CHARPTER 5
ANALYSIS OF THE NEW CUSTOMER ORDER PROCESS

This Chapter will present the analysis of the new customer order process. This analysis will be performed by comparing the new customer order process with the existing customer order process. So, firstly, this chapter will represent the high-level process of the existing customer order process. After that, it will show the activity flow diagram and activities' detail of the existing customer order process. Then, it will indicate the existing customer order process simulation result. Finally, it will show the comparison of the new customer order process and the existing customer order process.

5.1 The High-Level Process of The Existing Customer Order Process

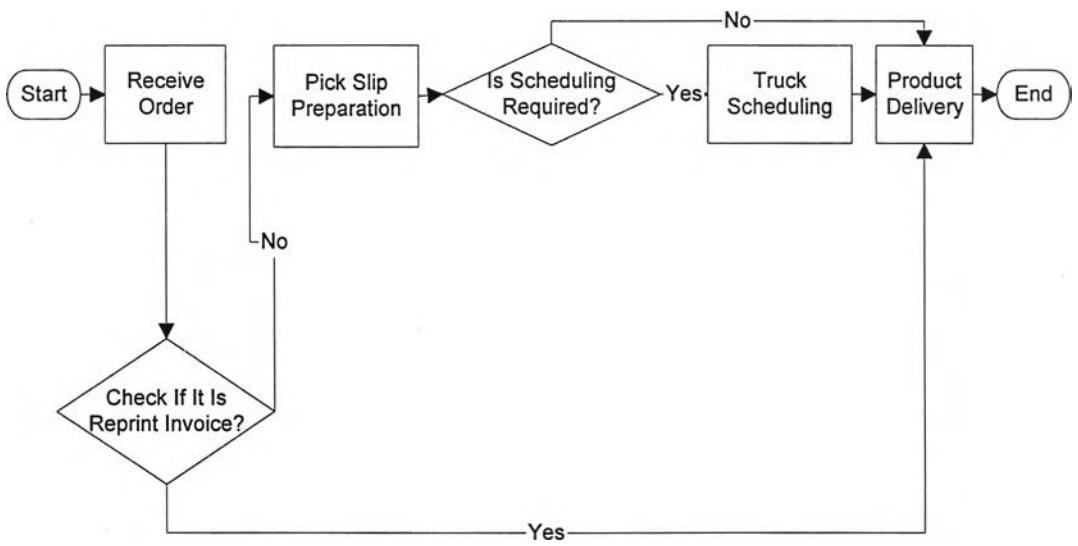

Figure 5.1 The high-level process of the existing customer order process

The existing customer order process starts when an order is received, followed by checking if it is a reprint invoice. If it is a reprint invoice, a product will be delivered to the customer otherwise, a pick slip will be prepared. After that the pick slip will be checked if a scheduling is required. If a scheduling is required, then truck scheduling process will be performed, and then the

product will be delivered to the customer. If a scheduling is not required, the product will be delivered to the customer. The process ends when the product is delivered to the customer.

5.2 The Activity Flow Diagram and Activities' Detail of the Existing Customer Order Process

In Figure 5.2, the existing customer order process model consists of 35 activities. All activities including responsible area or allocated resource, and processing time are listed in Table 5.1, while fixed cost, material input, and material output related to each activity is listed in Table 5.2.

Likewise, Activity 1to 3, and 5 to 8 are activities in 'Receive Order', activity 9 to 15 are in 'Pick Slip Preparation', activity 17 to 19 are in 'Truck Scheduling', activity 20-35 are in 'Product Delivery', activity 4, and 16 are 'Check If It Is Reprint Invoice', and 'Check If Schedule Required?', under the high-level process respectively.

