The Implementation Of Customer Relationship Management (CRM) With Service Oriented Architecture (SOA) to Improve Customers’ Loyalty

Ali Ibrahim¹, Annisa Turrahma², Endang Lestari Ruskan³
¹,²,³ Department of Information Systems, Faculty of Computer Science, Universitas Sriwijaya, Indonesia

E-mail: ¹aliibrahim@unsri.ac.id, ²annisaturrahma95@gmail.com, ³endangjurusan@gmail.com

Abstract: PT. Astra International Tbk - Honda (Astra Motor Indralaya) is a company which is engaged in the sale of products and services. Astra Motor often has problems such as product information distribution using brochure causing the effort not to be maximum. It also causes information delivery to customers to be inaccurate. There is also another problem which is the booking time that takes too long either for a motorcycle or spare parts. Therefore, the researchers are attempting to make a software using Service Oriented Architecture (SOA) by leveraging web services technology. SOA is a form of technology architecture that follows the principles of service orientation (service-oriented).

1. INTRODUCTION

This era of increasing globalization and rapidly evolving computer technology provides a big impact on companies’ progress. It is because of the benefits which are far greater than the component or the other tools. With current technological developments that are evolving rapidly, behaviors and conditions in social media greatly influence the results to be achieved[1]. Customers loyalty has an important role in a company because maintaining them can improve the performance of the company. Customers loyalty is closely related to customers satisfaction, since the more satisfied the they are, the higher level of loyalty they have. Maintaining customers loyalty is a very difficult thing for they are the greatest asset of a company. The reason a company emphasizes customers loyalty is because of the difficulty of finding new customers who will bear the level of profit and profitability which are directly proportional to the growth of the relationship between them and the company. Authorized Motorcycles Dealer and Service Center PT. Astra International, Tbk - Honda (Astra Motor Indralaya) is one of the companies engaged in the sale of products and services. The dealer service system as well as the authorized service center provide the customers’ right to get the maximum service possible. In addition, other tasks they need to do is how to provide a service that can keep the customers to use their products or services while the sale value of the products they offer can also increase.

From the research that has been done, it is known that at this time, the common obstacles are the marketing process which is not optimal because the salesperson’s commission to market the product is limited to marketing targets while to achieve the targets above it is difficult. In addition, the booking takes too long either for motorcycles or spare parts of workshops. The dissemination of information that is uneven and not optimal causes them to be unaware of the latest information related to the offered products making them switch to another dealer. From this problem, the researchers is trying to use Service Oriented Architecture (SOA) because this method is a service-oriented architecture, where the issue will be divided into many small services that work together. Since the researchers are interested to do research and make information systems required by PT. Astra International, Tbk - Honda (Astra Motor Indralaya) and they have chosen the title “The Implementation of Customer Relationship Management (CRM) With a Service Oriented
Architecture (SOA) to Improve Customers Loyalty in PT Astra International, Tbk - Honda (Astra Motor Indralaya)

2. LITERATURE REVIEW

A CRM is considered as technologies related to data, enabling higher results, or as a strategic approach that brings value, [2]. The technology used by the CRM can be divided into three categories:

a) Operational CRM: In this method, all communication process with customers of the marketing and sales stage to after-sales service receive feedback which are entrusted to someone: the course in a way that retailers and service engineers can access to each customer record without reference to the person. This mechanical or electrical sale is one of the CRM tool operational methods which is responsible for all operations related to contact management, stock and sales departments management. CSS is another operational CRM tool where there is no telephone communication with customers and other means of communication such as face to face communication, internet, fax and a special kiosk used to respond to customers

b) Analytic CRM: In Analytic CRM, the tools and techniques will be used to analyze the data which was obtained from operational CRM and it will be prepared for commercial results for performance management. In fact, analytical and operational CRM are in bilateral interaction; it means part of the operational data will be adopted into the analysis. After the data is analyzed, the results will have a direct impact on department operations. The customers will be categorized with the analysis of this section and it will be available for a special organization to focus on customers section.

c) Cooperation CRM: in this way of communication, the customer will use the easiest way of communication such as telephone, mobile phone, fax, Internet and other means of communication. CRM cooperation organizations will lead the customer to visit again and continue their relationship with the customers because they can choose the method of communication and most of the process (from data collection to processing and customers references) will be entrusted to the relevant authority in the minimum possible time,[3].

