CHAPTER IV

PROJECT INITIATION AND SYSTEM DESIGN

4.1 Introduction

Chapter 3 introduced the SDLC framework which touched on the background of the company, the current work flow and BPs of the modules which were related to the solution being scoped for the research namely, Enterprise Resource Planning System (ERP System) of which were order management (sales order, order picking, transporting of finish good to the customer), procurement and inventory management and its problems. Chapter 3 also introduced the TCO model on which the system cost be calculated upon. This chapter would focus on starting up the project of the solution mentioned. It would involve the steps required for setting up the project. The implementation of the project and its results would be present in the chapter 5 and 6 respectively.

4.2 System Design

According to Shelly et al (2003:24) the main objective of this phrase of the Structure Analysis strategy was to come up with the blueprint that attempt to satisfy all requirements requested by the users. This stage would involve the users deciding on the applications and programs interface designs which include identification of the input, output and processes, however the ERP system implemented was a standard package and modification were minimal therefore the designs would not be discuss.

The main benefit of this phrase was done to avoid the misunderstanding which would cost the company dearly during the implementation and post implementation stages. This was done by involving the entire system stake holder, e.g. middle management and end-users.

4.2.1 Implementation Strategy

Before implementing the ERP system, selecting the system vendor or even choosing over any of the features offered by different vendors, the steering committee must first decide on which of the three main implementation strategies would be pursue. The three implementation strategies were the Big-Bang, Franchising and the Slam Dunk strategy. As elaborated in the chapter 2, the three strategies were different in term of project management strategy and methodology.

In order to decide which strategy would be chosen, the steering committee accessed the company both internally and externally (chapter 3). The factors to consider on which strategy to be chosen depends on the time frame, the readiness of the company's work processes, IT, human resources, skills, and financial infrastructure.

The "Big Bang" strategy as it sound would be very ambitious and difficult, because every modules of the ERP system would be implemented virtually at the same time. On the another hand the "Franchising Strategy" or the "Slam Dunk" strategy can hold back, and prioritize on which of the module would be of the utmost importance and implementing that module first as the backbone or as a pilot module for other departments to be follow.

Another factor that must be considered in vendor and strategy selection would be whether to develop the ERP by themselves, in order to meet the user requirement of the company's current business strategy and process or to buy the whole package (total standard of the shelf) offered by the vendor and adapt the current work process to suits the software (canned strategy).

Alternatively the committee could use the standard procedure offered by the vendor and modifying some part of the standard package to make the software suitable to the company (Franchising Strategy).

A simple Competitive Profile Matrix (CPM) shall be adapted and implement as a logical tool to choose over between which strategies the company would pursued.

On the left hand column the matrix would represent factors which influenced the implementation team's decision i.e. the company's infrastructure and resources. The weight represented the management view on how important would that particular factor on the scale of 0-1 and the sum of "1". The score was the multiplication of the weight and the rating, where the rating was the requirement and effort of each strategy requested from the company on the scale from 1-5.

The strategy chosen would be the strategy with the score closest to the company's infrastructure assessment score.

The internal company assessment score through SWOT analysis on the scale of 1-5 is 2.8, and therefore the strategy with the closest score (suitability to the company's infrastructure and capability) was the Franchising Strategy which had the score of 2.85. Franchising strategy will start of with the accounting module of the ERP system being the General Ledger, Account Payable and Account Receivables modules. The CPM matrix was shown in the table 4-1.

Table 4-1: Modified CPM matrix for the choosing of the implementation strategy

Strategies		Big Bang		Franchising		Slam Dunk		Company Assessment	
Critical Success Factor	Weight	Rating	Score	Rating	Score	Rating	Score	Rating	Score
Human Resource Skill	0.1	5	0.5	3	0.3	3	0.3	2.5	0.25
Current IT Infrastructure	0.1	4	0.4	3	0.3	1	0.1	2	0.2
Business Constraints (modification needed)	0.2	5	1	3	0.6	1	0.2	4	0.8
Time Constraint	0.15	1	0.15	3	0.45	2	0.3	3	0.45
Financial Resource	0.15	5	0.75	2	0.3	2	0.3	3	0.45
IT Human Resource Skill and Experience	0.1	5	0.5	3	0.3	1	0.1	2	0.2
Human Resource exposure to change	0.1	5	0.5	3	0.3	1	0.1	2.5	0.25
Company Culture and Structure	0.1	4	0.4	3	0.3	3	0.3	2	0.2
Total	1		4.2		2.85		1.7		2.8

4.3 Setting up implementation team

The next step in the system planning would be the setting up of the implementation team. According to the Rockford Consulting Group's *"The 12 Cardinal Sins of ERP Implementation"* (can be found in the Annex section of this research), there could be many issues related to the human resources problems relating to the ERP system implementation failure. These problems were discussed in literature review and presented in Chapter 2.

These were issues such as failing to involve users/employees in the system design phrase. Including the lack of their participation in required to take in all accounts of the system requirements, change management i.e. preparing the personnel with skills needed in running the new information system, system integration with the previous system or obsolescing the previous system install and going live with the new one, dealing with the resistance to change from the system users etc.

All the mentioned issues led to failure of the employee system's buy-in and consequently the ultimate system failure. The ERP system implementation would involve nearly all parties in the company the failure could be catastrophic.

For an example, in the past IS/IT project responsibility lies in the hand of the IT manager alone. The IT manager would not have the insight of real business need or does but very little compared to the manager in other real sector area (department manager). This creates a system which would not match with the company's Business Processes (BPs). The result was most of the project failed horribly when they go live.

Therefore setting up a committee or ERP personnel board was an attempt to solve that problem. The board would be design in such a way that all users or representative from the group (stake holders) should be allowed to participate during the system design phrase i.e. system requirement development phrase, training etc. This means high

employee/users, IT personnel and management involvement. The following quote confirm the above idea.

"To be successful, all functional areas of the organization need be involved in determining the culture of the firm and in defining the new system's requirements. The film's willingness and ability to undertake a change of the magnitude of an ERP implementation is an important consideration"
Source: James A. Hall, 2001, "Accounting Information System" , South-Western College Publishing., Ohio

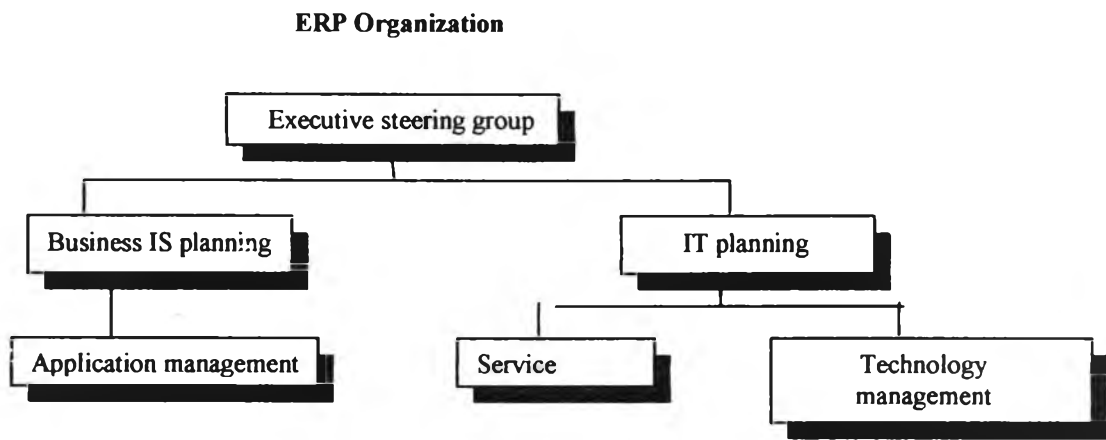The following figure shows the proposed ERP committee hierarchy.

ERP Organization

Figure 4-1: ERP committee hierarchy chart

The next section would be devoted to the task description of each group within the ERP organization.

i. Executive steering group

The executive steering group consisted of the top management of the company; this included the Managing Director, Assistant to the Managing Director and the General Manager. These were the people who were able to make important financial decision their responsibility and the description of theirs participation was elaborate as followed.

Project Responsibility:
- Give the company and all department clear business strategy direction and its linkage to the ERP system implementation strategies.

- Addresses all the financial problems and make important financial decisions, which would arise during project implementation in various phrases especially for the unseen or the indirect cost i.e. more money for consulting, program writing, incentives for phrase completions etc.

- Decentralize appropriate necessary decision-making power to the middle managements or the project implementation team in order to ensure that they would have enough authorities and certain level of decision-making power to solve sudden unexpected problems which may arise in various implementation phrases.

Attitude, skills and behavior desired:

- This would be a group of people who directed the company into certain way, they must share their visions and convert them into missions and plan linking them with the ERP system implementation.

- They were the entrepreneurs of the company and must accept new market challenges and changes. The ERP implementation team must make sure they would have the full commitment from this group of people as they would be vital in both financial and authorization perspective.

ii. **Business IS Planning Group**

This group of personnel would be the spear head of the project implementation. It would consist of people who understand in depth of the current BPs, the best practice BPs and the missions and visions of the company as well as parts of project requirements e.g. cost of ownership, funding, time required, human resources required, and training.

This included the manager and assistances from the various department, which included, accounting manager, factory manager, production manager, procurement manager, sales manager, logistic manager, warehouse manager and human resource manager and their assistances. The team would consist of project manager and two project coordinators, one representing the office side and

another representing the production plant side. Their responsibilities can be noted as followed.

Project Responsibility:

- Co-ordinations and prioritizing all IS project implementation in business area, agreeing budgets, acquire budgets approving proposals and determine resources allocation.
- Follow up; plan meetings with various departments, monitor the implementation, and work closely with the vendors.
- Arrange meeting and implement efficient change management to encourage positive attitude towards change.
- Set up motivation campaigns and follow up.
- Solve or coordinate all problems when implementing the project.
- Propose value for money invested in the IS project.
- Report to the Executive Steering committee for both results and problems.

Attitude, skills and behavior desired:

- The people selected for this role must be the one who ensure that everything would be on track. Therefore must be a self-motivating person with high internal drive for success.
- Must be a well all rounded with in depth knowledge and experience of the industry BPs and competitors as well as current best practice.
- Responsive, willing to be all ears for problem, self-driven, good team player and leader.

iii. **Business IS Planning Group IT Planning Department, Service Management and Technology Management Department**
IT Manager
Project Responsibility:

- Provide knowledge and information needed to other departments regarding the implementing module (1st tier i.e. users).

- Arrange meeting with the ERP and various IS solution vendor for updates.

- Update new technology; evaluate the current ERP IS solution, suggesting its pros and cons.

- Report all the technical difficulties and try to come up with solutions, inform solutions to all related parties.

- Monitor all IT related actions.

- Report to the Executive Steering committee.

- Find and suggest alternative solutions.

- Advise and direct both Service Management Team and Technology management department on all project's related issues.

Attitude, skills and behavior desired:

- This person should be technology-active people who are keen and keeps updating new technologies.

- Good team player.

iv. **Application Management Department**

1ˢᵗ tier users Managers

The board consists of accounting manager, sales manager, production manager, warehouse manager, logistic manager and procurement manager.

Project Responsibility:

- Reporting in requirements and BPs by arranging regular meeting with the rest of the end-user and the committee.

- Reporting in problems faced on site when the project is in progress.

- Reporting in the progresses, improvements and benefits.

- Monitor the implementation make sure that the effect on the current system (when the end-users are doing day to day business) is minimal while reporting any mishap during such period.

- Arrange, monitor, attend and report about training on the software in each ERP module for the end-users to the committee.
- Participate in giving in-sight functional information.

Attitude, skills and behavior desired:

- Energetic, open for new knowledge, participative and good team player.
- Have in-depth understanding on current BPs, company vision and missions.
- Moderate computer literacy.

End-User

Project Responsibility:

- Learn and adapt to new functions provided by the new software in each module.
- Report the implementation difficulties and its effect on the regular work to the supervisor and the responsible implementation committee.
- Attend all required training and meetings to minimize confusion.
- Participate in giving in-sight functional information.

Attitude, skills and behavior desired:

- Since this group has the least level of autonomy and minimal viewit is fair in general to say that they tend to cope with
- They tend to cope with the change and do Passive resistance

4.4 Project Costing Analysis (Risk Management 1)

This was the first part of the risk management. As mentioned in Chapter 2 of this study, one of the sources of risk for the ERP system implementation was inadequate allocation of funding in all phrases of the implementation. Therefore the next step in the system analysis would be the study of the cost that need to be allocated in order to own

the system. In this part of the research would deal with the benefit and of cost for the ERP system implementation.

This section could be regarded as one of the most important section because it deals with financial and cost which would be link to the system's performance limitation, expectation and return on investment. As written in chapter 2 underestimating cost would be one of the culprits that lead to implementation failure. All cost must therefore be define and gather as accurately as possible.

To emphasize further, Rockford Consulting Group, Ltd (2004) had commented that one of the ERP implementation failures was the unrealistic expectation of benefits and Return on Investment (ROI). "Another significant cause for ERP implementation failure was the unrealistic expectation of benefits and ROI.

Another was not preparing enough funds to support the implementation process through and through i.e. cost is often underestimated. Software vendors are unpopular for overstating the benefits in terms of ROI, when the total costs of the project have been understated. The common mistake would be those implementation teams often left out of the total costs are costs of planning, consulting fees, training, testing, data conversions, documentation, replacement staffing, and the learning curve performance drop. ROI become unrealistic goal when this happen. Problems would soon followed e.g. blaming each other for the failure, lack of system buy-in, management lost confidence and back off their supports etc.

