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Aplication of Liqu Quese for Light Weight Brick Transportation

(Case Study at PT Priority One Indonesia Krikilan No. 28, Driyorejo District, Gresik Regency)

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ABSTRACT

At the location of public queuing services, there are often many customers lining up to be served immediately. This problem also exists in the process of transporting light bricks at PT. Priority One Indonesia. It is not efficient because of the time they can spend doing more important things. In this case, a technology is needed to make it easier for customers to queue. In this study, a web-based or online queuing application called the LiQu application was designed. The output of the LiQu application system is to make the queuing process can be done online, and to conduct customer satisfaction research on the performance of the light brick transportation queue service at PT. Priority One Indonesia. Then perform 2 analysis tests, namely Usability analysis calculating the results of the questionnaire using the Likert Scale Inteval method and Reliability analysis with WAPT 3.1 software testing then calculations using the Nelson model.

Keywords : Queuing System, Web, Analysis Usability, Analysis Reliability

1. INTRODUCTION

Queues are events that we often encounter in various places that provide services to customers, for example in hospitals, toll roads, banks, companies and others. The current industrial competition is not only about a manufacture with other manufacturers, industry players must optimize the best possible service (Febryanto and Prihono, 2021). Queues are important in operations management (Jatmika & Tri prasetyo, 2017). Queuing is an activity where customers wait to get a service (Andika, et.al 2018). At this time in various places Customer Service has implemented a queue system that uses computers to manage queues. Customers take their own queue by pressing a button or screen on the machine or computer and then the queue number will be printed. After that the customer will wait to be called by the customer service.

When the process of queuing is a very tedious thing for customers who make purchases or other activities. Usually it often raises arguments from customers, such as uncomfortable waiting rooms, very long queuing processes, and a queuing system that is less able to provide queuing arrangements for customers.

Companies often experience delays in the service of transporting light bricks and customers are very complaining during the queuing process, namely the long waiting time to transport light bricks or purchase products. Transportation is a reciprocal agreement between the carrier and the sender of goods or services (Fatahillah, 2015).

PT. Priority One Indonesia is a manufacturing company engaged in the Bulding Materials that produces lightweight brick products. PT Priority One Indonesia was established in 2015 which is located on the Krikilan highway, Larangan, Driyorejo District, Gresik Regency, East Java. PT Priority One Indonesia produces lightweight bricks under the Priority one brand. Light weight bricks are bricks that have a density lighter than bricks in general (Tufik, et.al, 2017). lightweight concrete is concrete in its material elements using lightweight aggregate with a concrete density of not more than
1840 kg/m3 (Subagiono et. al 2021).

LiQu application or an abbreviation of Light Queue which is an online queue application, customers only enter the web or

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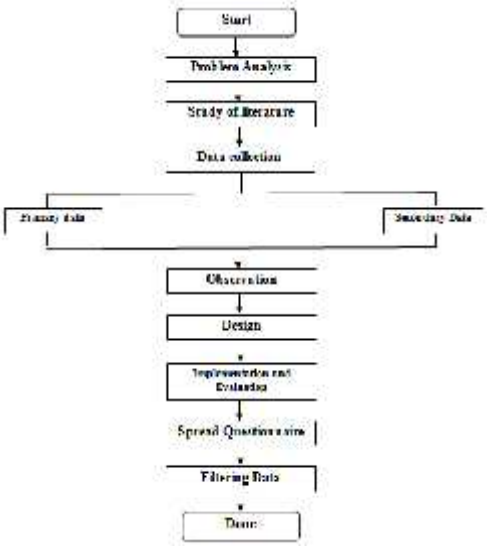
scan barcodes. According to Lado & Bimantara (2018), on a website there is one page known as the homepage. According to Kesuma & Rahmawati (2017) website is an information page provided via the internet on the information page provided.