Service Oriented Architecture (SOA)

SOA is an architecture that is flexible, loose and dynamic to develop different distributed systems. [4] SOA is a service-oriented architecture. SOA also has the concept of combining business, technology and IT management perspective. From a business standpoint, SOA is the second customer. In terms of technology, SOA is a service that can be reused. For IT management SOA can provide a new method for designing the IT application portfolio[5]. In this study, the researchers used a Service-Oriented Analysis and Design (SOAD). SOAD is a method used to design SOA-based applications so from the business process that has been described, they can identify and establish a wide range of services. In SOAD there are 3 stages:

1. Conceptual View (CV)

   It contains a business process that would be developed so that the management level can easily determine the business processes of the system that will be built. Here are the results of the analysis stage of the conceptual view:

   a. Service Blueprint

      Service blueprint is an image or a map which accurately depicts a service system so individuals who are involved in the provision of such services can understand the system well, although each has a somewhat different role.

   b. Business Process
A structured set of activities or work that relate to each other to solve a specific problem or that produce products or services (to achieve a particular purpose).

c. Analysis Services
   In this process there are several steps that must be done, namely:
   1. Define business requirements
   2. Identify automation system
   3. Model candidate services

2. Logical View (LV)
   This serves to bridge between CV and PV. By this stage the business processes are depicted that have been designed by CV into the form of a diagram illustrating components used by the service.

3. Physical View (PV)
   This phase contains the implementation of application development in accordance with the design in the previous stages.

3. RESEARCH METHODS
   The methods used in this study are literature collection, direct observation, and interview. As for the development of software systems, the researchers used SOA methods. SOA is an architectural style for building web applications based on service[6]. SOA is an architectural form of technology that follows the principles of service orientation (service-oriented). SOA is a collection of services. The services SOA’s scope is a collection of functions and procedures that respond to what is requested by the client to the server. The service itself is a working unit done by the service provider aiming to achieve the results of the service that the customers wish. In addition, the researchers also used Service-Oriented Analysis and Design (SOAD). SOAD is a method used to design SOA-based applications so that business processes that have been described can be identified and established into a variety of services. Service-Oriented Analysis and Design (SOAD) is an enhanced and interdisciplinary approach[7].

4. RESULTS AND DISCUSSION
   Fill out this questionnaire with a cross (X)
   SA = Strongly Agree (score 5)
   A = Agree (score 4)
   N = Neutral (score 3)
   DA = Disagree (score 2)
   SDA = Strongly Disagree (score 1)

| No | Statement                                                                 | SA | A | N | DA | SDA |
|----|--------------------------------------------------------------------------|----|---|---|----|-----|
| 1  | Does CRM Astra Motor Indralaya facilitate the process of purchasing a motorcycle purchase? | 6  | 4 | 0 | 0  | 0   |
| 2  | Does CRM Astra Motor Indralaya work in accordance with its function?     | 6  | 4 | 0 | 0  | 0   |
| 3  | Is Astra Motor Indralaya CRM easy to use?                                | 0  | 4 | 3 | 3  | 0   |
| 4  | Does Astra Motor Indralaya CRM allow you to obtain information related to Astra Motor Indralaya product? | 6  | 4 | 0 | 0  | 0   |
| 5  | Is the information available in CRM Astra Motor Indralaya complete?     | 8  | 2 | 0 | 0  | 0   |
4.1 Validity test

Validity means accuracy and precision of measuring instruments in performing their measurement functions. A dimension or an indicator is said to be valid if it is able to achieve the measurement aims from the right observational construct. Correlation is a statistical analysis which is used to find the relationship between two quantitative variables. In a short word, correlation means relationship. According to the Dictionary of Indonesian Language, the definition is a reciprocal relationship or causation. The following is the results of the calculation of the validity test.

| No | Statement | Category |
|----|-----------|----------|
|    |           | SA       | A | N | DA | SDA |
| 6  | Does CRM Astra Motor Indralaya provide customer service that can help you when you experience problems using CRM Astra Motor Indralaya and its transactions? | 6 | 4 | 0 | 0 | 0 |
| 7  | Does CRM Astra Motor Indralaya facilitate you to complete the transaction data? | 2 | 4 | 3 | 1 | 0 |
| 8  | If you are satisfied with Astra Motor Indralaya CRM, would you recommend to others? | 6 | 4 | 0 | 0 | 0 |

