A Customer Relationship Management (CRM) Approach with the Spiral Model (Case Study: Information System at Optik Sejahtera)

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***Abstract*— Optik Sejahtera is a company engaged in the sale of eye sight/ vision aids or often called glasses. In addition to glasses made of stainless and fiber, there are also many manufacturers in Indonesia that produce glasses from wood. The marketing of wood eyewear products still has problems, among which is still many people do not know about this product. This condition led to stagnant sales transactions in Optik Sejahtera. CRM (Customer Relationship Management) approach method is a marketing activity built on four pillars namely identifying, attracting, maintaining and strengthening brand loyalty, or strengthening relationships to achieve mutually beneficial goal. Therefore, information systems are required with the CRM approach method on Optik Sejahtera to increase sales transactions i.e. with spiral models. Spiral model steps are communication with customers, planning, risk analysis, engineering, construction and launch, and customer evaluation. The systems in this study use the MySQL database. The results of this study based on analysis system of hypothesis test showed before using the system it took 8,6840 minutes and after using the system it only took 4,3197 minutes. It means, there are changes in sales transactions before and after using the information system in Optik Sejahtera. In other words, the information system on Optik Sejahtera could resulted in an increase of sales transactions. In addition, the results of the study in benefit testing obtained a percentage for utilization of 89.98%, effectiveness of 90%, and efficiency of 92.23%. This means that information systems in Optik Sejahtera using CRM approach with spiral models can increase efficiency in sales transactions.**

***Keywords*—** *Customer Relationship Management, Spiral Method, Sales Transaction, MySQL*

1. Introduction

Optics is a store or outlet that provides glasses and contact lenses to meet the needs of consumers the optics need to manage goods data, sales data, consumer data, and employee data.

Optik Sejahtera is one of the optics located in Purwokerto on Sunan Ampel Street No. 55 Kedungmalang, Sumbang. Optik Sejahtera sells glasses where there are sales, purchasing, and checking of goods stock in the processes. In addition to glasses made of stainless and fiber, nowadays there are also many manufacturers in Indonesia that produce wooden glasses. Wooden glasses have unique characteristics, styles, patterns, and textures. Wooden glasses have a style that makes them look unique and become a different attraction from other types of glasses. Unlike most glasses, they have a relatively light weight and have quite a lot of variety. The marketing of wooden eyewear products still has obstacles, among which are still many people do not know about this product of wooden glasses. In addition, Optik Sejahtera also does not have many marketing networks. According to the statement from the interview, turnover in January 2019 to March 2019 were about IDR. 2,500,000 while in April to May 2019 the sales transactions about Rp. 2,000,000. Declining turnover is influenced by a lack of promotions so people do not know the latest products.

CRM is a marketing activity built on four pillars, namely: identifying, attracting, maintaining and strengthening brand loyalty, or strengthening relationships to achieve mutually beneficial goals [1]-[2]. While the spiral model is several frameworks of activity namely communication with customers, planning, risk analysis, engineering, construction and launch, as well as customer evaluation. This system provides member cards for customers to get discounts and product promotions. Therefore, an optical information system is required that can help the transaction process thus increasing sales turnover with spiral models and CRM methods [3].

The creation of a system with CRM method was studied on ref [4], that used waterfall and CRM

methods in Jaya Mandiri Optik Subang so that the management of sales transaction using computerized system [4]. In addition, there is also other research on the creation of optical inventory information systems but using the EOQ (Economic Order Quantity) method to generate cost information and sales profits [5]. Other research, the optical sales information system uses an object orientation method so that the sales transaction system can be computerized and print reports automatically [6]. Moreover, there was also an android-based optical product sales application) that made the process of selling products online [7]. Another research was conducted by [8], namely the use of data mining for the glasses sale on optics with clustering method. However, this research only analysis the interest and the number of customers only.

Based on references from the five studies above, it can be compared that the authors will create an information system on Optik Sejahtera. This system contains several activities including sales/order transactions, sales/ order reports and the amount of stock. The information system at Optik Sejahtera can help to know the goods sold and the CRM to add discounts for customers who become members so as to increase product sales. In this study, the researchers designed a system that was an information system on Optik Sejahtera using a CRM approach with a spiral model.

