Improvement of Automotive After-Sales Service Using Business Process Reengineering

Hanni Attarfi and M. Dachyar
Industrial Engineering Department
Faculty of Engineering
Universitas Indonesia
Depok, Indonesia
hanniattarfi@gmail.com, mdachyar@yahoo.com

Abstract

The COVID-19 pandemic has harmed automotive vehicle sales. A lot of automotive companies have shifted their focus from sales to after-sales service, and the trend in after-sales service is starting to recover and has a big contribution to the revenue. Along with the growth of digital technology and e-commerce, automotive companies must adapt and develop new strategies to compete with their competitors and maximize their potential in after-sales service. This study aims to design business process improvements by using Business Process Reengineering (BPR) to increase the time efficiency of the after-sales service journey in one of the automotive companies in Indonesia. The method is used to design improvements to the service journey using the iGrafx software. Improvements are carried out on the whole journey of car service, starting from customer reception until service delivery and payment. Data collection regarding the car service process was collected in one of the automotive companies in Indonesia. The method consists of three steps namely mapping as-is process, analyzing as-is process, and modelling to-be process. The results of this study obtained an improvement scenario of a to-be process with the highest reduction in time.

Keywords
Automotive, After-Sales Service, Digital Technology, Business Process Reengineering

1. Introduction

The Covid-19 pandemic that has occurred since 2020 has brought many changes to various aspects of life. Indonesia's economic growth, which for the last ten years has always been above the 5% (yoy) range, except in 2015 where economic growth was recorded at 4.88%, experienced a contraction due to the covid 19 pandemic, and was recorded at -2.07 in 2020%.

In 2020 the Indonesian economy is still dominated by the Processing Industry by 19.88 percent; followed by Agriculture, Forestry and Fisheries by 13.70 percent; and Wholesale-Retail Trade, Car-Motorcycle Repair by 12.93 percent. The automotive industry is one of the mainstay sectors that has a significant contribution to the national economy and is included in the Wholesale and Retail Trade, Car and Motor Vehicle Repair sectors, which are the top three sectors that have the highest contribution to Indonesia's GDP. In 2020 there was a decline in the Wholesale and Retail Trade, Car and Motorcycle Repair Industry compared to the previous year, where in 2019 this sector was the second largest contributor to GDP, which was 13.01% or 1,995.5 trillion.

However, various policies launched by the government and the rise of public confidence and the world economy after the Covid 19 vaccination, the automotive sector in 2021 continues to increase. In the second quarter of 2021, the Indonesian economy returned to life as indicated by economic growth of 7.07% (yoy) in the second quarter and 3.51% (yoy) in the third quarter. The positive economic growth was also accompanied by increased public confidence and increased purchasing power, which significantly affected the growth of the Indonesian automotive industry. Judging from the growth rate for the Wholesale and Retail Trade sector, Car and Motorcycle Repair in the second quarter of 2021 has grown positively by 9.45% after previously contracting by minus 7.57% in the same period in 2020. This sector is still experiencing an increase, where in the third quarter of 2021 it grew by 1.54% compared to the second quarter of 2021.

The object of this research is Automotive Company X, which is the sole distributor for a car brand that provides sales and after-sales services for all car products marketed in Indonesia. The Company currently has more than 100 authorized workshops spread throughout Indonesia. After-sales services offered by the official workshops of the company are periodic service and general repair at the workshop, body paint/body repair, home service, purchase of accessories, and purchase of spare parts. A source from the company stated that recently competition in the automotive service sector has increased. Competitors are not only fellow official workshops, but also with non-official workshops. In addition, it was found that there are still manual processes in the car service service business process which result in a longer service time than the promised estimate, as well as a number of complaints from customers regarding service bookings on digital channels.

1.1 Objectives

The purpose of this research is to design an improvement in the car service process at this Automotive Company using a Business Process Re-engineering approach to improve time efficiency, practicality, and flexibility in the entire car service process.

