. The limit sused were as follows: data taken in the present study is limited to the ticket counter data and support departments, the respondents on the serviceas well as customers who have served or purchases a ticket using the manual transportation services in PT.KAIDAOP8 Gubeng Station Surabaya.

2. Research Methodology

The first step to measure and improve the productivity of services is initial observations by researchers to conduct initial identification of the research object. After the observations and identification, next to find the equation of the theoretical framework through which support the study of literature to the study of both books, journals, articles, modules and other sources[3]. And then seek several theories in the study include the concept of services productivity, multi-factor productivity, likert scale, servqual etc. Using the theory we have, then deployment and testing of questionnaires to obtain the necessary data. Next, after all of the required data collected, perform data processing to find out the existing productivity index. After knowing the factors that affect the productivity index, the equation of alternative courses of productivity improvement can be designed and then selected to increase the productivity index. After doing all the necessary steps, it can be conclude any result obtained from the research.

3. Data Collection and Processing

3.1.Company Profile

Gubeng station is a railway station located in Gubeng, Surabaya, East Java and is under the auspices of PT Kereta Api Indonesia (Persero) Regional Operations 8 with a very large number of customers

3.2. TicketCounters Service Process

The order and service process that occurs at the ticket counter can be explained from the beginning of process until the process end as inTable 1 below:

Table 1. The division of the service ticket counter

Service process train ticket counter		
Process Name	**Beginning**	**Completion**
Customers arrive	Customers come in line	Arriving at the counter
Interaction of information-services	Customer arrive at the ticket counter	Customers get train schedules and fares information purposes
Booking train tickets	Customers get schedule information and train fare destination	Book atrain ticket
Customer Data Collection	Customer train ticket booking	Customer gives the data themselves
The costinformation	Customer givesthe data themselves	Customers get the information costs to be paid
Ticket payment	Customers get the information costs to be paid	Customer Pay
Settlement administration	Customer Pay	Customers get a ticket and change if they must
Customer departure	Customers get a ticket and change if they must	Customers leave the booth

With the information from Table 1, it can be describedthe process flow that occurs between the customer and the operator on duty at the station ticket counter.

3.2 Questionnaire

The process of distributing questionnaires conducted to collect data that can be used as internal, external efficiency and capacity. In the process of making and preparation of the questionnaire, the first conducted the interview process to determine and collect any possible factors that influence the service process. Broadly speaking, the structure of the questionnaire are as follows:

- Customers Questionnaire:
  In this questionnaire consisted of 9 questions were deemed important activity at interacts with the operator, and the order of their importance
- Operators Questionnaire:
  In this questionnaire consisted of 9 questions were deemed important aspect of the system by operators in supporting the performance

Each questionnaire included an additional table in the form of 9 questions of helper activity and the level of perceived common interests.

Total questionnaire that was distributed to some 100 customers and 10 for the operator. So the total number of-questionnaires was 110. Testing the adequacy of the data were performed to determine whether the number of questionnaires to customers already meet the standard requirement, while for the questionnaire operator does not need the test because the samples taken had a total number of operators.

By using statistical equations of the adequacy of the datat to determine the actual number of samples required so that data can be considered to be analyzed, namely:

- The equation (1)for N=∞(used to determine the actual number of samples from customers because the populationis unknown)

$$n = \frac{Z\alpha 2 \cdot \sigma 2}{e2} \tag{1}$$

It is known whether the data is valid by comparing thev alue of generated by calculating the value ofrin the table with n = 100.

Table 3. Value of n (the actual sample for each question)

	I	II	III	IV	V	VI	VII	VIII	IX
actual sample (n)	34.64	80.85	43.77	66.81	92.37	65.72	80.31	54.99	43.47

From the value of n is actually the overall sample questionnaire customer activity attributes in Table 3., we known the true sample (n) that need to be applied is greater than 93 (rounded up). Used actual sample values ≥ 93 as referring to the highest value obtained attribute question number V, the sample is actually needed to have the highest value when compared with other attributes of92.37.

Based on questionnaire data, it is known that the index value of existing variable for each attribute is in Table4, Table 5 and Table 6 with the maximum scale is 9.

