Development of Mobile Sales Force System for an Automotive Aftermarket Company

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ABSTRACT

The aftermarket automotive company has a set of documents that is called Customer Information Folder (CIF). The CIF is used by the salesmen to record every activity, observation and sales made with their customers. Currently, the CIF is a pile of papers, in which paper misplacement can occur and data can be mixed up, and salesmen must return to the office at the end of the day to write down what they have done. The objective of this research is to create a mobile sales force system with a web application back-end that can help the company handle customer data and the system can also assist in managing others such as sales, orders, stocks and commissions. Based on request from the company, an ERP system is planned to be developed, starting from customer data (CIF / SFA), orders, stocks and commissions, which are developed for this research. The result of this research shows that the new system can help provide and manage data relating to customers, orders, stocks and commissions. Secondly, the new system can reduce paper usage by half through the simulation. Thirdly, the new system can provide organized, accurate and trustworthy data. Fourthly, the new system can help the Sales Department and company owner in determining sales trends and buying trends. Lastly, the new system is shown to have fulfilled user expectation as there are positive gaps between expectation and perception.

Keywords: *Customer Information Folder, ERP, Mobile Sales Force, SFA, Trends*

1. Introduction

An automotive aftermarket company is founded in 2006 and this company sells automotive care products to car workshops, ranging from engine and body care such as leather cleaner to spare parts such as wipers. Currently, it has six branch offices throughout Indonesia, which are Jakarta, Semarang, Bandung, Makassar, Surabaya and Palembang and two overseas offices which are located in Malaysia and China. This company is a wholesaler as some products sold by this company are imported, but at the same time, it is a distributor as some of their products are ordered and manufactured by a local supplier or company in Indonesia.

As of now, it has more than 10,000 customers, and each branch has approximately 1500. The customers consist of retailers and workshops categorized into three types: general, engine and body repairs. Each customer has their own product preferences. As the number of customers is increasing, it is necessary to keep track of purchases from each of them and to follow the development of each customer, from product ordering up to the payment.

In 2006, the company created a mechanism that documents customer data, whose purpose is to ease the Sales Department in processing necessary information to increase sales volume. This mechanism is called Customer Information Folder (CIF). CIF is a group of documents where customer data is recorded daily in detail. It consists of description of customer visits, products offered to customers, products purchase, total purchases in a year, customers' reasons behind no purchase, description of their purchasing behavior and payment (whether customer pays on time or not). Based on these reports, the Sales Department discusses and evaluates to create a plan on which customers to approach or blacklist and what products will be offered to them.

The CIF is edited by the salesmen. During the entire day, they will visit customers, make an appointment if needed, and offer products while studying how the customers act. They will have to pay attention to the customers' reactions such as noticing which products the customers tend to buy the most. At the end of the day, it is mandatory for the salesman to return to the office to report their activities and observations/reports into CIF. (Salesmen also include sales managers because sales managers must also be involved in the selling)

The problems in this research consist of salesmen returning to the office to make their reports by writing manually on papers and they tend to forget what they have done throughout the entire day. The second is pertaining to papers misplacement due to them being held and moved many times by the employees. Therefore, unorganized data caused by paper misplacement can cause confusion for the company owner and the Sales Department, inability to determine buying trends of a customer and sales trends, which makes them unable to make confident decisions for future sales.

Thus, the objective of this research is to develop a mobile sales force system with a web application back-end that can be used by the company to manage information regarding customers and sales, as well as others, such as orders, stocks and commissions.

By developing the system, salesmen can directly input the data through their phones directly after their visits while their memories are still fresh. Next, use of paper can be reduced, and the data can be organized accurately and be easily read by the Sales Department and company owner, retrieval of data is faster, business process is shorter and lastly, the Sales Department and company owner can determine customer buying trends and sales trends easily.

2. Literature review

Sales Force Automation (SFA) is an application of technologies that helps salespeople to accomplish their goals. SFA consists of two main components: hardware and software. Hardware involves laptops or mobile devices while the software is developed to capture and store customer data and distribute those data to salesmen and their sales managers so they can decide on the most effective way to complete their objectives when they are with their customers (Buttle, 2009). This research involves developing an SFA application, which does involve both software, that is the program and hardware: smartphone and computers.