2. Literature Review

2.1 After Sales-Service

After-sales service is a service provided by the manufacturer to consumers after the consumer purchases products from the company Tjiptono (2008). Based on the above understanding it can be concluded that after-sales service is an activity carried out after the delivery of products to consumers on their purchase, which is valid as long as the consumer has a service bond or relationship in various service activities.

N. Nordin, et al.(2016) stated that after-sales service is related to the bond between the company and the consumer, and refers to a series of processes to ensure consumer satisfaction with the company's products and services. After-sales service ensures that products and services meet consumer expectations, covering a wide range of activities such as ensuring consumer satisfaction with the product, such as warranty, staff service, loyalty, security and comfort level.

Sudarsono and Edilius (2010) define after-sales service as a service that includes repair, provision of spare parts, etc. provided by the company to consumers after the product is purchased for a certain period of time. After-sales service is usually done as a form of responsibility given by the seller for the goods they have sold. This service is provided in the form of warranty, replacement of damaged goods, maintenance and provision of spare parts.

Tjiptono (2007) explains that there are basically three key benefits of providing after-sales service to customers:

a. Ability to understand customer needs and wants.
b. Development of a more accurate data base from competitors (includes data on the needs and wants of each customer segment and changing competition conditions).
c. Utilization of information obtained from market research in a strategic framework.

It is very important for companies to adopt good after-sales service management to increase effectiveness and efficiency to serve customers. Research conducted by kurniawan (2015) shows that after-sales service has a positive and significant effect on consumer satisfaction. From the description above it can be concluded that after-sales service is very influential on consumer satisfaction. If the service is less effective or not good it will affect consumer satisfaction.

2.2 Business Process Reengineering

BPR, according to Hammer and Champy (1993), is a fundamental rethinking and radical redesign of business processes in order to achieve higher performance and new important indicators including cost, quality, service, and speed. Procedures in Business Re-engineering is a business management technique that focuses on examining and redesigning material and information workflows and processes inside a company. The old process system should be abolished and replaced with a new system that is more inventive and effective, according to this approach (M. Dachyar and Christy 2014). BPR attempts to produce large gains in firm performance indicators by fundamentally and radically redesigning business processes with the newest information technology (IT) (M. Dachyar and Pertiwi 2020). BPR owes its birth to a variety of disciplines and four main areas.
BPR has been successfully applied in many industries. Here are examples of researches using BPR on various industries:

1. Logistics Industry

Azzahra and Dachyar (2021) conducted a research using BPR approach which resulted in three scenarios for process improvement in handling reefer containers and resulted in shorter processing times for each scenario.

2. Health Industry
BPR implementation in health industry was also conducted by Zen and Dachyar (2021), particularly in the Intensive Care Unit (ICU). IoT was used in this research which resulted in a 37.10% reduction of patient monitoring process time.

3. Automotive Industry
BPR was used in order to strengthen a motorcycle workshop's competitive advantages in research conducted by Budiono and Loice (2012). This research resulted in a reduction of the average customer service time from 30 minutes to less than 15 minutes, and an increase in the availability of the products from 70% to 90%.

3. Methodology
This research was conducted in the following stages:
1) Early Stages of Research
At this stage, the research theme is determined based on the study of literature on research materials and methods and the results of discussions with guidance lecturers. The research topic chosen is the design of the after-sales service order process using the Internet of Things (IoT) with a Business Process Re-engineering approach. Then, continued by formulating the research background, problem formulation, research objectives, and scope of research.

2) Design and Analysis of As-Is Models
This stage, researchers conduct in-depth interviews with experts to find out the process and process time that exists today (As-Is). The process is then mapped into iGrafx software. Then, validation is done using the face and event validity method and the simulation is run. As well, the flaws and problems on the As-Is model were analyzed. The results of the Simulation as-Is model were also validated using the same method.

3) Designing a To-Be Model
At this stage, researchers create a remedial model to address the problems that occur in the As-Is model. The problem is known from the voice of customer (VOC) that has been created before. Then, the process to be repaired is made to-be repair process and simulation is run.

