ANALYSIS OF SERVICE QUALITY AND PATTERN OF SALES TRANSACTIONS WITH CUSTOMER RELATIONSHIP MANAGEMENT APPROACH AT JAYA MAKMUR SHOP

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ABSTRACT

Jaya Makmur Shop is a business engaged in service maintenance, repair and sale of spare parts and car accessories. Company founded in 2005 is located at Jalan Ahmad Yani No. 281 Bandung. Maintenance and repair services offered by this company are very comprehensive, ranging from tune up, spooring up to the tire. Parts and accessories are sold also very comprehensive, ranging from oil, batteries until the fragrance is available at this company. There are several problems faced Jaya Makmur Shop, Jaya Makmur Shop difficulty in retaining customers to re-do the transaction and the manager difficulty in determining the appropriate combination of items to be used as a single package goods.

In determining the quality of service, there is a method called servperf. Methods servperf combined with likert scale is used so that Jaya Makmur Shop can provide charging facilities assessment questionnaire quality of service that can be filled by the customer and perform calculations on the results of filling the questionnaire, so the company will be able to understand the customer's wishes and can provide the desired each customer. While the method of association rule with a fp-growth algorithm is used to analyze the transaction data to obtain the appropriate combination of items to be used as a single package goods. All of this is packaged in a customer relationship management information system.

Based on the test results it can be concluded that this system has helped managers to know the quality of services based on an assessment of the customer, determines the action recommendations to attribute certain services and determine which combination of goods for packaging goods which can be seen customers through the front-end Jaya Makmur Shop website.

Keyword : Association Rule, FP-Growth Algorithm, Servperf Method, Customer Relationship Management, Information Systems

1. INTRODUCTION

Jaya Makmur Shop is a business engaged in service maintenance, repair and sale of spare parts and car accessories. Company founded in 2005 is located at Jalan Ahmad Yani No. 281 Bandung. Maintenance and repair services offered by this company are very comprehensive, ranging from tune up, spooring up to the tire. Parts and accessories are sold also very comprehensive, ranging from oil, batteries up to fragrance with a variety of brands available in this company.

Jaya Makmur Shop is a company that is always striving to improve the quality of its services. There are several attributes of the service are always assessed and got action from Jaya Makmur Shop manager, some of which are security parking area and facilities, waiting rooms and so on. Currently in assessing each service attribute only from the perspective of the manager. There are no facilities to make customers to participate in making assessments. This makes managers still do not understand the customer's wishes related to services provided to them. Based on transaction data Jaya Makmur Specialty Shop for items such as engine oil to customers who live in the city of Bandung in the period August 2015-July 2016, by 67% or 494 out of 737 customers total customer does not make transactions again after the first transaction. While returning customers conduct transactions after the first transaction is only about 33% or amounted to 243 customers. This raises a problem that Jaya Makmur Shop difficulty in retaining customers to re-do the transaction, as Jaya Makmur Shop still lack an understanding of the customer's wishes related services provided to them, which makes Jaya Makmur Shop can not provide services in accordance with customer wishes.

The solution to this problem is to provide facilities to customers in the form of questionnaires assessing the quality of each service attribute. The results of these assessments can help companies to better understand the customer's wishes and can be the basis of good recommendations for managers in delivering action to attribute certain services. So expect the quality of services provided companies

can match what the customer wants and make more and more customers to survive.

Furthermore, in an interview with Mr. Kurniawan as the Manager of Jaya Makmur Shop, he expressed his desire to make the sales package goods. Based on transaction data Jaya Makmur Shop the period August 2015-July 2016, as many as 72% or 2,230 of the total 3,095 transaction number transaction number contains more than one item. While that contains one item only around 28% or amounted to 865 the number of transactions. It shows that most customers Jaya Makmur Shop has a habit of buying more than one kind of goods. In addition, based on the results of the questionnaire form of identification of customer needs to pack the goods distributed to the customers who come to the company. Of the 30 respondents obtained, approximately 83% or 25 respondents stated that there should be a stuff pack. While stating not only amount to around 17% or 5 respondents. However, there are problems that arise in the manufacture of the goods package, the manager of difficulty in determining the appropriate combination of items to be used as a single package goods, because the goods contained in Jaya Makmur Shop very diverse where for goods and services such as engine oil alone there are 91 types of goods.