Sales Force Automation has six components: lead components, forecasting, opportunity management, quote management, design registration and commission management. The first component of the program is lead management. This component lists down the description of the current, ongoing sales with customers, along with the salesperson in-charge of it and its status. In addition to that, users can input new leads, meaning they can put in potential sales with a specific client. The second is forecasting. As the term suggests, a prediction report of possible, successful sales will be produced automatically by the program after an analysis of quotes. The third is opportunity management. Any lead listed from lead management is a candidate to be an opportunity or it will be considered as a failure or invalid due to various reasons such as selling to a specific customer will not be beneficial to the company.

The fourth is quote management. A quote is a proposal for the prices of a company's products or services. In other words, it is similar to an invoice, but the prices are proposed to the customer instead of finalized. After the quote is made by the user, it is to be sent to their superiors or those are who are responsible for accessing quotes, to obtain their approval before showing it to their customer. The fifth one is design registration. The user inputs its involvement during the duration of the customer project, which is the process from the beginning of initial contact until the customer's agreement to purchase. The last one is commission management, in which commission will be given to those who have contributed in the success of achieving a sale from a customer. These components can allow users to record all sales data, display changes in the data, process the data and automatically define the necessary approach based on the result from the analysis (Vaillancourt, 2008). The system developed during this research incorporates only two of the components, which are lead components and commission management.
Another program of SFA has eight components: lead generation, customer, order management, customer retention, sales management, training management, data and communication (Jerome, 2000). The developed system includes five of the eight components: lead generation, order management, sales management, data and communication.

There are barriers discovered that hinders mobile SFA. These five barriers are customer knowledge, poor information quality, lack of time, functionality of mobile devices and SFA systems. Interaction with customer can lessen, information must be updated all the time, it is inconvenient to display all data on the mobile devices and the SFA system must always be in sync with the mobile devices (Sinisalo, 2015).

The benefits of SFA is that it can increase sales performance, but through a good customer relationship. Therefore, SFA usage involves customer relationship quality as the latter can influence whether the sales performance will be high or not. So, overall, using SFA will result in high sales if the salesmen's relationship with their customer is good (Holloway, 2013).

3. Research methods

This research will follow according to the Software Development Life Cycle Waterfall framework (Barjtya, 2017). The process will begin from the existing system analysis stage until the testing stage.

The existing system analysis stage will consist of analyzing the current existing system and determining the user requirements for the new system. Afterwards, in the next stage, designs of the system, the current and new, will be drawn out. In the third stage, implementation, the mobile app and web application will be developed. Finally, in the last stage, testing methods which are unit testing, functional testing, user acceptance test, paper simulation test and user expectation test will be carried out. The waterfall framework is used because it is step by step for software development and then the user could have a most finished application to be tested. Even though some iterations and feedbacks are still also needed.
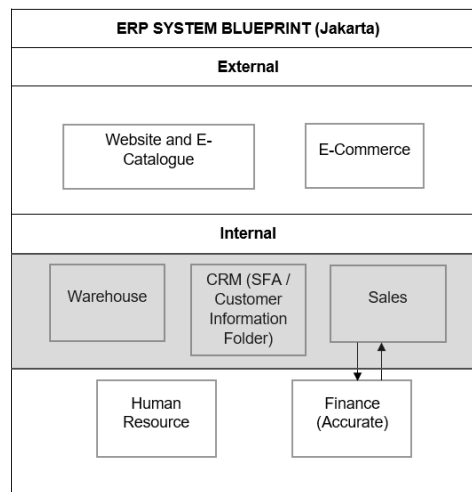