Table 4. Total value and the target company (static factor) existing

	I	II	III	IV	V	VI	VII	VIII	IX
Existing Index	6.30	6.08	5.63	6.53	6.98	7.43	6.30	6.75	7.88
Target	8.00	8.00	8.00	9.00	9.00	9.00	9.00	8.00	9.00
output-input	1.70	1.93	2.38	2.48	2.03	1.58	2.70	1.25	1.13

Table5. Total value and the target company (dynamic factor) existing

	I	II	III	IV	V	VI	VII	VIII	IX
Existing Index	6.64	6.03	6.37	6.10	5.85	6.55	5.36	6.21	6.75
Target	8.00	8.00	9.00	9.00	8.00	8.00	8.00	9.00	8.00
output-input	1.36	1.97	2.63	2.90	2.15	1.45	2.65	2.79	1.25

Table6. Total value and the target company (sub key parameters) existing

	I	II	III	IV	V	VI	VII	VIII	IX
Existing Index	5.71	6.30	5.20	5.44	6.63	4.77	5.93	5.40	6.10
Target	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
output/input	3.3	2.7	3.8	3.6	2.4	4.2	3.1	3.6	2.9

3.3 Measurement of partial productivity for each multi-factor element

In this sub-section will determine the partial productivity of each multi-factor element, the internal efficiency (operator interaction with the system), external efficiency (operator interactions with customers) as well as the capacity efficiency (productivity activities supporters). In partial productivity calculation, the weights used are weighted ranking results from questionnaires that have been propagated.

$$\text{Partial productivity} = \sum_{i=1}^{n} \text{Weight} \frac{\text{Existing index achievement}}{\text{Company target}} \qquad (2)$$

Using the equation (2), the partial productivity index obtained for each factor are: for partial internal efficiency (PIe) 0,76, partial external efficiency (PEe) 0,78 and partial capacity efficiency (PCe) is 0,65.

3.4 Measurement the total productivity index

From the weightened data provided by the company, the total productivity can be calculated from static and dynamic indicators of productivity to get the key terminal parameters and then the sub key terminal paramaters.
Using the following equation[4],

- Internal efficiency (static indicator)

$$PI_{SI} \qquad = \sum_{i=1}^{n} W_i P_{SIi}/P_{STIi} \qquad (3)$$
$$= 29,86$$

- External efficiency (dynamic indicator)

$$PI_{DI} \qquad = \sum_{j=n+1}^{m} W_j P_{DIj}/P_{DITj} \qquad (4)$$
$$= 19,38$$

- Key Terminal Parameters (KTP)

$$PI_{KTP} \qquad = PI_{SI} + PI_{DI} \qquad (5)$$
$$= 49,24$$

- Capacity efficiency (sub key terminal parameters)

$$PI_{SKT} = \sum_{k=m+1}^{0} W_k P_{SKTk} \qquad (6)$$
$$= 22,36$$

- Total Productivity Index

$$TPI \quad = PI_{KTP} + PI_{SKT} \qquad (7)$$
$$= 49,24 + 22,36$$
$$= 71,60$$

From the calculation above, it is known index of productivity services for the ticket counter gubeng station PT. KAIDAOP8 Surabaya today is71.60 (with a maximum scale of 100).

4. Analysis and Interpretation

4.1 Analysis of existing conditions

Lack of input (internal efficiency) to produce output (external efficiency) that occur at the ticket booth is a problem that must be addressed by the parties as a responsible DAOP 8 Gubeng Railway Station. Complaints that appear to the mismatch of services provided is a proof that there is still a difference (gap) between what should be achieved by the company based on the given input to the output produced on the fact the implementation. Evidence can be known either through the interview process as well as written proof in the form of customer complaints about services provided by the operator on duty to give a bad perception to the customer.The main cause of the occurrence of gaps in services provided is the absence of Standard Operation Procedure (SOP) in the ticket counter service process and various other factors, so there is no corresponding grooves in the handling of customer service.

4.2 Identification of gaps on the influential attributes

To measure the quality of care score performed, using the Servqual model which includes the calculation of the difference between the value assigned to each attribute of all customer questions. Questions consist of a variable expectation (hope) companies with existing conditions perceived by the customer, the following is the equation of servqual scores for each question [5].

Based on data from any existing gaps, it is known the average gap between the existing condition with the target company is-2.10. Negative values indicate that the overall service activity occurs, the performance of the service ticket counter at the station is still bad because the value is below the normal value that should be achieved by the service.