The LIQU application applied at PT. Priority One Indonesia is expected to be able to facilitate the company in helping to deal with the problem of queuing for the transportation of light bricks at PT. Priority One Indonesia.

2.METHODOLOGY



Picture 1 Research Design Flowchart

The research uses the calculation method used 2 methods of data analysis Usability and Reliability analysis:

1. Usability Data Analysis

Usability is one of the determining factors for the success of the system in knowing the high or low level of usability of a system (Alam Supriyatna, 2018). Usability data analysis uses the Likert Scale Inteval method, namely the results of filling out questionnaires to customers who queue for transporting light bricks using the LiQu application at PT . Priority One Indonesia and will be distributed to participants to fill out the questionnaire with a formula.

Counting the number of respondents the maximum and minimum values are as follows:

1. Max value = number of respondents x number of questions x 5 = (Assuming all respondents answered strongly agree)
2. Max value = number of respondents x number of questions x 1 = (Assuming all respondents answered strongly disagree)

From the data obtained by these calculations, it can be grouped categories based on class intervals:

1. Counting Number of Classes
   K = 1 + 3,3 log n
   Information :
   K = Class Interval
   n = Lots of observational data
2. Calculating Range
   $R = x_t - x_r + 1$
   Information :
   x_t = The largest data in the group
   x_r = The smallest data in the group
3. Calculating Class Length
   Class Length = $\frac{R}{K}$
   Information:
   R = Data range
   K = Number of classes

Table 1 Questionnaire Assessment Criteria

Alphabet	Score	Information
A	5	Meaning strongly agree
B	4	Meaning Agree
C	3	Deciding whether to agree or not
D	2	Disagree
E	1	Meaning strongly disagree

2. Data Reliability Analysis

Reliability is the level of ability of a program that is expected to display the intended function with high precision has been established (Ahmad Fatih, 2017). Testing on the reliability aspect uses the software, namely WAPT 3.1 to test the Performance level of the software. This test is used to test the reliability of the sub-characteristics of fault tolerance, maturity, and recoverability. The following is the formula for calculating reliability using the Nelson model:

$$R1 = 1 - \frac{n}{N} \text{ x } 100\ \%$$

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R1 = reliability value
ne = number of failed inputs
N = number of inputs

The results of the calculation of the reliability value are then compared with the Telcordia Standard. If the success rate ≥ 95% then the software is said to meet the reliability aspect.

3. METHOD AND DISCUSSION

a. Homepage

Figure 2 LIQU Home Page

b. Company Profile Page

Figure 3 Company Profile Page

c. Interface Page

Figure 4 Interface Page

d. Queue Number Page

Figure 5 Queue Number Page

e. Call Queue Page

Figure 6 Call Queue Page

f. Admin Access Page

Figure 7 Admin Access View

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Table 2 Presentation of the Usability Questionnaire Data

No	Question	1	2	3	4	5
1	Readiness of officers in serving customers	0	0	3	10	17
2	Willingness of officers to help customers	1	6	7	9	7
3	Quickly respond to customers who come	0	1	1	16	12
4	Officers provide clear information that is easy to understand	0	7	6	8	9
5	There is skill in doing service	0	3	6	11	10
6	Customers expect officers to provide appropriate service	0	0	5	6	19
7	Customers have the right to complain	0	0	0	18	12
8	Officers and customers participate each other	0	0	7	19	4
	Total	1	17	35	97	90

The results of usability testing using a questionnaire that was distributed directly to the respondents in the transportation of lightweight bricks PT. Priority One Indonesia using the LIQU application. With a total of 30.

g. Usability Analysis

The presentation of usability data is obtained from the distribution of questionnaires that have been distributed to 30, can be seen in the table below respondents, the maximum and minimum values can be calculated as follows:

1. The maximum value is 30 x 8 x 5 = 1200, with the assumption that the respondents answered strongly agree.
2. Minimum Value 30 x 8 x 1 = 240, with the assumption that the respondents answered strongly disagree.

