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BOOK OF  
ABSTRACT

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*"Strengthening The Impact of Science, Technology,  
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# GREEN TECHNOLOGY AND ENGINEERING



# Improving service quality through customer relationship management using the framework of dynamic model

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**Abstract.** The number of new students at several educational institutions decreases every year due to competition between educational institutions. To keep new students from decreasing, service improvement is needed. This research applies Customer Relationship Management (CRM) by using the Dynamic framework model to carry out a series of stages in the application of CRM which produces output in the form of Relationship Management. The quality of service provided by the school is measured using Servqual and Importance Performance Analysis (IPA). The data tested ranged from 59 respondents with a margin of error of 10%. With a sample of student guardians, school officials, and alumni. The results of calculations using the servqual method on statement item 18 are ranked first with a gap value of -0.763 so that this statement item is not satisfactory. while on statement item 17 is ranked last with a gap value of -0.034 so that this item must be better maintained. The results of the IPA calculation can be seen in the first quadrant of statement items number 6,7,15,18. Quadrant two statement items number 1,3,9,11,12,14. Quadrant three statement items number 4,5,8. Quadrant four statement items included in quadrant 4 are statement numbers 2,10,12,13,17.

*Keywords:* Customer Relationship Management, Framework of Dynamic, Service Quality, Importance Performance Analysis

## 1. Introduction

Establishing relationships with the community or known as public relations is an effective strategy implemented in the business world, especially service providers. CRM is a system developed to improve companies in order to establish relationships with customers [2]. To develop customers, it is necessary to focus clearly on each attribute in order to get value so that customers will be loyal.

The number of registrants can decrease due to competition between educational institutions. This can be seen from the results of collecting data on the number of new student admissions registrants obtained from all kindergartens in Kupang Krajan Village. Table 1.1. is a table of new student admission for Kupang Krajan Village.

**Table 1.1.** Statistical data of new student admission for Kupang Krajan Village (Sumber : Head of Gugus Depan VI dan VII (2021) Kupang Krajan.

Academic Year	1	2	3	4	5	6	7	8
2010/2011	70	95	40	73	60	70	95	50
2011/2012	75	99	45	83	55	80	100	60
2012/2013	77	98	65	100	67	80	97	50
2013/2014	87	100	67	88	77	77	98	50
2014/2015	98	87	73	88	85	87	98	67
2015/2016	88	87	67	80	63	75	99	60
2016/2017	82	99	77	98	73	88	95	67

<b>2017/2018</b>	83	97	84	97	100	80	85	<b>70</b>
<b>2018/2019</b>	83	98	86	83	92	100	80	<b>80</b>
<b>2019/2020</b>	90	97	80	94	83	87	78	<b>65</b>
<b>2020/2021</b>	86	94	78	85	82	87	72	<b>50</b>
<b>2010/2011</b>	70	95	40	73	60	70	95	<b>50</b>
							<b>Average</b>	<b>81%</b>

Description :

(1) TK Budi Luhur (2) TK Matahari (3) TK Tunas Kartika (4) TK Nurul Huda (5) TK Siswa Tama (6) TK Tunas Harapan (7) TK Musra (8) TK Indriasana IV

The average enrollment of Tunas Harapan Kindergarten is 83% and the average enrollment in 2011, 2012, 2013, 2014, 2016, and 2018 was below average. The overall statistics of kindergartens in Kupang Krajan Village averaged 81%. Therefore, it is necessary to improve services so that the number of registrants remains above average.

The average number of TK Tunas Harapan is above average so TK Tunas Harapan needs to maintain customers. Table 1.2. is the number of registrants of Tunas Harapan Kindergarten in 2010-2021.