Figure 1. Company ERP System Blueprint

Figure 1 displays the blueprint of the ERP System intended to be developed for the company (Fitrix, 2011). The system is split into two sections: External and Internal. For the external, there is a website and an E-Commerce while for the internal, there are five subsystems: Warehouse, CRM / SFA (CIF system in company terms) with no automation, Sales, Human Resource (HRD) and Finance. The area which is layered blue refers to the subsystems that is to be developed first for the company as they require them urgently.
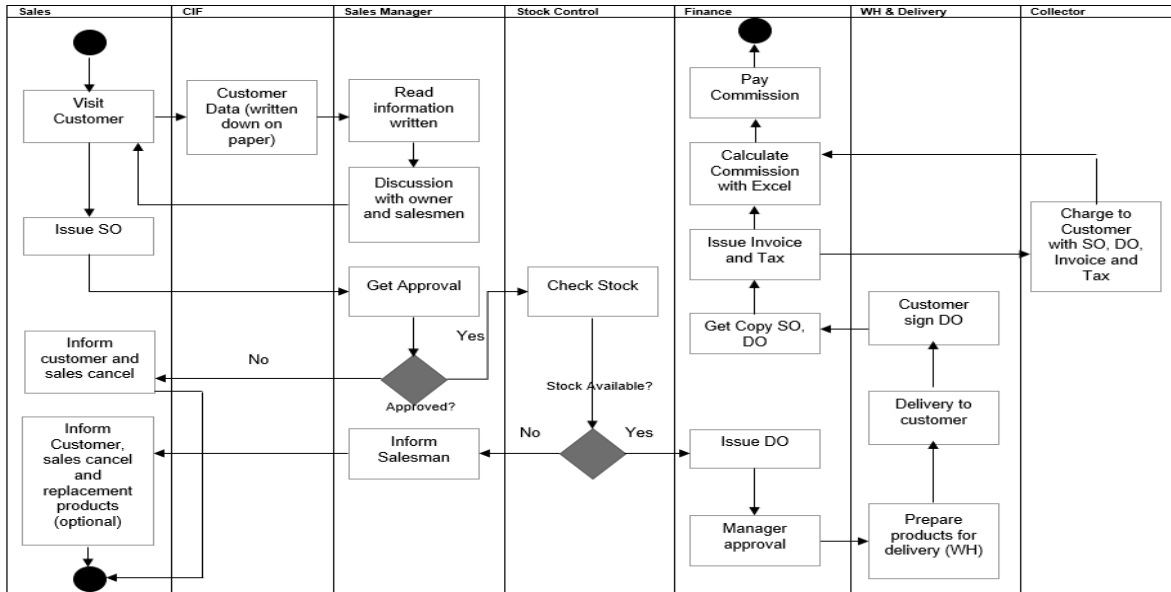
Figure 2. Current Activity Diagram

Figure 2 illustrates an activity diagram of the company's current business process relating to sales order and its customer information folder.
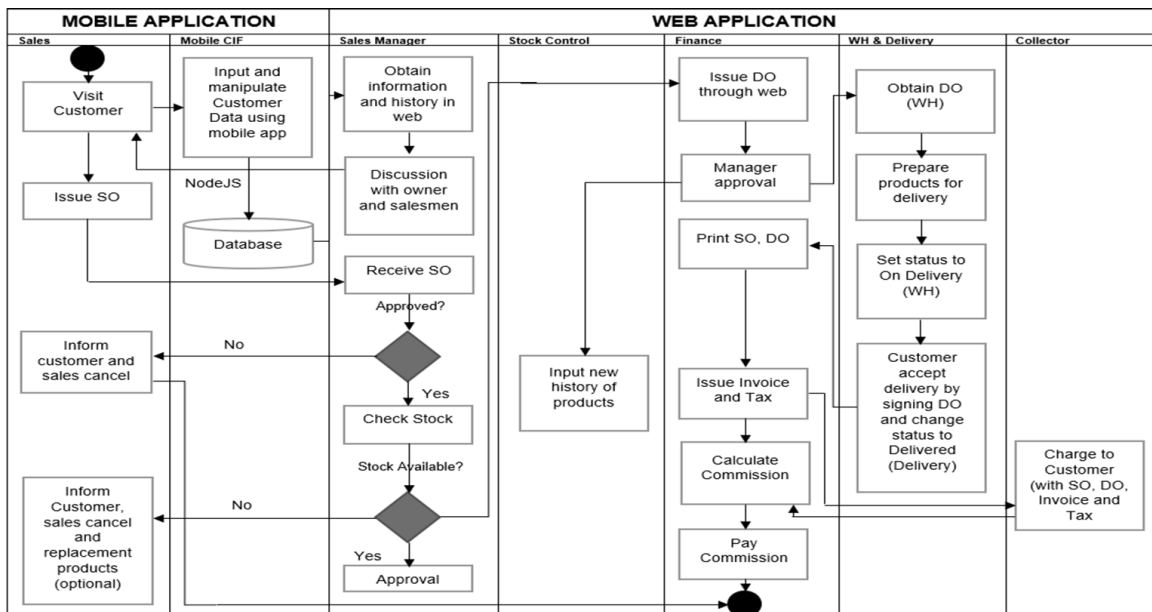

