

The Implementation of QFD and FMEA in Order to Improve Ojek Online Service Quality Based on Non-Specific Application in Jember

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Abstract: *Ojek Online in Indonesia has been gaining so many attention because of its efficiency and effectiveness to overcome traffic in Indonesia. Without doubt those attention attract so many people to compete in the same field of business. Many competitors means tight competition. This study aims to improve service quality of ojek online non-specific based application in jember by identifying its customer needs and translating it into service design. The object of this study is three non-specific application based ojek online company in Jember. QFD is one method that is capable to translate customer needs into service design. The popular tools of QFD is House of Quality matrix. This matrix will help to identify which of many needs of customer that's most demanded by the customer by its rating of importance. FMEA applied to make sure that service design of QFD will meets the customer needs.*

Keywords: QFD, FMEA, Service Design, Service Quality

1. Introduction

In the era of Globalization, the economic competition of both manufacturing and service industries is growing very rapidly. The impact of the business is placed in a situation of increasingly fierce competition, both domestic and international market. To maintain the survival of the company, the company is required to continue to grow and compete to be number one in the business sector. One of the fastest growing service industries in Indonesia is in the transportation sector.

One of many public transportation that has been gaining many attention from Indonesian is ojek online (motorcycle taxi). quoted from liputan6.com[7] according to its history ojek has been appearing in Jakarta since 1970's by using bicycle. That kind of motorcycles taxis are called a conventional ojek or motorcycle taxi. Conventional motorcycle taxis can only be found when consumers search for them at certain points [7]. Unlike the conventional motorcycle taxis, online motorcycle taxis can be ordered online through android apps or ios. online motorcycle taxis arise due to the needs of the people of Jakarta who needs a fast and efficient transportation. It's no longer a public secret that Jakarta is a busy and jammed city. The Castrol's Magnatec Stop-Start Index survey shows that Jakarta is the world's most jammed city with an average of 33,240 times the vehicle stops on the road within a year [7][18]. There are two types of ojek online in indonesia. First, ojek online based on special application and ojek online based on non-special application.

Not only in Jakarta, ojek online based on specific application technology is now starting to emerge in various regions in Indonesia including Jember. Currently there is no official calculation from the Indonesian Central Bureau of Statistics on the exact number of online motorcycle taxi companies in Indonesia. However, one web mentioned that in 2015 there are approximately 60 companies in Indonesia and still

growing [8]. The growing number of online motorcycle taxi companies that have sprung up causing competition in this industry is increasing. In the competition, one of the determinants of business success is consumer satisfaction. Therefore, the company must always provide quality service in accordance with the wishes of consumers. The most important step to do in order to become number one in the competition is by designing new services or products according to the wants and needs of consumers[5] the same is expressed by Tanik[14] who says that every company providing services and products to consumers must understand their wants and needs to survive in a tight marketplace. Customer satisfaction is determined by many factors that are difficult to detect (intangibles). According Tjiptono[9] there are two factors that affect the quality of services, the expected service and perceived service. If the services received or perceived service in accordance with the expected service then it can be said that the services provided are good or meet the quality expected by consumers. Designing the quality of services in accordance with the wishes of consumers is not an easy thing but not something that can't be done. One of the measures to fulfill the quality that can be done is to use Quality Function Deployment (QFD). QFD is a method that helps to translate what customer needs into service or product design. According to Jaiswal[6] QFD "is a quality tool that helps to translate the Voice of the Customer (VoC) into new products that truly satisfy their needs". Then, FMEA can be applied to help the design resulted from QFD will really meets the consumer wants. FMEA helps to prevent failure that may occur from the process of QFD which may cause failure to service design.

As mentioned earlier, ojek online (motorcycle taxi) is growing so fast in Jakarta as well as in jember. The promotor of ojek online in Indonesia is PT. Aplikasi Karya Anak Bangsa named GO-JEK. GO-JEK is a specific based application company. They create their own application that can be downloaded in App store and play store. Go-Jek

started to operate in Jember since late of 2017. Before Go-jek operate in Jember, there are so many ojek online company that is not based on special application operate in Jember. This company operate manually. There is admin to help maintain the orders. Unlike go-Jek with its special application, customer only need to download the application to start order. Non-specific based application don't have their own application so they use whatsapp and bbm instead for their operational. Customer has to contac the phone number given by the company to order. The problem of this study is after Go-Jek starts to operate in Jember, the company with no-special application which is most of the are a start-up company are struggling to hold its company from bankrupt. Set aside the technology factors, this study is aimed to identify the needs of non-specific application based customer of ojek online in jember and translate it into service design.