The solution to the problems of the stuff pack is by analyzing the existing transaction data. The analysis process that is focused on the relationship that occurs between items in a transaction. The results of the analysis can be a good basis for Managers Jaya Makmur Shop in making packages of goods.

The purpose of this research is to design and develop information systems Customer Relationship Management in Jaya Makmur Shop Servperf adapting the method to analyze the quality of services and methods Association Rule to analyze the pattern of sales transactions. The purpose of this study was as follows:

a. Helps managers to know the quality of services based on an assessment of the customer and determine recommendations for action to attribute certain services.
b. Help managers determine which combination of goods for packaging goods and customers can see the results on the goods package through the front-end website Jaya Makmur Shop.

2. CONTENTS OF RESEARCH

2.1 Customer Relationship Management

Customer Relationship Management (CRM) is a business managing the company's relationship with customers so that the company can better understand the character and needs of its customers and then create a program company in accordance with the requirements [1]. The principle of the importance of fostering a close relationship with the company's customers in the early stages came from the marketing department needs who are in work directly related to the customer. But in subsequent developments, proximity to customers is just not enough or can not only be the responsibility of the marketing department or sales alone.

2.2 Association Rule

Association rule is one of the main techniques or procedures in market basket analysis to find hugungan between items in a dataset and display forms of association rule [2]. Association rule (association rules) will find a certain pattern to associate the data with other data. Then to find association rule from a data set, the first phase should be done is to find frequent itemset first. Frequent itemset is a set of items that frequently appear simultaneously. After all frequent patterns item is found, then look for an association rule or rule linkage eligible predetermined.

2.3 Fp-growth Algorithm

Fp-growth algorithm is an alternative algorithm that is effective enough to specify the data set that appears most frequently (frequent itemset) in a data set. Fp-growth algorithm can be divided into three main stages, namely [3]:

1. Phase Conditional Pattern Base generation
2. Phase Conditional FP-Tree generation
3. Phase frequent itemset search

The third stage is a step that will be done to get frequent itemset which can be seen in the algorithm in Figure 1.

```
Input       : FP-Tree Tree
Output      : Rt Sekumpulan lengkap pola frequent
Method      : FP-Ggrowth ( Tree, null )
Procedure   : FP-Growth ( Tree, _ )
{
01 : if Tree mengandung single path P;
02 : then untuk tiap kombinasi ( dinotasikan _ ) dari node node dalam path do
03 : bangkitkan pola _ _  dengan support daro node-node dalam _;
04 : else untuk tiap a1 dalam header dari Tree
do
{
05 : bangkitkan pola
06 : bangun _ = a1 _ dengan support = a1.
Support
07 : if Tree _ = _
08 : then panggil FP-Growth  (Tree, _ )
}
```

Figure 1 Algorithm for Getting Frequent Itemset

2.4 Servperf Method

Servperf determine the quality of service by only performing measurements on service performance. In this concept, the performance is the best representation of the customer's perception of the quality of service received. Instruments used Servperf still based dimensions of service quality, but eliminates the element of hope and change that to the benefit [4]. For consumer perceptions of a service is an important thing to note, given the main focus is customer service. Service good performance

will be achieved if the customer's perception of a service is also good.

2.5 Likert Scale

Likert scale is a type of scale that uses a psychometric questionnaire and use a wider scale in survey research [5]. The rating methods are summed popular also with the name of the model Likert scaling. Likert scaling method is a method of using a distribution statement gesture responses as the basis for determining the scale. In this approach does not provide any group appraiser panel, due to the scale value of each statement will not be determined by the degree of its favorable respectively, but the distribution is determined by the response of approval or disapproval of a group of respondents who acted as the pilot group.

In a Likert scale, calculating the average score of each questionnaire using the arithmetic mean formula, as follows [6]:

$$Rata - rata\ hitung = \frac{\sum semua\ nilai}{banyak\ data} \quad (1)$$

As for the present the average score into a description of his representative, used the scale intervals obtained from a statistical formula to find the length of the class interval, as follows [6]:

$$Panjang\ kelas\ interval = \frac{nilai\ tertinggi - nilai\ terendah}{banyaknya\ kelas\ interval} \quad (2)$$

2.6 Framework Analysis of Dynamic CRM

In making the CRM information system to be built, we need a framework as a reference so CRM features can be built quickly and accurately. The CRM framework in accordance with the system to be built in Jaya Makmur Shop is the Framework of Dynamic CRM that describe a series of steps in the CRM representing pembenagunan phase and maturity of the company's relationship with customers. CRM to be built is a kind of Analytical CRM, so that the process undertaken to achieve the commitment with customers focusing on Dynamic Relationship Management. Analysis of Dynamic CRM using CRM Framework consists of Relationship Phase, Dynamic Relationship Management and Customer Information. Framework Analysis of Dynamic CRM can be seen in Figure 2.