From the data obtained by these calculations, it can be grouped categories based on class intervals:

1. Counting Number of Classes
   K = 1 + 3,3 log n
   K = 1 + 3,3 (log 8)
   K = 1 + 3,3 (0.903) = 3.9 ≈ 4
   (rounded to 4 so that the number of classes is equal to the number of answer choices in the questionnaire)

2.Calculating Range

$$R = x_t - x_r + 1$$
$$= (1200 - 240) + 1$$
$$= 960 + 1$$
$$= 961$$

3. Calculating Class Length

$$\text{Class Length} = \frac{R}{K}$$
$$= \frac{9}{4}$$
$$= 961$$

From the results of these calculations, groupings are arranged based on the interval values as shown in the table:

Table 3 Value Interval Grouping

Value Interval	Category
240 – 480	Very Not Good
481 – 721	Not good
722 – 962	Enough
963 – 1203	Good
1204 – 1444	Very good

The results of the Usability Test for calculating the score of each question that has been asked to 30 respondents

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are as follows:

Strongly agree	= 90 x 5	=	450
Agree	= 97 x 4	=	388
Agree or not	= 35 x 3	=	105
Disagree	= 17 x 2	=	34
Strongly Disagree	= 1 x 1	=	1
Total number			978

The number obtained from the questionnaire is 978. The value is in the range of **963 – 1203**.

h. Reliability Analysis

The presentation of reliability data is obtained from testing the WAPT 3.1 software to determine the performance of the LIQU application which is shown in the figure:

Figure 8 Application Testing Using WAPT 3.1
(source: image processed by WAPT3.1 Application)

Measuring stress testing using WAPT is shown in Figure:

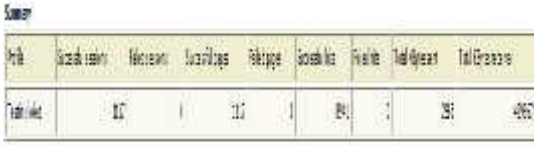

Figure 9 Stress testing results Using WAPT 3.1
(source: image processed by WAPT3.1 Application)

The following table is a calculation of the results of Performance testing:

Table 4 Reliability Testing Using WAPT 3.1

Category	Success	Failed	Total
Sessions	1117	0	1117
Pages	1117	0	1117
Hits	8941	0	8941
Jumlah		0	11175

R1 = $1 - \frac{n}{N}$ x 100 %

R1 = $1 - \frac{0}{1}$ 100 %

R1 = 1 x 100 %

R1 = 100 %

i. Analysis of Arrival Characteristics

Table 5 Arrival Queue Characteristics

Minutes	Time	Arrival	Service
0	07:15	0	0
1	08:16 - 08:21	1	1
2	08:21 - 08:26	1	1
3	08:26 - 08:31	2	0
4	08:31 - 08:36	1	1
5	08:36 - 08:41	1	1
6	08:41 - 08:46	1	1
Total		28	27

Based on the data from the table above, it can be seen that the number of arrivals of lightweight bricks for 30 minutes is 28 people and the number of services for 30 minutes is 27 people.

To calculate the steady state size of the LIQU application performance, see the formula below:

$\lambda = \frac{N \quad o \quad c \quad who \; cc}{N \quad o \quad c \quad S}$

$\lambda = \frac{2}{3}$

λ = 0,9333 person/minute

The service level of the light brick transportation queue for the LIQU application can be seen in the formula below:

$\mu = \frac{S \quad Ti}{N \quad o \quad S}$

$\mu = \frac{3}{2}$

μ = 1,1111 minutes/person

Furthermore, calculating the level of service facility intensity (ρ) can be calculated by the following formula.