2. Literature Survey

2.1 Service Quality

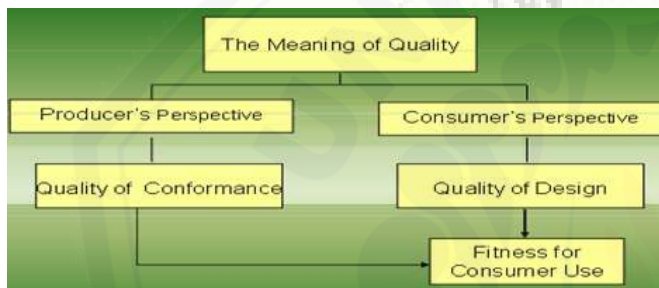


Figure 1 : The meaning of quality

According to Heizer and Render[12] quality is the ability of a good or service in meeting customer needs. The concept of quality itself is often regarded as a relative measure of the good of a product or service consisting of design qualities and quality of conformity. Quality of design Measures how similar characteristics exist to products or services to consumer demand while quality conformity Is the performance of a product or service based on design and product specifications[10]. Service quality itself According to Tjiptono[6] is the level of excellence expected to meet consumer desires. In other words, there are two main factors that affect the service quality factor of the expected service and perceived service. If the services received or perceived service in accordance with the expected service then it can be said that the services provided are good or meet the quality expected by consumers. Service quality can be defined by 5 dimension, which are[11]: tangibility, reliability, responsiveness, assurance, and empathy.

- 1) Tangibles involves physical facilities, equipment and communications tools
- 2) Reliability is the ability to provide services promised immediately, accurately and satisfactorily
- 3) Responsiveness is the desire of the staff to help customers and provide responsive services.
- 4) Assurance includes knowledge, skills, modesty, and trustworthiness of staff, free of danger, risk or doubt.
- 5) Empathy includes the ease in making good communication links, personal attention and meet the

needs of the customers.

2.2 Quality Function Deployment (QFD)

QFD (Quality Function Deployment) is the translation of a set of consumer needs priorities subjectively into a set of system levels during the conceptual process of the design system[15]. Another said QFD is a popular method to create a high quality service[4]. Another words by jaiswal[6] said QFD is a method or tools that is capable to translate the voice of customer into service design that will satisfy the customer. QFD also refres to a comprehensive Quality process to achieve high consumer satisfaction and business growth that can be applied in all type of business industries [16].

The process of QFD [1]:

Phase 1, Product Planning: Building the House of Quality. Led by the marketing department, Phase 1, or product planning, is also called The House of Quality. Many organizations only get through this phase of a QFD process. This phase documents customer requirements, warranty data, competitive opportunities, product measurements, competing product measures, and the technical ability of the organization to meet each customer requirement. Getting good data from the customer in Phase 1 is critical to the success of the entire QFD process.

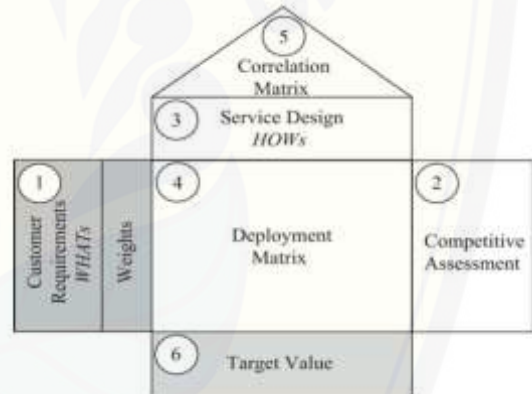


Figure 2: House of Quality Matrix

Phase 2, Product Design: This phase is led by the engineering department. Product design requires creativity and innovative team ideas. Product concepts are created during this phase and part specifications are documented. Parts that are determined to be most important to meeting customer needs are then deployed into process planning.

Phase 3, Process Planning: Process planning comes next and is led by manufacturing engineering. During process planning, manufacturing processes are flowcharted and process parameters (or target values) are documented.