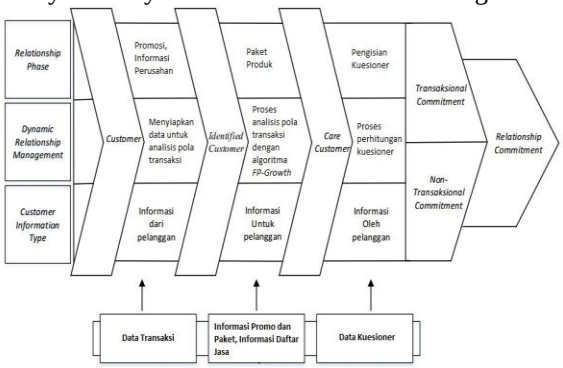


Figure 2 Framework Analysis of Dynamic CRM [7]

2.7 Analysis of the Sales Transaction Patterns

Analysis of the pattern of sales transactions conducted using association rule. The data used is data transaction Jaya Makmur Shop the period 1 to 4 July 2016. The basic method of association rule is divided into two phases: the highest frequency pattern search and creation or association calculation of frequencies that have been obtained. To make the search patterns of the highest frequency required minimum support value, in this case assumed to be the minimum value of its support is 10% of the amount of transaction data are used, because of the amount of transaction data is 30, the minimum value of its support is 3. Here are the stages in performing analysis of patterns of transactions, ranging from the initial modeling process of getting frequent itemset until the end of the presentation:

a. Providing frequent value on each item code
   Values obtained by counting the frequent appearance of each item in the transaction data. From the calculation of frequent can know the number of items contained in the transaction data is the period 1-4 July 2016 as many as 19 items. Results Award frequent values shown in Table 1.

Table 1 Frequent Item

Code	Frequency
JSA.001	10
JSA.002	3
JSA.004	2
JSA.005	13
JSA.006	1
JSA.010	1
JSA.012	2
JSA.015	12
JSA.019	1
JSA.021	1
JSA.027	2
SHL10W4001.001	2
SHL10W4002.002	4
SHL15W5001.007	1
TTO.006	5
TTO.007	11
TTO.010	1
TTO.012	1
TTO.020	1

b. Eliminate items that frequent its value is lower than the minimum support
   At this stage, the items that have frequent value less than 3 will be eliminated. The results at this stage can be seen in Table 2.

Table 2 Item Meets the Minimum Support

Code	Support Count
JSA.001	10
JSA.002	3
JSA.005	13
JSA.015	12
SHL10W4002.002	4
TTO.006	5
TTO.007	11

c. Giving priority for each item
After getting the data that meets the minimum support value, then every item was given priority as a sign of any items that have the greatest frequent up to the smallest. Results sort items based on the priority value can be seen in Table 3.

Table 3 Giving Priority Value

Code	Support Count	Priority
JSA.005	13	1
JSA.015	12	2
TTO.007	11	3
JSA.001	10	4
TTO.006	5	5
SHL10W4002.002	4	6
JSA.002	3	7

d. Sort of transaction data by priority
At this stage the item that has the highest priority takes precedence over the value of writing for each transaction number.

e. Make fp-tree
After each item in the transaction data has been sorted, the next step is to make fp-tree. Fp-tree final stage in this case can be seen in Figure 3.

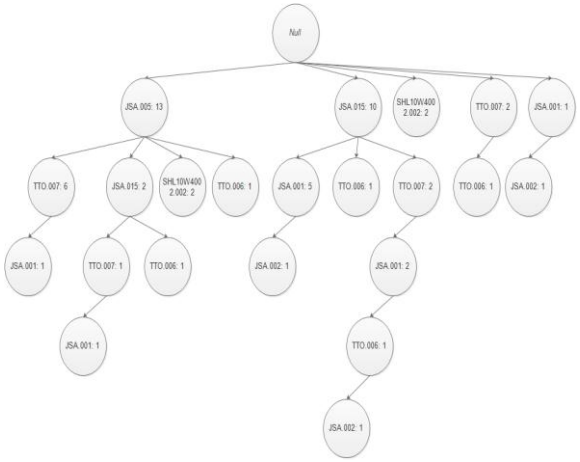


Figure 3 The Final Result of Fp-Tree

f. Conditional pattern base generation
Generation conditional pattern base obtained through fp-tree that had been established earlier, by looking for patterns trajectory beginning and end of each item, from the item with a value of support count (result priority) with the smallest to the largest. The generation of conditional pattern base can be seen in Table 4.