2 Methodology

2.1 System Development Method

The spiral model is a combination of prototyping and waterfall models with a high emphasis on risk analysis at each stage. The prototyping method is a method of software development. It is a new paradigm in the creation or development of software through interaction and repetitive processes. While the waterfall method is a sequential software development process, where progress is seen as continuing to flow downwards (waterfalls) through phases of planning, modeling, implementation (construction), and testing. Spiral models provide rapid development with software that has a growing version of its functionality [9].

The spiral model is divided into several activity frameworks or also called task regions. The number of working areas is usually between three and six areas as follows:

a. Communication with customers

Observation is done by looking directly at the running work process. Researchers conduct interviews to collect data on problems and system needs [10]-[12].

b. Planning

After knowing what Optik Sejahtera wants, researchers designed the system design. This stage is the construction of early stage products in accordance with the pre-defined planning. In this system there are 3 actors that can access the system which are admin, cashier and warehouse. Every actor has different access rights and functions according to their need. Figure 1-3 is a use case diagram admin, cashier and warehouse.

c. Risk analysis

The risk analysis that will be taken in the design of information system applications on Optik Sejahtera using CRM approach with spiral model are [13]-[15]:

1. Working time in creating application.
2. Design use case diagram, view, input, output and database.
3. The software component is not as suitable in running the application, as it is not yet using the latest version.
4. Customer does not understand the impact of system changes.

d. Engineering

This stage aims to build one representation of the application. At this stage of engineering uses several tools in creating system design namely general needs of the system, system development, new system design, data base design, and interface design.

e. Construction and Launching

This stage is used as an evaluation system to measure the results of the Information System program on Optik Sejahtera by collecting data, determining Hypothesis Test, Normality Test, Implementation Results.

f. Customer evaluation

This stage is used as a benefit test to find out the benefits of an Optik Sejahtera information system program using a CRM approach with a spiral model.

2.2 System Testing Method

Testing of applications made using ISO 25022 standards consists of usability, flexibility, efficiency, effectiveness, and maintenance. Testing of the system uses black and white box test, Normality Test, Hypothesis Test, Reliability Test, and Benefit Test where the entire system is tested both from coding to existing functions.

The next test is to use questionnaires distributed to respondents by purposive sampling method. The respondents consisted of: owners, employees, customers, students and lecturers STIKOM Yos Sudarso to measure how well the system runs.