Phase 4, Process Control: And finally, in production planning, performance indicators are created to monitor the production process, maintenance schedules, and skills training for operators. Also, in this phase decisions are made as to which process poses the most risk and controls are put in place to prevent failures. The quality assurance department in concert with manufacturing leads Phase 4[2].

2.3 Improving the QFD process using FMEA



Figure 3 : Integration between QFD and FMEA

QFD is a method that allows companies to translate consumer desires into services or end products of a company. However, in its application, there are several potential failures that may occur in the design process or the process of making such services or products. Therefore, the application of Failure Mode Analysis Effects can help to minimize and overcome the risk of failure that may occur[14]

2.4 Failure Mode and Effects Analysis (FMEA)

FMEA is a structured procedure for identifying and preventing as many failure modes as possible[19]. According to Tanik[14] FMEA is a methodology to improve service process reliability in the design phase. Greenough et al aid FMEA is "a disciplined approach used to identify potential failures of a product or service and then determine the frequency and impact of the failure"[2]. FMEA uses Risk Priority Number (RPN) to evaluate the risk level of a component or process. The RPN index is determined by the calculation of Severity, occurrence, and detectability. The RPN score inform that the higher the score means the higher its potential failure to damage service or products.[2]

$$RPN = \text{Severity} \times \text{occurrence} \times \text{detection}$$

Severity is ranked according to the seriousness of the failure mode effect on the next higher level assembly, the system or the user. Occurrence is ranked according to the failure probability, which represents the relative number of failures anticipated during the design life of the item. The effects of a failure mode are normally described by the effects on the user of the product or as they would be seen by the user. Detectability is an assessment of the ability of a proposed design verification program to identify a potential weakness before the part or assembly is released for production.[17]

3. Methodology

The process of solving the problem of this study are as follows :

1) The implementation of QFD

The data obtained from ojek online company and its customer regarding the wishes and needs of consumers and the technical capabilities of the company is included in the house of quality matrix. The data obtained from forum grup discussion, survey, and postal quistioner also interview with the owners of the company and the consumer.

Step of building the house of quality matrix are as follows :

Step 1 determining the voice of customer

Determining the voice of consumer by interviewing them and built a forum group discussion about what they are search in using ojek online services.

Step 2. Determining customer importance ratings (CIR)

After knowing the atribut that's importance for consumer then the consumer asked to rank or prioritize them according from the most importance to not importance. The scale are from 5-1. This step are done by distributing quistionare to the consumer. To measure the level of consumer priority in each attribute can use the following formula:

$$CIR = \frac{\sum x}{n} \quad (1)$$

Explanation:

CIR= Consumer Importance Rating

$\sum x$ = Amount CIR in one atribute

n = Amount of Respondent

Step 3. Determining the current performance of the company from consumer point of view.

Step 4. Determining the company objectives and sales point. This step is conducted by a special team who knows about the company.

Step 5. The improvement ratio (IR)

Improvement ratio is a ratio that will pointed out which of the attributes that needs much effort to be completed by the company. The improvement ratio can be calculated as follow:

$$IR = \frac{\text{performanceobjective}}{\text{currentperformance}} \quad (2)$$

Step 6. Calculating raw weight of each atribut. In this step, the raw weight of each affecting factor on customer satisfaction is calculated using the following formula:

Raw weight = consumer importance rating \times Improvement ratio \times Sales point

Step 7. Identify technical description of the company and determining the direction of importance of each technical descriptors

Step. 8 determining relationship matrix

In this section the special team will determine the relationship between the consumer needs and what company has to fullfill it.

Step 9. Identify the correlation matrix

This step will identify the correlation between technical descriptors.

Step 10. Calculate absolute importance and relative importance of each atribut

AI = \sum (Importance level of each atribut x relationship value)

$$RI = \frac{AI}{\sum AI} \quad (3)$$

2) Service Design

In this phase, the information represented in HoQ matrix, then arranged to be service design that will offered to the consumer.

3) Process Planning

After the design of the service is complete, then company identify the process of changing the input into output.

4) Proses Control

In this phase company ensures that the design has been planned to reach consumers according to the original plan. Therefore, in the process of this control, FMEA applied to analyze any risks that may arise from steps two and three at the time of service design and process planning.