Table 4 The Result of Conditional Pattern Base Generation

Items	Conditional Pattern Base
JSA.002	• JSA.015, JSA.001: 1 • JSA.015, TTO.007, JSA.001, TTO.006: 1 • JSA.001: 1
SHL10W4002.002	• JSA.005: 2
TTO.006	• JSA.005, JSA.015: 1 • JSA.005: 1 • JSA.015: 1 • JSA.015, TTO.007, JSA.001:1 • TTO.007:1
JSA.001	• JSA.005, TTO.007:1 • JSA.005, JSA.015, TTO.007: 1 • JSA.015: 5 • JSA.015, TTO.007: 2
TTO.007	• JSA.005: 6 • JSA.005, JSA.015:1 • JSA.015: 2
JSA.015	• JSA.005: 2

g. Frequent itemset formation
Phase formation of frequent itemset obtained from the conditional fp-tree which is also the result after the generation of conditional pattern base. The result of the formation of frequent itemset can be seen in Table 5.

Table 5 The Result of Frequent Itemset

Item	Frequent Itemset
JSA.002	• JSA.002, JSA.001: 3
TTO.006	• TTO.006, JSA.015: 3
JSA.001	• JSA.001, TTO.007: 4 • JSA.001, JSA.015: 8 • JSA.001, TTO.007, JSA.015: 3
TTO.007	• TTO.007, JSA.005: 7 • TTO.007, JSA.015: 3

h. Calculation of confidence and generate rule
After the formation of frequent itemset obtained, the final step in this model is to calculate the value of the confidence of any existing rule. Assumed value of minimum

confidence is 50%, so that the rule which has the confidence value below 50% is not worth being a package. The results of calculations and generate confidence rule can be seen in Table 6.

Table 6 Confidence and Generate Rule Calculation Result

Rule	Confidence
JSA.001 → JSA.002	(3/8) * 100 % = 37,5%
JSA.015 → TTO.006	(3/12) * 100 % = 25%
TTO.007 → JSA.001	(4/9) * 100 % = 44,4%
JSA.015 → JSA.001	(8/12) * 100 % = 66,7%
TTO.007, JSA.015 → JSA.001	(3/3) * 100% = 100%
JSA.005 → TT0.007	(7/13) * 100 % = 53,8%
JSA.015 → TT0.007	(3/12) * 100 % = 25%

i. Interpretation

Stage displays pattern information generated from the data mining process in a form that is easily understood. Every rule that the value of its confidence-confidence meets minimum value will be displayed with the addition of the name of the goods. The combination of items that could be used as one package can be seen in Table 7.

Table 7 Recommendation of Item Combination

No	Item Combination
1	Tambah Angin Nitrogen – Jasa Service Spooring
2	Quartz 7000 10W40 Galon, Tambah Angin Nitrogen – Jasa Service Spooring
3	Jasa Tune Up – Quartz 7000 10W40 Galon

2.8 Calculation Analysis of Service Quality

Analysis of calculation of service quality in this study was conducted to determine the level of quality (in terms of both interest and customer satisfaction) of any services provided to customers based on ratings from customers in Jaya Makmur Shop. The following are the attributes of the services in Jaya Makmur Shop in accordance with the dimensions of service in Servperf methods:

1. Tangibles
   a. Kemudahan untuk mencapai lokasi bengkel.
   b. Kerapihan berpakaian para pegawai.
   c. Ketersediaan area parkir yang aman.
   d. Ketersediaan ruang tunggu yang nyaman.
   e. Kelengkapan peralatan bengkel.
   f. Ketersediaan toilet yang bersih.
   g. Ketersediaan tempat ibadah (mushola).
   h. Kemudahan dalam mendapatkan suku cadang.
2. Reliability
   a. Kecepatan layanan saat pendaftaran.
   b. Pengetahuan dan keahlian pegawai dalam bekerja.
   c. Ketepatan identifikasi kerusakan kendaraan.
   d. Ketepatan mekanik dalam memperbaiki kendaraan.
   e. Ketepatan waktu penyelesaian sesuai yang dijanjikan.
3. Responsiveness
   a. Kesiapan pegawai dalam melayani pelanggan.
   b. Ketanggapan pegawai dalam menangani keluhan pelanggan.
   c. Pemberian informasi yang mudah dimengerti.
4. Assurance
   a. Keramahan pegawai dalam melayani pelanggan.
   b. Keamanan pelanggan dari kesalahan biaya perbaikan.
   c. Tanggung jawab bengkel terhadap hasil pekerjaan.
5. Empathy
   a. Keadilan dalam memberikan layanan kepada setiap pelanggan.
   b. Kemudahan prosedur layanan bengkel.
   c. Ketersediaan layanan melalui telepon.

Here are the stages in the analysis of the calculation of quality of service:

a. Data collection

Researchers collected data service attribute ratings by spreading questionnaire to customers, after the system is built, customers can make filling out the questionnaire directly in the system. Deployment questionnaire was conducted on December 21-26, 2016 and the results of the accumulated scores for each attribute of the service can be seen in Table 8.

Table 8 Accumulated Scores Results Dissemination Service Attributes Questionnaire

No	Atribut Layanan	Kepentingan	Kepuasan
1	Kemudahan untuk mencapai lokasi bengkel	123	106
2	Kerapihan berpakaian para pegawai	103	93
3	Ketersediaan area parkir yang aman	101	96
4	Ketersediaan ruang tunggu yang nyaman	99	94
5	Kelengkapan peralatan bengkel	103	85
6	Ketersediaan toilet yang bersih	89	92
7	Ketersediaan tempat ibadah (mushola)	62	89
8	Kemudahan dalam mendapatkan suku cadang	95	93
9	Kecepatan pelayanan saat pendaftaran	103	95
10	Pengetahuan dan keahlian pegawai dalam bekerja	102	92
11	Ketepatan identifikasi kerusakan kendaraan	96	93
12	Ketelitian mekanik dalam memperbaiki kendaraan	97	91
13	Ketepatan waktu penyelesaian sesuai yang dijanjikan	90	92
14	Kesiapan pegawai dalam melayani pelanggan	100	85
15	Ketanggapan pegawai dalam menangani keluhan pelanggan	104	95
16	Pemberian informasi yang mudah dimengerti	96	92
17	Keramahan pegawai dalam melayani pelanggan	96	91
18	Keamanan pelanggan dari kesalahan biaya perbaikan	95	90
19	Tanggung jawab bengkel terhadap hasil pekerjaan	95	87
20	Keadilan dalam memberikan layanan kepada setiap pelanggan	93	89
21	Kemudahan prosedur pelayanan bengkel	95	91
22	Ketersediaan layanan melalui telepon	92	90

b. Presentation of final result calculation

From the results of previous accumulated scores for each attribute of service is calculated the average value using equation 1. Once it was sorted with the provisions of the earliest is a service with the highest interest value and have the lowest satisfaction scores. Presentation of final results of the calculation can be seen in Table 9.