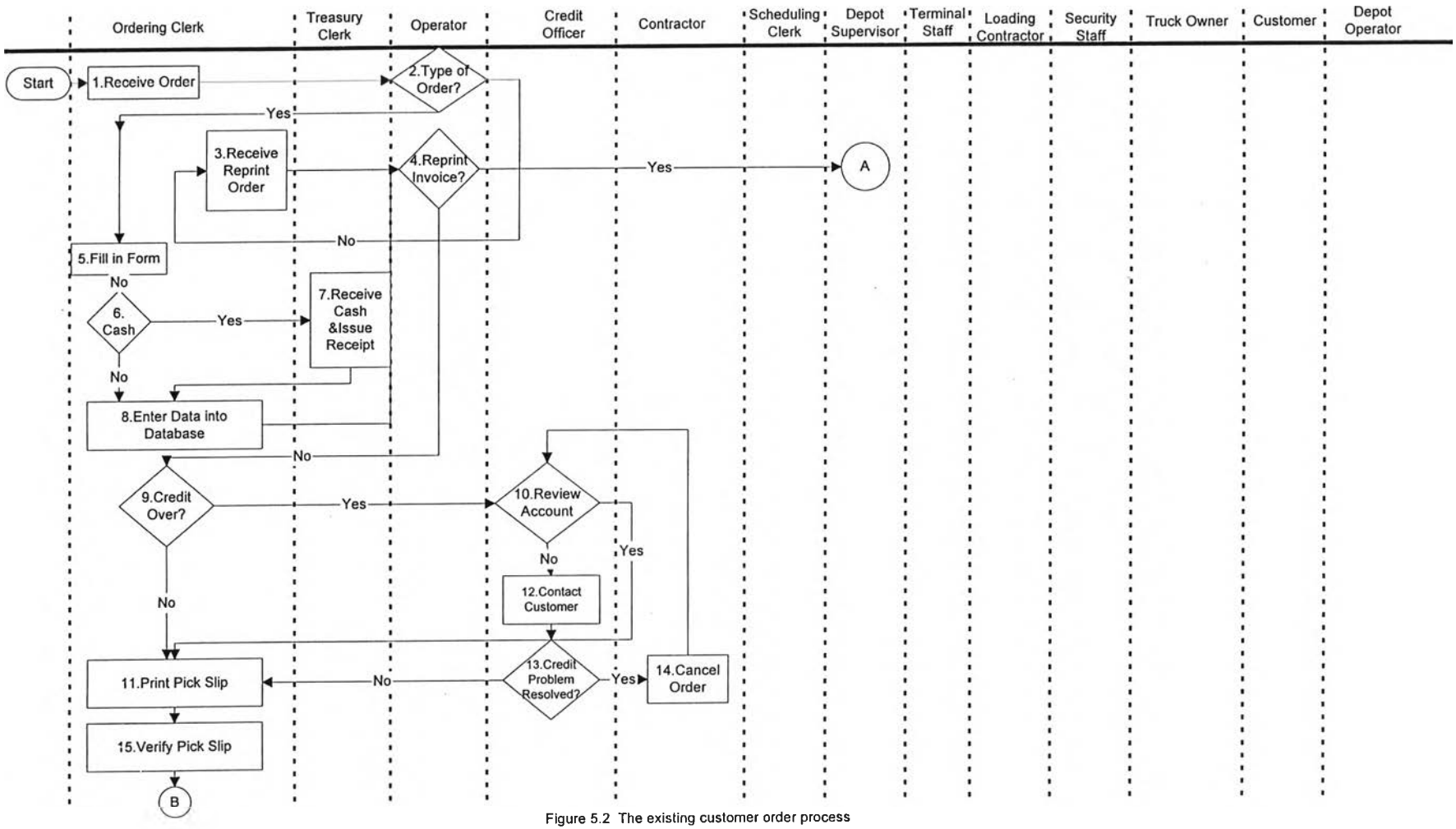

Figure 5.2 The existing customer order process

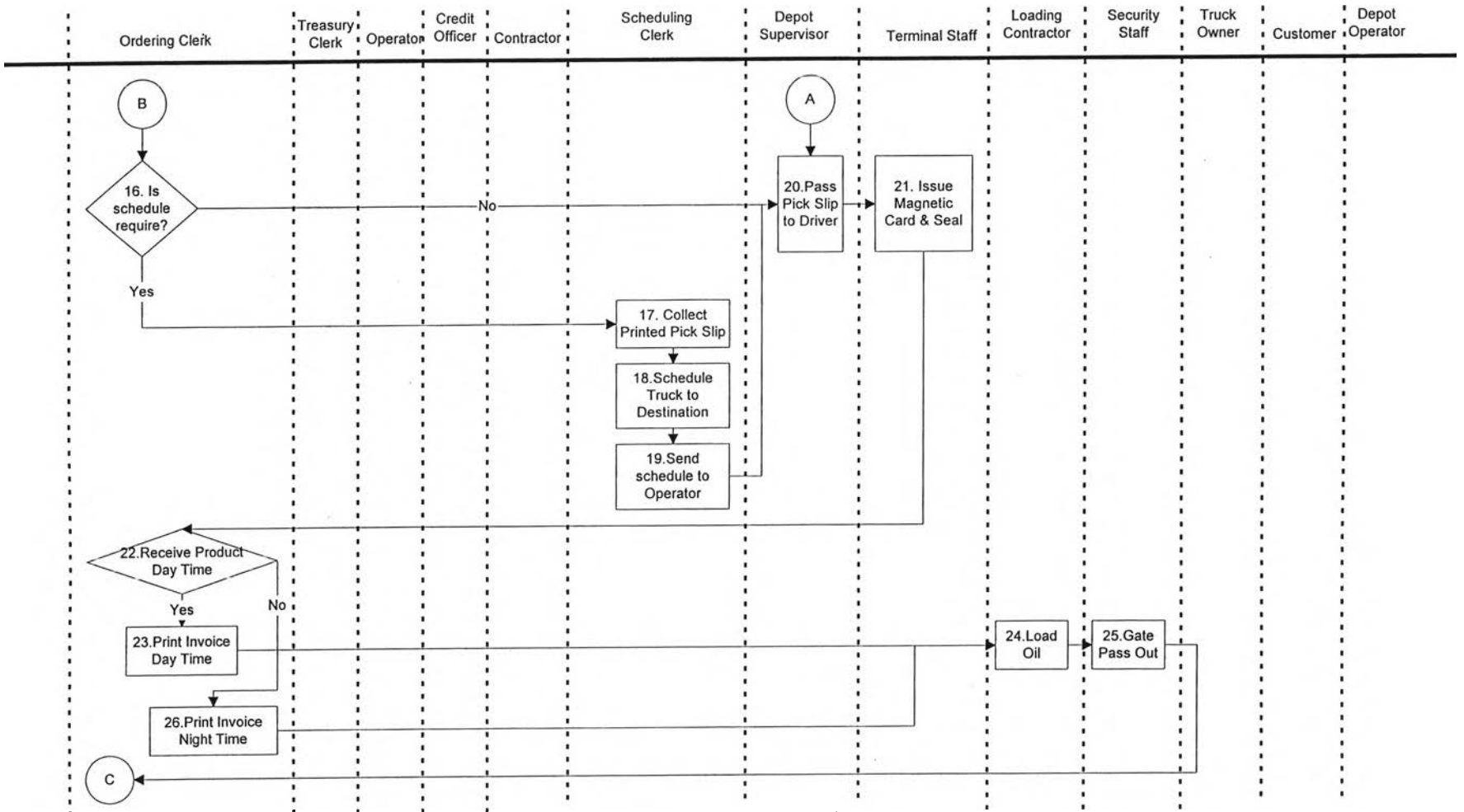

Figure 5.2 (continued) The existing customer order process

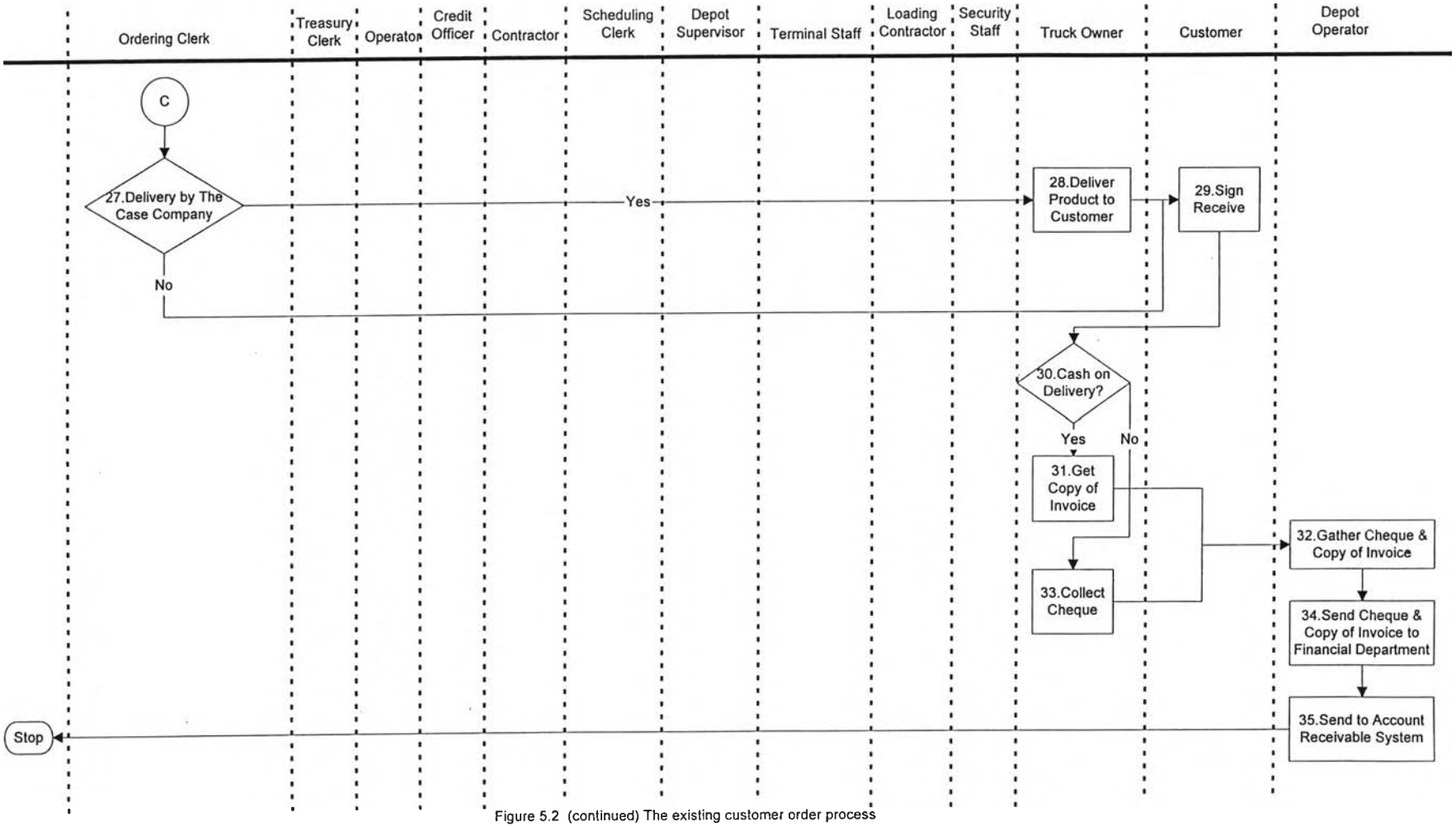

Figure 5.2 (continued) The existing customer order process

Table 5.1 The existing customer order process 's activities with resources, and processing time