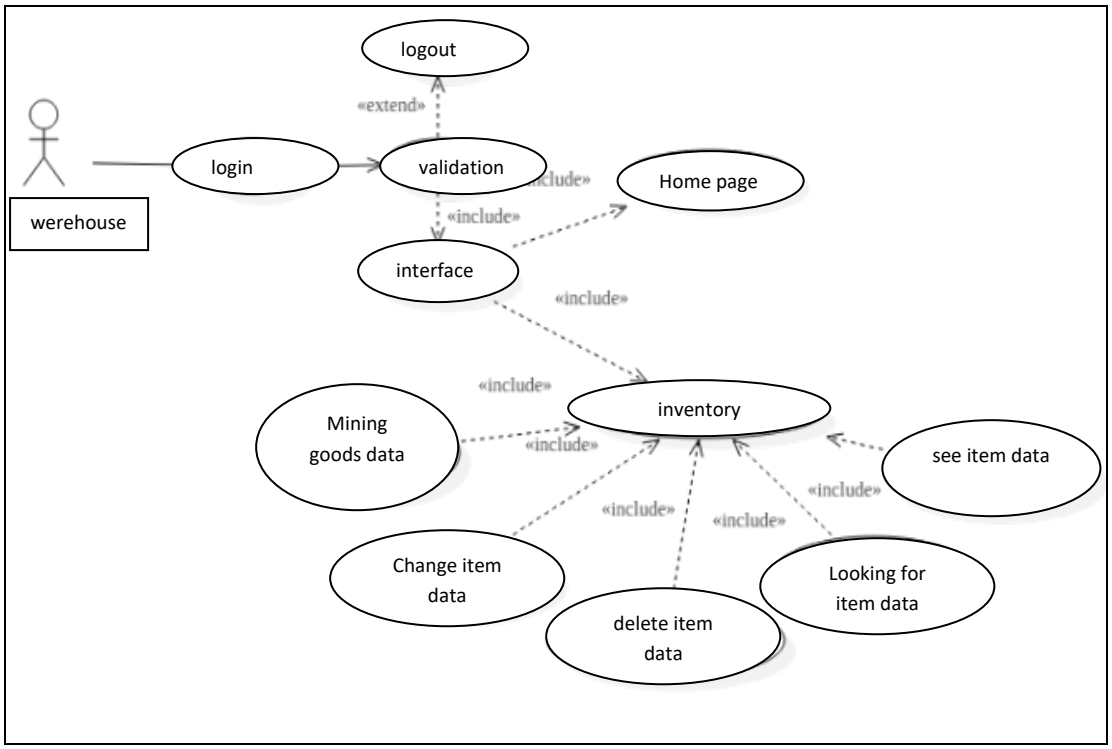

Figure 1 Use Case Warehouse Diagram

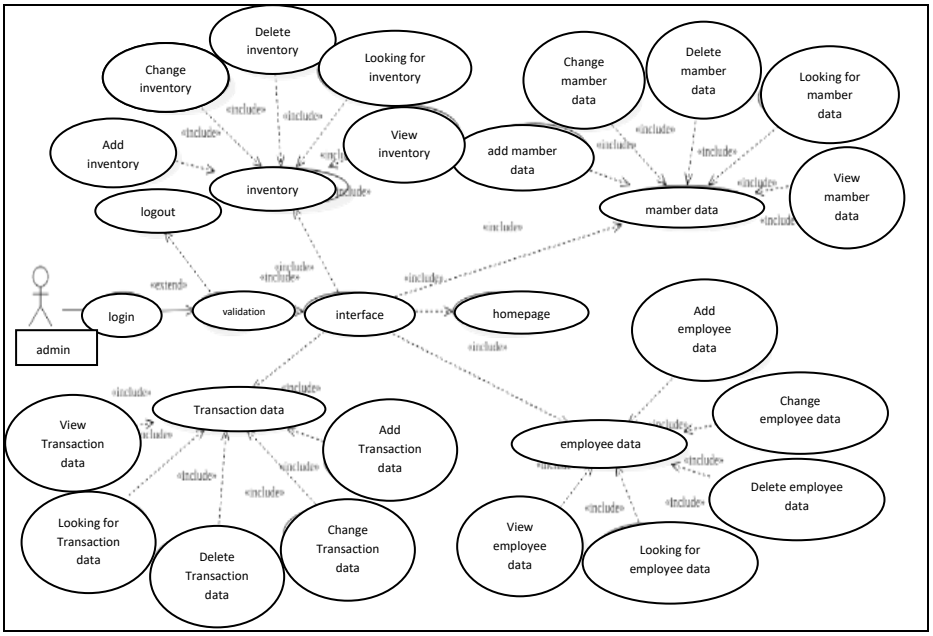

Figure 2 Use Case Admin Diagram

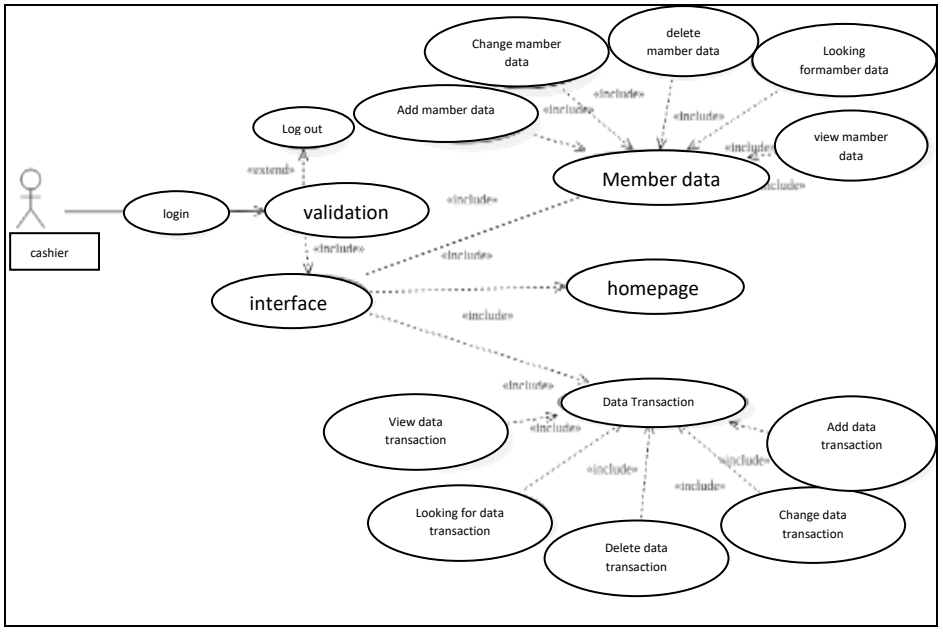

Figure 3 Use Case Cashier Diagram

3 Results and Discussion

3.1 Result of System Development

Website is a document that contains many links to connect one document with another. This is the website page developed to facilitate user accessing the system in information in the web:

a. The display in Figure 4 shows the login menu that first appears when the website is opened and user must enter username and password in order to log into the system. There are permissions that distinguish the menu displayed.

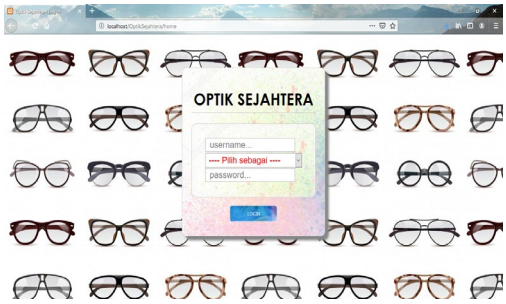

Figure 4. Website Home View

b. The view in Figure 5 shows the home page that appears moments after the login click. The menu displayed if logged in as admin is the home page, user data, optical data, sales transactions, product categories, item types, all product data reports and logout menus.

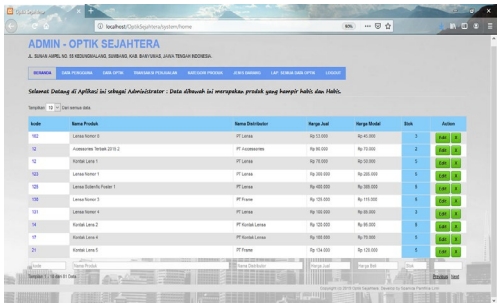

Figure 5. Home Page View

c. The view in Figure 6 displays the employee data page that appears after clicking user data and selecting Manage Employees. This page contains data of all employees that can be viewed, edited, deleted and add new employees.

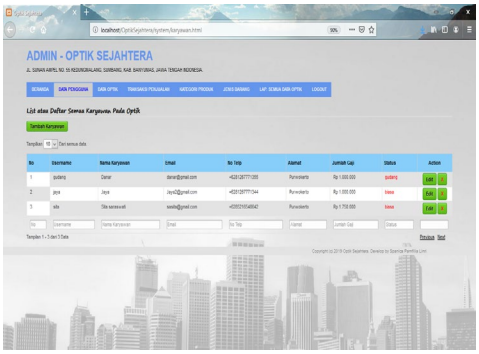

Figure 6. Employee Data View

d. The display in Figure 7 shows the member data page that appears after clicking optical data and selecting the member data. This page contains data of all members that can be viewed, edited, deleted and add new members.

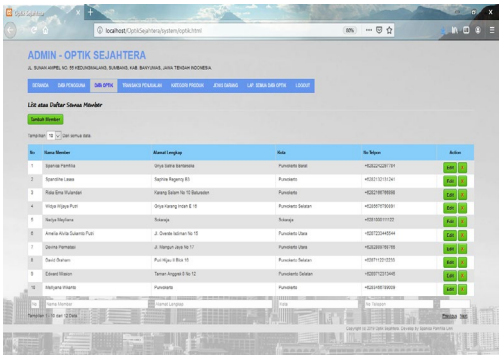

Figure 7. Member Data View

e. The display in Figure 8 displays the doctor data page that appears after clicking optical data and selecting the doctor data. This page contains data on all doctors that can be viewed, edited, deleted and add new doctors.

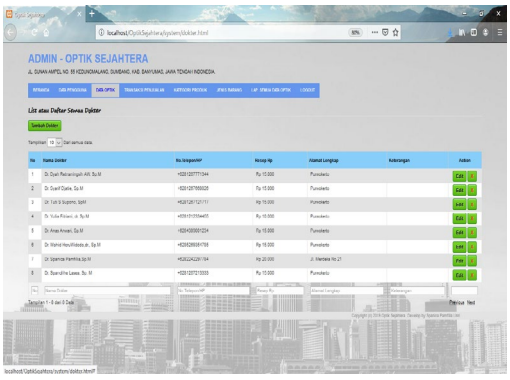

Figure 8. Doctor Data Display

f. The display in Figure 9 is a page supplier data that appears after clicking optical data and selecting the supplier data. This page contains data of all agencies that can be viewed, edited, deleted and add suppliers.