4. Result and discussion

4.1 Result of HoQ

The atribut or the needs of consumer preferences are shown in table 1. Below :

Table 1: Attribute of consumer preferences

No	Indicator	Consumer needs
1	Tangibles	a. Ojek online company provides complete and fragrant riding equipment (eg: helmet and mask)
		b. Ojek online company provides adequate motorcycle
		c. Ojek online company provides additional equipment such as: pwerbank, headset, etc .
		d. Ojek Online company provides good looking driver
2	Reliability	a. Ojek Online able to meet the gender preference (male / female) drivers desired by consumers
		b. Drivers pick up the consumer just in time (in accordance with the deal with the admin)
		c. Drivers can deliver consumers or food orders at the destination quickly and accurately
		d. Fixed travel and food order (no additional costs)
3	Assurance	a. Ojek online company provides polite staff behaviour (driver and admin)
		b. Driver knows every streets name and every foodstop in Jember
		c. Drivers do not speed and adhere to traffic rules when carrying passengers
4	Responsivness	a. Responsiveness staff towards chat and consumers orders.
5	Emphyaty	a. Friendly behaviour from the staff while serving the consumer
		b. Driver can be easily communicate with consumer

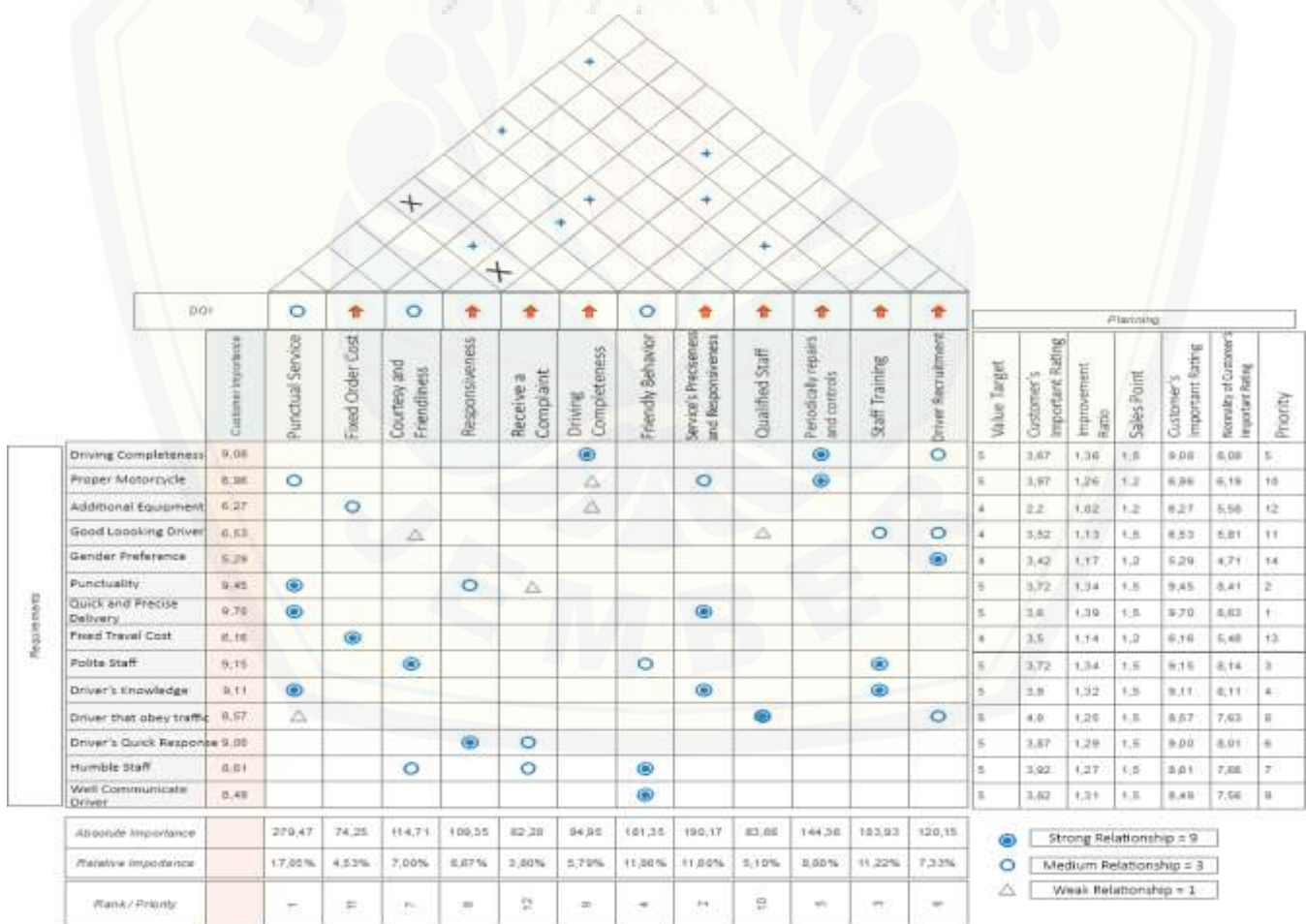


Figure 4: House Of Quality Matrix

Based on house of quality matrix in figure 4. Company can make service design based on rank of what consumer needs. This study, will only cover service design for 2 services

which are ojek online passenger and food delivery services. Based on HoQ Matrix the most importance attribute that should be fullfill by the company are :

a) For food delivery services :

- 1) Drivers can deliver consumers or food orders at the destination quickly and accurately
- 2) Ojek online company provides polite staff behaviour (driver and admin)
- 3) Driver knows every streets name and every foodstop in Jember.
- 4) Responsiveness staff towards chat and consumers orders.
- 5) Friendly behaviour from the staff while serving the consumer
- 6) Ojek Online company provides good looking driver
- 7) Fixed travel and food order (no additional costs)

b) For Passenger delivery services :