Table 9 Presentation of Fnal Result Calculation

No	Atribut Layanan	Kepentingan	Kepuasan	Keterangan
1	Kemudahan untuk mencapai lokasi bengkel	4,2	3,7	Sangat Penting & Puas
2	Kelengkapan peralatan bengkel	3,6	2,9	Penting & Ragu-ragu
3	Kerapihan berpakaian para pegawai	3,6	3,2	Penting & Ragu-ragu
4	Kecepatan pelayanan saat pendaftaran	3,6	3,3	Penting & Ragu-ragu
5	Ketanggapan pegawai dalam menangani keluhan pelanggan	3,6	3,3	Penting & Ragu-ragu
6	Pengetahuan dan keahlian pegawai dalam bekerja	3,5	3,2	Penting & Ragu-ragu
7	Ketersediaan area parkir yang aman	3,5	3,3	Penting & Ragu-ragu
8	Kesiapan pegawai dalam melayani pelanggan	3,4	2,9	Penting & Ragu-ragu
9	Ketersediaan ruang tunggu yang nyaman	3,4	3,2	Penting & Ragu-ragu
10	Tanggung jawab bengkel terhadap hasil pekerjaan	3,3	3,0	Ragu-ragu & Ragu-ragu
11	Ketelitian mekanik dalam memperbaiki kendaraan	3,3	3,1	Ragu-ragu & Ragu-ragu
12	Keramahan pegawai dalam melayani pelanggan	3,3	3,1	Ragu-ragu & Ragu-ragu
13	Keamanan pelanggan dari kesalahan biaya perbaikan	3,3	3,1	Ragu-ragu & Ragu-ragu
14	Kemudahan prosedur pelayanan bengkel	3,3	3,1	Ragu-ragu & Ragu-ragu
15	Kemudahan dalam mendapatkan suku cadang	3,3	3,2	Ragu-ragu & Ragu-ragu
16	Ketepatan identifikasi kerusakan kendaraan	3,3	3,2	Ragu-ragu & Ragu-ragu
17	Pemberian informasi yang mudah dimengerti	3,3	3,2	Ragu-ragu & Ragu-ragu
18	Keadilan dalam memberikan layanan kepada setiap pelanggan	3,2	3,1	Ragu-ragu & Ragu-ragu
19	Ketersediaan layanan melalui telepon	3,2	3,1	Ragu-ragu & Ragu-ragu
20	Ketersediaan toilet yang bersih	3,1	3,2	Ragu-ragu & Ragu-ragu
21	Ketepatan waktu penyelesaian sesuai yang dijanjikan	3,1	3,2	Ragu-ragu & Ragu-ragu
22	Ketersediaan tempat ibadah (mushola)	2,1	3,1	Tidak Penting & Ragu-ragu

c. Analysis of Decision-making

Analysis of decision-making is the stage of decision making based on the final calculation of the questionnaire. Rule his decision making can be seen in Table 10.

Table 10 Rule of Decision-making

Kepentingan	Kepuasan	Tindakan
Sangat penting atau penting	Sangat tidak puas atau tidak puas	Memberikan arahan dan pelatihan kepada pegawai terkait untuk meningkatkan kualitas layanan
	Ragu-ragu	Memberikan arahan kepada pegawai terkait untuk meningkatkan kualitas layanan
	Sangat puas atau Puas	Memberikan arahan kepada pegawai terkait untuk mempertahankan kualitas layanan

Based on the decision rule and the result of calculation of the questionnaire before the decision given recommendations are presented in Table 11.

Table 11 Recommendation of Decision

No.	Atribut Layanan	Tindakan
1	Kemudahan untuk mencapai lokasi bengkel	Memberikan arahan kepada pegawai terkait untuk mempertahankan kualitas layanan
2	Kelengkapan peralatan bengkel	Memberikan arahan kepada pegawai terkait untuk meningkatkan kualitas layanan
3	Kerapihan berpakaian para pegawai	Memberikan arahan kepada pegawai terkait untuk meningkatkan kualitas layanan
4	Kecepatan pelayanan saat pendaftaran	Memberikan arahan kepada pegawai terkait untuk meningkatkan kualitas layanan
5	Ketanggapan pegawai dalam menangani keluhan pelanggan	Memberikan arahan kepada pegawai terkait untuk meningkatkan kualitas layanan
6	Pengetahuan dan keahlian pegawai dalam bekerja	Memberikan arahan kepada pegawai terkait untuk meningkatkan kualitas layanan
7	Ketersediaan area parkir yang aman	Memberikan arahan kepada pegawai terkait untuk meningkatkan kualitas layanan
8	Kesiapan pegawai dalam melayani pelanggan	Memberikan arahan kepada pegawai terkait untuk meningkatkan kualitas layanan
9	Ketersediaan ruang tunggu yang nyaman	Memberikan arahan kepada pegawai terkait untuk meningkatkan kualitas layanan

2.9 Database Analysis (ERD)

In the development of the information systems required in a design database. Modelling to be used in the analysis of this data base using the Entity Relationship Diagram (ERD) which can be seen in Figure 4.