**Table 1.2.** Statistical data of new registrants of Tunas Harapan Kindergarten 2010-2021

<b>AcademicYear</b>	<b>Quota</b>	<b>registrants</b>	<b>Average</b>
2010/2011	20	14	70%
2011/2012	20	16	80%
2012/2013	20	16	80%
2013/2014	30	23	77%
2014/2015	30	26	87%
2015/2016	40	30	75%
2016/2017	40	35	88%
2017/2018	40	32	80%
2018/2019	30	30	100%
2019/2020	30	26	87%
2020/2021	30	26	87%
<b>Amount</b>	<b>330</b>	<b>274</b>	<b>83%</b>

This research is expected to (1) build relationships with customers in order to create a sense of satisfaction and benefit between the two parties by applying the Framework of Dynamic CRM (2) Improve services at the School by creating a website-based CRM application in order to facilitate customers in accessing School information. (3) Knowing how big the difference is between the level of importance (expectations) and the level of satisfaction (reality) of the services provided to customers using the servqual method. (4) Knowing the main causal factors of each attribute that affect customer satisfaction using the IPA method. The benefit of this research is that this research is expected to be able to provide an in-depth understanding by applying CRM[3] using the Dynamic Framework applied in educational institutions. Framework applied in educational institutions.

The results of this study are expected to be able to retain customers and improve services so as to create a relationship between the school and parents / guardians of students, both in terms of delivering information or services and can increase the number of registrants so as to generate profit or profit and later have an impact on creating customer satisfaction.



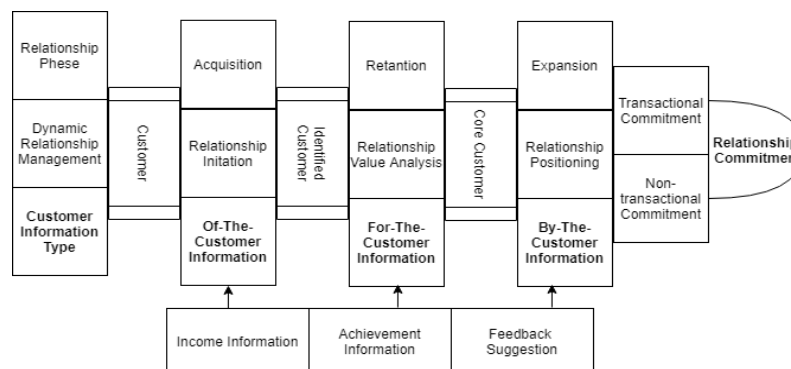
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## 2. Materials and Methods

Customer Relationship Management is an information industry term for methodologies, software, and tools used to help companies manage customer relationships in an organized way [4].

CRM is more emphasized on customer strategies designed to build customer base value with one customer at a time or with well-defined groups [5].

Figure 2.1. is a description of the integration of the Framework of Dynamic CRM.



**Figure 2.1.** Integration of the Framework of Dynamic CRM.

In Figure 2.1. shows that the framework of dynamic is integrated based on the type of customer information, namely "Of the Customer Information". At this stage the school identifies customers by collecting some data such as parent income information to apply for assistance if the income earned is in the low category.

Customer Relationship Management has 3 phases [6] including:

1. Acquire is looking for new customers by providing various kinds of information, services, access, the latest innovations, and good service.
2. Enhance is to improve the ability to generate profits from customers and increase customers. Companies are required to establish relationships with customers, namely by providing good service to customers.
3. Retain is to retain customers so that they can provide benefits. In this phase, it is called an effort to get customer loyalty by meeting customer needs.

Customers are all members of the public who have the authority to demand a company to meet certain quality standards [7]. Therefore, everyone can have an influence on company performance.

Satisfaction is said to be a feeling of pleasure or disappointment obtained from customers from product comparison results. According to [8] customer satisfaction is customer expectations that must be met or exceeded.

Loyalty is a form of loyalty while customer loyalty is a customer who has a sense of loyalty to create repeat purchases and then provide recommendations to new customers to use the services used.