In order to avoid the pitfalls, identifying all the possible cost that might occur during the project set up and implementation which involves order management, procurement and inventory management modules would be arrange and classify according to the Gartner's TCO Model Distributed Computing Chart of Accounts definitions presented in chapter 2.

From the author point of view this method was very detail and did not leave out any cost occur during the implementation of the system, and therefore would not be restricted to the implementation of the ERP system only but also can be adapt to the implementation of other IS system e.g. call centers and customer relationship management software systems.

As mentioned in chapter 2 the method tallies costs for an annual analysis period. As a guideline map to follow, the author would reintroduce figure 2-2 presented in chapter 2.
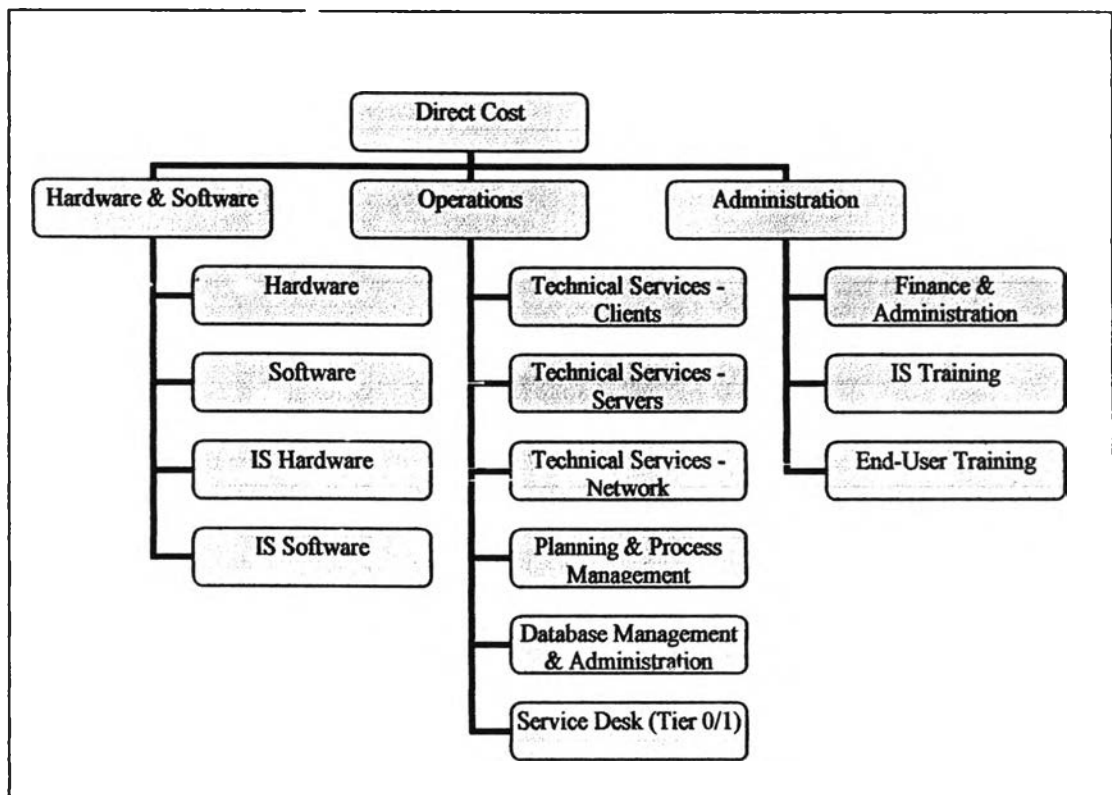

Figure 4-2: Overview of the direct cost category

4.4.1 Direct Cost

4.4.1.1 Hardware and Software cost

i. Hardware Costs

- **Expensed/Depreciated/Lease:** Please be noted that service fee e.g. installation fee was excluded here but would be included in the appropriate operations labor category.

According to quotations and network diagram provided by the vendors, the system requires 4 new servers (where 2 are used as standby), 40 new clients' computers, 5 new laptop computers, 4 new routers and 40, 10/100Mbps Local Area Network (LAN) card.

Table 4-2: Hardware Costs under expensed depreciated lease category

Item	Amount	Cost per unit (Bht)	Total Cost (Bht)
Servers	4	200,000	800,000
Client computer	40	40,000	1,600,000
Laptop Computer	5	80,000	400,000
Routers	4	30,000	120,000
LAN card	40	2,000	80,000
Total			3,000,000

- **Upgrades:** Noting that such upgrades were not included in the original purchased bundle or were purchased or installed after the original installation and are included within this category. As the system required brand new hardware and have been bought under Expensed/Depreciated/Lease category no upgraded was needed at the moment and for the next 3 years.

- **Spares:** As mentioned this category of cost excludes device which were use as standby servers or disk drives that sending heartbeat to the system in the case that the main server fail (these devices was included in the

expense, depreciation and lease category) As all production hardware comes with minimal 3 years guarantee and onsite service (vendors providing substitute machine if one fail with another within 4 hours of calling time) there shall be no spares are required.

- **Supplies:** This category did not include printing paper

Table 4-3: Hardware Costs under supplies category

Item	Amount	Cost per unit (Bht)	Total Cost (Bht)
CD-RW	100	55	5,500
DVD Rams	100	1,200	120,000
SD Card	45	2,500	37,500
Printer toners	300	800	240,000
Total			403,000

ii. Software Costs

- **Personal productivity and personal database applications:**

Table 4-4: Software Costs under Personal productivity and personal database applications category

Item	Amount	Cost per unit (Bht)	Total Cost (Bht)
Microsoft Office	40 Licenses	16,000	640,000
Microsoft Visio	8 Licenses	10,000	80,000
Total			720,000

- **Business and engineers:**

Table 4-5: Software Costs under business and engineer category

Item	Amount	Cost per	Total Cost

		license (Bht)	(Bht)
ERP Modules order management, procurement ,inventory management	50 licenses	220,000	11,000,000
Total			11,000,000

- **Database, data management and development tools:** This was the operating system for the four new servers.

Table 4-6: Software Costs under database, data management and development tools category

Item	Amount	Cost per license (Bht)	Total Cost (Bht)
Microsoft Windows Server 2000	4 licenses	18,000	72,000
Total			72,000

- **Messaging and groupware:** None, since the company utilized Microsoft Outlook as e-mail base and the software was bundled together with Microsoft Office therefore the cost of this software is already included in "Personal productivity and personal database applications" category.

- **Other:** This was the cost for new operation system on production servers and client computers, operation system upgrades, additional licenses on user base licensed system. It include cost for remote access software that facilitate business application e.g. Norton Ghost, PC Anywhere.

Table 4-7: Software Costs under other category

Item	Amount	Cost per license (Bht)	Total Cost (Bht)

Microsoft Window XP Professional service Pack 1	50 licenses	8,000	400,000
PC anywhere software	2 licenses	2,000	4,000
Total			404,000

iii. Information System Hardware Costs

- Expensed/Depreciated/Lease: None, as the ERP system runs on single database and utilized two servers included in the Expensed/Depreciated/Lease in the Hardware cost category.

- Upgrades: None, see "Upgrades" in the "Hardware" cost category

- Spares: None, please see "Spares" in the "Hardware" category and "Expensed/Depreciated/Lease" category above.

- Supplies: Included in the "Supplies" in the "Hardware" category.

iv. Information System Software

- Network, systems, storage and asset management: As mentioned, the system required new hardware and operation system hardware running on the client and server mentioned in the "Hardware" cost category, therefore there was no exclusives software used by the IS department.

- Service desk management: None as the service desk management was a hot line set up that the vendor is supplying therefore it was bundled in the ERP modules.

- Training Software and Computer Base Training (CBT) software: Bundled in the ERP modules.

- Test/Other: None.

Total Hardware and Software cost: 15,599,000

4.4.1.2 Operation Costs

Since the personnel time spends and responding to various responsibilities/activities according to the project's requirement and job description as well as the regular routine work (apart from the Project implementation) therefore the cost for this is difficult category to measure and to be accurate.

In order to come up with a pilot cost (which should be reviewed and modify as the project implementation continues its course) as possible the paper would therefore assign approximate time factor that each group of the personnel would likely to be spending time in each of the activities which includes the technical services of the client, server and net work, the planning and process management and lastly the database management and administration. The time factor will then be multiply to the annual salary of each group of the personnel. The personnel involved in this area of the project mainly were those from the Implementation Committee set in section 3.4.8. They were sum up to five main groups of personnel being the executive steering group; the business IS planning, project manager, project engineer, network engineer and the database engineer. The annual salaries of the groups mentioned were as followed.

Table 4-8 Annual salary of the implementation committee and their allocation on the project

Positions	Annual Salary	Approximate % of time spend on the project (off normal responsibility)	Cost of the man power allocated to project
Executive Steering Group (MD, Asst to MD and GM)	4,680,000	5%	234,000
Business IS Planning Group	11,100,000	20%	2,220,000
Project Manager	1,200,000	80%	960,000
Project Engineers (2)	720,000	100%	- 720,000

Network Engineer	420,000	90%	378,000
Database Engineer	480,000	90%	432,000

i. Technical Services on Clients Server and Network

- Tier II problem resolution:
- Tier III problem resolution:
- Traffic management and planning:
- Performance tuning:
- User administration (logical addition and changes):
- Operation system support:
- Maintenance labor:
- Software deployment:
- Application management:
- Hardware configuration/reconfiguration:
- Hardware deployment:
- Disk and file management:
- Storage capacity planning:
- Backup and archiving:
- Repository management:

Table 4-9: Operation cost under technical services of clients, servers and network category

Position	Responsibility	Percentage of total time used on the category	Annual expense (Bht)
Project Engineers (2)	Tier II resolution, Application management, software deployment , performance tuning	30%	216,000
Network Engineer	Tier II resolution, user administration, repository	40%	151,200

	management, hardware configuration, hardware deployment, performance tuning, traffic management and planning		
Database Engineer	Tier II resolution, back up and archiving, storage capacity planning, disk and files management , performance tuning	40%	172,800
Technical Service Staff (outsourced)	Tier III resolution, Software deployment, maintenance and labor, service desk, contracted as obligation in the quotation for 24/7 service desk service, performance tuning, operation system support, hardware configuration/reconfiguration	25%	5% of the total cost (according to quotation) 137,500
Total cost devoted to the activity			677,500

ii. Planning and Process Management

- Account Management:
- System research, planning and product management:
- Evaluation for purchase:
- Security and virus protection:
- Business recovery:

Table 4-10: Operation cost under planning and process management category

Position	Responsibility	Percentage of total time used on the category	Annual expense (Bht)
Executive Steering Group (MD, Asst to MD and GM)	Account Management, System research, planning and product management, Evaluation for purchase	50%	117,000
Business IS Planning Group	Account Management, System research, planning and product management, Evaluation for purchase	50%	1,110,000
Project Manager	Account Management, Evaluation for purchase, System research, planning and product management, Account Management	50%	480,000
Project Engineer (2)	Evaluation for purchase, System research, planning and product management, Account Management	40%	288,000
Network Engineer	Security and virus protection, Evaluation for purchase, System research, planning and product management	40%	151,200
Database Engineer	Security and virus protection, Evaluation for purchase, System research, planning and product management	20%	86,400
Technical Service Staff (outsourced)	Business recovery, Security and virus protection	25%	5% of the total cost (according

			to quotation) 137,500
Total cost devoted to the activity			2,370,100

iii. Database Management and Administration

Table 4-11: Operation cost under database management and administration category

Position	Responsibility	Percentage of total time used on the category	Annual expense (Bht)
Database Engineer	Database Management and Administration	30%	129,600
Technical Service Staff (outsourced)	Business recovery and maintenance cost	25%	5% of the total cost (according to quotation) 137,500
Total cost devoted to the activity			267,100

Total Operation cost: 3,314,700

4.4.1.3   Administration Costs

i. Finance and Administration
- Supervisory management:
- IS administrative assistance:
- Asset management:
- Budgeting and chargeback:
- Auditing:
- Purchasing, procurement and contract management:
- Vendor management:

Table 4-12: Administration cost under finance and administration category

Position	Responsibility	Percentage of total time used on the category	Annual expense (Bht)
Executive Steering Group (MD, Asst to MD and GM)	Supervisory management, asset management, budgeting and chargeback, auditing	50%	117,000
Business IS Planning Group	IS administrative assistance, asset management, purchasing, procurement and contract management, budgeting and chargeback, vendor management, auditing	50%	1,110,000
Project Manager	IS administrative assistance, asset management, budgeting and chargeback, auditing, vendor management	50%	480,000
Project Engineers (2)	IS administrative assistance, auditing	30%	216,000
Network Engineer	IS administrative assistance	20%	75,600
Database Engineer	IS administrative assistance	10%	43,200
Technical Service Staff (outsourced)	IS administrative assistance	25%	5% of the total cost (according to quotation) 137,500
Total cost devoted to the activity			2,179,300

ii. IS Training

- IS course development:
- IS training (delivery):

The cost for this category was already provided and included in the ERP modules package please refer "ERP Modules order management, procurement, inventory management" in the software cost sub categorizing business and engineers category.

iii. End-User Training

- End-user course development:
- End-user training:

The cost for this category was also already provided and included in the ERP modules package please refer "ERP Modules order management, procurement, inventory management" in the software cost sub categorizing business and engineers category.