4) The final stage of research
At this stage, after all the data is processed and the simulation is executed then the next stage is to perform the final analysis of the results of the Simulation process As-Is and To-Be. Then, the next stage is the withdrawal of conclusions and suggestions.

4. Data Collection
The collection and processing of data on research will be explained in this chapter. An explanation of the company profile as the object of research will also be briefly explained in order to provide an overview of the place of data retrieval. The collection and processing of data in this study is carried out through a number of stages. The first stage is to track indications of problems from customer feedback data about car service services and the quality of company applications that are the subject of research. In the second stage, interviews were conducted with workshop workers who are responsible for the car service process from receipt of service bookings until the receipt is completed. This aims to find out the flow of the car service process and the parties involved in it.

In the later stages, direct observation is conducted to find out the length of time each process is in as-is (initial) conditions. Interview results and direct observations are used to map the car's servicing process in as-is conditions with the help of iGrafx software.

The selected speakers are 5 people, who are representatives of workshop workers involved in the car servicing process (see Table 1.). The five sources consisted of 1 Service Relation Officer (SRO), 1 *Service Advisor,*1 *Foreman* (Squad Head), 1 Spare Parts Warehouse Officer, and 1 Service *Admin.* These five sources were selected to know the current car service process overview and also as a discussion partner on the draft repair proposal.

Table 1. List of Interviewees

No.	Initials	Gender	Position
1	T	Woman	*Service Relation Officer* (SRO)
2	M	Man	*Service Advisor*(SA)
3	H	Man	*Foreman*
4	Y	Man	Spare Parts Warehouse Officer
5	A	Woman	*Service Admin*

5. Results and Discussion

5.1 As-Is Model for Car Service

The subject of this research is a company which is the sole distributor as well as a retailer of vehicles, products, and services of a car brand in Indonesia. That is, the company manages the distribution of automotive products to other companies or dealers, while managing the sale of vehicles, parts, and after-sales services to customers. The object of the research is a car service in their official workshop.

The activity and time in the BPMN model are then mapped using iGrafx software. Time is used as input for the task. After mapping on iGrafx, face validity is done to see the suitability of the model with the actual running process on the car service process in the research object along with the source. To illustrate the whole process of car service, BPMN (Business Process Model Notation) was used. The As-Is model Booked Service Order Acceptance Process can be seen in Figure 1.

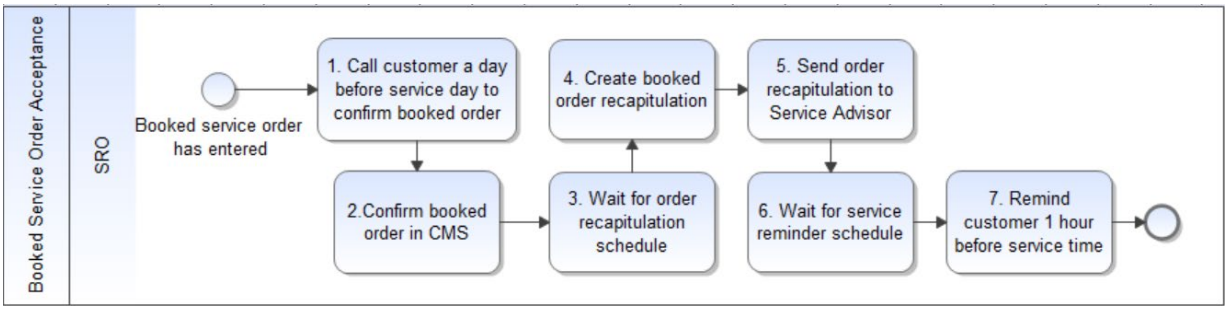

Figure 1. As-Is Model for Booked Service Order Acceptance Process

Figure 2 shows the As Is Model for Vehicle Repair Process, which includes customer reception process, vehicle repair process, handling customers, final inspection, and vehicle delivery. This model includes Customer, Service Advisor, Foreman, Mechanic, Spare Part/Material warehouse worker, Service Admin, and Cashier as the resources.