Framework of Dynamic is a feature that exists in CRM, namely by doing a series or stages in implementing CRM [9]. Information obtained from customers is the most important part of the substantive. So that later the resulting output will be in the form of Relationship Commitment, which is a relationship that can provide services and get benefits in every company. Types of customer information are: 1) Information from customers 2) Information for customers and 3) Information by customers.

Data collection techniques are made in order to obtain data and information that will be used during research. The following are data collection techniques including:

- Observation Method (direct observation)

The observation method is a method most often used by researchers. Observation is referred to as a method of looking at the subject phenomenon from the researcher's point of view. The purpose of this observation is to find out the behavior of the subject teacher about how the teaching and learning process works.

- Interview Method

The interview method is a method in the form of submitting a statement that will be addressed directly to the respondent. This interview is used to find out and select respondents according to predetermined criteria as additional data if the questionnaire is not clear.

#### - Questionnaire

The questionnaire is a data collection technique by providing a list of statements in writing in the form of answers provided by researchers or essays that will later be filled in by respondents. The questionnaire in this study was divided into two stages, namely given directly in the form of a written statement (offline) to the school and student guardians and an online questionnaire in the form of a google form addressed to alumni. In Table 2.1. There is a measurement of respondents having an answer option consisting of 4 answer choices given to respondents where each answer has a different value.

**Table 2.1** Alternative Questionnaire Answer Measures

Answer Options	Weight Value
Very Important/ Strongly Agree	4
Important / Agree	3
Not Important / Disagree	2
Very Unimportant	1

According to [10] population is a collection of variables, subjects and concepts. Based on this research, the population is considered to be all student guardians, school officials and alumni of Tunas Harapan Kindergarten. The sample is part of the number and characteristics that exist in the population. In this study, in order to determine the number of samples to be taken, the Slovin formula is needed.

$$n = \frac{N}{1+N.e^2} \quad (1)$$

description:

$n$  = Sample size  $N$  = Population size

$e$  = margin of error / tolerable error

An approach to testing theory by examining the relationships between variables. Variables can be measured on instruments using statistical procedures. The data variables tested are: tangible, Reliability, Responsive, Assurance and Emphaty.

According to [11] Test validation methods are at the heart of language testing research.

The validity test is made to measure whether a questionnaire is valid or not. The questionnaire is declared valid if it is able to explain something that can be measured by the questionnaire. The level of validity is measured by comparing the  $r$  value (Correlation item total correlation) with the  $r$  table with the provisions of  $df$  (degree of freedom) -  $n-2$ , where  $n$  is the number of samples.

The criteria for being able to conduct validity test research are:

$r$  total  $>$   $r$  table then the statement is considered valid

$r$  total  $<$   $r$  table then the statement is considered invalid

The Service Quality (Servqual) method can be interpreted as how far the level of difference between the level of importance (expectations) and the level of satisfaction (reality) of the services to be received to customers. The reference used for marketing research is widely carried out by researchers, namely by using the Service Quality (servqual) method this method was developed by [12].

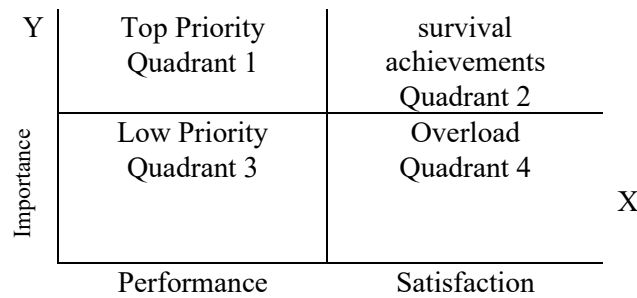
According to [13], the Service Quality method is used using a Likert scale whose calculations use this equation:

$$\text{Servqual Score (GAP) reality score} - \text{expectation score} \quad (2)$$

According to [14] Importance-performance analysis (IPA) is considered a useful tool in examining customer satisfaction and management strategies.