- 1) Drivers pick up the consumer just in time (in accordance with the deal with the admin)
- 2) Ojek online company provides polite staff behaviour (driver and admin)
- 3) Driver knows every streets name and every foodstop in Jember
- 4) Ojek online company provides complete and fragrant riding equipment (eg; helmet and mask)
- 5) Responsiveness staff towards chat and consumers orders.
- 6) Friendly behaviour from the staff while serving the consumer
- 7) Drivers do not speed and adhere to traffic rules when carrying passengers
- 8) Driver can be easily communicate with consumer
- 9) Ojek online company provides adequate motorcycle
- 10) Ojek Online company provides good looking driver
- 11) Ojek online company provides additional equipment such as: pwerbank, headset, etc .
- 12) Ojek Online able to meet the gender preference (male / female) drivers desired by consumers

4.2 Planning the process of the services

After knowing about the consumer needs, company should make an action about how to meets those needs. From HoQ, its inform the company about what action or technical descriptor that must be done first. The list of technical descriptor from the most importance to do are listed below:

- 1) Providing on time services for ojek online passenger
- 2) Staff training
- 3) Providing accuracy and fast services
- 4) Friendly behaviour from the staff
- 5) Recruiting new drivers
- 6) Responsive behaviour from all the staff
- 7) Polite behaviour from all the staff
- 8) Providing complete equipment for riding
- 9) Qualified staff
- 10) Repair and check the equipment periodically
- 11) Make sure the cost charged are fixed
- 12) Received complaints from consumer

Operational process of ojek online non-specific application based consist of four process, which are shon in figure below

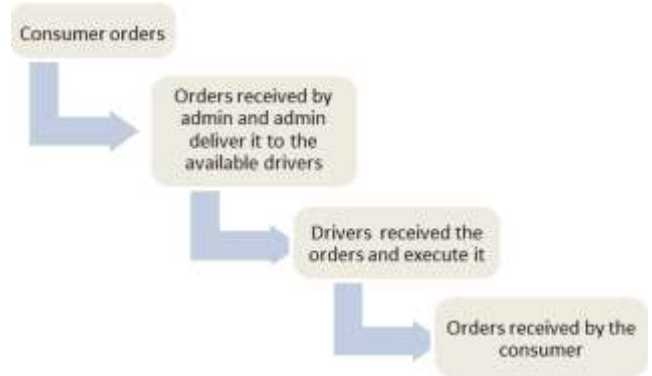


Figure 5: Operational process of ojek online company in Jember

Operational process can be summarize as standard operating company. To make sure that the operational process will not harm the end services offered, company needs to make a guidline for every staff. Below are the recommendation of standard operating company for the company:

a) For food delivery services :