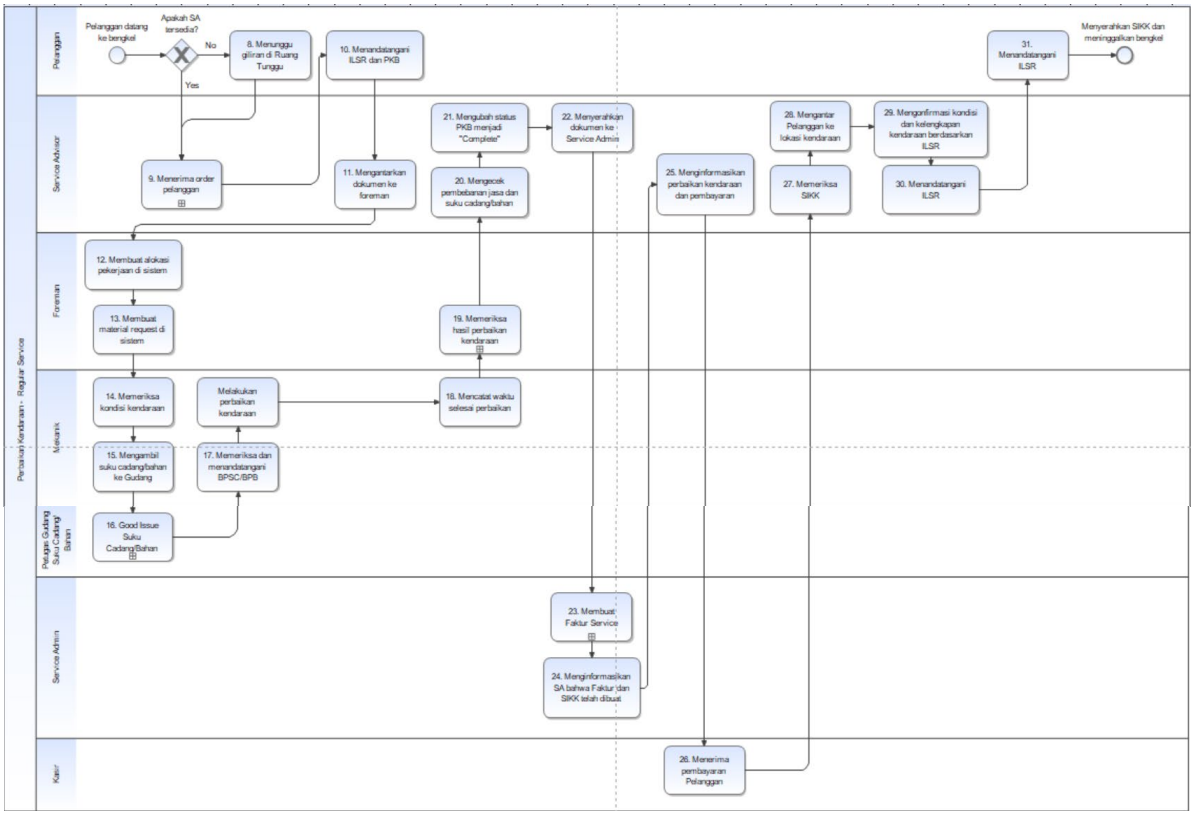

Figure 2. As Is Model for Vehicle Repair Process

Figure 3 shows four subprocesses of the vehicle repair process. The subprocess are order reception, good issue, final inspection, and Invoicing subprocesses. These four subprocesses explains the processes In vehicle repair process in a more detailed manner.