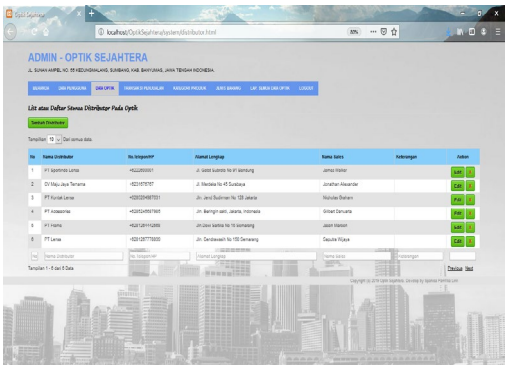

Figure 9. Supplier Data Display

g. The view in Figure 10 is sales transaction data page that appears after the sales transaction click and add the sales transaction.

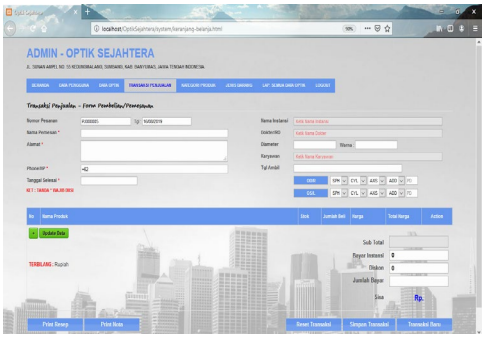

Figure 10. Sales Transaction View

h. The view in Figure 11 is an order product data page appears after clicking the order item and product type. This page contains data on all order products that can be viewed, edited, deleted and add product orders.

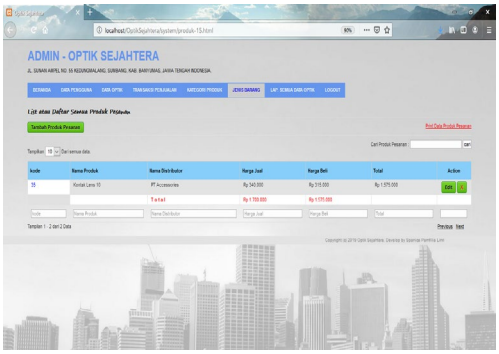

Figure 11. Order Product Data Display

i. This view in Figure 12 is a sales recap page after clicking the sales recap report.

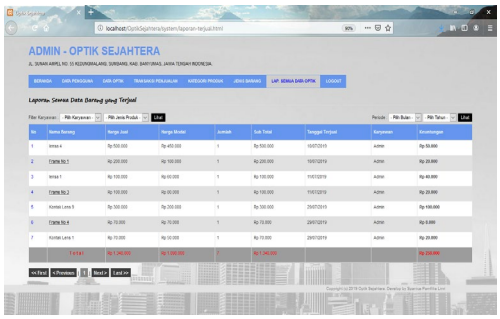

Figure 12. Sales Recap Report View

j. This view in Figure 13 is a page managing order reports after click order report. It can view orders details and delete order reports but cannot edit order reports.

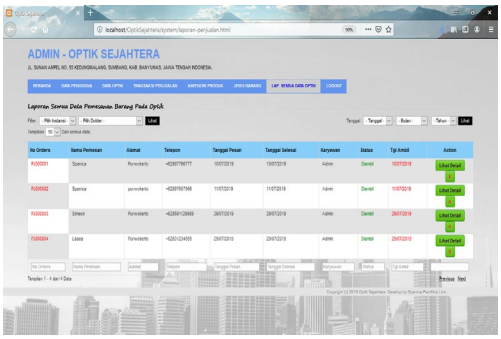

Figure 13 the Order Report View

3.2 System Test Results

This information system after being created then tested using white box test and black box test. White box testing is a clue to getting the program right a 100%. Meanwhile, Black-Box Testing serves to show the functionality of the software on how it operates, whether the insertion of output data has run as expected and whether externally stored information is always maintained.