Total Administration Cost: 2,179,300

4.4.2   Indirect Cost

4.4.2.1   Downtime

Annual downtime hours * % productivity impact to users when downtime occurs*end-user burdened salary

---

As mentioned in chapter 2, the down time category could be divided into two further sub-categories, being planned and unplanned downtime. The later was very difficult category to measure as it attempt to quantify values that has yet to happen. Also mentioned in chapter 2 that downtime was expenses resulting from annual losses in productivity due to users' inability to use the system. As the ERP implementation was first timed, the planned down time was calculated as an average at 0.08 hour (or 1% of working time) per working day per person, five days a week, four weeks a month and 12 months a working year. The productivity impact was averaged at 5%. -

Table 4-13: Downtime cost

Number of person	Annual downtime hours per person	% productivity impact	End-user burdened salary	Value
50	19.20	5.00%	600,000.00	28,000,000.00

The TCO or the total cost of owner ship was 49,093,000.00 baht.

4.5 Business Process Reengineering

The research did the BPR for the required work flow according to the sequence of work flows presented in chapter 3. The presentation would present figures showing old processes before BPR and new processes after BPR. The first phase of studying and identifying problems relating to the previous system and business processes was done in chapter 3. In this section the design and development of the new systems would be done before the system implementation.

4.5.1 Sale Order Management BPR

The first BPR would be on the sale order management processes of the company, which could be subdivided into four main processes which were, one flow in taking in sales order (SO)/purchase Order (PO) or SO-01, two flow in preparing the finish goods or SO-02, three flow in receiving returned goods or SO-03 and four flow in exchanging from one bought product to another product or SO-04.

i. SO-01 Flow of taking in Sales Order Purchase Order (incoming) BPR

From the figure 4-2 there was no elimination of processes but with the implementation of the new ERP and the database system the data and information transfer from one department to the other will be in electronics rather than the old paper base, paper basket system. The ERP system would enable the user to process their work according to the work flow either automatically and semi automatically.

The data entry would be cut down. There was no longer physical traveling of information. In the new process and system, the sale agent had to take calls or order, enter the customer account number, the system will pop up record of that particular customer, showing her/his credit, payment term, deposit buying or not, delivery address, buying records, status of ordered goods, trade discounts and promotions as well as the customer's personal profiles such as birthday, anniversary, siblings, relative etc.

If there would be new customer, the sale agents need to ask for the entire mentioned information field and enter them into the customer database. As all department used the same database the information could then be shared between departments given the person has the password and key lock authorization.
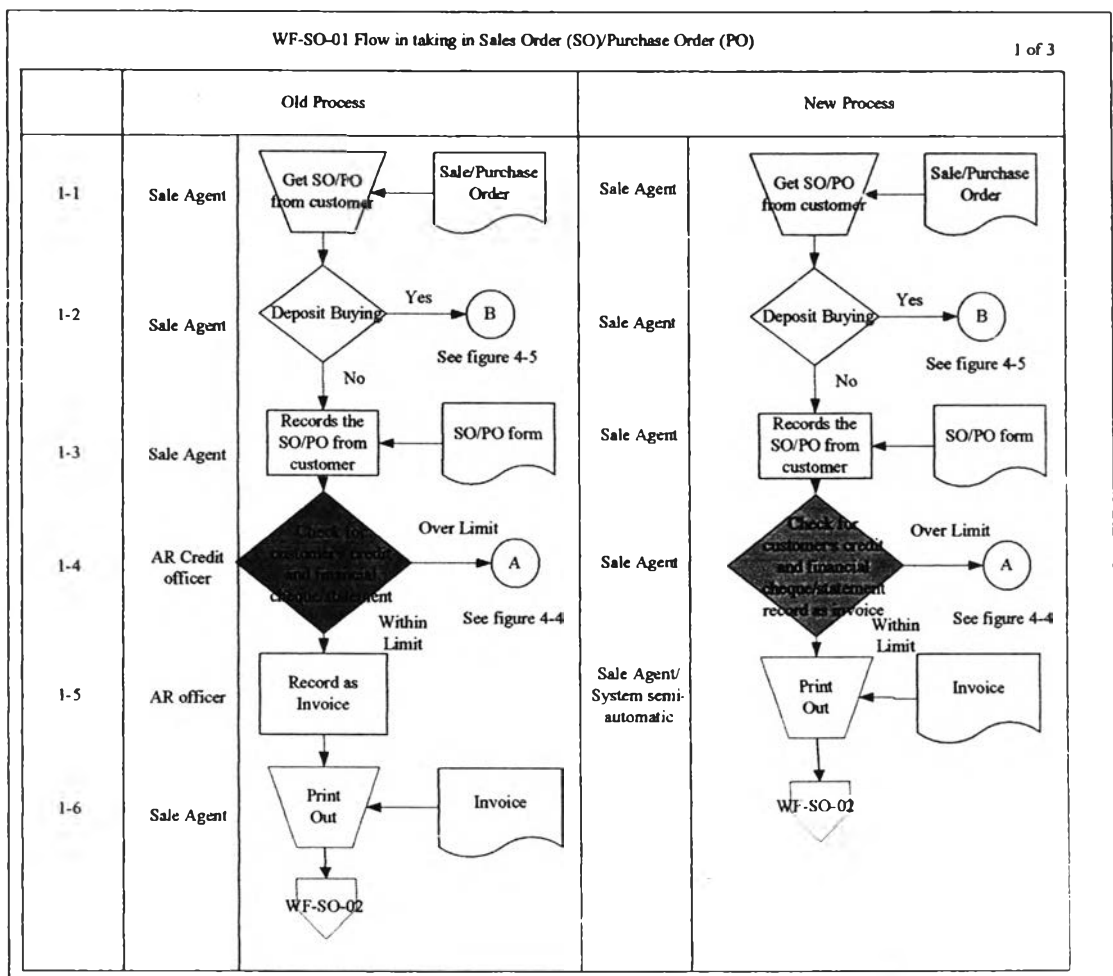

Figure 4-3: BPs comparison of old and new flow in taking in Sales Order (SO) /Purchase Order (PO) (1)

The sale manager could approve for credit expansion electronically base on the ERP system. From the figure 4-3 it could also be observe that cutting out the AR Credit officer the sale agents would have wider scope of work. They would have to interact with the area sale or the customer calling in for order, check the customer credits, inventory available, record invoices, ask for credit expansion or to consider one by her/himself and giving the customer all sort of information regarding the order e.g. the delivery date.

Through the new work flow the sale agent would be the center of sale information. They would no longer be just a sale agent, but would have to change their role into small business entrepreneurs. According to the improved work flow the changes that the sale agent would face the following changes;

- wider scope of work,
- more computer skill would be needed (trained by internal IT team and the outsourced vendors) and hand on business sale-oriented problem tacking skill (trained by internal personnel e.g. sale manager and the sale department).

		Old Process	New Process
		WF-SO-01 Flow in taking in Sales Order (SO)/Purchase Order (PO)	2 of 3

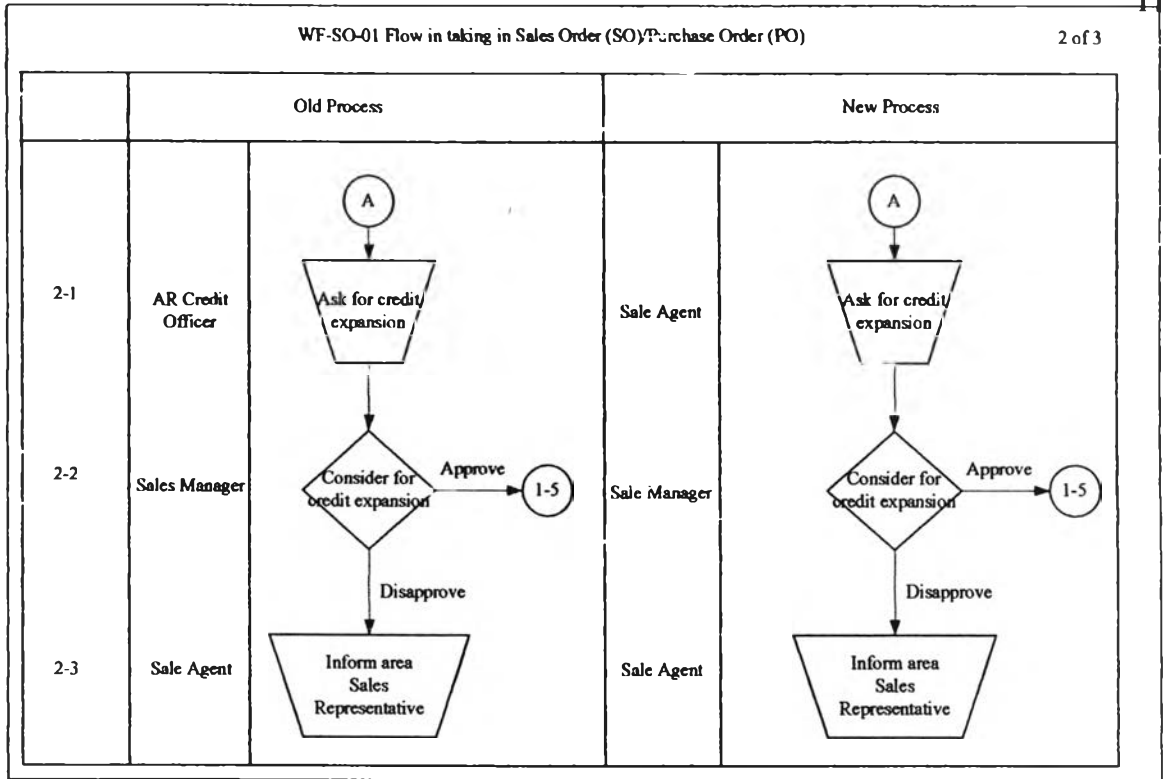|		Old Process	New Process
2-1	AR Credit Officer	Ask for credit expansion	Sale Agent
2-2	Sales Manager	Consider for credit expansion — Approve → 1-5	Sale Manager
2-3	Sale Agent	Disapprove → Inform area Sales Representative	Sale Agent

Figure 4-4: BPs comparison of old and new flow in taking in Sales Order (SO) /Purchase Order (PO) (2)

From the figure 4-4 it could be observe that the backbone of the work flow would still be the same as the old work process. However taken over by the sale agent the AR officers would be obsolete from the sale order management work flow.

		Old Process			New Process	

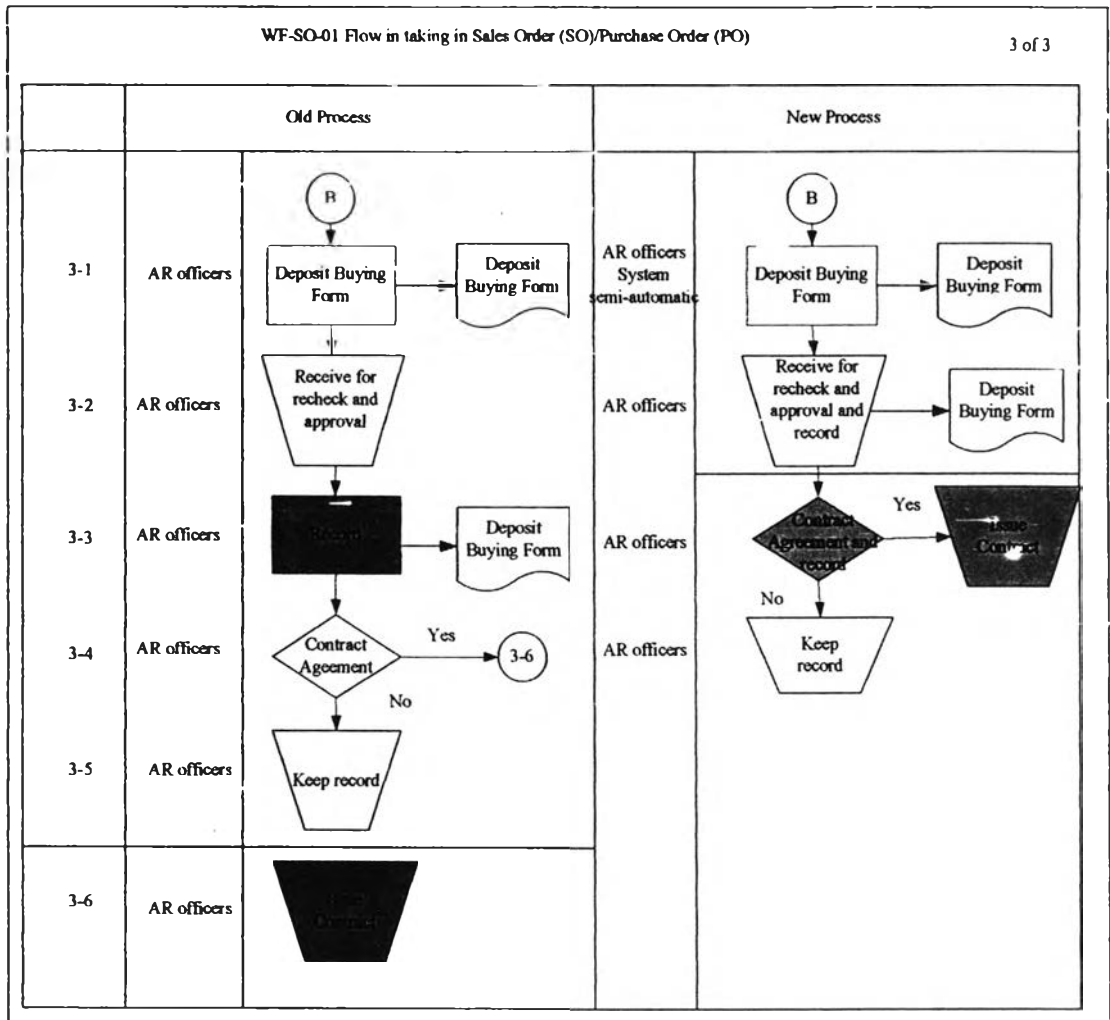|		Old Process	New Process
3-1	AR officers	B → Deposit Buying Form → Deposit Buying Form	AR officers System semi-automatic	B → Deposit Buying Form → Deposit Buying Form
3-2	AR officers	Receive for recheck and approval	AR officers	Receive for recheck and approval and record → Deposit Buying Form
3-3	AR officers	Record → Deposit Buying Form	AR officers	Contract Agreement and record — Yes → Issue Contract
3-4	AR officers	Contract Agreement — Yes → 3-6 / No	AR officers	No → Keep record
3-5	AR officers	Keep record		
3-6	AR officers	Issue Contract		

Figure 4-5: BPs comparison of old and new flow in taking in Sales Order (SO) /Purchase Order (PO) (3)

According to the figure 4-5 the new work flow terminated the dedicate time consuming and tedious activities such as recording and contract issuing.