Figure 3. New Activity Diagram

Figure 3 illustrates an activity diagram of the company's new business process relating to sales order and its customer information folder. The process, similar to the previous diagram, begins with salesmen visiting a customer. Afterwards, after their visits, they can immediately input all customer data with the mobile app, in which the data is sent to the database. The data and data that has been inputted in weeks or months before is retrieved by web, which is accessed by sales managers and company owner. They have a discussion with the salesmen team to think of their next tactics for a better sale before visiting the customers again.

After getting the customers to agree in buying their products, the salesmen issue a sales order, that needs to be approved by the sales manager. While in the previous activity diagram, the stock control employee is the one who will check the products stock, in the new business process, the sales managers do the checking through the web. And when they approve, the employee from Finance issues a delivery order using the web, print the delivery order which will need to go through the finance manager for approval and afterwards, stock control can input a new history of the specific products.

The difference with the previous business process is that the warehouse staffs receive the delivery orders through the web and once the products are being delivered, they change the status to 'On Delivery'. Once the delivery men arrive at the customers and have obtained their signatures, they change the status to 'Delivered' instead. The other difference is the calculation of commissions. The Finance Department no longer uses Microsoft Excel, they just have to input the sales and transactions into the web and all calculations are done by the web.
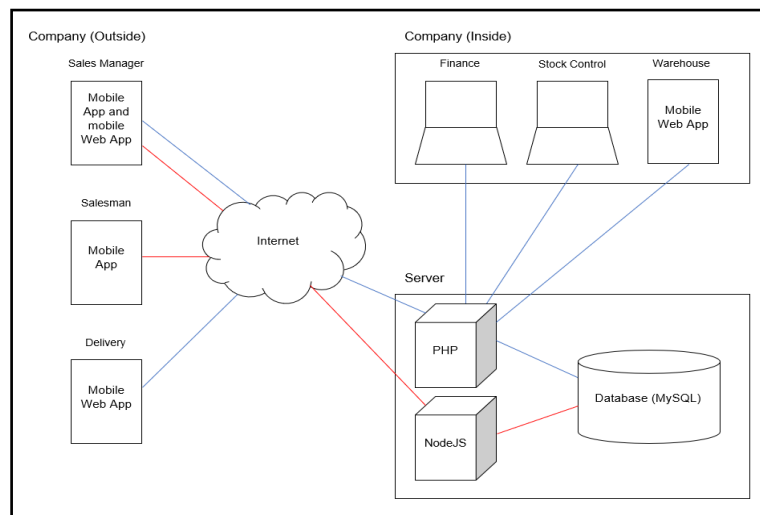

Figure 4. System Architecture

Figure 4 shows the system architecture for the developed system. The red line refers to the connections made by mobile apps while the blue line refers to the connections made by the web.

After the development, the employees of the company are given questionnaire regarding the quality of the new system, consisting of both the mobile application and web application. While the employees use and experience the new system, these questionnaires are made to determine how they perceive it, in other words, determining their perceptions of the new system. There are two types of questionnaires for this research: mobile application quality assessment and web application quality assessment.

The mobile application questionnaire is designed using the Mobile App Rating Scale (MARS). There are six categories of criteria: Classification, Engagement, Functionality, Aesthetics, Information Quality and Subjective. Firstly, classification is not part of the assessment as it is used as a description of the mobile application such as its technical features. Secondly, engagement refers to whether the mobile app is entertaining, worth using for its target age group. Thirdly, functionality pertains to the performance, navigation, design of gestures and ease of usage of the mobile app. Fourthly, aesthetics means to ask whether the visual of mobile app is appealing, whether its graphics such as the shape of the buttons and its layout is consistent in all

types of smartphones and the buttons or icons are in the appropriate positions. Fifthly, information quality refers to how credible the data are to the users. Lastly, subjective pertains to whether the users will recommend the app to other people and use it repeatedly   (Stoyanov, 2015). During this research, only two of the six are used: Functionality and Information Quality.