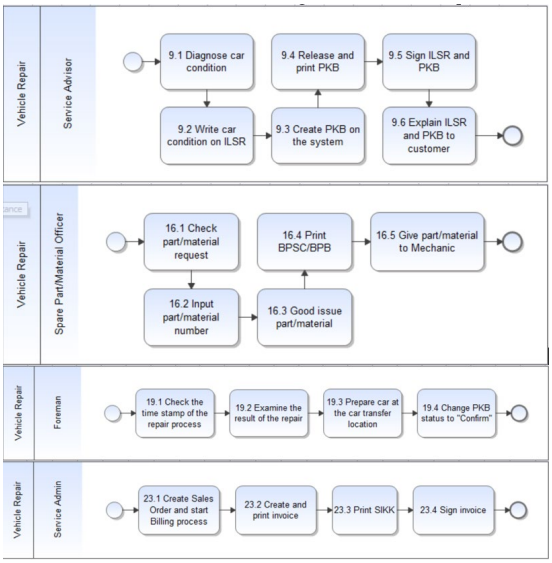

Figure 3. Subprocesses of As-Is Model

Table 2 shows the findings of the as-is model on BPMN iGrafx, which shows the total process time (cycle time) for each process, including work time and waiting time. From the table, we can see that the booked service order acceptance process has the average cycle time of 53,45 hours or equivalent to more than two days.

Table 2. Results of As-Is booking service order confirmation process model simulation

Transaction Statistics (Hours)			
Process	Avg Cycle	Avg Work	Avg Wait
Booked service order acceptance	53,45	0,45	53,00
Vehicle repair	2,31	2,31	0,00

5.2 Analysis of Current Business Processes

Needs analysis of warehouse operations is carried out using the Voice of Customer (VoC) method which is analyzed on four components, namely, voice of customer, driver, requirement, and output. The author conducted an interview with the source to find out the drivers needed and needed in determining the repair solution for the car service process. After that, the design of solutions / alternatives is made by analyzing the relationship between *goal-problem-solution* in warehouse operations. Table 3. describes the analysis of goal problem *solutions* that the author has done on problems, VOC, and best *practice.*

Table 3. Goal-Problem-Solution Analysis Table

Goal	Problem	Solution	BPR Best Practice
Efficiency	Overall service longer than estimated time promised	Utilize information technology to eliminate the mobilization process for information transfer	Elimination & Integration of Technology
Ease of use	Experience booking service online through the application or website is not easier and practical than coming directly to the workshop.	Improve mobile apps to ease car service experience	Integration of technology
Responsiveness	Customers receive a booking confirmation a few days after booking, sometimes not receiving confirmation at all	Automate by using automated order confirmation email technology and improve database performance	Integration of technology

5.3 Determining improvement scenarios

Based on the results of the literature study, several alternative solutions were obtained. Here are alternative solutions considered by the author:

1. QR Code

QR codes are IoT enablers that can be implemented to reduce customer acceptance process interactions at counters by Service Advisors as well as wait times. QR code stands for quick response code, which is a two-dimensional barcode that can provide various types of information directly.

How QR Codes work is by scanning or scanning with a smartphone through a mobile application owned by customers. This creates a QR code to store and forward customer data and customer service data to the associated worker information system.

2. Self-Service Key Exchange Machine

Self-service key exchange machines can be implemented so that customers can check in and check out at any time, even outside of workshop hours. This machine is a self-service safe according to EN 1143-1. These engines are designed for key exchange, more specifically for storing and exchanging car keys. Customers can send car keys and/or pick up car keys, usually outside car dealerships, workshops or car rental facilities. The cabinet connects to sharebox back-end servers over the internet. Staff and customers communicate with these servers to manage and gain access to one of the lockers.

Key drop/pick-up stages:

1. When the customer is standing in front of the machine, on the application, click the "drop key" button on the order page
2. Enter machine ID in the application
3. The engine button light will be green flashing, click the button to confirm that the customer is on the spot
4. The engine button light stops flashing, and will open the small locker automatically.
5. Enter the key, then click the back button to close.
6. The button light turns red flashing, then closes automatically. then the button stops flashing and stays red on

3. Improvement of workers' information systems

API integration is carried out on database management systems that workers use to improve worker work efficiency and eliminate data input processes by workers. With this, the two different worker information systems can connect directly and transmit data and information automatically. In addition, improvements were proposed with the addition of notification features and document submission features on internal worker information systems. This will certainly reduce the process of mobilizing workers to deliver physical documents.