From observing the figure 4-5 and 4-5, the benefit would be that the work load of the AR officers would be reduced leaving he/she more time to do value added activities and there would be significant improve customer purchase order transaction time.

The changes that the AR officer would be facing;

- lesser role in sale order management

ii. SO-02 Flow of preparing Finish Goods BPR

Continuing from the SO-01 the second order management work flow (SO-02) (figures 4-6, 4-7, 4-8) started where the data would be electronically transmitted to the warehouse department for product preparation and delivery processes. In the new work flow when there would be approval for order from the sales office the invoice would be automatically printed and sorted to different route and utilization of internal or external logistic.

In the new work process the warehouse administration work would be eliminated. The process would be handled by the system automatically until the logistic and the driver sort the invoices and prepare the finish goods for delivery.
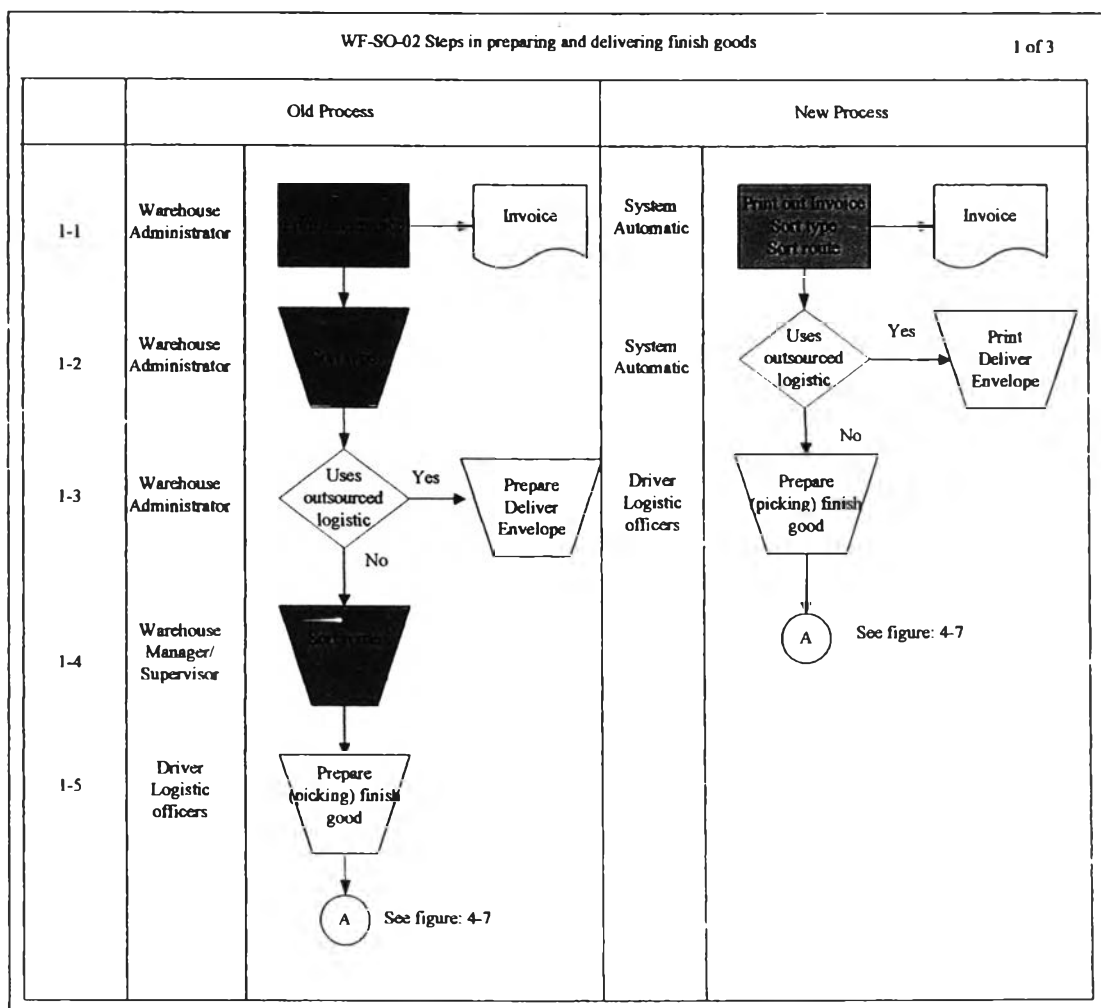

Figure 4-6: BPs comparison of old and new flow in preparing and delivering finish goods (1)

The only change in the work flow shown in the figure 4-6 and 4-7 would be the automatic print out of the delivery form which would be taken over by the system and used to be the work of the warehouse administrators and personnel at the office. Again training was done to improve the personnel involved on the software knowledge and the new workflow.

Similarly the job description or the daily routine job of the warehouse administration would be reduce and eliminated. This indicates the lower work load and time for other more productive tasks.
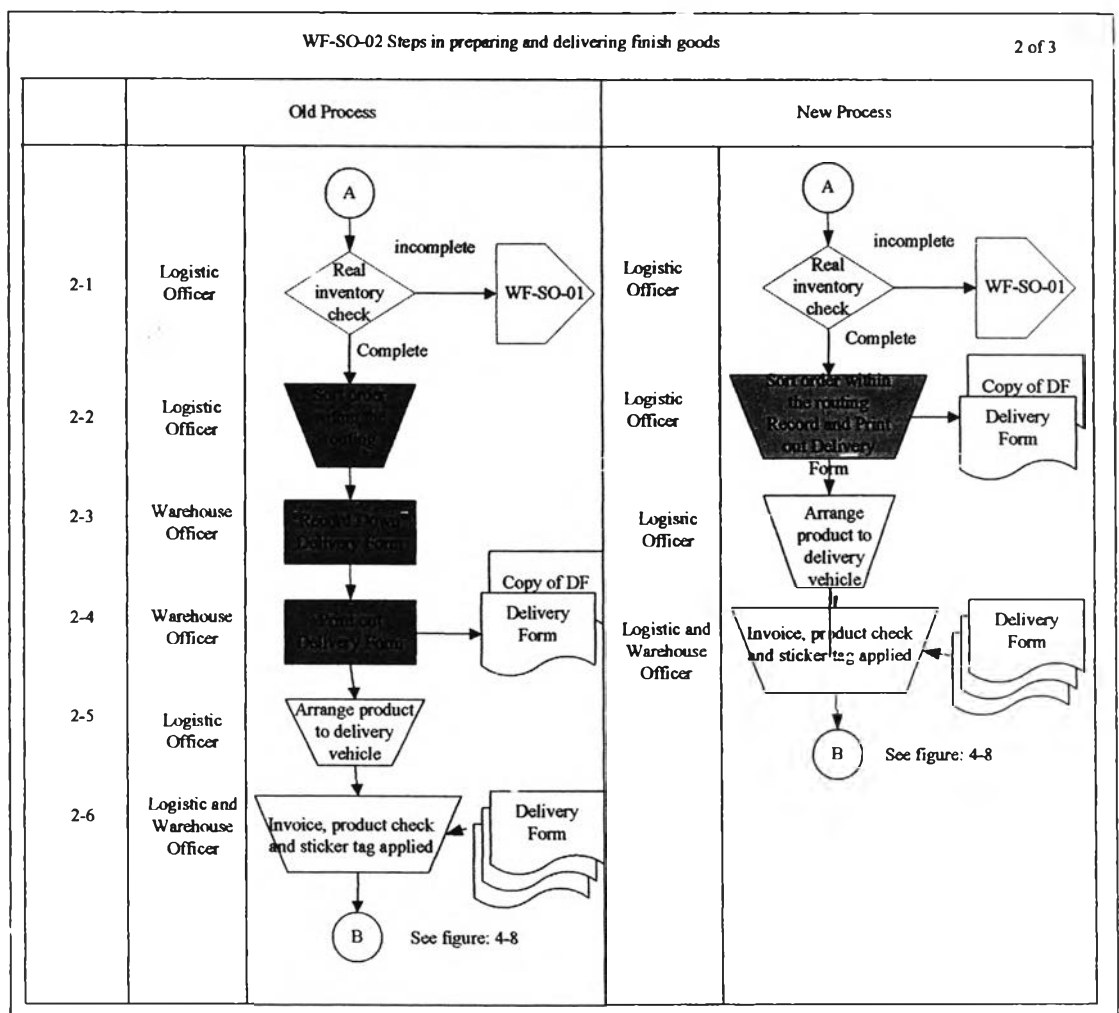

Figure 4-7: BPs comparison of old and new flow in preparing and delivering finish goods (2)
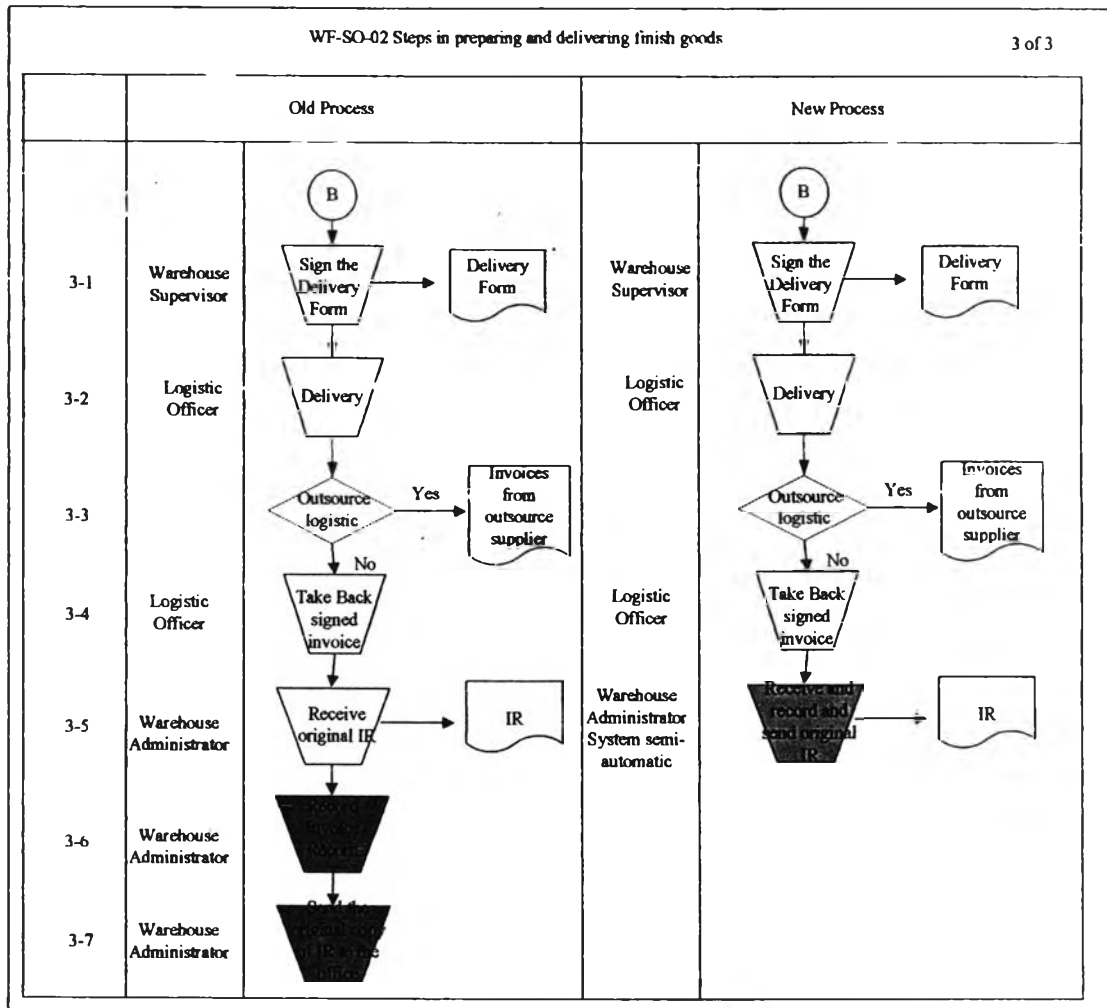
Figure 4-8: BPs comparison of old and new flow in preparing and delivering finish goods (3)

Through analyzing the figure 4-8 this work flow consists of one of the change to over come the "delay of information" problem discussed earlier. This occurred in step 3-5, 3-6 and 3-7 where there use to be sending back of the Invoice Record (IR) which used to be in paper base back to the office for the input into the database (that the delivery had been made). Then the IR would be distributed to the area sales representative to go out and collect AR according to the committed credit term made.

According to the old work process there use to be a lot of delays (please refer chapter 3) because one, the old database might showed there was stock available but when come to real inventory check there was no product available, therefore the delivery was not made within the day that the invoice was issue due to

false amount of stock. Or two, there was no route to that particular customer just yet, or three the logistic person cannot complete the delivery due to accidents, traffic jams etc.

One of the problems stated by the area sale and sale agent were that, they did not know what to tell the customer, because in the old system only the completion of the delivery would then the IR would be send back to the office either as a whole or as one by one. The result was as previous stated that customer were frustrated and do not know the reason why the ordered goods were not being delivered.