3.2.1 White box Testing

The login flow graph is presented in Figure 14. Graph math login process can be seen in Table 1. Based on the Figure 14, the next stage is to calculate Cyclomatic Complexity (CC):

CC = (Number of Edges – Number of Nodes) + 2
= (5 – 5) + 2
= **2**

Based on the order in which the flow is obtained by a base group of flow graphs

Line 1 = 1-2-3-4-5

Line 2 = 1-2-3-2-3-4-5

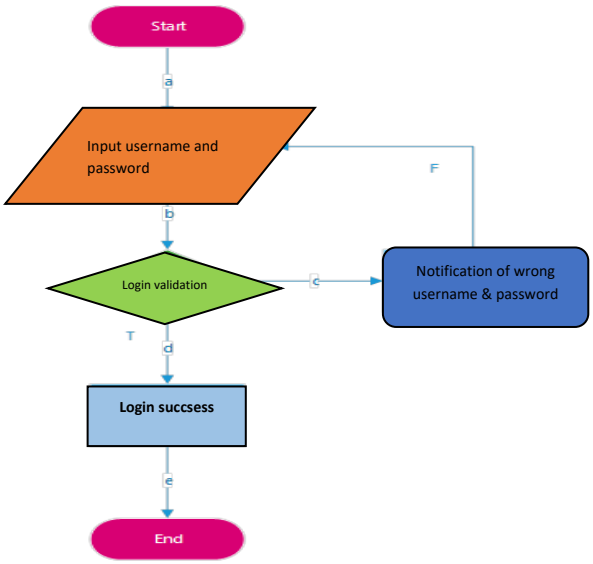

Figure 14. Flow Graph

Table 1. Graph Math Login Process

Start	1	2	3	4	5	6
1		a				
2			b			
3				c	e	
4		d				
5						F
6						

From Table 1 each node marked with numbers and edges with lowercase letters, then translated into graph math. The relationship of node 1 with node 2 is marked with the letter a, node 2 with node 3 is marked with the letter b, node 3 with node 4 is marked with the letter c, node 3 with node 5 is marked with the letter e, node 4 with node 2 is marked with the letter d, node 5 with node 6 is marked with the letter f.

3.2.2 Black Box Testing

The results of the black box test are presented in Table 2.

Table 2. Black Box test

Input	Function	Output	Description
Login	Validate username and password according to system login rights	Main page according to actor	Successful
Admin			
Employee Data Input	Admin adds employee data	Employee data input form	Successful
Input Data Member	Admin adds member data	Member data input form	Successful
Doctor Data Input	Admin adds doctor data	Doctor data input form	Successful
Agency Data Input	Admin adds Instance data	Agency data input form	Successful
Supplier Data Input	Admin adds Supplier data	Supplier data input form	Successful
Lens Type Data Input	Admin adds Lens Type data	Lens Type data input form	Successful
Lens Type Data Input	Admin adds Lens Type data	Lens Type data input form	Successful
Lens Size Data Input	Admin adds Lens Size data	Lens Size data input form	Successful
Accessories Data Input	Admin adds Accessories data	Accessories data input form	Successful
Lens Contact Data Input	Admin adds Contact Lens data	Lens Contact data input form	Successful
Frame Data Input	Admin adds Frame data	Frame data input form	Successful
Lens Data Input	Admin adds Lens data	Lens data input form	Successful
Ordering Product Data Input	Admin adds Ordering Product data	Order product data input form	Successful
Sales Transaction Data Input	Admin adds Sales Transaction data	Sales Transaction data input form	Successful
Report	Admins manage reports	Report form view	Successful
Warehouse			
Accessories Data Input	Warehouse adds Accessories data	Accessories data input form	Successful
Lens Contact Data Input	Warehouse adds Contact Lens data	Lens Contact data input form	Successful
Frame Data Input	Warehouse Adds Frame Data	Frame data input form	Successful
Lens Data Input	Warehouse adds Lens data	Lens data input form	Successful
Ordering Product Data Input	Warehouse adds Ordering Product data	Order product data input form	Successful
Cashier			
Member Data Input	Cashier adds member data	Member data input form	Successful
Sales Transaction Data Input	Cashier adds Sales Transaction data	Sales Transaction data input form	Successful

3.2.3. Normality Test Results

The data obtained was then tested for normalization using the Kolmogorov-Smirnov method [16]-[18]. Data normality is important because with normal distributed data, it is considered to represent the population.