Activity No.	**Activity Name** / Activity Description	Allocated Resource	Processing Time
1.	**Receive Order.**	Ordering Clerk	-
2.	**Check Type of Order.** If it is a reprint invoice causing from invoicing the wrong destination or wrong product, go to activity 3. If it is not a reprint invoice, go to activity 5.	Operator	-
3.	**Receive Reprint Order** Reprint invoice normally includes pick slip. Receive reprint invoice, and pass it to the operator to check to make sure that it is a reprint invoice.	Ordering Clerk	1 minute
4.	**Check If It Is Reprint Invoice.** After receiving of reprint invoice, operator will check again whether it is a reprint invoice. If yes, pass pick slip to the Driver. If no, go to activity 9; ask the ordering clerk for credit limit checking.	Operator	1 second
5.	**Fill in Form.** Fill the order's detail in the paper form.	Ordering Clerk	2 minutes
6.	**Check If The Customer Pay Cash.** If yes, go to activity 7, tell treasury clerk to receive cash, and issue receipt. If no, go to activity 8.	Ordering Clerk	30 seconds
7.	**Receive Cash and Issue Receipt**	Treasury Clerk	10%: 5 minutes 90%: 2 minutes
8.	**Enter Data into Database** Key the order's detail in the database.	Ordering Clerk	3 minutes
9.	**Check If Credit Is Over Limit.** If credit is over limit, go to activity 10; ask the credit officer to review customer's account. If the credit is not over limit, tell the ordering clerk to print pick slip.	Ordering Clerk	30 seconds
10.	**Review Account.** If the customer account can be adjusted, tell the ordering clerk to print pick slip. If the customer account can not be adjusted, contact customer.	Credit Officer	20%: 10 minutes 80%: 5 minutes
11.	**Print pick slip.** Print pick slip if the credit is not over limit, or customer account can be adjusted, or credit has no problem.	Ordering Clerk	3 minutes

Table 5.1 The existing customer order process 's activities with resources, and processing time

Activity No.	**Activity Name** / Activity Description	Allocated Resource	Processing Time
12.	**Contact Customer.** Contact customer to inform the customer that customer's credit is over limit, and the account can not be adjusted.	Credit Officer	5%: 24 hours 15%: 1 hour 80%:10 minutes
13.	**Check If Credit Problem Can Be Resolved.** If credit has not been resolved, he will tell the contractor to cancel order with that customer. If credit has been resolved, he will tell ordering clerk to print pick slip.	Credit Officer	5 minutes
14.	**Cancel Order.** Cancel order when the credit has problem. Customer will ask credit officer to review account again when customer account is available.	Contractor	-
15.	**Verify pick slip.** After the pick slip is printed, it will be verified again. Then go to activity 16.	Ordering Clerk	10 minutes
16.	**Check If Schedule Required.** Check from the printed pick slip whether it requires truck scheduling. If yes, tell the scheduling clerk to collect the printed pick slip. If no, tell depot operator to pass pick slip to the driver.	Ordering Clerk	10%: 4 minutes 90%: 2 minutes
17.	**Collect Printed Pick Slip.** Printed pick slip will be collected by scheduling clerk when the data in the pick slip show that it requires truck scheduling.	Scheduling Clerk	5 minutes
18.	**Schedule Truck to Destination.** Match destination with the available truck, and prepare a truck scheduling.	Scheduling Clerk	10 minutes
19.	**Send Schedule to Depot Operator.** Send truck scheduling prepared in activity 18 to the depot operator.	Scheduling Clerk	-
20.	**Pass Pick Slip to Driver.** Pick slip will be pass to the driver when it is a reprint invoice, or the un-required schedule- pick slip, or truck scheduling preparation is completed.	Depot Supervisor	5 minutes

Table 5.1 (continued) The existing customer order process 's activities with resources, and processing time

Activity No.	**Activity Name** / Activity Description	Allocated Resource	Processing Time
21.	**Issue Magnetic Card, Seal, and Loading Tickets.** Magnetic card and seal are issued to the driver and they are used for a security purpose.	Terminal Staff	5 minutes
22.	**Check If Customer Want to Receive Product Day Time.** If customer want to receive product daytime, print invoice at daytime. If customer want to receive product nighttime, print invoice at nighttime.	Ordering Clerk	1 second
23.	**Print Invoice DayTime.** Print invoice daytime when customer wants to receive product at daytime.	Ordering Clerk	-
24.	**Load Oil.** Load oil when invoice is printed. Whether oil is loaded at day time or night time, the driver must show magnetic card, seal, and invoice to loading contractor before loading, or driver will not allow to load oil.	Loading Contractor	40+/-10 minutes
25.	**Gate Pass Out.** Check seal, and whip magnetic card to record a Time Out.	Security Staff	10%: 10 minutes 90%: 5 minutes
26.	**Print Invoice NightTime.** Print invoice daytime when customer wants to receive product at nighttime.	Ordering Clerk	40+/-20 minutes
27.	**Check If The Product Is Delivered By The Case Company.** At the gate, if the product is delivered by the case company, go to activity 28, let the truck owner delivery product to customer. If the product is not delivered by the case company (customer has its own driver deliver product to customer), ask the customer/driver to sign in the receipt before delivery, to be an evidence that the customer has already received the product.	Ordering Clerk	1 second
28.	**Deliver Product to Customer.**	Truck Owner	-

Table 5.1 (continued) The existing customer order process 's activities with resources, and processing time

Activity No.	**Activity Name** / Activity Description	Allocated Resource	Processing Time
29.	**Sign Receive Product.** Invoice will be signed by customer as soon as the customer receives product. So, if the customer has its own driver deliver the product to customer, invoice/receipt will be signed before product arrives at the destination. If the customer use the case company truck service, invoice/receipt will be signed after the product arrives at the destination.	Customer	30 minutes
30.	**Check If It Is Cash on Delivery.** From the invoice/receipt, truck owner will check if the customer use Cash on Delivery. If yes, get copy of signed invoice and send to depot operator. If no, collect cheque, and send to depot operator.	Truck Owner	5 minutes
31.	**Customer Sign and Get Copy of Invoice.** Collect copy of invoice if customer use Cash on Delivery.	Truck Owner	1 minute
32.	**Gather Cheque and Copy of Invoice.** Depot operator will gather cheque and copy of invoice from truck owner, and then send to Financial Department (activity 34).	Depot Operator	2 minutes
33.	**Collect Cheque.** Collect cheque if the customer does not use Cash on Delivery.	Truck Owner	2 minutes
34.	**Send Cheque and Copy of Invoice to Financial Department.**	Depot Operator	-
35.	**Send to Account Receivable System**	Depot Operator	-

The new customer order process's activities with fixed cost and material inputs and outputs is shown in Table 5.2.