4.2 Test Reliability

Reliability can be defined as trust and consistency. The measurement results can be trusted if from numerous measurements on the same subject, the researchers obtained relatively similar results, which means it has good consistency of measurement. Conversely, if different results were obtained with the

Table 4.2 validity test

| Respondents | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | Total |
|-------------|----|----|----|----|----|----|----|----|-------|
| 1           | 5  | 5  | 4  | 5  | 5  | 5  | 5  | 5  | 39    |
| 2           | 4  | 4  | 2  | 4  | 4  | 4  | 2  | 4  | 28    |
| 3           | 5  | 5  | 2  | 5  | 5  | 5  | 4  | 5  | 36    |
| 4           | 4  | 5  | 3  | 5  | 4  | 4  | 3  | 4  | 32    |
| 5           | 5  | 4  | 2  | 4  | 5  | 4  | 4  | 5  | 33    |
| 6           | 5  | 5  | 4  | 5  | 5  | 5  | 3  | 5  | 37    |
| 7           | 4  | 4  | 3  | 4  | 5  | 5  | 3  | 4  | 32    |
| 8           | 5  | 4  | 3  | 4  | 5  | 4  | 5  | 4  | 35    |
| 9           | 4  | 5  | 4  | 5  | 5  | 4  | 4  | 4  | 35    |
| 10          | 5  | 5  | 4  | 5  | 5  | 5  | 5  | 5  | 39    |
| count       |    |    |    |    |    |    |    |    |       |
| correlation | 0.713392298 | 0.650814 | 0.679082 | 0.650814 | 0.70511 | 0.650814 | 0.84477 | 0.713392 |       |
| R (arithmetic) |       |       |       |       |       |       |       |       |       |

The questionnaire item is considered valid if \( r_{\text{arithmetic}} \geq r_{\text{table}} \). From the chart above, the value of \( r \) count for all of the columns is valid because \( r \) count each column has stated greater value than \( r_{\text{table}} \).
same subject, they are said to be inconsistent. This test uses Cronbach Alpha formula. The following is a calculation of the reliability test results:

1. Calculating the total variant of each item

| squared xi number of items | 2116 | 2116 | 961 | 2116 | 2304 | 2116 | 1369 | 2116 |
|----------------------------|------|------|-----|------|------|------|------|------|
| the sum of squared xi items | 214  | 214  | 103 | 214  | 232  | 214  | 145  | 214  |
| the number of respondents   | 10   | 10   | 10  | 10   | 10   | 10   | 10   | 10   |
| variance                   | 2.4  | 2.4  | 6.9 | 2.4  | 1.6  | 2.4  | 8.1  | 2.4  |
| total variant              | 2.86 |      |     |      |      |      |      |      |

2. Calculating the total variance

| the squared x total item   | 1521 | 784  | 1296 | 1024 | 1089 | 1369 | 1024 | 1225 |
|----------------------------|------|------|------|------|------|------|------|------|
| the total number of x items squared | 119  | 716  |      |      |      |      |      |      |
| total variance             | 106.4|      |      |      |      |      |      |      |
|                            | 10.64|      |      |      |      |      |      |      |

3. Calculating the value of Cronbach's Alpha coefficient

\[
r = \frac{8}{8-1} \left[ 1 - \frac{2.86}{10.64} \right]
\]

\[
= (1.142857143) \times (0.731203008)
\]

\[
= 0.83566058
\]

From the reliability calculation using Cronbach Alpha with 8 item numbers and the number of respondents, 10 people have a correlation value of 0.83. This value is then compared with the value of r in the table with a significance level of 5% to get a table r of 0.6319. The correlation value is greater than 0.6319 so that it can be concluded that these items are reliable.

4.3 Recapitulation Questionnaire Results

|        | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 |
|--------|----|----|----|----|----|----|----|----|
| (SA) 5 | 6  | 6  | 0  | 6  | 8  | 6  | 2  | 6  |
| (A) 4  | 4  | 4  | 4  | 4  | 2  | 4  | 4  | 4  |
| (N) 3  | 0  | 0  | 0  | 0  | 0  | 0  | 3  | 0  |
| (DA) 2 | 0  | 0  | 3  | 0  | 0  | 0  | 1  | 0  |
| (NR) 1 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|        | 46 | 46 | 31 | 46 | 48 | 46 | 37 | 46 |

| total  | 4.6| 4.6| 3.1| 4.6| 4.8| 4.6| 3.7| 4.6|
|--------|----|----|----|----|----|----|----|----|
|        | 34.6|   |    |    |    |    |    |    |
| Final score | 4325 |   |    |    |    |    |    |    |

5
Figure 4.1 pie chart

From the results of the questionnaires, 86.5% of Astra Motor Indralaya CRM which has been built helps to increase customers’ loyalty, as respondents stated that Astra Motor Indralaya CRM can help facilitate the process of their transactions.