As for the web application questionnaire, it is designed using the Web Quality Assessment Criteria framework. There are five criteria: Content, Navigation, Structure and Design, Appearance and Multimedia and Uniqueness. Firstly, content refers to the information displayed by the web, whether the data are accurate and reliable. Secondly, navigation refers to the ease of navigating through a web. Thirdly, structure and design mean to ask about the loading speed, browser compatibility and software requirements. Fourthly, appearance and multimedia refer to how the data are presented, whether they are concise and are in simple readable text, and whether the overall appearance of the web suits its purpose. Lastly, uniqueness pertains to the design and aesthetic of the web (Moustakis, 2004). For this research, Uniqueness is excluded as the company prioritizes functionality over the web application's unique design.

Table 1. Web Application Questionnaire – Content (Subject Specialization)

CONTENT

NO	SUB-CRITERIA	DETAILS
1	Subject Specialization 1 (Company owner and Sales managers)	The web application provides the necessary information that allows employees to know about their customers and determine sales trends and buying trends
2	Subject Specialization 2 (Finance – Orders)	The web application provides the content needed for employees to know about sales orders, return orders, cancel orders and delivery orders
3	Subject Specialization 3 (Finance – Commission)	The web application provides the ease for employees in obtaining the information relating to commissions
4	Subject Specialization 4 (WH and Delivery)	The web application provides the needed content for employees with regards to products and stocks
5	Subject Specialization 5 (Stock Control)	The web application provides the easiness in getting information concerning delivery orders and customers

Table 1 lists down the questions pertaining to the content of the web application, but in terms of Subject Specialization, which pertains to different employees seeing contents allowed to them.

After obtaining the questionnaire results from the employees, a user expectation measurement is calculated. To measure users expectation or service quality, one questionnaire is for expectation, which is to know how much they expect from the system and the other is for

perception, which is to know how satisfied they are after knowing and experiencing the system features. Afterwards, for Gap Analysis, a Gap score will be calculated (Qadri, 2015, Galinium, 2016, Adipridhana, 2014)

Firstly, the average score of the questionnaire is calculated using the mean calculation formula (1).

$$\bar{x} = \frac{\sum x}{n} \qquad (1)$$

Where:
$\sum x$　is the sum of the scores
n　is the total number of participants or scores

To calculate the gap between expectation and perception, a simple subtraction formula is used.

$$G = P - E \qquad (2)$$

Where:
P　is the mean perception score
E　is the mean expectation score

4. Results and discussion

4.1 Development Result (Mobile App)

As illustrated in Figure 4, each of the customer has this format, where the information on the customer are displayed. In addition to that, at the bottom, there are four sections. The detail section is first thing the user will see. Afterwards, the user can tap on one of the sections to view the others. However, for customers that are blacklisted, the sections are reduced to only customer detail.
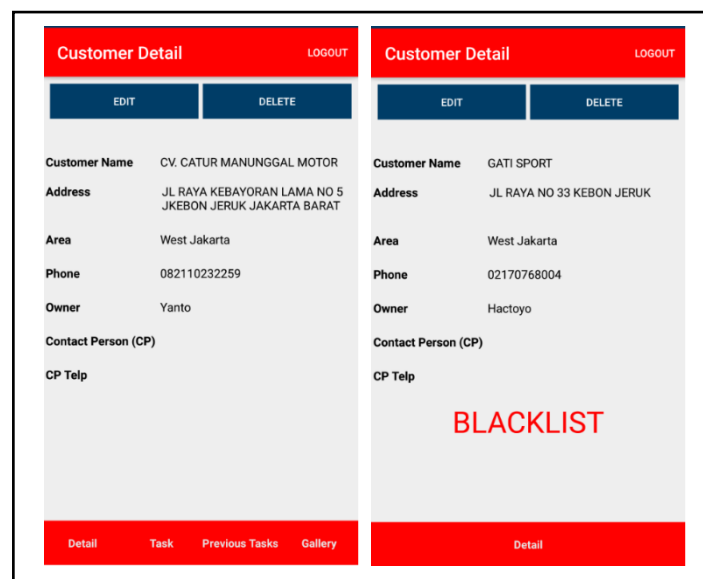