In the new system the sale agent or the area sale representative or even the AR department can log into the database system and view real time of the order status as there is real time information i.e. without having to wait for the paper base IR.

iii. SO-03 Flow of Receiving Return Goods BPR

Using the old system, with reference to the figure 4-9 this was one of the culprits causing the difference between the physical count inventory and the digital number showing in the main office's database. The main reason to this difference was that there was delay of information due to the paper base system which needed to be send back and forth between the office and the warehouse in order to ask for authorization, permission, approval etc.
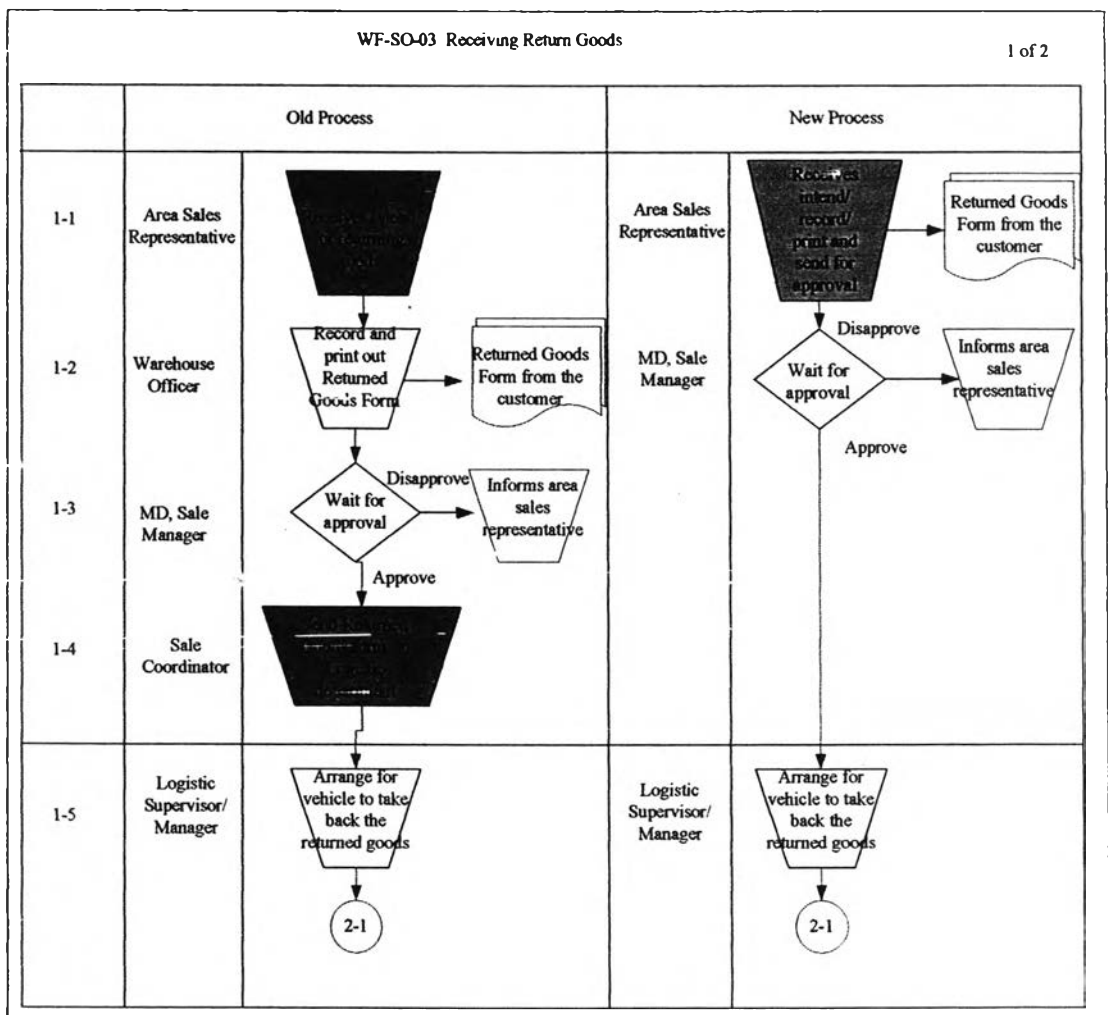
Figure 4-9: BPs comparison of old and new flow in receiving return goods (1)
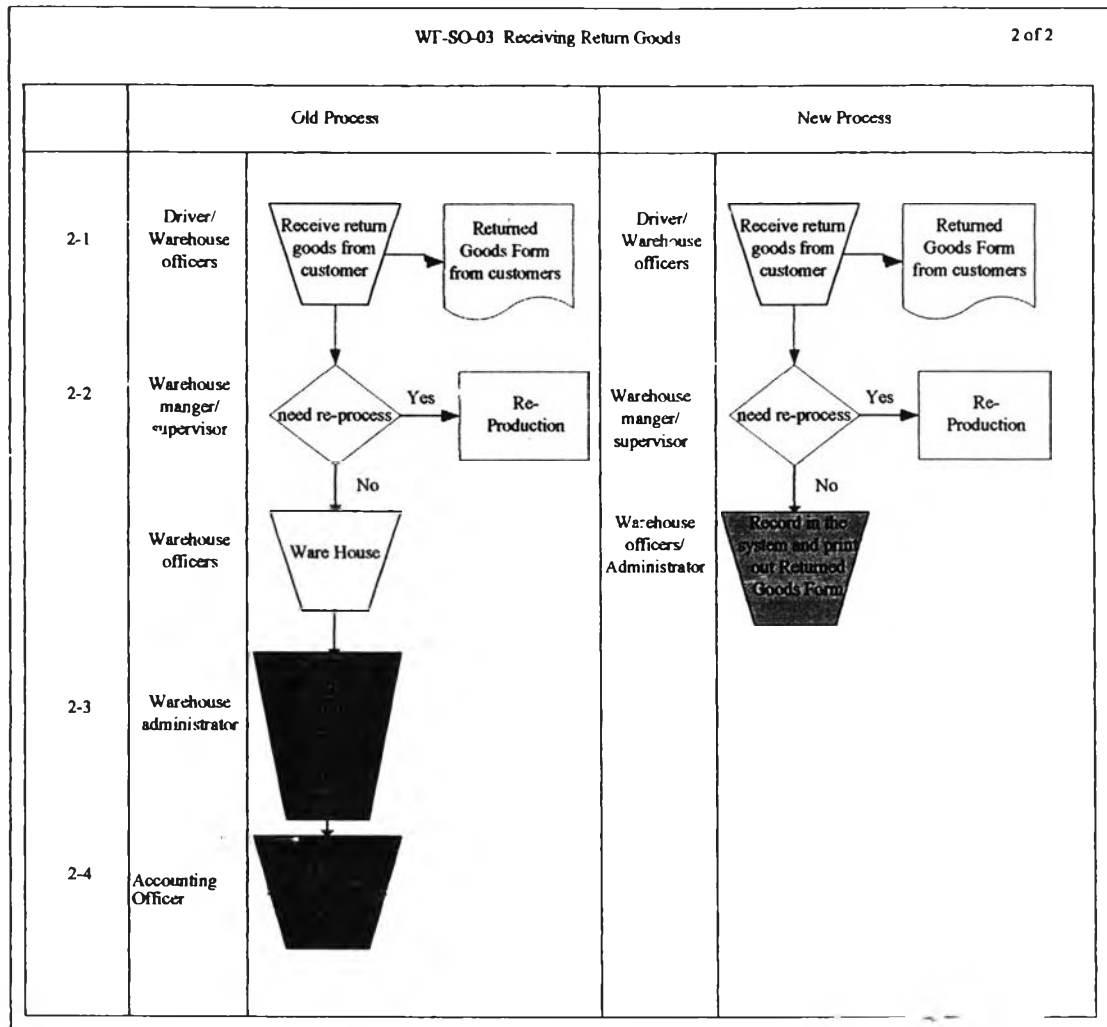
Figure 4-10: BPs comparison of old and new flow in receiving return goods (2)

With reference to figure 4-10, according to the records from the inventory officer in the warehouse department around 35% of the returned goods were in good shape and could be rework. However due to the limited time and capacity availability of the production department, the rework could be done whenever there was a free space of production capacity and time. Therefore the reprocess of the rework product was not routine in its nature.

Since the production department did not have the information database linking directly to the inventory on hand showing in the office's database. Whenever the production line was available for rework, the returned goods were rework and repack to be resell (back into the warehouse). This means that there

would be extra inventory on hand physically when the real database shows nothing. Therefore when there was a request for that particular product the sale agent cannot open the purchase order and invoices. This was one of the causes of "lost of sale".

To sum up the difference of the new work flows shown in the figure 4-9 and 4-10, the new system there would be no need to wait for delivery of the document between the warehouse and the office. Instead when there would be intention for return of good, the area sale representative could phone in and inform the warehouse where the warehouse administrator recheck with the real returned good to check for its status whether it need rework or be considered as scrap. If the product needs to be rework, the amount would be forwarded electronically for authorize person approval. The authorized person could then authorize the allowance for return. Information would be electronically resent back to the warehouse and the stock database would be updated.

iv. SO-04 Flows of exchanging product
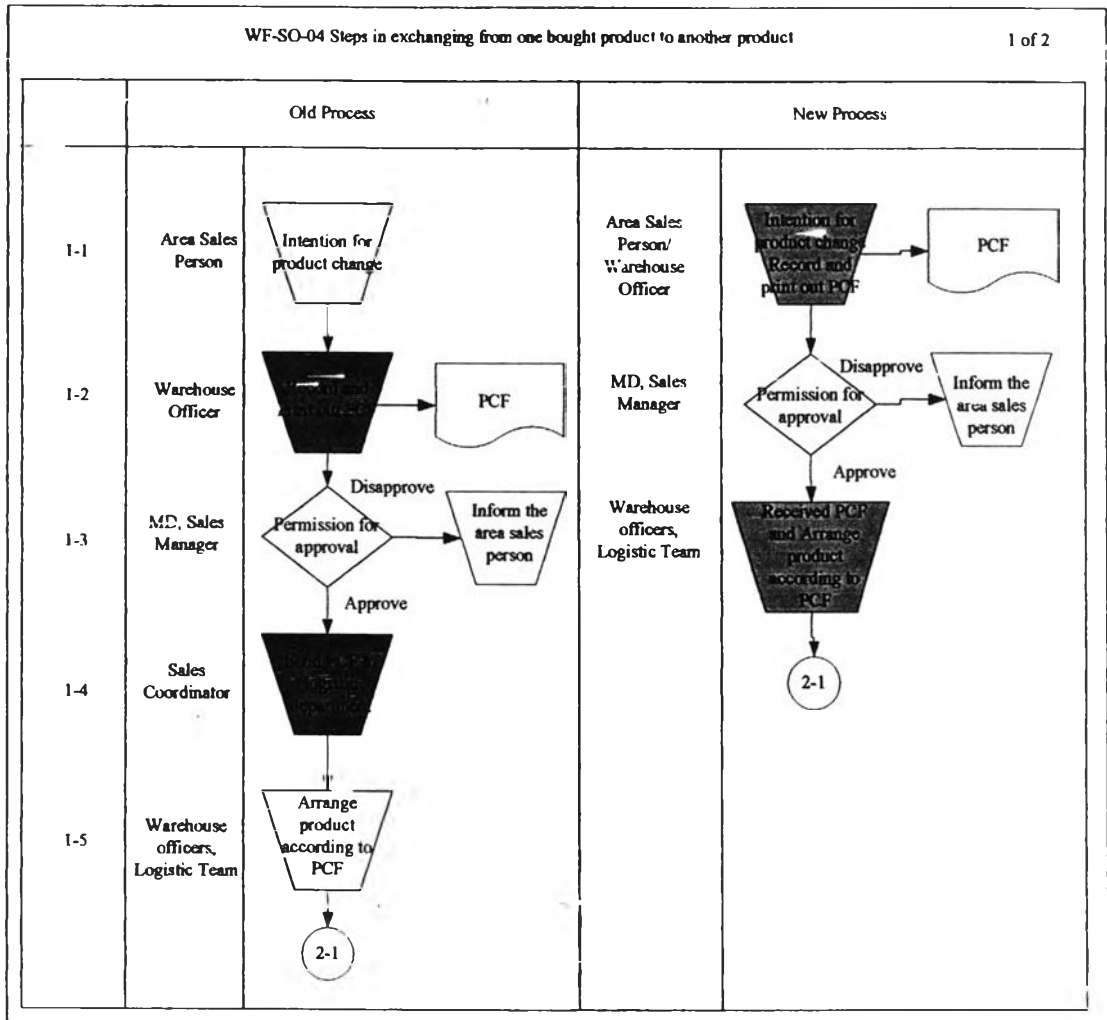
Figure 4-11: BPs comparison of old and new flow in exchanging from bought product to another (1)

WF-SO-04 Steps in exchanging from one bought product to another product				2 of 2
		Old Process		New Process