4. Mobile app improvements for customers

For application improvement, several innovations are proposed as follows:

a. Car Repair Animation Video
   To replace the process of SA explaining the repair directly to the customer, it can be provided with animated video improvements through the company's mobile application.
b. Online payments
   The addition of the online payment feature can eliminate queues for payments at the checkout, and supports contactless journey.

5. Develop a mobile app for workshop workers

To improve the customer's car service experience, a mobile app is needed for workshop workers that connects to the mobile application used by the customer. The development of this application allows for chat features with Service Advisors for visitors. In addition, the application can also be used by mechanics in order to update the status of the job more quickly and easily, and facilitate the acceptance of work allocated by *Foreman.*

From the technology mentioned above, two scenarios are compiled to compare QR code implementation with self-service key exchange machines. Scenario 1 is a scenario that uses a Self-Service Key Exchange Machine, and Scenario 2 is a scenario that uses QR Code. Based on the draft scenario that has been made, then each scenario will be modeled and simulated by using iGrafx software to compare the repair process to be with as is. Figure 4. shows the To-Be model for booking service order acceptance process. The improvements made for this process are the same for Scenario 1 and Scenario 2.

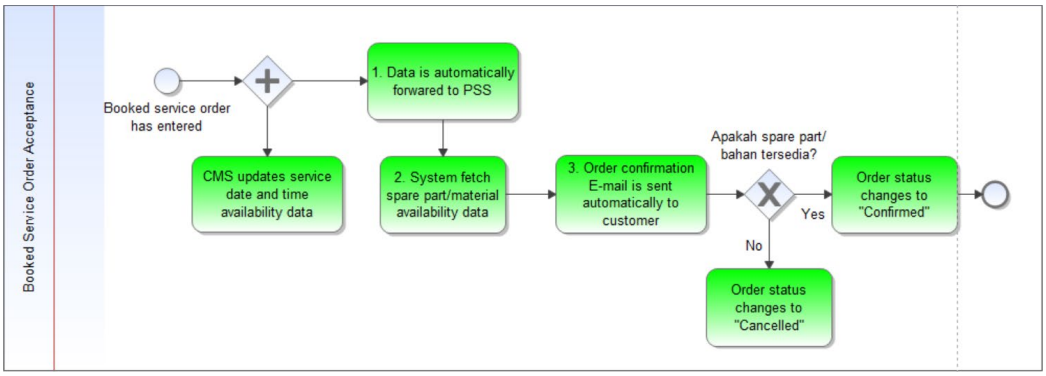

Figure 4. Improvement of Booking Service Order Acceptance Process

Figure 5. shows the Scenario 1 To-Be model for vehicle repair process. In this scenario, self-service key exchange machine is implemented at the beginning and at the end of the whole car service experience. The process starts with the customer dropping of their car keys into the self-service key exchange machine, and ends with customer picking up the car keys and leaving the parking area.