$\rho = \frac{\lambda}{C \; x \; \mu}$

$\rho = \frac{0,9}{1 \; x \; 1,1}$

ρ = 0,84 < 1

Table 6 Service Facility Usability Level

C	λ	μ	ρ
1	0,933	1,1111	0,84

Based on Table 6, it is known that the usability level of the LIQU queue

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application is less than one so it can be said that the lightweight brick transportation queuing system at PT. Priority One Indonesia meets steady state conditions, which means that the average level of buyer arrivals does not exceed the average level of service.

The time required for light brick transportation services is assumed to be exponentially distributed. In this test, an alpha (α) of 5% or 0.05 is used. From the research data, the pattern of each customer arrival per 30 minute interval is then used to test the exponential distribution as follows:

H0 : Queuing time using the LIQU application with exponential distribution

H1 : Queuing time using Liqu application is not exponentially distributed.

Table 7 Arrival Distribution Test

X	F	P(X)	Fe	(F0-Fe)2	χ^2
0	0	0,2500	6,7500	45,5625	6,7500
1	8	0,1947	5,2569	7,5246	1,4314
2	3	0,1516	4,0941	1,1970	0,2924
3	6	0,1516	4,0941	3,6325	0,8873
4	3	0,1181	3,1885	0,0355	0,0111
5	4	0,0920	2,4832	2,3007	0,9265
6	1	0,0716	1,9339	1,1366	0,5877
Total	27		27,8006		10,8875

Based on the calculation χ^2 is 10.8875. From the Chi Square table, it is obtained that $X^2_{(0,05:6)}$ is 11.071, thus $X^2_{(count)} < X^2_{(table)}$ then Ho is accepted, meaning that the queue time for transporting light bricks using Poission distributed LIQU queue application.

Based on the plans and results of testing on the web software of the lightweight brick transportation queuing system, PT. Priority One Indonesia uses two testing techniques, namely Usability analysis and Reliability analysis. Generating analysis data are as follows:

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Table 8 Discussion result

No	Aspect	Results	Category
1	*Usability* Analysis	Usability Test Results, the number obtained from the questionnaire is **978**. The value is in the range of **963 – 1203**	**Good**
2	*Reliability* Analysis	Reliability test results, In tests that use WAPT 3.1 there is no data input that fails then. Based on *Telecordia Standard* if success rate ≥ 95 then meet the aspect of **Reliability**.	**Good**
3	Arrival Characteristics Analysis	Based on calculations x^2 as big as 10,8875. From table *Chi Square*, obtained $X^2_{(0,05:6)}$ is 11,071 therefore $X^2 < X^2$ then Ho is accepted.	**Good**

4. CONCLUSIONS

Based on the research that has been carried out for the manufacture of LIQU Applications in the transportation of lightweight bricks at PT. Priority One Indonesia Based on the Web, the following conclusions can be drawn:

1. The results of the LIQU queue application can be used by the company during the queuing process for the transportation of light bricks at PT. Priority One Indonesia. The LIQU application makes it very easy for admins and customers to queue up when transporting light bricks. The LIQU application is equipped with a voice call feature according to the number obtained by the customer and this application can also display reports on how many customers carry out the transportation of light bricks every day.
2. The LIQU application is very helpful in dealing with queuing problems when transporting PT. Priority One Indonesia is seen from the analysis that has been done using Usability Analysis and Reability Analysis. In the Usability Analysis, the number obtained from the questionnaire is 978. The value is in the range of 963 – 1203 so it is included in the Good category. Reliability analysis resulted in 100% in the Sessions category, the Pages category obtained 100% and for the Hits category 100% (fulfilled). Analysis of Arrival Characteristics obtained by calculation Based on calculations x^2 as big as 10,8875. From table *Chi Square*, obtained $X^2_{(0,05:6)}$ is 11,071 therefore $X^2_{(Count)} < X^2_{(table)}$ then Ho is accepted. With customer time in queue 0.4023 minutes per person. Based on the test results, it can be concluded that the LIQU application is suitable for use at PT. Priority One Indonesia in helping to deal with queues when transporting light bricks.

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