Importance Performance Analysis (IPA) is a procedure to show importance as an attribute of company

performance. The IPA method can be combined with performance and importance dimensions into a grid. Then the two dimensions are connected to it. The importance value is made as a vertical axis and the performance value as a horizontal axis using the mean (average) of the importance and performance dimensions. The level of conformity is referred to as the comparison between the value of the level of importance (expectations) and the level of satisfaction (reality). This level of conformity will determine the main level of priority for factors that can affect customer satisfaction. This study has two variables in [15]. According to J Supranto [16] states the formula to find out the average value  $\bar{X}$  and  $\bar{Y}$  of the axis pieces  $\bar{X}$  and  $\bar{Y}$  are in figure 2.2 :



**Figure 2.2** Importance-Performance Analysis Schematic Diagram

### 3. Results and discussion

Improving the quality of service in this study is to create a website application along with infographic attributes and questionnaire applications. Information obtained from customer expectations wants the Tunas Harapan Kindergarten school to be more advanced and further improved, especially in terms of service. The level of conformity between reality and expectations (TKi Xi and Yi) is 91%. This shows that generally the Tunas Harapan Kindergarten School has met customer expectations by 91% so that in this case it is necessary to improve services so that the level of conformity reaches 91%.

The school website will make it easier for customers to access information, such as notification of registration information, achievement information, galleries of every student activity. Good feedback from making this website customers can fill out a questionnaire to answer each question item to be used as evaluation material for the school.

**Table 3.1** Recapitulation of Respondents' Level of Importance (Expectations)

Item	$\sum Y_i$	$Y_i$	$\sum X_i$	$X_i$	GAP	TKi
1	199	3,373	213	3,610	-0,237	93%
2	202	3,424	199	3,373	0,051	98%
3	192	3,254	210	3,559	-0,305	91%
4	185	3,136	206	3,492	-0,356	90%
5	182	3,085	207	3,508	-0,424	88%
6	186	3,153	216	3,661	-0,508	86%
7	182	3,085	211	3,576	-0,492	86%
8	179	3,034	203	3,441	-0,407	88%
9	191	3,237	209	3,542	-0,305	91%
10	197	3,339	204	3,458	-0,119	96%
11	198	3,356	214	3,627	-0,271	92%
12	196	3,322	208	3,525	-0,203	94%
13	197	3,339	201	3,407	-0,068	98%
14	196	3,322	217	3,678	-0,356	90%
15	182	3,085	213	3,610	-0,525	85%
16	193	3,271	209	3,542	-0,271	92%
17	196	3,322	198	3,356	-0,034	98%
18	167	2,831	212	3,593	-0,763	79%
<b>Average Xi</b>	<b>57,97</b>		<b>Average Yi</b>	<b>63,55</b>	<b>TKi Xi and Yi</b>	<b>91%</b>



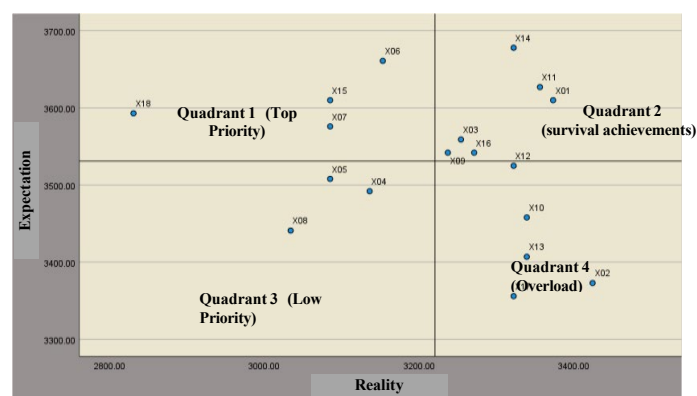
Service quality improvement can be applied in the servqual method by looking at the five dimensions of servqual, namely tangible, reliability, responsiveness, assurance, and empathy. If the gap value is obtained negative (-) then the service quality of Tunas Harapan Surabaya Kindergarten School is not good or the customer is not satisfied with the expectations given to the customer. Likewise, on the other hand, if the gap value is positive (+), the quality of service of the Tunas Harapan Surabaya Kindergarten School is very good or the customer is very satisfied with the expectations given to the customer.