4.3 Analysis of repair and benefits

Suggested repair to improve the efficiency/productivity index of each attribute are as follows, on the operator attributes to customers, where there is the difference between the target and the perceived quality of the existing output (externalefficiency) by the customer to the speed and hospitality operators. Then made efforts to improve the determination of the SOP of the service system by the service to customers at the ticket counter, as is known there is no SOP in its implementation. In the attributes of the system operator, where the difference occurs and the target efficiency of existing internal input by the operator of the existing system. Then made efforts to improve the operation of the ticketing system for training and periodic evaluations. In additional attributes, to increase the frequency of occurrence of attributes that are considered important by customers of the purpose and price confirmation, return to the SOP creation and training in order to set a standard ticketing system flow and implementation services that would suit the needs of customers.

Using the cost of repairs based on proposals made and some data of passengers number from the previous year, then the investment gains can be calculated by the ROI method.

Rate = 6.75% (interest rate of Bank Indonesia in 2011)
Investment = Rp. 10,500,000 (SOP and training)
Fixed Cost = Rp. 1,100,000 (evaluation)

$$ROI = \frac{GrossMargin - Investasi}{Investasi} \tag{8}$$

$$ROI = \frac{(Rp.\,11.564.587) - Rp.\,1.100.000}{Rp.\,1.100.000}$$

$$ROI = 0,101$$

From the ROI is obtain edit can be seen the total index gains to be obtained by companies after 5 years will increase compared with prior improvements to the service system about 0.101.

4.4 Analysis of the index increase

Based on the percentage of waste that exist and have been distujui by management, can be estimated range value of each factor attributes to the enactment of improvements that have been proposed previously. Added each index value due to the previously existing waste can be reduced by the implementation of the improvements made, and based on an agreement with the achievement of agreed management improvements are 5% below the waste (increase = % waste-5%). This was because of an improvement will not necessarily be able to eliminate the waste that previously existed with the consideration of various things such as habits of factors, circumstances etc.
Operator attributes to the customer
- Speed Services = 20% x 6.64 + 6.64 to 7.97
- Friend lines Operator = 32.5% x 6.03 + 6.03 to 7.99

Attributes to the system operator
- Training programs ticketing operation = 15% x 6.08 + 6.08 to 6.99
- Training ticketing system = 10% x 6.3 + 6.3 to 6.93

Additional attributes are (supposedly) occurred
- Confirmation destination = 17.5% x 5.71 + 5.71 to 6.71
- Confirm price = 32.5% x 6.3 + 6.3 to 8.03

Index increased influential factors assumed to increase close to the target/potential. The assumption is based on the estimated increase in the successful implementation of improvements to be performed by management companies by looking at the existing condition in the field.

4.5 Analysis of partial productivity

With the addition of an index using the assumptions of each attribute, then the partial productivity are known to each factor. The value of partial internal efficiency (PIe) based on the equation (2) is 0.84, partial external efficiency (PEe) is 0.82, and partial capacity efficiency (PCe) is 0, 72.

4.6 Analysis of total productivity

Using existing index increments, and the weighting performed by the company, it is known that the value of productivity (TPI) based on equation (7) is 76.20, with a total increase when compared with prior service productivity improvement (from 76.20 to 71, 60) is 4.60.

5. Conclusions

Based on data processing and analysis has been done before, we can conclude several things associated with this research. Based on observations made, it can be known to the service process flow service purchase train tickets that take place between operators with the customer. Several factors/attributes that have a significant effect on the activity on the quality of service, for the external efficiency: speed of service and hospitality operators, the internal efficiency: training courses ticketing, ticketing systems training, while the capacity efficiency is confirmed by the operator attributes to the customer (destination and ticket prices). Productivity index services company in the implementation of existing ticketing system based on calculations carried out amounted to71.60 (with a maximum scale of 100). By performing the proposed improvements, the value index of total productivity can be achieved, is expected to increase by 4.60 percentage ratio of profit to be earned based on the ROI calculation is equal to 0.101 and can be increased in subsequent years if continued service improvement. Some improvement solutions that can be given to the management of related companies increase productivity ticketing services for the department is drafting standard operating procedures and training standards of quality service in accordance with standard operating procedures that have been prepared and implementation of reward and punishment system.

6. References

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