Figure 4. Customer Detail

Figure 5 shows the task section, which displays all the tasks the user has done with that certain customer on that specific day. The user can add sales (task, but type sales) or add other tasks

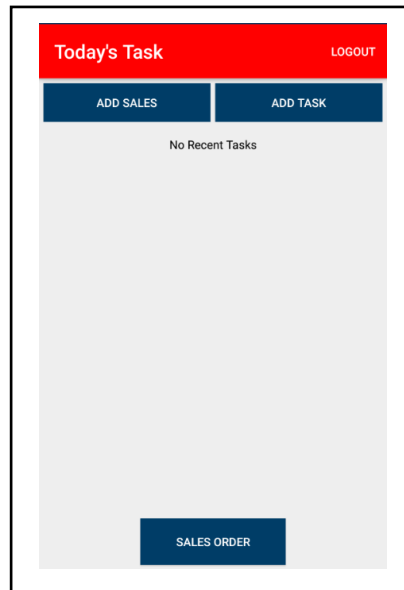(activity, observation and appointment). Furthermore, the user can issue a sales order after adding sales.

Figure 5. Task

4.2 Development Result (Web)

As shown in Figure 6, all the company's customers are listed down. Those who are blacklisted will be given a blacklist status beside their names. In addition to that, there are areas and branches as categories for the customers.

Figure 6. Customer List

Figure 7 shows the customer detail page, where the general information of the customer is written out. There are two tables, in which the right table is for task type: Sales, while the left table is for the other task: Activity, Observation and Appointment.

Figure 7. Customer Detail

4.3 Accuracy Testing Result

Figure 8 shows the screenshot of a section on the CIF of a certain customer while Figure 9 shows the result of the web application side of the developed system. As seen from the two figures, both are similar to each other, the difference is that the system also provides any return or cancel made and it calculates the total sales of each month.

Figure 8. Customer Information Folder (Paper)

NO.	Date	Salesman	Description	Quantity	Price	Total
1	09-04-2019	DR	Toyota Wiper Blade 4G - 14" 8mm	8	98,000	784,000
2	09-04-2019	DR	Toyota Wiper Blade 4G - 16" 8mm	4	99,000	396,000
3	09-04-2019	DR	Toyota Wiper Blade 4G - 20" 8mm	6	107,500	645,000
4	09-04-2019	DR	Toyota Wiper Blade 4G - 22" 8mm	10	112,000	1,120,000
5	09-04-2019	DR	Toyota Wiper Blade 4G - 24" 8mm	7	112,000	784,000
6	09-04-2019	DR	Toyota Wiper Blade 4G - 14" 8mm	5	0	0
7	09-04-2019	DR	Toyota Wiper Blade 4G - 16" 8mm	5	0	0
8	09-04-2019	DR	Radiator Cleaner 300ml	24	90,000	2,160,000
						5,889,000
9	10-04-2019	DR	RTV Silicone Sealant Grey - RETURN Sales made: 2019-02-28	60	50,000	3,000,000
						0
10	26-04-2019	DR	Rear Wiper Blade 12"	15	98,500	1,477,500
11	26-04-2019	DR	Rear Wiper Blade 14"	15	98,500	1,477,500
12	26-04-2019	DR	Rear Wiper Blade 12"	5	0	0
13	26-04-2019	DR	Rear Wiper Blade 14"	5	0	0
						2,955,000
						8,844,000
14	20-05-2019	DR	Hybrid Blade 14"	6	100,500	603,000
15	20-05-2019	DR	Hybrid Blade 16"	6	112,500	675,000
16	20-05-2019	DR	Hybrid Blade 22"	6	130,500	783,000
17	20-05-2019	DR	Hybrid Blade 24"	6	133,000	798,000
18	20-05-2019	DR	Hybrid Blade 26"	6	135,000	810,000
						3,669,000

Figure 9. Customer Detail (Sales)

Figure 10 shows the screenshot of the sales order written by salesman while the Figure 11 shows the sales order from the web application side of the developed system, which is viewed by sales manager. The sales order has been issued from the mobile app by the salesman. As seen from the two figures, the system shows a similar result, with the addition of price without tax, current stock and quantity that has booked by other customers, which will be helpful to managers when they want to check whether stock is available. There is also status to show whether that particular sale is cancelled as customers can cancel a product before manager approval.