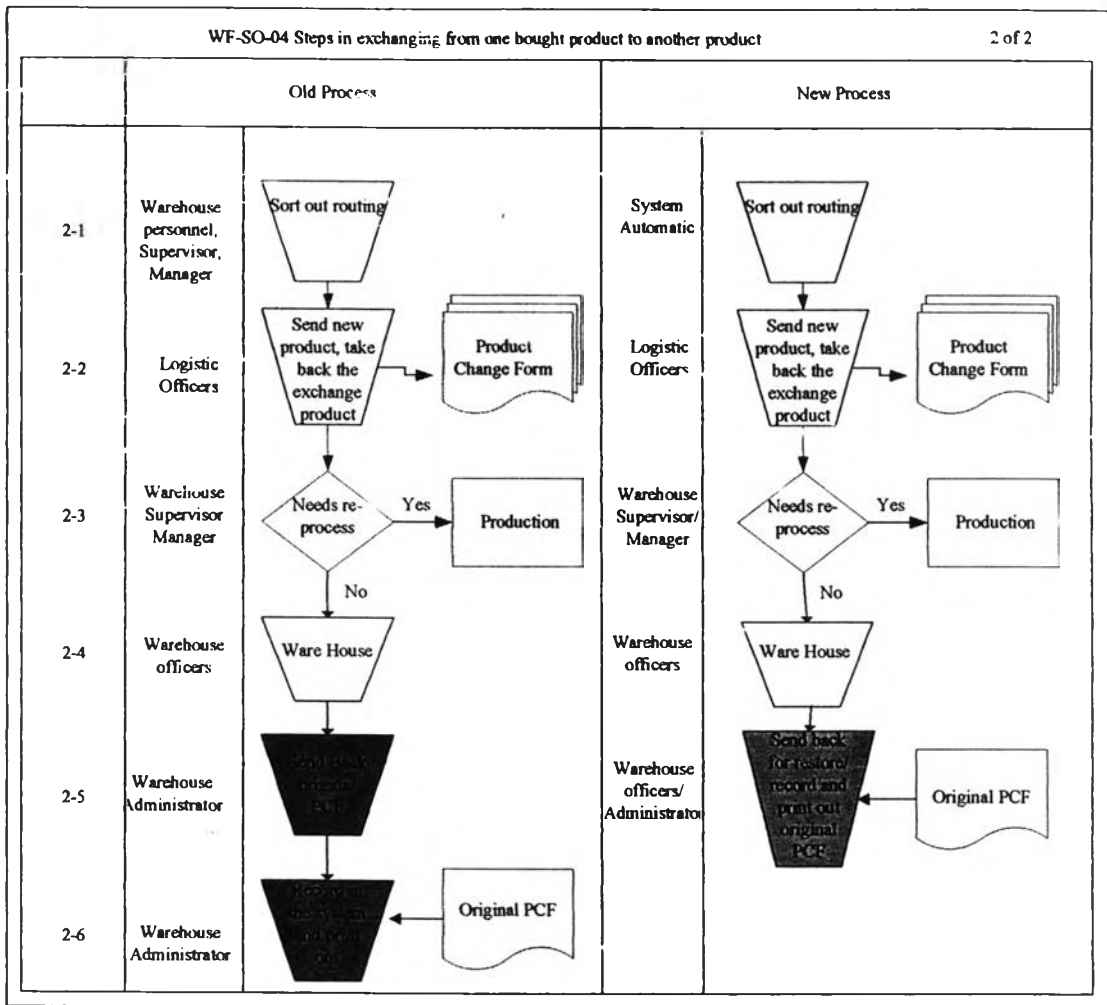|		Old Process		New Process	
2-1	Warehouse personnel, Supervisor, Manager	Sort out routing		System Automatic	Sort out routing
2-2	Logistic Officers	Send new product, take back the exchange product	Product Change Form	Logistic Officers	Send new product, take back the exchange product → Product Change Form
2-3	Warehouse Supervisor Manager	Needs re-process — Yes → Production		Warehouse Supervisor/ Manager	Needs re-process — Yes → Production
2-4	Warehouse officers	No ↓ Ware House		Warehouse officers	No ↓ Ware House
2-5	Warehouse Administrator			Warehouse officers/ Administrator	Send back for restore/ record and print out original PCF ← Original PCF
2-6	Warehouse Administrator	(process) ← Original PCF			

Figure 4-12: BPs comparison of old and new flow in exchanging from bought product to another (2)

4.5.2   Inventory Management BPR

The second BPR would be on the inventory management processes. This could be subdivided into three main work processes being IN-01, IN-02, IN-03 which were flow in taking in finish product from the production department, flow in taking out raw material for production and flow in taking out other material which to be use for production e.g. packaging accordingly.

i.   IN-01 Flow of recording finish product from production department
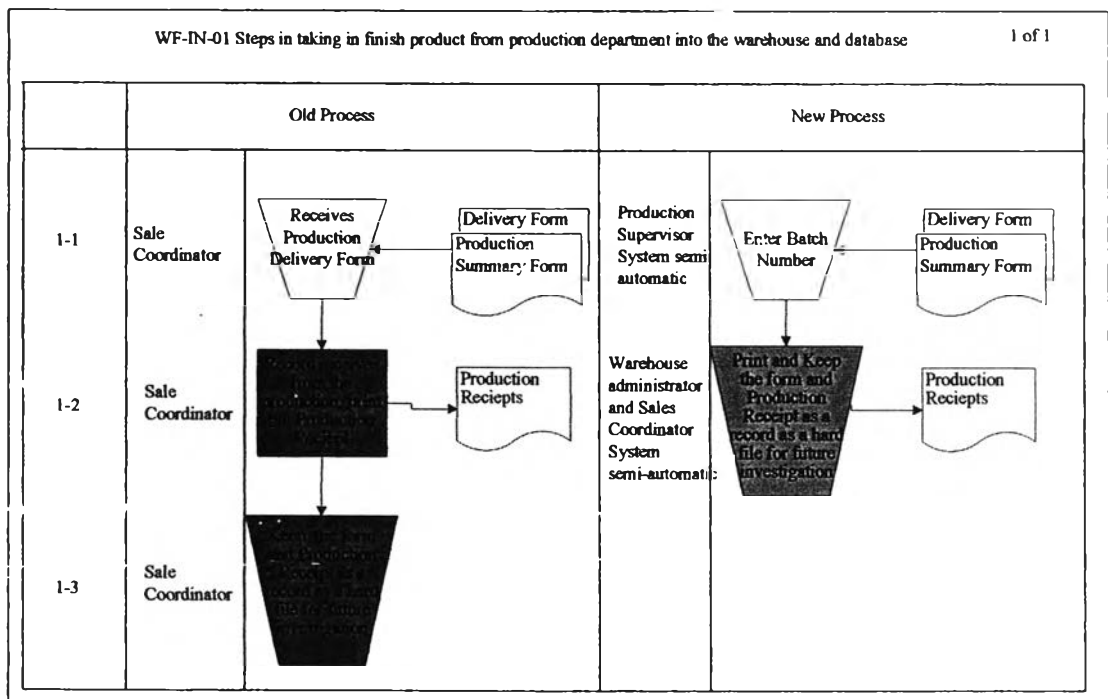
Figure 4-13: BPs comparison of old and new flow in receiving product into warehouse database

The main changes here were also the transforming of the paper base information transfer into faster electronic information transfer. When a batch of finish product passes QC department, the new process only required the production supervisor to input the batch number into the database. The only work left for both warehouse and sales coordinator would be to take out the printed production receipts as a hard record.

Again when entered the batch number into the database, since all department share the same database, there would be virtually no delay or lapping of information, all departments involve could share the information. For an example, the sale coordinator, sales agent and area sales representative could know the actual arrival time of the product.

ii. IN-02 Flow of taking out raw materials for production

WF-IN-02 Steps in taking out raw materials for production			1 of 1	
	Old Process		New Process	
1-1	Procurement Officer	Calculate the quantity of RMTL used everyday → Used Quantity	System/ Automatic	Re-Calculate the quantity of RMTL used real time and Record into the database → Stock Balance / Used Quantity
1-2	Procurement Officer	→ Used Quantity / Stock Balance		
1-3	Accounting Personnel		Inventory Warehouse Officer	Quantity Check → Incorrect 1-1
1-4	Accounting Personnel	Quantity Check → Incorrect 1-1 / Correct	Inventory Warehouse Officer System semi-automatic	Correct / Record and prints out as hard file → Request Form
1-5	Accounting Personnel	Record and prints out → Request Form		
1-6	Accounting Personnel			

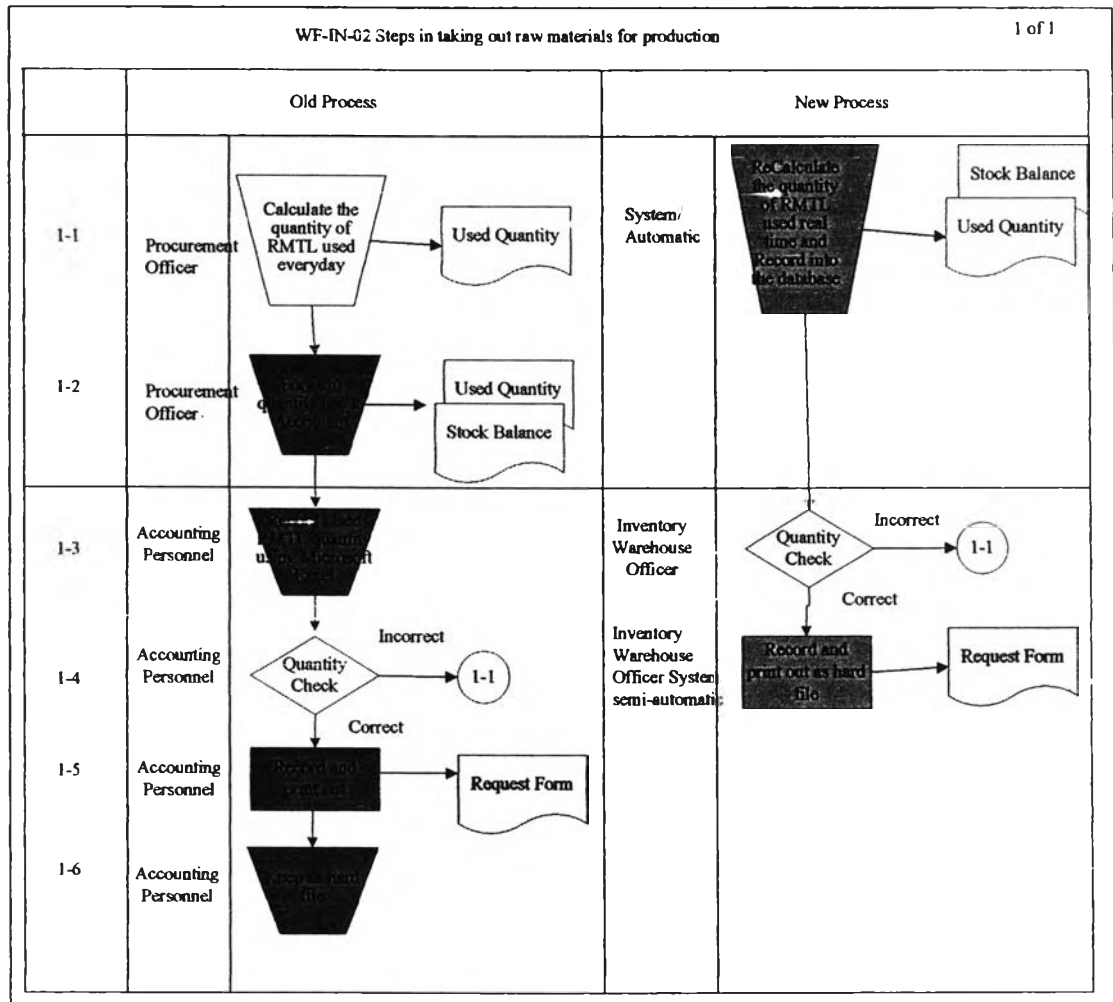**Figure 4-14: BPs comparison of old and new flow in taking out raw material for production**

In the old flow work process (step 1-1 and 1-2 in the figure 4-14), this was another culprit in the raw material stock inaccuracy, delay, production inaccuracy and improper raw material management. In the previous flow chart there was only recalculation of both on hand and used raw material at the end of the day,

however in the real circumstances there were usually inconsistent use of raw material for production.

The production manager could not know the amount of the raw material on hand unless he call up the procurement officer accounting personnel at the main office which had a copy of hard file of not up to date information. The production manager also could not know the arrival time of raw material unless critically check with the personnel in charge or checking out the out going purchase order. This make production planning with or without sales forecast very difficult.

According to the new work process when the production department takes out the raw material and key in the numerical usage, the system would automatically recalculate the amount of raw material available in stock.