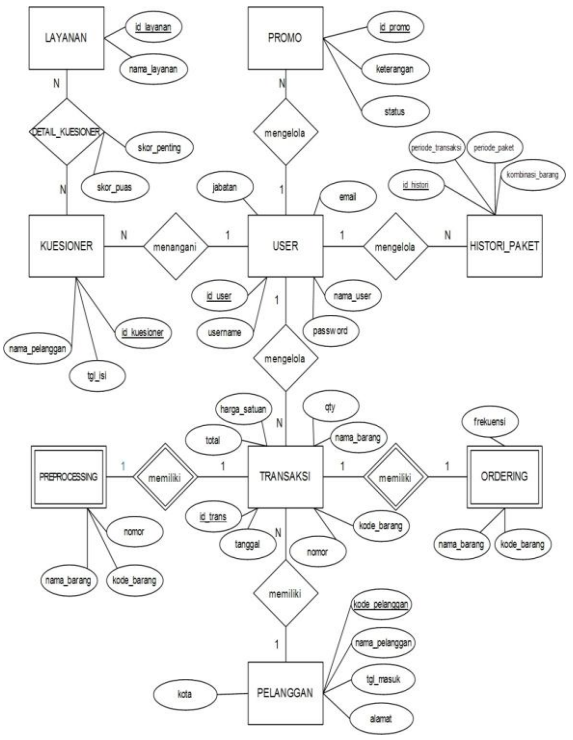


Figure 4 Entity Relationship Diagram

2.10 Context Diagram

Diagram context is a basic diagram of the DFD that describes the relationship in the system to its users. Actors involved in this context diagram, ie admin, manager, cashier and customer. Each actor will have different access rights. Diagram context of a system that will be created can be seen in Figure 5.

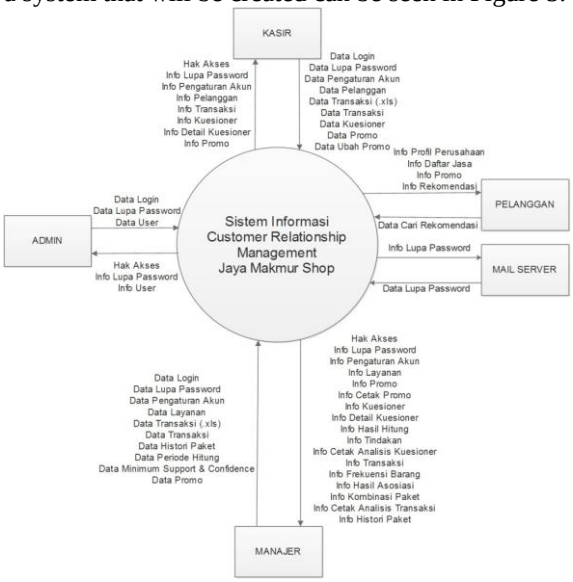


Figure 5 Context Diagram

2.11 Design of Database

Relationship scheme is a series of relationships between multiple tables in a database system. Explanation The set of databases on this system can be seen in Figure 6.

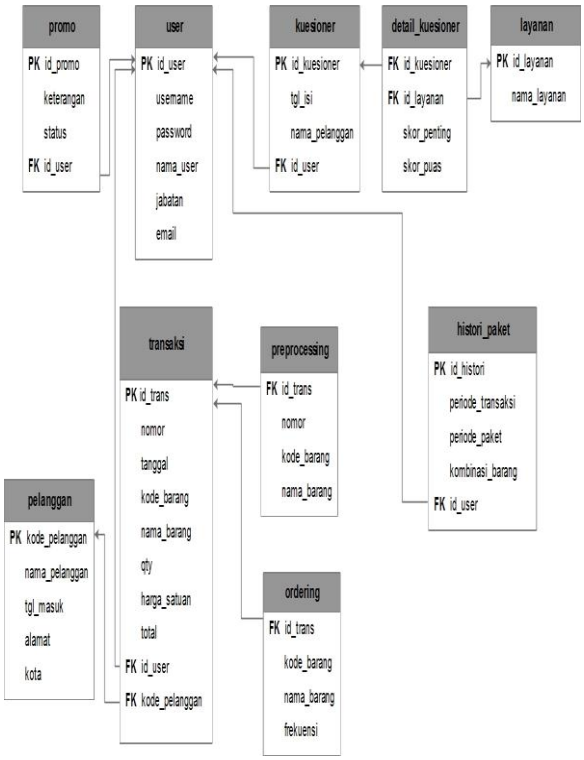


Figure 6 Relationship Scheme

3. CONCLUSION

Based on the results of testing that has been done in previous chapters as well adapted to the purpose of research it can be concluded as follows:

1. Analysis of the questionnaire with servperf method and the Likert scale in information systems can help managers to know the quality of services based on an assessment of the customer and determine recommendations for action to attribute certain services.
2. Analysis of the pattern of sales transactions with the association rule method and algorithm FP-growth in information systems can help managers determine which combination of goods for packaging goods and customers can see the results on the goods package through the front-end website Jaya Makmur Shop.

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