Table 3. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

		S1	S2
N		30	30
Normal Parameters[a,b]	Mean	8.6840	4.3197
	Std. Deviation	.84535	.59531
Most Extreme Differences	Absolute	.153	.141
	Positive	.153	.129
	Negative	-.111	-.141
Test Statistic		.153	.141
Asymp. Sig. (2-tailed)		.072[c]	.131[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Based on the normality test obtained results as in Table 3 i.e. Asymp. value. Sig. Before using the information system in Optik Sejahtera (0.072) and After using the information system in Optik Sejahtera (0.131). Thus, it can be concluded that the distributed data is normal due to the value of significance (Asymp. Sig.) larger than α (0.05).

3.2.4 Hypothesis Test Results

The hypothesis test is a formal requirement regarding the relationship between variables and it is tested directly. In this case, the estimates made against the relationship between variables can be true or false. The Hypothesis test to be conducted is a correlation of 2 variables .

H_0: There was no significant increase in sales transactions before and after using the information system in Optik Sejahtera.

H_1: There has been a significant increase in sales transactions before and after using the information system in Optik Sejahtera.

Paired Sample T-Test results result in paired sample t-test table used to declare H0 accepted or rejected. Here are the hypothetical test results using Paired Sample T-Test.

Table 4. Paired Sample Statistic

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	S1	8.6840	30	.84535	.15434
	S2	4.3197	30	.59531	.10869

Table 4 explains that there have been increased changes in sales transactions before and after using the information system in Optik Sejahtera. Testing before using the system takes 8,6840 minutes and after using the system only takes 4,3197 minutes.

Table 5. Paired Samples Test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	S1 - S2	4.36433	.90971	.16609	4.02464	4.70403	26.277	29	.000

Based on Table 5 it can be concluded that H_0 was rejected because of the value of sig. (2-tailed) is smaller than 0.05. In other words, the information system in Optik Sejahtera resulted in an increase of sales transactions.

3.2.5. Reability Test Results

Reliability tests are used to measure whether a questionnaire is consistently used as a data collector so that it can be relied upon.. The following in Table 6 presents the results of the reliability test:

Table 6. Case Processing Summary Results

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Based on Table 6. Case Processing Summary, the amount of data declared valid is 30.

Table 7. Reliability Statistics Results

Reliability Statistics	
Cronbach's Alpha	N of Items
0.888	10

In Table 7. presents reliability statistics obtained a Cronbach Alpha value of 0.888 with a total of 10 items. Since the Value of Cronbach Alpha is greater than 0.6 it can be concluded that the item (question) is acceptable or reliable.

3.2.6 Benefit Test Results

The results displayed on the frequency table and pie chart, obtained a percentage for usability of 89.96%, effectiveness of 90%, and efficiency of 92.23%. As a result of the large percentage, it can be concluded that the information system in Optik Sejahtera is useful in improving efficient sales transactions (See Table 8).

Table 8. Benefits Test Summary Table in Percent

Attribute	Criteria	P1	P2	P3	Average
Usability	3	83,3%	76,7%	73,3%	89,96%
	4	10%	13,3%	13,3%	
		93,3%	90%	86,6%	
Attribute	Criteria	P1	P2	P3	Average
Effectiveness	3	76,7%	83,3%	86,7%	90%
	4	3,3%	10%	10%	
		80%	93,3%	96,7%	
Attribute	Criteria	P1	P2	P3	Average
Efficiency	3	80%	80%	90%	92,23%
	4	10%	10%	6,7%	
		90%	90%	96,7%	

4. Conclusions

Based on the results of information system research on Optik Sejahtera using CRM approach with spiral model can be concluded that

1. In hypothetical testing, there was a significant increase in sales transactions between before and after using the information system in Optik Sejahtera. The result before using the system took 8,6840 minutes and after using the system only took 4,3197 minutes. After using the information system, it results in an increased of sales transactions than before.
2. In the benefit test there was a difference in the percentage of statements from the 30 respondents who had been selected, namely a percentage for usability of 89.96%, effectiveness of 90%, and efficiency of 92.23%.
3. The information system on Optik Sejahtera using CRM approach with spiral model can increase efficiency in sales transactions.

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