- 1) Admin should act friendlyin responding complaints and orders chat from the consumer
- 2) Admin should make sure at least one driver are available to do orders
- 3) Admin should tell or inform consumer if there are some additional cost and asked whether the consumer still wanted to orders or not because of that additional charge.
- 4) Admin should clearly tell drivers about the orders (name of place, street, and address should inform clearly)
- 5) Conducted periodic checks for equipments (once a week)
- 6) Training for new staff
- 7) Driver must act friendly and polite while communicating with consumers

b) For Passenger delivery services :

- 1) Admin should act friendlyin responding complaints and orders chat from the consumer
- 2) Admin should make sure at least one driver are available to do orders
- 3) The information about the pick up point must be clear
- 4) Driver should dressed properly
- 5) Driver should obey traffic regulation while driving with the consumer
- 6) Driver should act friendly and polite to the consumer
- 7) Driver should make sure the equipment for riding is complete
- 8) Driver has to have driving license
- 9) conducted periodic checks for equipments (once a week)
- 10) Clean the equipment every week

4.3 Analyzing potential failure from design and process phase by using FMEA.

FMEA identify Potential failure or failure mode that might occur in product or service offered by a company. This study identify potential failure in three main factors which are : Staff, Physicall evidence, and the operational process.

Table 2 below shown the potential failure and its effect

Table 2: FMEA Table

No	Aspects	Failure mode	S	Cause	O	Effects	D	Solution	RPN
1	Admin	a. Admin slowrespon	5	a. there is only 1 admin	6	Customer dissatisfaction	5	a. recruiting new admin	150
		b. Admin being rude	5	b. staff training is not maximal	5		5	b. evaluation	125
		c. admin get wrong orders	8	c. admin negligence	3		6	c. evaluation	144
		d. admin canceled orders unilaterally	7	d. non-available drivers	5		3	d. recruiting new driver	105
2	Driver	a. Driver dressed improperly	5	staff training is not maximal	5	Customer dissatisfaction	4	Work evaluation everyday	100
		b. unpolite drivers	6		5		4	c. fired driver	120
		c. driver don't obey the traffic regulation	9		1		7	c. open criticism and advice	42
3	Physical evidence	a. Uncomplete equipment	9	a. lack of money	2	Customer dissatisfaction	4	a. buying one by one corresponding to company budget	72
		b. equipment smells bad	7	b. less maintenance equipment	5		3	b. periodic cleaning	105
		c. motorcycle brokedown	7	c. motorcycles not well maintained and too old	1		4	c. determination of year worthy vehicles to wear	28
		d. unable to provide additional equipment	5	d. lack of money	8		1	d. buying one by one corresponding to company budget	40
4	Operational	a. service time take long time	7	a. motorcycle broke down	5	Customer dissatisfaction	5	a. determination of year worthy vehicles to wear	175
				a. driver doesn't know the street name (lack of knowledge about jember street)					
		b. additional charge	6	b. there is parking cost	4		3	b. inform the consumer first about the additional cost	72

5. Conclusion

Based on consumer opinions attributes that are prioritized to be met by ojek onlone company non-specific application based in Jember is the timeliness in terms of pickup and delivery of passengers and orders, staff friendly and polite and quick response, knowledge of drivers about existing food places in Jember as well as the streets of Jember, driving equipment, driving obedience, gender preferences, good looking drivers, fixed order rates to the availability of additional equipment such as Powerbank and headsets. Based on the consumer's opinion, the company responds with a technical response. The technical response is to provide timely services, anticipate the additional costs that arise, the attitude of the friendly staff, quick response, and courteous, the recruitment of drivers, the provision of training for existing staff, make improvements and checks on equipment owned , providing accuracy and speed of service, and ensuring that the staff serving the customers are qualified staff.

Failure Mode Effects Analysis method is applied to see which complaints will impact the worst for the company. the worst impact will be marked with the highest or highest Risk Priority Number (RPN). Based on the RPN value, the attributes that must be corrected in advance by the company are slow respons staff, drivers that do not comply with traffic regulations, long service times, additional fees, unilateral order cancellation, and the last is poorly maintained equipment.

6. Future Scope

This study only cover two service among many services offered by ojek online non-specific application based in Jember. The service offered are motorcycle taxi, foods delivery, car taxi, freight services, delivery of goods, ticket purchases and many more but this study only focus on two services, motorcycle taxi and foods delivery. For future study that focusing in ojek online especially for the other services, this study might be helpfull in identifying customer needs since their needs are quite simillar.

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