Table 5.2 The existing customer order process 's activities with fixed cost, and material inputs /material outputs

Activity No.	Activity Name	Material Inputs	Material Outputs	Fixed Cost (Baht)
1.	**Receive Order.**	-	Client order	-
2.	**Check Type of Order.**	Client order	30%: Reprint invoice 70%: Client order	0.00
3.	**Receive Reprint Order**	Reprint invoice	Electronic order form	0.00
4.	**Check If It Is Reprint Invoice.**	Electronic order form	30% : Completed pick slip 70% : Electronic order form	0.00
5.	**Fill in Form**	Client order	Order form	0.20
6.	**Check If The Customer Pay Cash.**	Order form	10%: Cash 90%: Client order	0.00
7.	**Receive Cash and Issue Receipt**	Cash	Client order	1.00
8.	**Enter Data into Database**	Client order	Electronic order form	1.00
9.	**Check Credit Limit.**	Electronic order form	3%: Over credit limit 97%:Available credit	5.00
10.	**Review Account.**	Over credit limit	50%: Available credit 50%: Over credit limit	2.50
11.	**Print Pick Slip.**	Available credit	Pick slip	3.50
12.	**Contact Customer.**	Over credit limit	Credit problem	0.00
13.	**Check If Credit Problem Resolved.**	Credit problem	5%: Order cancelled 15%: Over credit 80%: Available credit	0.00
14.	**Cancel Order.**	Order cancelled-credit problem	-	-
15.	**Verify Pick Slip.**	Pick slip	Pick slip	0.00
16.	**Check If Schedule Required.**	Pick sip	20%: Complete pick slip 80%: Required schedule, and pick slip	0.00
17.	**Collect Printed Pick Slip.**	Required schedule, and pick slip	Information for scheduling	0.00

Table 5.2 (continued) The existing customer order process 's activities with fixed cost, and material inputs /material outputs

Activity No.	Activity Name	Material Inputs	Material Outputs	Fixed Cost (Baht)
18.	**Schedule Truck to Destination.**	Information for scheduling	Complete pick slip	0.00
19.	**Send Schedule to Depot Operator.**	Complete pick slip	-	0.00
20.	**Pass Pick Slip to Driver.**	Complete pick slip	Complete pick slip	0.00
21.	**Issue Magnetic Card, Seal, and Loading Tickets.**	Complete pick slip	Material to issue invoice and receive product	1.00
22.	**Check Time that Customer Want to Receive Product.**	Material to issue invoice and receive product	30%: Daytime reprint invoice 70%: Nighttime print invoice	0.00
23.	**Print Invoice Day Time.**	Daytime reprint invoice	Material for loading	1.00
24.	**Load Oil.**	Material for loading	Loaded product	450.00
25.	**Gate Pass Out.**	Loaded product	Loaded product	0.00
26.	**Print Invoice Night Time.**	Nighttime print invoice	Material for loading	1.00
27.	**Check If The Product Is Delivery By The Case Company.**	Loaded product	20%: Receive product (customer) 80%: Product delivered	0.00
28.	**Deliver Product to Customer.**	Product delivered	Receive product (customer)	0.00
29.	**Sign Receive Product.**	Receive product	Invoice	0.00
30.	**Check If It Is Cash on Delivery.**	Invoice	40%: Invoice (credit) 60%: Invoice (Cash On Delivery)	0.00
31.	**Customer Sign and Get Copy of Invoice.**	Invoice	Financial document	0.00
32.	**Gather Cheque and Copy of Invoice.**	Financial document	Cheque Copy of invoice (Cash On Delivery) Copy of invoice	0.00
33.	**Collect Cheque**	Invoice	Financial document	0.00

Table 5.2 (continued) The existing customer order process 's activities with fixed cost, and material inputs /material outputs

Activity No.	Activity Name	Material Inputs	Material Outputs	Fixed Cost (Baht)
34.	**Send Cheque and Copy of Invoice to Financial Department**	Cheque Copy of invoice (Cash On Delivery) Copy of invoice	-	0.00
35.	**Send to Account Receivable System**	Cheque Copy of invoice (Cash On Delivery) Copy of invoice	-	-

5.3 The Existing Customer Order Process Simulation Result

The simulation configuration specified for this model was as follow:

- Simulation length: 30 Days 0:00:00 hours
- Volume of orders was set to 12000+/-1600 per 30 days

5.3.1 Average Cost of The Existing Customer Order Process

The cost of the activity / process comprises of the fixed cost and any variable cost. The activity-total cost report is calculated from the simple mathematical equations which are closely resemble the actual algorithms used by the software (Interfacing Technologies Corporation, 2000:70-73). These equations are:

$$C_{ACT,TOT} = \sum_{i=1}^{o} [C_{ACT,VAR} + C_{ACT,FIX}]$$

where:

$$C_{ACT,VAR} = \sum_{i=1}^{o} [P_{ACT} * R_{C/UTi}]$$

when :

$C_{ACT,TOT}$ = Activity-Total cost

$C_{ACT,VAR}$ = Activity variable cost

$C_{ACT,FIX}$ = Activity fixed cost

P_{ACT} = Activity processing time (Duration)

R_{CUTi} = Resource cost per unit time

O = Number of occurrences which are the number of times the activity will be created within the specified time period.

An existing process consists of many activities. Each activity has different number of occurrences created in the specified simulation time period (30 days). Therefore, cost incurred in each activity is different. The average cost of each activity can be calculated from the equation below:

$$C_{ACT,AVG} = C_{ACT,TOT} / O$$

when:

$C_{ACT,AVG}$ = Activity- Average cost

$C_{ACT,TOT}$ = Activity-Total cost

O = Number of occurrences

As a consequence, to calculate average cost of the existing customer order process is to sum up the average cost of each activity. The average cost, of each activities, incurred in the specified simulation time period (30 days) is shown in Table 5.3 .

Table 5.3 Average processing time and cost of the existing customer order process

Activity No.	Activity Name	No. of occurrences	Activity-Average Processing Time (hour:minute:second)	Activity-Average Cost (Baht)
1.	**Receive Order.**	2833	0:00:00	0.00
2.	**Check Type of Order.**	2833	0:00:00	0.00
3.	**Receive Reprint Order**	874	0:01:00	2.71
4.	**Check If It Is Reprint Invoice.**	2832	0:00:01	0.05
5.	**Fill in Form**	1959	0:02:01	5.66
6.	**Check If The Customer Pay Cash.**	1959	0:00:30	1.35
7.	**Receive Cash and Issue Receipt**	176	0:02:16	9.63
8.	**Enter Data into Database**	1958	0:03:00	4.89
9.	**Check Credit Limit.**	1974	0:00:30	5.63
10.	**Review Account.**	71	0:05:59	22.48
11.	**Print Pick Slip.**	1972	0:03:01	7.40
12.	**Contact Customer.**	33	3:10:55	772.32
13.	**Check If Credit Problem Resolved.**	33	0:05:00	17.14
14.	**Cancel Order.**	2	0:00:00	0.00
15.	**Verify Pick Slip.**	1969	0:10:00	32.47
16.	**Check If Schedule Required.**	1969	0:02:13	6.01
17.	**Collect Printed Pick Slip.**	158	0:05:00	10.82
18.	**Schedule Truck to Destination.**	158	0:10:00	17.22
19.	**Send Schedule to Operator.**	158	0:00:00	0.00
20.	**Pass Pick Slip to Driver.**	1963	0:05:00	24.35
21.	**Issue Magnetic Card and Seal and Loading Ticket.**	1963	0:05:00	10.60
22.	**Check Time that Customer Want to Receive Product.**	1961	0:00:01	0.05
23.	**Print Invoice Day Time.**	556	0:00:00	1.00
24.	**Load Oil.**	322	0:39:58	493.27
25.	**Gate Pass Out.**	322	0:05:38	9.17
26.	**Print Invoice Night Time.**	1355	0:40:51	89.46
27.	**Check If The Product Is Delivery By The Case Company.**	644	0:00:01	0.02