In table 3.1, it can be seen that the GAP value is negative because the service quality of the Tunas Harapan Surabaya Kindergarten School is not good or the customer is not satisfied with the expectations given to the customer. So that there is a need for improvement and improvement in service quality. The Average Expected Value  $Y_i$  has a total of 63.55 while the Average Reality Value  $X_i$  has a total of 57.97. In this case, it can be seen that the average number of expected values is higher when compared to reality, because customer expectations want the Tunas Harapan Kindergarten school to be more advanced and further improved, especially in terms of service. The level of conformity between reality and expectations (TKi  $X_i$  and  $Y_i$ ) is 91%. This shows that generally the Tunas Harapan Kindergarten School has met customer expectations up to 91% so that in this case it is necessary to improve services so that the level of conformity reaches the target of 100%. The thing that needs to be done to achieve the 100% target is to make improvements and improvements in the quality of the School's performance.

**Table 3.2** GAP Value Based on Five Dimensions

Dimension	$X_i$	$Y_i$	GAP	%	Ranking
<i>Tangible</i>	3,254	3,508	-0,254	15,91	4
<i>Reliability</i>	3,169	3,536	-0,366	22,91	2
<i>Responsiv</i>	3,339	3,520	-0,181	11,32	5
<i>Assurance</i>	3,203	3,644	-0,441	27,58	1
<i>Emphaty</i>	3,141	3,497	-0,356	22,28	3
Total			-1,598	100	

After calculating the GAP calculation in table 3.2 based on the five dimensions of servqual, it can be obtained that the first rank is in the responsiveness dimension so that in this case the school must prioritize the services provided to customers. While the fifth rank is in the emphaty dimension in this dimension the services provided by the school have met customer expectations.



**Figure 4.1** IPA Diagram

The main causal factors of each attribute that can affect customer satisfaction using the IPA method can be known from 4 parts. In Figure 4.1. The results of the IPA calculation can be seen in the first quadrant of statement items number 6,7,15,18. In this quadrant, handling TK Tunas Harapan must be prioritized because this factor is very important to customers. Meanwhile, the implementation is not satisfactory. Quadrant two statement items number 1,3,9,11,12,14. In this quadrant it is necessary to maintain because the implementation provided is in accordance with customer expectations. Quadrant three statement items number 4,5,8. In this quadrant, it affects customer satisfaction, but this quadrant is not that important to customers and is considered as a matter of course implementation. Quadrant four statement items included

in quadrant four are statement numbers 2,10,12,13,17. In this quadrant, it affects customer satisfaction which is overvalued in its implementation. The main factor affecting this quadrant is that the attributes are not too important but the implementation is very good so that customers are satisfied.

#### 4. Conclusion

1. Building relationships with customers in order to create a sense of satisfaction by applying the framework of dynamic is to apply 3 types including of the customer information, for the customer information and by the customer information.
2. Improve services at the School, namely by creating a website-based CRM application in order to make it easier for customers to access information such as registration info notifications, school achievements, galleries and school announcements.
3. The difference between the level of importance (expectations) and the level of satisfaction (reality) of the services provided by the school using the servqual method in the five dimensions of tangible, reliability, responsiveness, assurance and empathy. The results of calculations using the servqual method on the reality score have a total of 57.97 and the expectation score has a total of 63.55 so that in this case it can be seen that the total expectation score has the highest value when compared to the reality score due to expectations for the future customers want the kindergarten to be more advanced.
4. The main causal factors of each attribute that can affect customer satisfaction using the IPA method can be known from 4 parts The results of the IPA calculation can be seen in the first quadrant of statement items number 6,7,15,18. In this quadrant, handling TK Tunas Harapan must be prioritized because this factor is very important to customers. Meanwhile, the implementation is not satisfactory. Quadrant two statement items number 1,3,9,11,12,14. In this quadrant it is necessary to maintain because the implementation provided is in accordance with customer expectations. Quadrant three statement items number 4,5,8. In this quadrant, it affects customer satisfaction, but this quadrant is not that important to customers and is considered as a matter of course implementation. Quadrant four statement items included in quadrant four are statement numbers 2,10,12,13,17. In this quadrant, it affects customer satisfaction which is of excessive value in its implementation. The main factor affecting this quadrant is that the attributes are not too important but the implementation is very good so that customers are satisfied.