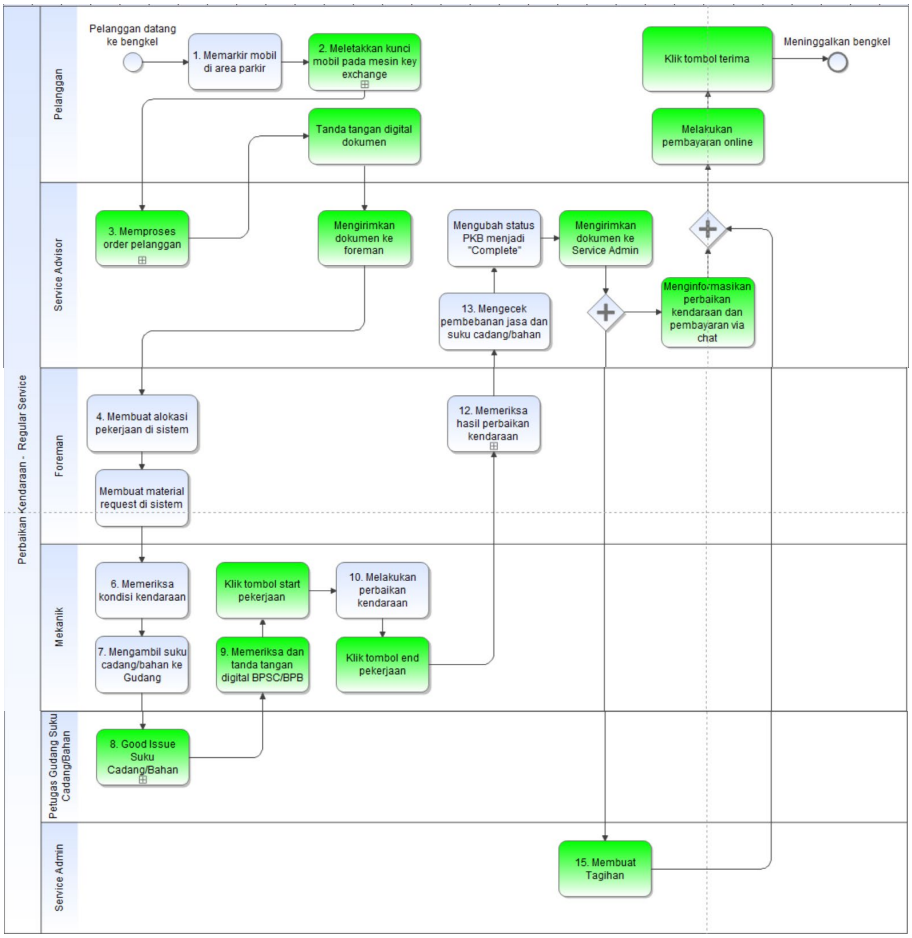

Figure 5. Scenario 1 improvement of vehicle repair process

Figure 6. shows Scenario 2 To-Be model for vehicle repair process where QR Code is implemented at the beginning of the whole process, specifically in the customer reception process. The process starts with customer checking in by scanning the QR code in the workshop using the company's mobile application.