Table 5.3 (continued) Average processing time and cost of the existing customer order process

Activity No.	Activity Name	No. of occurrences	Activity-Average Processing Time (hour:minute:second)	Activity-Average Cost (Baht)
28.	**Deliver Product to Customer.**	502	0:00:00	0.00
29.	**Sign Receive Product.**	320	0:30:00	0.00
30.	**Check If It Is Cash on Delivery.**	320	0:05:00	0.00
31.	**Customer Sign and Get Copy of Invoice.**	129	0:01:00	0.00
32.	**Gather Cheque and Copy of Invoice.**	311	0:02:00	4.33
33.	**Collect Cheque**	182	0:02:00	0.00
34.	**Send Cheque and Copy of Invoice to Financial Department**	309	0:00:00	0.00
35.	**Send to Account Receivable System**	309	0:00:00	0.00

Therefore, the average cost of the existing customer order process is 1,548.03 Baht.

5.3.2 Average Processing Time of The Existing Customer Order Process

As mentioned earlier that an existing process consists of many activities, and each activity has different number of occurrences created in the specified simulation time period (30 days). Therefore, processing time spent in each activity is different. The average processing time of each activity can be calculated from the equation below:

$$P_{ACT,AVG} = P_{ACT,TOT} / O$$

when:

$P_{ACT,AVG}$ = Activity- Average processing time

$P_{ACT,TOT}$ = Activity-Total processing time

O = Number of occurrences

where:

$$P_{ACT,TOT} = \sum_{i=1}^{O} P_{ACT}$$

when:

P_{ACT} = Activity processing time (Duration)

O = Number of occurrences

To calculate average processing time of the existing customer order process is to sum up the average processing time of each activity. The average processing time, of each activity, spent in the specified simulation time period (30 days) is shown in Table 5.3. Hence, average processing time of the existing customer order process is 6 hours, 17 minutes, and 55 seconds.

5.3.3 Average Elapsed Time of The Existing Customer Order Process

The elapsed time of a process is the time between the actual start of the first activity and the end of the last activity. As shown in the equations below, the average of the process elapsed time is:

$$E_{PRC,AVG} = \sum_{i=1}^{O} E_{ACT,AVG}$$

when:

$E_{PRC,AVG}$ = Process-Average Elapsed Time

$E_{ACT,AVG}$ = Activity-Average Elapsed Time

where:

$$E_{ACT,AVG} = [\sum_{i=1}^{O} MWT + DFR_i + DRR_i + P_{ACT,AVG}] / O$$

when:

MWT = Material Waiting Time

DFR = Free Resource Delay

DRR = Reserved Resource Delay

$P_{ACT, AVG}$ = Activity-Average Processing Time

O = Number of occurrences

Table 5.4 Average elapsed time of each activity in the existing customer order process

Activity No.	Activity Name	No. of occurrences	Activity-Average Elapsed Time (day: hour:minute:second)
1.	**Receive Order.**	2833	0:00:00
2.	**Check Type of Order.**	2833	0:00:00
3.	**Receive Reprint Order**	874	0:01:00
4.	**Check If It Is Reprint Invoice.**	2832	0:00:01
5.	**Fill in Form**	1959	0:02:01
6.	**Check If The Customer Pay Cash.**	1959	0:00:30
7.	**Receive Cash and Issue Receipt**	176	0:02:16
8.	**Enter Data into Database**	1958	0:30:00
9.	**Check Credit Limit.**	1974	0:00:30
10.	**Review Account.**	71	0:54:16
11.	**Print Pick Slip.**	1972	0:30:01
12.	**Contact Customer.**	33	3:25:03
13.	**Check If Credit Problem Resolved.**	33	2:27:51
14.	**Cancel Order.**	2	1:02:23:36
15.	**Verify Pick Slip.**	1969	0:10:39
16.	**Check If Schedule Required.**	1969	0:02:13
17.	**Collect Printed Pick Slip.**	158	1:02:27
18.	**Schedule Truck to Destination.**	158	2:56:46
19.	**Send Schedule to Operator.**	158	1:02:48
20.	**Pass Pick Slip to Driver.**	1963	4:00:16:04
21.	**Issue Magnetic Card and Seal and Loading Ticket.**	1963	0:06:28
22.	**Check Time that Customer Want to Receive Product.**	1961	0:26:05
23.	**Print Invoice Day Time.**	556	0:00:00

Table 5.4 Average elapsed time of each activity in the existing customer order process

Activity No.	Activity Name	No. of occurrences	Activity-Average Elapsed Time (day: hour:minute:second)
24.	**Load Oil.**	322	10:05:59:59
25.	**Gate Pass Out.**	322	1:00:05:38
26.	**Print Invoice Night Time.**	1355	6:00:15:16
27.	**Check If The Product Is Delivery By The Case Company.**	644	1:48:56
28.	**Deliver Product to Customer.**	502	1:00:27:22
29.	**Sign Receive Product.**	320	5:04:25:57
30.	**Check If It Is Cash on Delivery.**	320	0:05:02
31.	**Customer Sign and Get Copy of Invoice.**	129	0:01:01
32.	**Gather Cheque and Copy of Invoice.**	311	0:02:00
33.	**Collect Cheque**	182	1:00:29:46
34.	**Send Cheque and Copy of Invoice to Financial Department**	309	0:59:50
35.	**Send to Account Receivable System**	309	0:00:00

Table 5.4 shows that, average elapsed time of the process is 35 days, 1 hour, 7 minutes, and 22 hours.

5.3.4 Resource Use Summary

Table 5.5 represents the percentage of busy and idle resources used in the process, reported by the simulation result. Most percentage of idle resources (more than 70%) occur in many resources: terminal contractor, terminal clerk, some ordering clerk, security contract, security staff, operator, treasury clerk, scheduling staff, depot operator, and credit officer, while depot supervisor and loading contractor are very busy.

Table 5.5 Resource use summary of the existing customer order process

No. of Resources	Resource Name	Activities Executed	Busy %	Idle %
1	Trays of fax machine	Send to Account Receivable System	-	-
2	Terminal Contractors2	Issue Magnetic Card and Seal and Loading Ticket	0.10	99.90
3	Terminal Clerk2	Issue Magnetic Card and Seal and Loading Ticket	0.10	99.90
4	Ordering Clerk1	Receive Order Fill in Form Receive Reprint Order Print Invoice (Day time) Check If scheduling required?	0.44	99.56
5	Security Contract3	Gate Pass Out	0.35	99.65
6	Operator1	Print Pick Slip Check If It is Reprint Invoice? Check Type of Order Check If The Product Is Delivery By The Case Company?	0.38	99.62
7	Security Staff4	Gate Pass Out	0.38	99.62
8	Security Contract2	Gate Pass Out	0.38	99.62
9	Security Staff6	Gate Pass Out	0.38	99.62
10	Security Staff3	Gate Pass Out	0.42	99.58
11	Security Contract2	Gate Pass Out	0.42	99.58
12	Security Contract5	Gate Pass Out	0.52	99.48
13	Security Staff5	Gate Pass Out	0.56	99.44
14	Treasury Clerk2	Receive Cash and Issue Receipt	1.95	98.05
15	Treasury Clerk	Receive Cash and Issue Receipt	2.01	97.99
16	Terminal Clerk	Issue Magnetic Card and Seal and Loading Ticket	2.01	97.99
17	Terminal Contractor	Issue Magnetic Card and Seal and Loading Ticket	2.05	97.95
18	Security Staff1	Gate Pass Out	2.16	97.84
19	Security Staff2	Gate Pass Out	2.26	97.74
20	Security Contract	Gate Pass Out	2.33	97.67
21	Security Contract1	Gate Pass Out	2.44	97.56
22	Scheduling Staff2	Schedule Truck to Destination Send Schedule to Operation	12.70	87.30