Since the production, raw material warehouse officers and procurement officers all share the same real time database provided by the new ERP system, they all now can see the same information at the same time. This makes both production and procurement management much easier as the procurement officer would know real time when there would be depletion of raw material on hand and outgoing purchase order could be done in the middle of the day where there would be time for raw material delivery (instead of having to wait for the next day because information is only available once a day). This speed up production and increases the flexibility in the production management and production line. The physical check of the raw material in step 1-3 was just a confirmation of what was in the database.

iii. IN-03 Flow of taking out materials for production

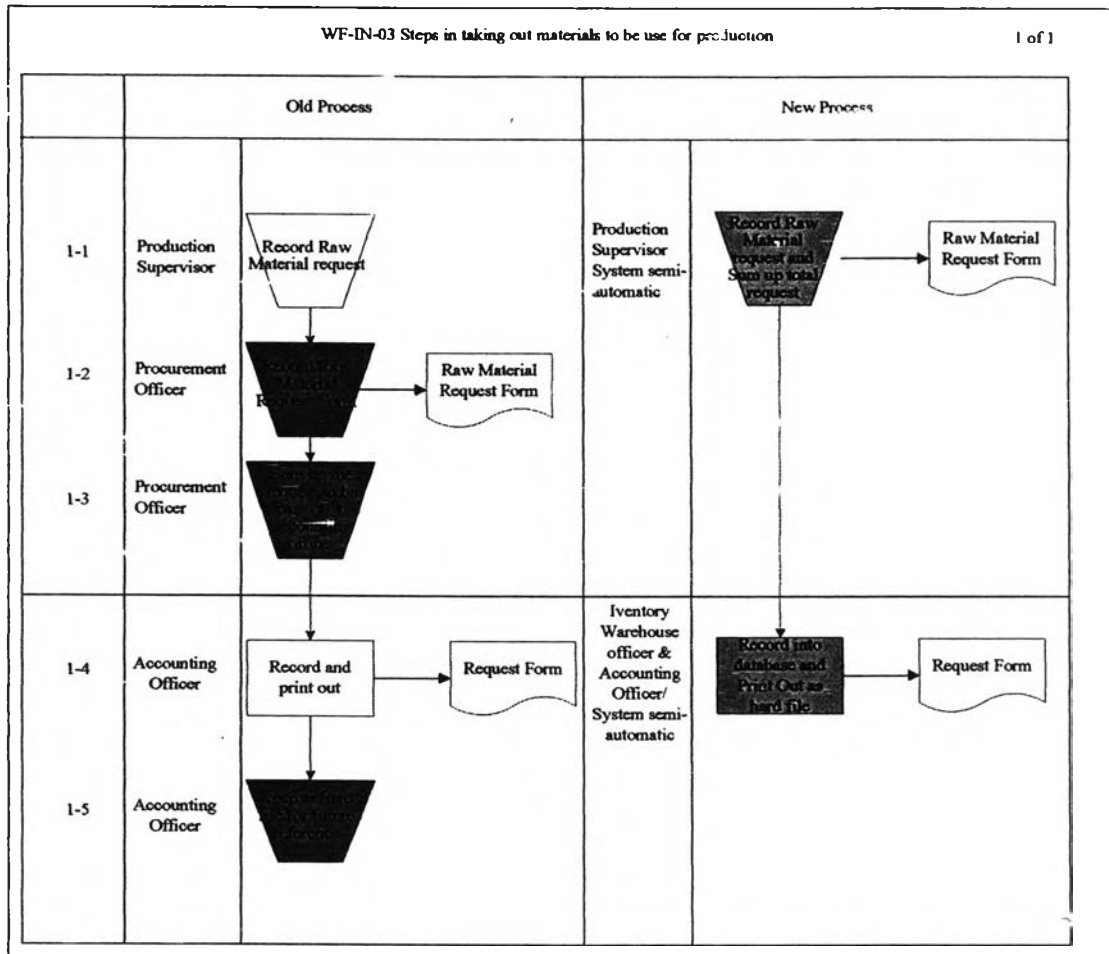**Figure 4-15: BPs comparison of old and new flow in taking out raw material for producito**

4.5.3   Purchase Order (Outgoing) Management BPR

The third BPR would be on the purchase order management processes of the company, which could be subdivided into two main processes which were, one flow in ordering raw materials and accessories which were to be use in the factory PO-01 and two flow in receiving them naming PO-02.

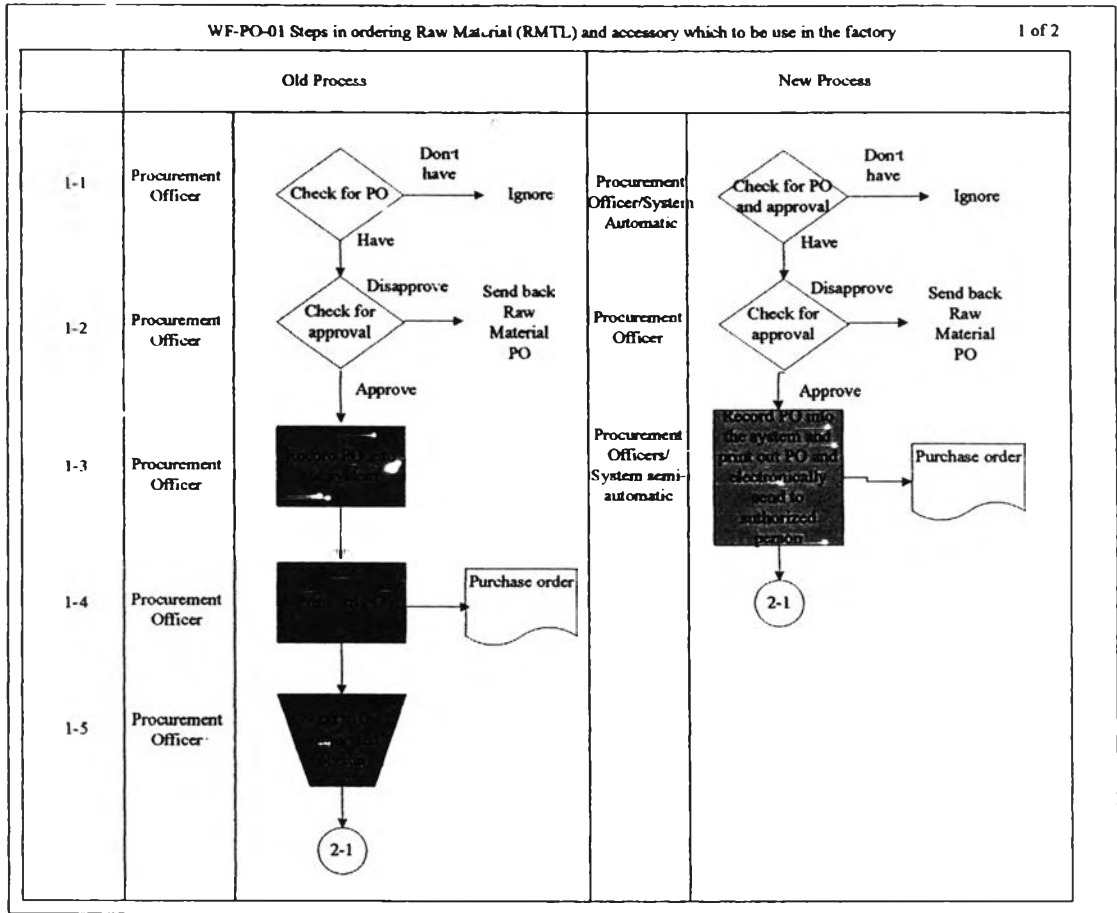## i. PO-01 Flow in ordering raw materials and accessories

		Old Process		New Process
1-1	Procurement Officer	Check for PO — Don't have → Ignore / Have	Procurement Officer/System Automatic	Check for PO and approval — Don't have → Ignore / Have
1-2	Procurement Officer	Check for approval — Disapprove → Send back Raw Material PO / Approve	Procurement Officer	Check for approval — Disapprove → Send back Raw Material PO / Approve
1-3	Procurement Officer	Record PO into the system	Procurement Officers/ System semi-automatic	Record PO into the system and print out PO and electronically send to authorized person → Purchase order
1-4	Procurement Officer	→ Purchase order		
1-5	Procurement Officer	→ 2-1		2-1

Figure 4-16: BPs comparison of old and new flow in ordering raw materials (1)

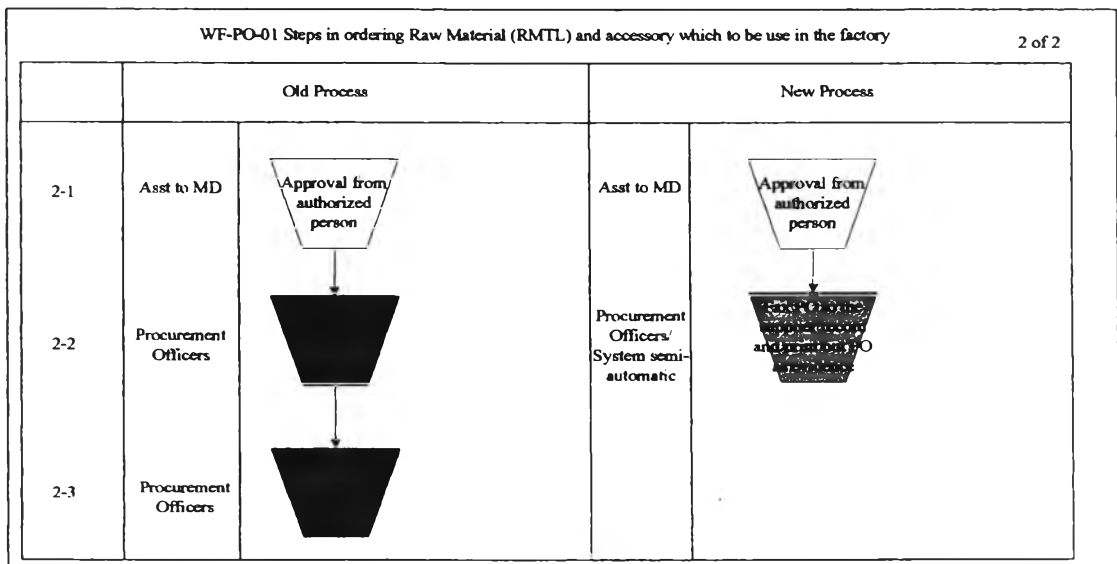|		Old Process		New Process
2-1	Asst to MD	Approval from authorized person	Asst to MD	Approval from authorized person
2-2	Procurement Officers		Procurement Officers/ System semi-automatic	Record PO into the system and print out PO electronically
2-3	Procurement Officers			

Figure 4-17: BPs comparison of old and new flow in ordering raw materials (2)

In the old work process, the outgoing PO had to be sent back and forth between the factory (procurement department) and authorization department which was located in the office. This causes delays and high volume of raw material stock on hand was required as a buffer to ease off production demand variations.

In the new flow the system would automatically check for PO if there were to be any there would be alert in the 'inbox' of the procurement officer. The procurement officer would then check whether there was electronics signature from the requested department manager, if there were approval then the procurement officer would certify the PO. Afterwards the system would automatically take care of the PO recording into the system as pending order, print out the actual PO for the procurement officer to keep as hard copy for record keeping, and one more being sent electronically to the inbox of the authorized person.

If the authorized person approved the order one copy would be automatically print out for record keeping and one will be automatically fax to the supplier according to supplier code and vendor.

The new work process would solve the following problems.

- Shorten the outgoing PO cycle
- Real time information i.e. the production department would be able to plan ahead with higher accuracy to meet the market demands
- Reduction of raw material stock on hand as the buffer for production (demand) variation could be better manage and reduce

ii. PO-02 Flows in receiving ordered goods

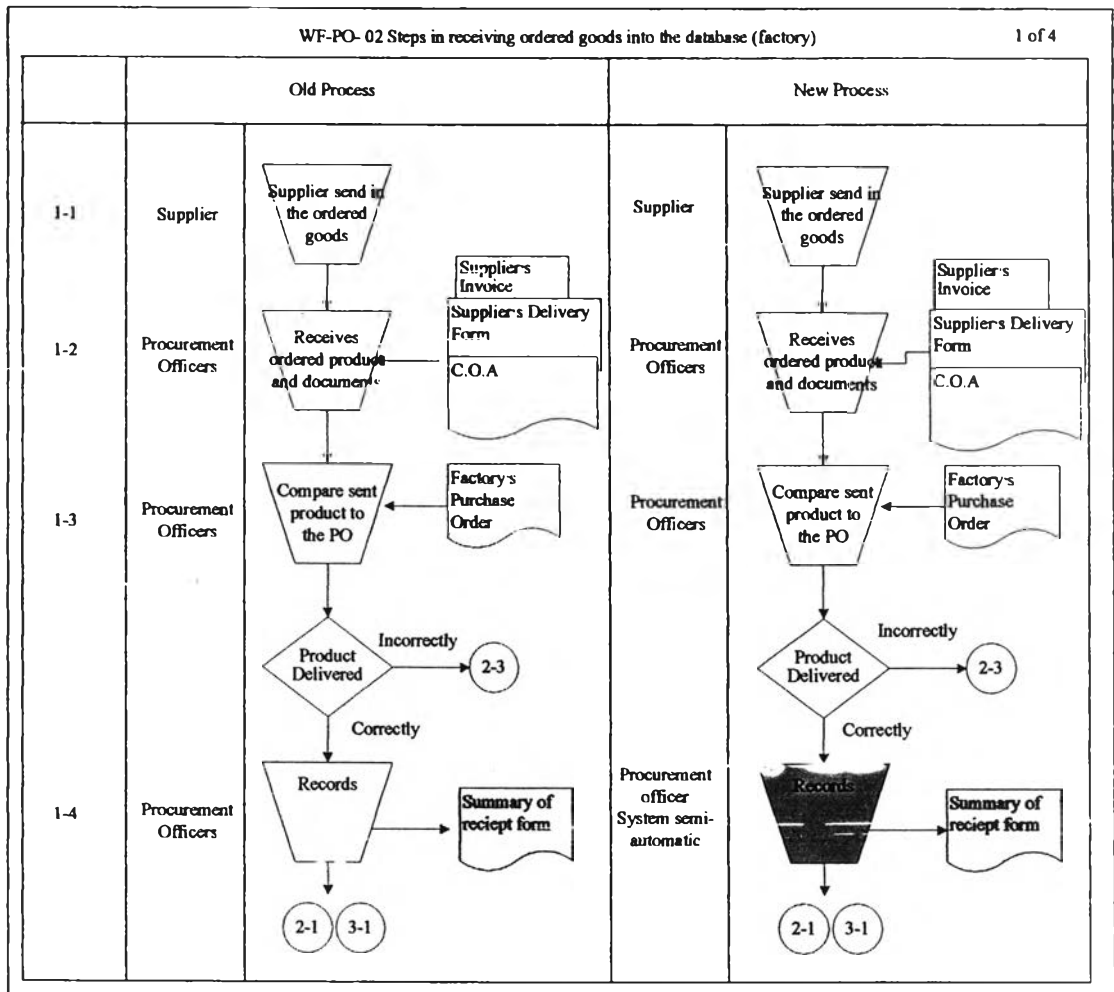This involved the steps of taking in the ordered raw materials from the supplier into the factory.