Figure 10. Sales Orders (Manager)

Figure 11. Sales Orders (Web)

Figure 12 shows the sales commission result in Excel file, while Figure 13 shows the result of sales commission in the web application that is accessed by finance. As shown in the two figures, the system produces an exact result as the commission calculated in Excel. However, based on the requirements from the company, the system does not provide total VAT and sales.

Commission Record									
Sales				Net Sales	Payment Received	Payment Received	Commission %	Commission Received	Remarks
Total	Cancel	Return	VAT						
111,868,402	-	-	3,969,068	101,497,902	89,282,578	26,916,663	4%+5%	1076666.52	
							Sub Total	1,076,667	
							Less: Cancellation	-	
							Return Pinalty	0	
							Total	1,076,667	

Figure 12. Sales Commission (Excel)

Net Sales : 101,497,902

Amount Paid : 89,282,578

Commission Based On : 26,916,663

Commission Value : 4 + 5 %

Commission Value : 1,076,667

Figure 13. Sales Commission (Web)

4.4 Business Process Comparison

The before-business process shows that the sales manager consults with the stock control employee to inquiry about product stock before issuing delivery order or cancel depending on whether the stock is available or not. As for the after-business process, with the new system, the sales manager does not have to ask the stock control, rather they can check stock on their own. Therefore, based on the two difference chains, the business process has been shortened with the use of the new system.

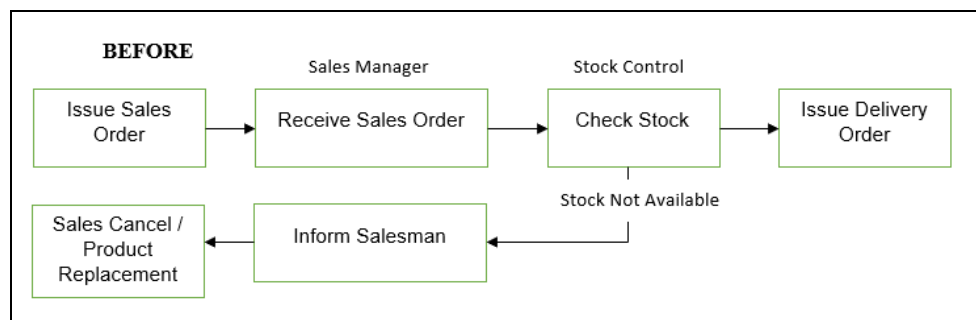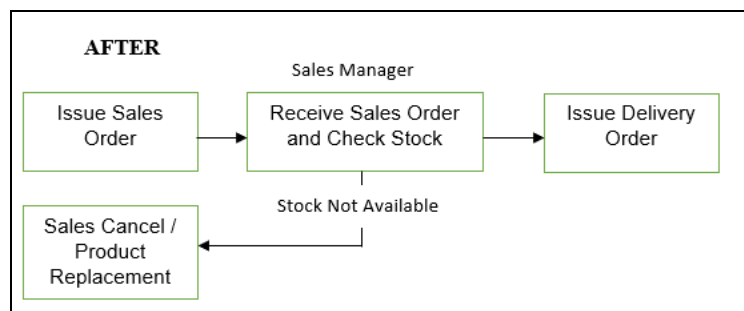**Figure 14.** Business Process Chain (Before)

Figure 15. Business Process Chain (After)

4.5 Time Comparison

Table 2 shows the various processes and the day and amount of time taken place for each. The processes are based on the business process on the previous page. The table also shows the amount of time taken before the system and after the usage of the system, as well as the difference.

Table 2. Time Comparison Result

Process	Before		After		Difference	
	Day	Duration	Day	Duration	Duration	%
Issue sales order	1st	2 minutes	1st	1.5 minutes	0.5	25
Sales manager receive and read sales order	2nd	1 minute	1st	1 minute	0	0
Sales manager obtaining stock information for a sales order	2nd	3 minutes	1st	1.5 minutes	1.5	50
Sales cancel / product replacement	2nd	2 minutes	1st	2 minutes	0	0
A delivery order to Ware-house	2nd	3 minutes	2nd	1.5 minutes	1.5	50

The time calculated excludes the time taken to log into the system. The day refers to which day the process takes place (1st, 2nd or 3rd day). From the table, with the new system, since the sales manager can approve and check stock on the first day, in case of stock unavailable, the salesmen can quickly provide customers with the choice of product replacement. Therefore, maximizing the number of sales, rather than waiting until the next day, unless the customers wish to cancel instead.