Table 5.5 (continued) Resource use summary of the existing customer order process

No. of Resources	Resource Name	Activities Executed	Busy %	Idle %
23	Scheduling Staff1	Schedule Truck to Destination Send Schedule to Operation	13.49	86.51
24	Scheduling Staff	Schedule Truck to Destination Send Schedule to Operation	15.61	84.39
25	Depot Operator	Gather Cheque and Copy of Invoice Send Cheque and Copy of Invoice to Financial Division	6.17	93.83
26	Scheduling Clerk	Collect Pick Slip	7.84	92.16
27	Credit Officer	Contact Customer Check If Credit Problem Resolved? Review Account	19.15	80.85
28	Truck Owner	Customer Sign and Get Copy of Signed Invoice. Collect Cheque Deliver Product to Client Check If It Is Cash On Delivery	20.76	79.24
29	Contractor1	Cancel Order Enter Data into Database Print Pick Slip Check If Product Delivered By the Case Company? Check Credit Limit Check Type of Order	30.84	69.16
30	Contractor3	Enter Data into Database Print Pick Slip Check If Product Delivered By the Case Company? Check Credit Limit Check Type of Order	31.42	68.58
31	Operator2	Print Pick Slip Enter Data into Database Check If Product Delivered By the Case Company? Check Credit Limit Check Type of Order	32.29	67.71

Table 5.5 (continued) Resource use summary of the existing customer order process

No. of Resources	Resource Name	Activities Executed	Busy %	Idle %
32	Contractor2	Print Pick Slip Enter Data into Database Check If Product Delivered By the Case Company? Check Credit Limit Check Type of Order	32.61	67.39
33	Ordering Clerk4	Print Invoice (Day time) Receive Reprint Order Fill in Form Check If scheduling required? Check If The Customer Pay Cash	33.33	66.67
34	Ordering Clerk3	Print Invoice (Day time) Receive Reprint Order Fill in Form Check If The Customer Pay Cash Check If scheduling required?	33.44	66.56
35	Shift Staff Order2	Print Invoice (Night Time)	58.86	41.14
36	Shift Contract3	Print Invoice (Night Time)	54.44	45.56
37	Ordering Clerk2	Print Invoice (Day time) Receive Reprint Order Fill in Form Check If The Customer Pay Cash Check If scheduling required?	33.75	66.25
38	Shift Contract9	Print Invoice (Night Time)	54.77	45.23
39	Shift Staff Order7	Print Invoice (Night Time)	55.47	44.53
40	Shift Staff Order6	Print Invoice (Night Time)	59.31	40.69
41	Shift Contract1	Print Invoice (Night Time)	65.23	34.77
42	Shift Staff Order3	Print Invoice (Night Time)	66.45	33.55
43	Shift Contract	Print Invoice (Night Time)	69.26	30.74
44	Shift Staff Order5	Print Invoice (Night Time)	61.44	38.56
45	Shift Staff Order4	Print Invoice (Night Time)	62.84	37.16
46	Shift Staff Order	Print Invoice (Night Time)	75.43	24.57

Table 5.5 (continued) Resource use summary of the existing customer order process				
No. of Resources	Resource Name	Activities Executed	Busy %	Idle %
47	Shift Staff Order1	Print Invoice (Night Time)	75.92	24.08
48	Terminal Clerk1	Issue Magnetic Card and Seal and Loading Ticket	31.94	68.06
49	Terminal Contractor1	Issue Magnetic Card and Seal and Loading Ticket	31.94	68.06
50	Shift Contract2	Print Invoice (Night Time)	69.79	30.21
51	Shift Staff Order8	Print Invoice (Night Time)	70.53	29.47
52	Credit Officer1	Contact Customer Check If Credit Problem Resolved? Review Account	49.21	50.79
53	Verification Officer2	Verify Pick Slip Check What Time Does Customer Receive Invoice	65.11	34.89
54	Verification Officer1	Verify Pick Slip Check What Time Does Customer Receive Invoice	65.11	34.89
55	Verification Officer3	Verify Pick Slip Check What Time Does Customer Receive Invoice	65.60	34.40
56	Customer	Sign Receive	95.54	4.46
57	Depot Supervisor	Pass Pick Slip to Driver	97.42	2.58
58	Loading Contractor	Load Product	97.75	2.25

5.4 The Existing Customer Order Process Analysis

5.4.1 Identification of Symptoms / Disease

Symptoms are something occur as a consequence of a problem because of a problem, while the diseases are the causes of the problem. A Problem is a deviation or failure to meet a specification or requirement for unknown reasons. By exploring the existing customer order process, there are 3 main symptoms found along the process. So, the company must find the cause of the problem, and treat that cause to solve the problem.

The first symptoms found in the existing process are 'Rekeying the Data', and 'Extensive Information Exchange'. In Activity 5, an ordering clerk fills the order in the form, and re-keys the ordering data into the database again in Activity 8. This, rekeying the data, results in the redundant work, and delays the entire process. Extensive information exchange can be found, for example, in Activity 4, Activity 6, Activity 9, and Activity 10. In Activity 4, if the operator who is under the responsibility of ordering center unit finds that the reprint order is not a reprint invoice, he or she will ask an ordering clerk in the same unit to check whether the credit is over limit. In Activity 6, if an ordering clerk discovers that the customer pays cash, he will tell a treasury clerk to receive cash and issue receipt to the customer. In Activity 9, If an ordering clerk detects that the customer's credit is over limit, he will ask credit officer who is under the responsibility of customer credit unit to review account. In Activity 10, if such account can be adjusted, the customer credit will tell the ordering clerk to print the pick slip. In addition, the existing process involves so many people from different working unit. For example, from receiving order to loading oil, there are 7 working units involved: Ordering Clerk unit, Treasury unit, Customer Credit unit, Central Scheduling unit, Central depot unit, and Terminal Management unit. This induces errors, and misunderstanding.

The cause of these symptoms or disease: 'Rekeying the Data', and 'Extensive Information Exchange' are 'A process has been inappropriately broken apart'. Hence, the solution of such cause is creating a cross-functional integration to allow the organization capture data just one time and then share it. In other word, several jobs should be combined into one. Furthermore, if what people do is so closely linked, it should be done by one person or an empowered employee to provide a single point of contact.

To perform this role, such person needs access to all the information systems that the people actually performing the process use, and the ability to contact those people for further assistance when necessary. With the solution stated above, errors, delays, and rework can be reduced. Moreover, performance is easier to be monitored.

The second symptom is 'Rework and Iteration'. Rework and iteration involves doing work that has been done before again. Activity 2, Activity 3, and Activity 4 occur since there

was some error occurring in the invoice printed at almost the end of the process, before loading the product. The cause of these symptoms is 'A consequence of inadequate feedback along work process'. The solution is eliminating the rework and iteration.