Figure 4-18: BPs comparison of old and new flow in receiving ordered goods into the database (1)
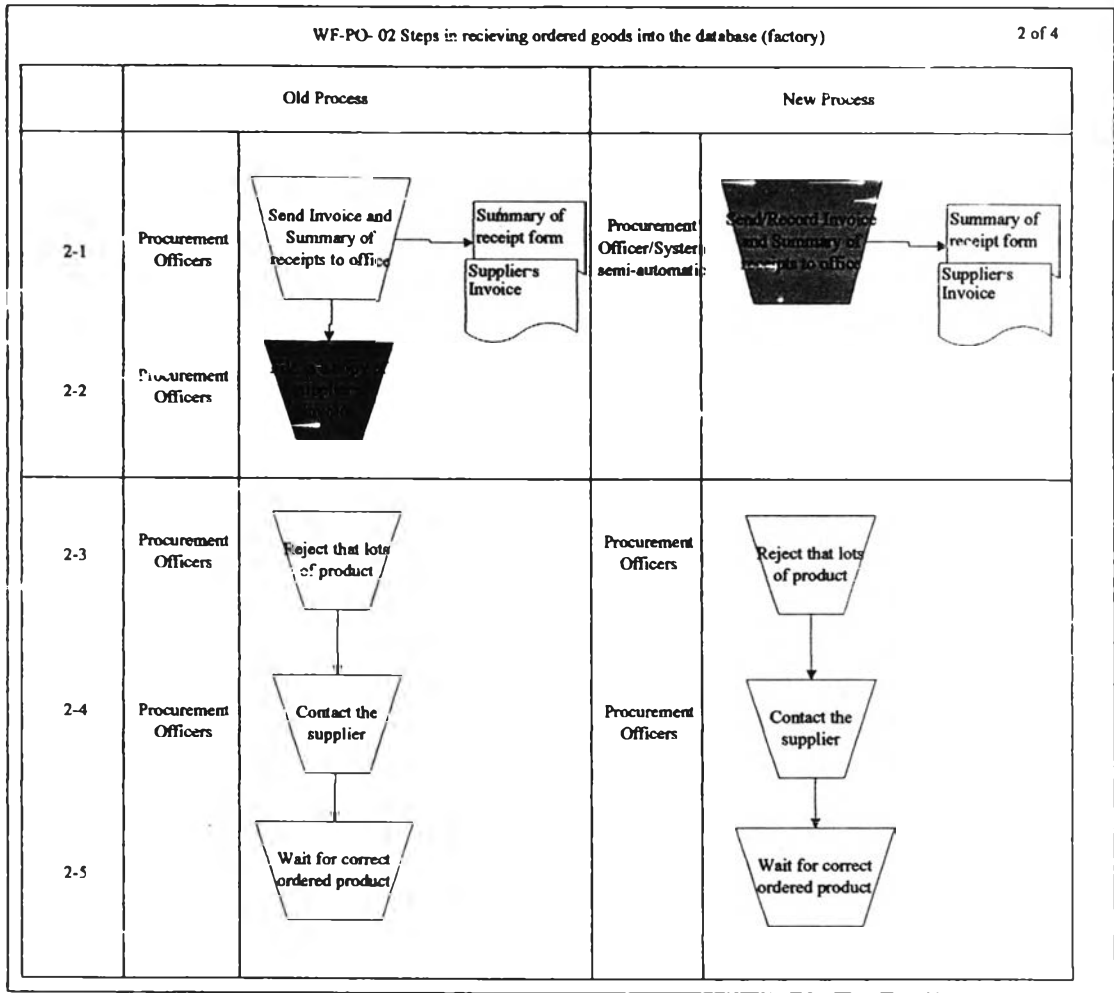
WF-PO- 02 Steps in recieving ordered goods into the database (factory)			2 of 4

		Old Process		New Process	
2-1	Procurement Officers	Send Invoice and Summary of receipts to office → Summary of receipt form / Suppliers Invoice		Procurement Officer/System semi-automatic	Send/Record Invoice and Summary of receipts to office → Summary of receipt form / Suppliers Invoice
2-2	Procurement Officers				
2-3	Procurement Officers	Reject that lots of product		Procurement Officers	Reject that lots of product
2-4	Procurement Officers	Contact the supplier		Procurement Officers	Contact the supplier
2-5		Wait for correct ordered product			Wait for correct ordered product

Figure 4-19: BPs comparison of old and new flow in receiving ordered goods into the database (2)

WF-PO- 02 Steps in receiving ordered goods into the database (factory)

		Old Process			New Process	
3-1	IQC officer	Receives C.O.A	C.O.A	IQC officer	Receives C.O.A	C.O.A
3-2	IQC officer	Sort product into categories		IQC officer	Sort product into categories	
3-3	IQC officer	Measures various property according to the standard		IQC officer	Measures various property according to the standard	
3-4	IQC officer	Record down measurement taken	RMTL IQC Form	IQC officer System semiautomatic	Record down measurement taken	RMTL IQC Form
		4-1			4-1	

Figure 4-20: BPs comparison of old and new flow in receiving ordered goods into the database (3)

WF-PO- 02 Steps in receiving ordered goods into the database (factory)

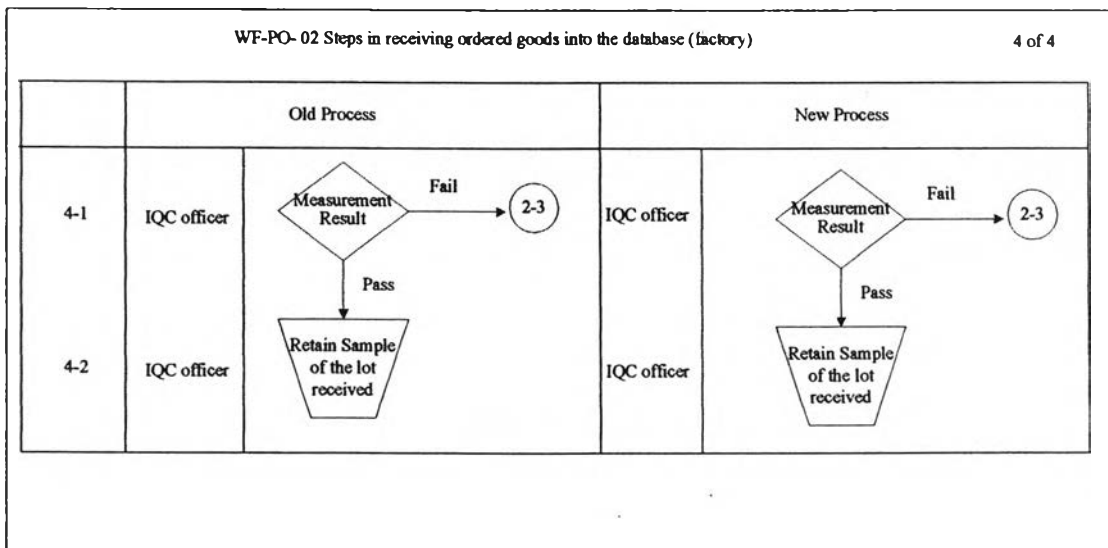|		Old Process			New Process	
4-1	IQC officer	Measurement Result	Fail → 2-3	IQC officer	Measurement Result	Fail → 2-3
4-2	IQC officer	Pass → Retain Sample of the lot received		IQC officer	Pass → Retain Sample of the lot received	

Figure 4-21: BPs comparison of old and new flow in receiving ordered goods into the-database (4)

4.6 Change Management (Risk Management 2)

In this section, all changes occurred prior and after ERP system implementation shall be discussed. As a result of section 4.3 BPR there is changes made to the old BPs and job descriptions of various end-user impacted by the ERP system implementation. The result is most of the end-user are now more business oriented and no longer functional oriented and less formalization. The sale agent are no longer sale agent, there scope of work change dramatically from just receiving phone calls and jot down the order on to a sale order form to small business entrepreneur, having higher responsibilities, in order to take care all the customer requests.

Therefore, repeating Robbins (2001:430), "An organization's is a mean to help management achieve its objectives. Since objectives are derived from the organization's overall strategy, it is only logical that strategy and structure should be closely link." The ERP implementation calls for changes in BPs, job description, organizational structure and culture.

4.6.1 Change in Organizational Structure

The current organization structure can be described as high vertical hierarchy traditional rigid structure. The current structure consists of clear cut delineated jobs, formal chain of command for control i.e. decision making processes are made from top down. For an example, the credit control AR officers need to receive authorization from the sales manager in order to expand a customer's credit, or the warehouse officers needs the authorization of the managing director or the sales manger before allowing the return of goods.

Following the BPR made, we can see that there is a lot of elimination of steps. Employees are having wider scope of responsibility which means higher power of decision making. This calls for a change from the current mechanistic structure in to a more flexible, less rigid organic structure. This would allow more participative form of

management. As analyzed in chapter 2 the organic structure is flatter with minimal level of management i.e. flatter organizational structure. The changes that occur here is that the top and middle management must now allow decentralization of decision making power in order to be able the company to respond to the customer's request in much faster manner. The resistance to change which might involve here can be both organizational and individual resistance to changes. Individual resistance to changes and the recommendation methods in overcoming them are of the following.

- Selective Information Processing: This will occur in the case that the personnel both management and operation do not understand the need for the change of the organization structure. They tend to have their own individual perception of how the organization must work. In order to over come this the implementation team must clearly explain the benefits of the new BPs and the need for change in organization structure to fit in the new BPs.

- Fear of the unknown: This will surely occur when job description changes. The personnel do not know what will be expected of them in the future. The only way to overcome this fear factor, the implementation team must fully explain the benefits of the new BPs, structure (more skill) how will the system generate more company's income and how every one will benefit from it.

- Economic factor and Security: As there will be change in job descriptions. According to the new BPs, most of the end-user involved have wider range of job descriptions which mean the personnel might expect more salary. Vise versa those minority who has their job description cut will start asking, will their job be eliminated, or will there be shrink in salary, or will be there be cut in this year bonus etc. The way out is the implementation team must work closely with the top management executives in order to, one convinced them of the benefits of the new BPs, two revise, plan and explain the change of end-user position within the organization, their income change before actual implementation.

- Habits: People get adapted and use to routine. The changes in BPs would not result in elimination of routine, but instead a newer, more flexible, efficient

routine is developed. The implementation team must acquire and gives good hand on training in order for the end-user to be able to see the benefits and get adapted to the new work routine.

Organizational resistance to changes and the recommendation methods in overcoming them are of the following.

- Threat to Established Resource Allocation and Threat to Established Power Relationships: When change from mechanistic structure to organic, flatter organizational structure the span of control will be widened and the decision making power will shift from one to another and resource allocation will also be changed. The sale manager will now be control of his sale force only and will not be able to deal with the company's accounting system. This change in organization structure change the established power relationship and resource allocation i.e. the inventory database will be situated at the factory instead of the office. In order to overcome these resistance forces, the implementation team must clearly explain the benefits that the new will have an effect on the company.
- Threat to Expertise: The ERP system is new, the current IT department supporting the company's current information system will be obsolete. Their knowledge is no longer adequate to the requirement of the new system. The current IT personnel must be upgraded given the trainings in order to over this resistance.
- Group Inertia:
- Limited Focus of Change:
- Structural Inertia: Successful ERP implementation in the ABC Paint Co., Ltd will needs the transformation of the current mechanistic vertical hierarchy organization structure to less rigid and formal organic structure.

4.6.2 Change in Organizational Culture

As mentioned in chapter 2 the cultural management and change is vital for the ERP system implementation to be successful. Please refer to chapter 2 for more in-depth theoretical consideration of the organization culture.

Current culture within ABC Paint Co., Ltd can be described following Hofstede (1980) definition of factors making up culture as the following. Please be noted that the level of these factors are very difficult to quantified therefore the author of this research is employed by the company, the author will personally comment on the current culture (its degree) and what can be done in order to achieve the desire culture.

- Power Distance: The power distance in the ABC Paint Co., Ltd is large. This is the result of the current mechanistic structure which promotes high hierarchy and vertical and rigid span of control. As mentioned in the last section, the organization structure will be change to support the new BPs and the ERP system. In order to cope with this change the new culture must be employed. The management must now be more open, allowing debate of decision making. Trainings and trust is important. In order for the top management to pass on the decision making power to lower level of employee, the top management must believe, trust and assure that the employee will utilize that power ethically, un-biased, honestly and to the company's advantage. In order to have these training of new skills and communication is crucial. Once the top management and the employees sees the same picture then the right culture can evolves.
- Uncertainty avoidance: The current uncertainty avoidance within the company is moderate or screwing towards the low side. As this is a measure of how a company dealt (avoid or face) with crisis or problem, this is already the desired culture within the company prior the ERP system implementation.
- Individualism versus collectivism: The current degree of individualism and collectivism within ABC Paint Co., Ltd can be divided into two. Those with supervisory and middle management post and above tend to contain

collectivism culture and those lower down tends to be more individualism. Setting the right Key Performance Index so that everybody sees the same target should make overcoming the individualism culture easier.

- Masculinity versus femininity: ABC Paint co., Ltd can be described as a company of result. Managers and employees are judged by numerical effort and performance. However personally the author feels that among staff within the same department there existed certain degree of femininity. This is suggested to be the influence of Thai culture. The desire culture of the ERP system implementation is a mix of both. The implementation team must be materialistic outcome orientation enough to crunch out the promised return on investment, meet deadlines yet express caring and nurturing when difficulties arise.