4.4 Testing

The testing was performed using black box testing technique. Black box testing is a test that focuses on the functional specification of the software. The tester can define a set of input conditions and do the testing on the functional specification of the program. The test results using black box testing can be seen in Table 4.6.

| Username   | Test Class         | Test Item                                      | Identification No | Result |
|------------|--------------------|-----------------------------------------------|-------------------|--------|
| Admin      | Manage Buyers      | View and Delete Data Buyers                   | 1                 | OK     |
|           |                    | Buyer Data Verification Process               | 2                 | OK     |
|           | Manage Vehicles    | Check and Change Vehicles Data                | 3                 | OK     |
|           | Data               | Add and Delete Vehicles Data                  | 4                 | OK     |
|           | Manage Transactions| View and Process Transactions                 | 5                 | OK     |
|           |                    | Requests From Buyers                          |                   |        |
|           |                    | Check And Print Invoice Transactions          | 6                 | OK     |
|           | Manage Payments    | Check and Process Payment List                | 7                 | OK     |
| Buyer      | Account Registration| Register Input Data                          | 8                 | OK     |
|           | Profile            | View profile                                  | 9                 | OK     |
|           | Vehicles List      | See List of Vehicles                          | 10                | OK     |
|           | Transaction List   | See and Add Transaction                       | 11                | OK     |
|           |                    | Delete and Print Transaction                  | 12                | OK     |
|           | Payment list       | See and Add Payment                           | 13                | OK     |
|           | List Comments      | See and Add a Comment                         | 14                | OK     |
|           |                    | Remove Comments                               | 15                | OK     |
|           | Address List       | See and Add Address                           | 16                | OK     |
|           |                    | Change and Delete Address                     | 17                | OK     |
| Manager    | Transaction Reports| View and Print a Transaction Reports          | 18                | OK     |
|           | Payment Reports    | See and Print Payment Reports                 | 19                | OK     |
|           | Comments Reports   | View and Print Reports Comments               | 20                | OK     |
5. CONCLUSIONS

The conclusions from this study are:

1. Astra Motor Indralaya has successfully designed and built the application of Customer Relationship Management (CRM) with Service Oriented Architecture (SOA) method. It can market the dealer’s products online so that the information submitted will be spread more evenly and the customers can easily find information about the marketed products online without requesting a brochure. The system also provides online transaction process so that the customers can buy the motorcycles online with ease from Astra Motor Indralaya.

2. The built system has been tested using the black box and the results show that the system has been constructed in accordance with the expected outcome.

3. From questionnaire distribution, the result was 86.5 percent of CRM Astra Motor Indralaya has been designed and built to improve customers loyalty because Astra Motor Indralaya CRM can help the customers to purchase motorcycles from Astra Honda Motorcycle.

References

[1] Boumahdi, F., & Chalal, R. (2013). SOAda: Service Oriented Architecture with Aspect Decision. Procedia Computer Science 22, 340-348.
[2] Hustad, E., & de Lange, C. (2014). Service-oriented architecture project into practice: A study of the implementation of the joint document services. Procedia Technology 16, 684-693.
[3] Ibrahim, A., Ermatita, Saparudin, & Adetya, Z. (2017). Weakness Analysis Of Data Validation Social Customer Relationship Management. International Conference on Data and Software Engineering (ICoDSE), 1-5.
[4] Aljazzaf M., Z., AM Capretz, M., & Perry, M. (2016). Trust-based Service-Oriented Architecture. Journal of King Saud University - Computer and Information Sciences, 470-480.
[5] Rafe, V., & Mahdian, F. (2011). style-based modeling and verification of fault tolerance service-oriented architecture. CEDIA Computer Science 3, 972-976.
[6] Tohidi, H., & Jabbari, MM (2012). The Importance Of Using CRM. Procedia Technology 1, 514-516.
[7] Triznova, M., Matova, H., Dvoracek, J., & Sadek, S. (2015). Customer Relationship Management by Employees and Corporate Culture. Procedia Economics and Finance 26, 953-959.