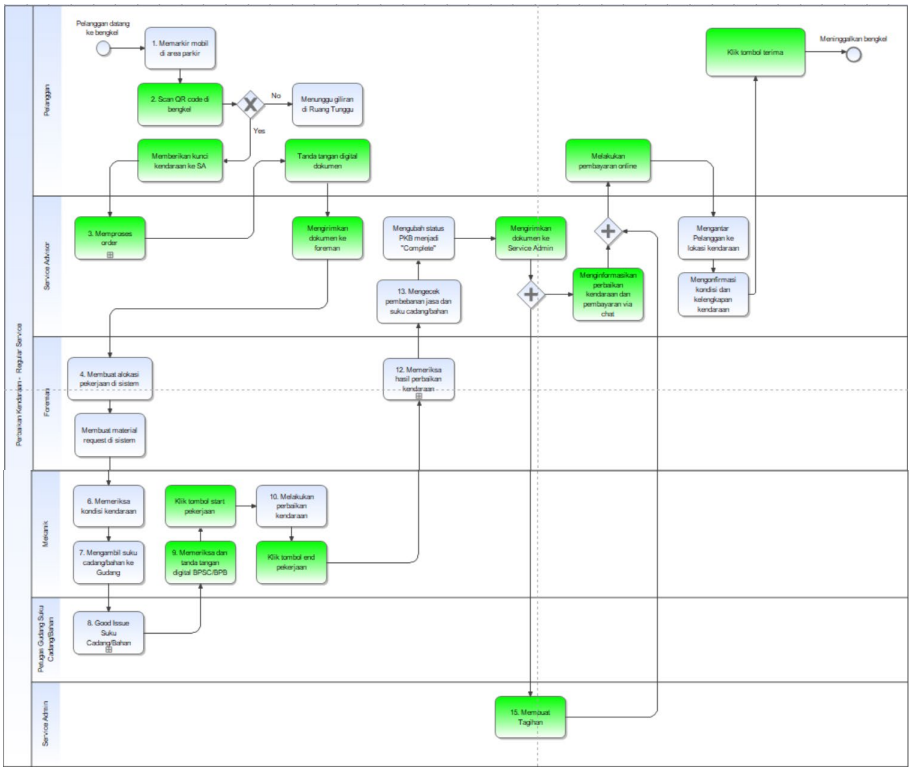

Figure 6. Scenario 2 improvement of vehicle repair process

5.4 Scenario Comparison Analysis

Simulations on two improvement scenarios consisting of the application of best practice BPR have been modeled and simulated. The scenario indicates a change in the process either in the form of a change in method or a change in process time. However, time input in simulations on both As-Is and To-Be models can be overestimated or underestimated because in defining the time does not consider the allowance time factor that considers the time for personnel needs that are personal, fatigue factors, delays, and others of each process. Table 4 shows the comparison of the simulation results of the As-Is and To-Be processes of each scenario designed for the booking service order confirmation process.

Table 4. Recapitulation of simulation results of To-Be confirmation of booking service order process

Process	Avg Cycle		Avg Work		Avg Waiting	
	As Is	S1	As Is	S1	As Is	S1
Order confirmation	53,45	0,00	0,45	0,00	53,00	0,00

Table 5 shows the efficiency of the To-Be process and the As-Is process designed for the booking service order confirmation process based on of the simulation results of the As-Is and To-Be processes. Results show that the effiency rate of the average cycle, average work, and the average waiting time of the To-Be process is almost 100%

Table 5. Efficiency comparison of booking service order confirmation process

Process	Avg Cycle	Avg Work	Avg Waiting
Order confirmation	100%	100%	100%

Table 6 shows the comparison of the simulation results of the As-Is and To-Be processes of each scenario designed for the vehicle repair process. In this table, Scenario 1 and Scenario 2 is being compared and we can see that Scenario 1 yielded shorter process time with that is 1,57 for the average cycle time and average work time, and 0,00 for the average waiting time.

Table 6. Recapitulation of Alternative Scenario Simulation Results of vehicle repair process

Process	Avg Cycle			Avg Work			Avg Waiting		
	As Is	S1	S2	As Is	S1	S2	As Is	S1	S2
Vehicle Repair	2,31	1,57	1,96	2,31	1,57	1,96	0,00	0,00	0,00

Table 7 shows the comparison of the simulation results of the As-Is and To-Be processes of each scenario designed for the vehicle repair process. In this table, Scenario 1 and Scenario 2 is being compared and we can see that Scenario 1 yielded better efficiency rate of the that is 32% for the average cycle and average work, and 0% for the average waiting.

Table 7. Efficiency comparison of vehicle repair process

Proses	Avg Cycle		Avg Work		Avg Waiting	
	S1	S2	S1	S2	S1	S2
Vehicle Repair	32%	15%	32%	15%	0%	0%

6. Conclusion

With the Business Process Reengineering approach through the iGrafx simulation process, the research conducted has yielded the following conclusions:

The proposed car service process improvement consists of two scenarios. Scenario 1 process improvement is done with the technology integration approach through the implementation of self-service key exchange engines, Scenario 2 is done with the technology integration approach through QR code implementation.

Scenario 1 using a self-service key exchange engine is the best-case scenario with a reduction in the overall process average cycle time for vehicle repair processes by 32% to 1.57 hours. The reduction in the average working time of Scenario 1 is also 32% 1.57 hours, and the average waiting time remains the same as 0.00 hours.

Scenario 2 that implements QR Code is an alternative scenario to implement. Scenario 2 resulted in a 15% reduction in the average cycle time of the overall process to 1.96 hours. The reduction in the average working time of Scenario 2 is also 15% to 1.96 hours and the average waiting time remains the same as 0.00 hours.

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Biographies

Hanni Attarfi is a research assistant of Management Information System and Decision Support (MISDS) Prof. Dr. Dachyar Laboratory, Industrial Engineering Department, Universitas Indonesia. Her research focused on the business process reengineering and management information systems.

M. Dachyar is a Professor and Head of Management Information System and Decision Support (MISDS) Prof. Dr. Dachyar Laboratory, Industrial Engineering Dept. Universitas Indonesia. His research focused on management information systems, decision support systems, operations management, and business process reengineering.