#### References

- [1] B. P. Dewa and B. Setyohadi, "Analisis Dampak Faktor Customer Relationship Management dalam Melihat Tingkat Kepuasan Dan Loyalitas Pada Pelanggan Marketplace Di Indonesia," *Telemat. J. Inform. dan Teknol. Inf.*, vol. 14, no. 1, pp. 33–38, 2017.
- [2] D. Permatasari and F. Firniawati, "Membangun Customer Relationship Management (Crm) Berbasis Website Pada Testtube Clothing and Digital Printing," *J. Teknol. dan Inf.*, vol. 3, no. 2, pp. 7–16, 2013.
- [3] M. P. Espinosa-Vélez and R. Cárdenas-Carrillo, "Relational Marketing applied to higher education institutions in the field of Digital Society: approach from a strategic perspective," in *2021 16th Iberian Conference on Information Systems and Technologies (CISTI)*, 2021, pp. 1–7. doi: 10.23919/CISTI52073.2021.9476438.
- [4] F. Buttle and S. Maklan, *Customer relationship management: concepts and technologies*. Routledge, 2019.
- [5] P. Don and R. Martha, "Managing Customer Experience and Relationships-A Strategic Framework." Wiley, 2017.
- [6] R. Kalakota and M. Robinson, "e-Business," *Roadmap for Success*, 2000.
- [7] R. Mujiastuti and R. D. Haryani, "Aplikasi customer relationship management (CRM) dengan metode framework of dynamic CRM," *J. Teknol.*, vol. 6, no. 1, pp. 33–46, 2014.
- [8] R. F. Gerson, *Mengukur kepuasan pelanggan*. Pelangi Publishing Group Bhd, 2004.
- [9] C.-H. Park and Y.-G. Kim, "A framework of dynamic CRM: linking marketing with information strategy," *Bus. Process Manag. J.*, vol. 9, no. 5, pp. 652–671, 2003.
- [10] Morissan, *Metode Penelitian Survei*, First. Jakarta: Kencana, 2012.
- [11] X. Xi and Y. Sawaki, "Methods of Test Validation," in *Language Testing and Assessment*, E. Shohamy, I. G. Or, and S. May, Eds., Cham: Springer International Publishing, 2017, pp. 193–

209. doi: 10.1007/978-3-319-02261-1\_14.
- [12] A. Parasuraman, L. L. Berry, and V. A. Zeithaml, "Guidelines for Conducting Service Quality Research.," *Mark. Res.*, vol. 2, no. 4, 1990.
  - [13] V. A. Zeithaml, A. Parasuraman, and L. L. Berry, *Delivering quality service: Balancing customer perceptions and expectations*. Simon and Schuster, 1990.
  - [14] I. Sever, "Importance-performance analysis: A valid management tool?," *Tour. Manag.*, vol. 48, pp. 43–53, 2015.
  - [15] A. Kurniawan, I. G. M. Metera, and N. K. A. Mekarsari, "Kualitas Pelayanan Jasa Dan kepuasan Pelanggan Pada Auto 2000 Singaraja," *Widya Amerta*, vol. 5, no. 2, pp. 1–15, 2018.
  - [16] J. Supranto, "Pengukuran Tingkat Kepuasan Pelayanan," *Jakarta PT. Tenata Cipta*, 1997.



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