The third symptoms are 'High Ratio of Checking and Control Activity'. This can be found in many activities along the entire process: Activity 2, Activity 4, Activity 6, Activity 9, Activity 10, Activity 12, Activity 13, Activity 16, Activity 22, Activity 27, and Activity 30. The conventional process are full with checking and control steps, which add no value but are included to ensure that people are not abusing the process. However, as long as companies consist of people, some amount of checking and control will be unavoidable (Hammer and Champy, 1994: 125).

The cause of this symptom is 'Fragmentation'. So, the solution is trying to eliminate activities that do not contribute value to the customer, and installing a decision point up front that can send work along the process.

5.4.2 Value - Added Assessment Analysis

Value-Added Assessment (VAA) is an analysis of every activity in the business process to determine its contribution to meeting end-customer expectations (Harrington, 1991: 139). Its objective is to optimize Business-Value-Added (BVA) activities (activities that are performed and required by the business, but add no value from the customer's point of view) and minimize or eliminate no-value-added activities. The activity that must be performed to provide the output that the customer is expecting is called Real-Value-Added activities. Activities that do not contribute to the customer requirement, and could be eliminated without degrading the product or service functionality or the business, are considered as No-Value-Added (NVA) activities.

There are two kinds of No-Value-Added activities:

- Activities that exist as the process is inadequately designed or the process is not functioning as designed. These activities include moving, waiting, setting up for an activity, storing, and doing work over.

- Activities not required by the customer or the process and activity that could be eliminated without affecting the output to the customer such as logging in a document.

Figure 5.3 shows how the evaluation is done. Each activity on the flowchart should be analyzed and classified as an RVA, a BVA, or an NVA activity. For the existing customer order process, Real-Value-Added activities are:

- Receive Order
- Enter Data into Database
- Contact Customer
- Schedule Truck to Destination
- Print Invoice Day Time
- Load Oil
- Print Invoice Night Time
- Deliver Product to Customer
- Customer Sign (Invoice) and (the company)Get Copy of Invoice

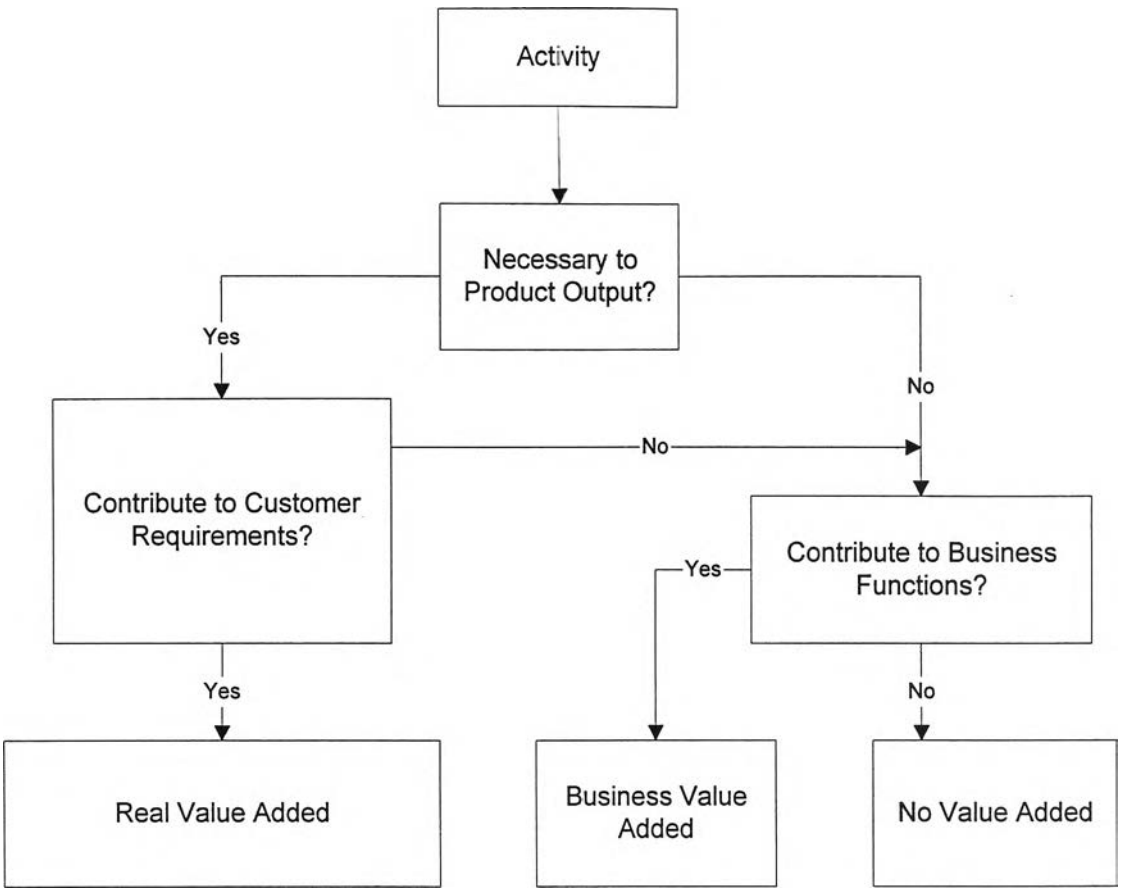

Figure 5.3 Value-added assessment analysis (Harrington, 1991:142)

Business-Value-Added activities of the existing customer order process are:

- Check If The Customer Pays Cash
- Receive Cash and Issue Receipt
- Check If Credit is Over The Limit
- Print Pick Slip
- Check If Credit Problem Can Be Solved

- Cancel Order
- Send Schedule to Depot Operator
- Pass Pick Slip to Driver
- Issue Magnetic Card, Seal, and Loading Tickets
- Gate Pass Out
- Check If The Product Is Delivered by The Case Company
- Sign Receive Product
- Check If It is Cash on Delivery
- Gather Cheque and Copy of Invoice
- Collect Cheque
- Send Cheque and Copy of Invoice to Financial Department
- Send to Account Receivable System

Non-Value-Added activities of the existing customer order process are:

- Check Type of Order
- Receive Reprint Order
- Check If It is Reprint Invoice
- Fill in Form
- Review Account
- Verify Pick Slip

- Check If Schedule Required
- Collect Printed Pick Slip
- Check If Customer Want to Receive Product Day Time

5.5 Comparison of the New Customer Order Process and the Existing Customer Order Process

To complete the customer order process, there are 18 activities that must be performed in the new customer order process, while there are 35 activities that must be performed in the existing process . The comparison of the new customer order process and the existing customer order process is shown in Figure 5.4.

From Figure 5.4, the new process has been designed to treat the cause and to solve the problems of the existing process stated before in Section 5.4. That is:

- The no-value-added activities of existing process are eliminated

In Figure 5.4 no-value-added activities are underlined. In existing process, 9 no-value-added activities stated in Section 5.4.2 are eliminated, For example, Activity 2-check type of order, Activity 3-receive reprint order, and Activity 4-check if it is reprint invoice which are occurred due to error causing rework. Activity 15-verify pick slip is not necessary to be performed at the middle of the process as it can be performed at the beginning of the process by reconfirming the order detail, which part of its will be filled in the pick slip, immediately after order is received. In addition, whether a delivery requires truck scheduling, pick slip will be sent to the driver, as it is legal requirement. So, the Activity 16-check if schedule is require can be eliminated if the scheduling can be check at the beginning of the process, from the database.