4.6 Paper Simulation Result
Table 3 shows the simulated, approximate total number of paper usage before and after the new system. The Issue Invoice process in has no change because it does not use the system. The table shows the difference and percentage difference between the totals from the previous two tables. Based on the result, the number of papers is reduced by half.

Table 3. Paper Simulation Result

Process	Paper Usage in a day		Paper Usage in a week (6 days)	
	Before	After	Before	After
Customer Information Folder	100	0	600	0
Issue Sales Order	75	50	450	300
Issue Delivery Order	75	50	450	300
Issue Invoice	45	45	270	270
Total	295	145	1770	870
Difference	150		900	
Difference (%)	51		51	

4.7 User Expectation (Gap Analysis) Result
A focus group discussion is conducted with the employees. During the discussion, questionnaires are given to them to fill in for expectation and perception. The participants of the mobile app questionnaires are sales managers and salesmen.

Table 4. Questionnaire Average Result – Mobile Application

Criteria	Expectation	Perception	Gap
Functionality	4.4	4.8	0.4
Information Quality	4.3	4.9	0.6

Table 4 shows the average expectation and perception between two criteria pertaining to the quality of the mobile application. As shown in the table, both gaps are positive.

The participants of web application questionnaires are the employees from the following departments and roles:

- Company Owner
- National Sales Manager
- Finance (Commission)
- Finance (Sales Orders)
- Stock Control
- Warehouse
- Delivery

Table 5. Questionnaire Average Result – Web Application

Criteria	Expectation	Perception	Gap
Content	4.4	4.7	0.3
Navigation	4.7	4.9	0.2
Structure and Design	4.6	4.9	0.3
Appearance and Multimedia	4.7	5	0.3

Table 5 shows the average expectation and perception between six criteria pertaining to the quality of the web application as mentioned in the reference (Moustakis, 2004). As shown in the table, both gaps are positive.

5. Conclusion

After the development of the system, there are several software testings conducted. Firstly, the unit testing result conducted by the developer shows that all unit / features of the system are functioning well. Secondly, the functional testing result that is also conducted by the developer shows that the system provides the correct output from the input and that all features from the unit testing are integrated as one.

Thirdly, the accuracy testing shows that the system can produce an exact result as the one written in papers or calculated in Excel files, with additional features such as inclusion of cancel and return orders of a certain customer that can be read by sales managers and owner or quantity of a product that has been booked by other customers when sales managers view a particular sales order for approval or not.

Fourthly, the user acceptance result shows that all system features have been accepted by the company employees.

Fifthly, the paper usage simulation result illustrates that the system can reduce the amount of papers used by half. Papers are still included in issuing sales and delivery orders due to the additional print feature in the web application as the company requires it for records.

Lastly, the user expectation test result derived from the scores obtained in the questionnaires display that there are no negative gaps between expectation and perception, therefore fulfilling their expectation. Thus, from the six-testing result, they prove that the system is capable of handling and producing data regarding customer, sales, orders, commission and stocks for the company, reducing paper usage and fulfilling the employees' expectation.

The data shown by the system is reliable as in the category of Information Quality from the mobile app questionnaire and Content and Structure and Design from web application questionnaire, there is an average positive gap between expectation and perception. Therefore, it shows that the data shown is credible and satisfying for the employees.

The web application side of the system provides a data visualization of top selling products and sales trends as well as list of sales or products bought from every customer, which allows the Sales Department and company owner to determine buying trends and sales trends. Furthermore, according to the web application questionnaire result, in the Content category, Subject Specialization 1, which is for reading trends, there is a positive gap. Thus, it shows that the web application can help the Sales Department and company owner in determining customer buying trends and sales trends.

In addition, the system does shorten the business process and thus reducing the time and maximizing sales.

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