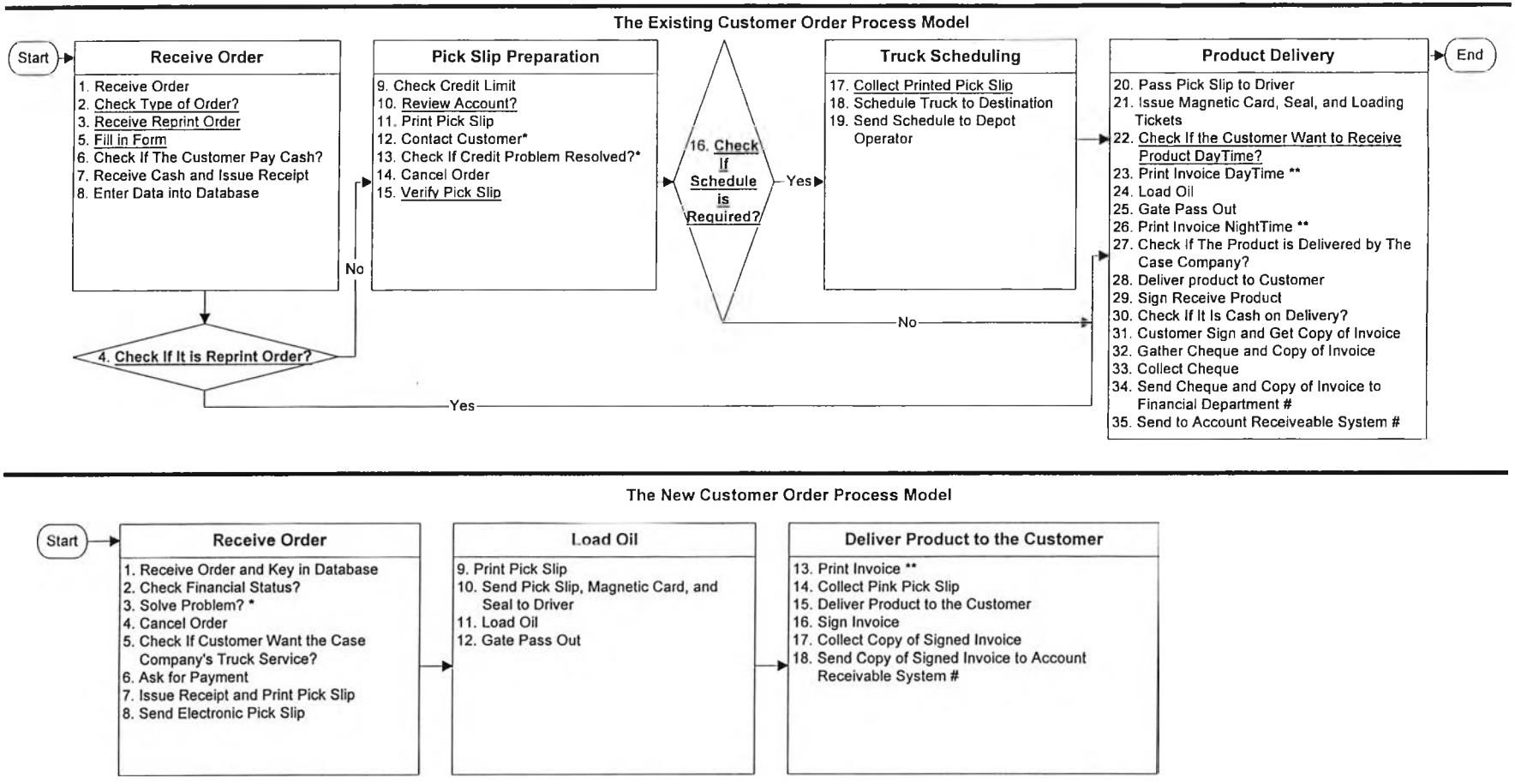

Figure 5.4 The comparision of the new customer order process model and the existing customer order process model

Like wise, Activity 22-check if customer want to receive product day time before printing invoice can be eliminated as whether the customer want product day time or night time, invoice must be printed.

Furthermore, before the process is simulated, about 20 minutes of processing time is spent in all no-value-added activities in the existing process (see Table 5.1). After the process is simulated on average, about 24 minutes of processing time is spent in these activities, or about 8.79% of processing time of the entire process (see Table 5.3). In addition, in average, about 74.24 Baht is spent in these activities or about 4.8% of the cost of the entire process (see Table 5.3). So, eliminating the no-value-added activities can reduce processing time and cost of the process.

- Several jobs in the existing process are combined into one, and are performed by authorized people

Apart form no-value added activities, this action reduces the cause, 'A process has been inappropriately broken apart', that result in 'Rekeying the Data', and 'Extensive Information Exchange'. In existing process, Activity 12-contact customer (marked with *), and Activity 13-check if credit problem can be resolved (marked with *) can be combined into Activity 3-solve problem in the new process (marked with *), and let the ordering clerk working only by allowing him to access all information that credit officer use in the existing process. By doing so, the average processing time spent in those three activities is reduced from 3 hours, 21 minutes, 54 seconds to 2 hours, 56 minutes, 18 seconds. The average cost is reduced from 881.94 Baht to 445.23 Baht.

Eliminating Activity 22-check if the customer want to receive product daytime?, in existing customer order process model, results in the combination of activity 23-print invoice daytime (marked with **) and activity 26-print invoice night time (marked with **).

In the new process, instead of sending cheque and copy of invoice to Financial Department (Activity 34 that is marked with #), and then sending them to account receivable

system (Activity 35 that is also marked with #)), cheque and copy of invoice are only sent to account receivable system (Activity 18 marked with #) .

- Decision points in the new process are installed up front so that work can be sent along the process

From the new customer order process flow represented in Figure 4.3, decision points such as Activity 2-check the financial status, Activity 3-solve problem, Activity 5-check truck service are install at the beginning of the process, while the existing process has many decision points along the process.

Table 5.6 shows the comparison between time and cost of entire process after they are simulated. The results per occurrence (number of occurrences specify the number of times the activity will be created within the specified time period) of the process shows that average processing cost incur in the existing customer order process is about 1548.03 Baht, while average processing cost incurred in the new process is about 1055.65 Baht.

The average processing time spent in the existing customer order process is 6 hours, 17 minutes, 55 seconds, while the average processing time spent in the new process is 4 hours, 33 minutes, 59 seconds. The average elapsed time spent in the existing customer order process is 35 days, 1 hour, 7 minutes, 22 seconds, while the average elapsed time spent in the new process is 33 days, 19 hours, 48 minutes, 13 seconds.

In other words, following the new customer order process can:

- reduce cost by 492.38 Baht per occurrence, or 31.81 percent
- reduce average processing time by 6,236 seconds (1 hour, 43 minutes, 56 seconds)or 27.50%
- reduce average elapsed time by 105,549 seconds (1 day, 5 hours, 19 minutes, 9 seconds), or by 3.49%

Table 5.6 The comparison between time and cost of entire process, after simulation

The Process-	Existing Customer Order Process	New Customer Order Process
Average Processing Cost	1548.03 Baht	1055.65 Baht
Average Processing Time	6 hours, 17 minutes, 55 seconds	4 hours, 33 minutes, 59 seconds
Average Elapsed Time	35 days, 1 hour, 7 minutes, 22 seconds	33 days, 19 hours, 48 minutes, 13 seconds

In conclusion, the new customer order process is better than the existing one because the new one can reduce cause of the existing problem found in the existing process. Otherwise, it can reduce average processing cost that directly concerns with the organization, average processing time, and average elapsed time that directly concerns with the customer. So, the new process can satisfy both organization and customer.