4.0 Business Process Reengineering in ABC

4.1 Purpose
4.2 Preparation for Change
4.3 The Design Stage
4.4 The Implementation Stage
  4.4.1 Stage 1: Restructuring the Engineering Dept
  4.4.2 Stage 2: Restructuring the Works Dept
4.5 The Evaluation Stage
4.0 BUSINESS PROCESS REENGINEERING IN ABC

4.1 Purpose of Reengineering

In 1996, ABC saw declining sales margins by RM 14m from 1995 due to complacency, falling productivity, costs of reworks and increasing cost of labour. Shareholders were also concerned with the dip in profits as the Malaysian economy was still considered good. Recurring late deliveries and customer complaints had prompted the CEO to take firm and concrete steps to engineer a revival.

There was an urgent need to provide timely response to the changing needs and tastes of the customer. This was in line with ABC’s mission to respond to customers needs with high quality and cost effective switchgear.

4.2 Preparation for Change

In late 1996, Roger, the CEO went to the United Kingdom and Australia to attend courses on business process reengineering before embarking on the project. Upon his return in November that year, the top managers comprising all the heads of departments (Finance, Sales, Engineering, Works, R&D and Materials) and the GM convened for four consecutive weekly sessions with the CEO. In these sessions, the group brainstormed on the problems of ABC and explored possible solutions. The operational problems resulting in late deliveries and increased cost of quality were quite apparent to both management and the workforce.

Roger unfolded his newly acquired master plan on reengineering the corporation and held lengthy debates with the top management to induce a
buy-in of the concept presented.

The plan was as follows:

1. Start with core processes
2. Involve top executives in design of new processes
3. Senior managers must change, become role models
4. Agree on corporate values, then design corporate architecture
5. Communicate business plan
6. Taskforce to design work processes

In his viewpoint, ABC was at the matured stage of its corporate lifecycle as depicted in Figure 3; characteristics at this stage were a strong administrative concern over other factors such as productivity, integration or entrepreneurship. This chart was familiar to the people, as ABC had managed the company based on Adizes methodology, a diagnostic and organisational therapy. According to Dr Ichak Adizes, there are four management roles to be performed for business success both in the short and long term, i.e., Produce, Administer, Entrepreneur and Integrate. During every stage of the lifecycle, one role dominates the rest. For example, during the initial stage, the entrepreneurial spirit is dominant.

![Figure 3. Adizes corporate Life-cycle](image-url)
It remained the decision of the people within the company to project themselves further up or to follow the inevitable fate of decline as shown in Figure 4 below, corporate lifecycle. The lifecycle of a company is therefore not one of fate, rather its workers can determine its destiny. It was this belief that the CEO chose to convince the top management of the need to change. How a company prolongs the lifecycle is how much effort and energy the top management put in to steer the course of its history.

Figure 4. Corporate Life Cycle with characteristic properties
4.3 The Design Stage

The CEO masterminded the plan and design of the whole reengineering exercise. The initial focus was on the value chain where the core processes were defined, i.e., Sales (quotations and orders), Operations (Project Engineering, Manufacturing, Tests) and outbound logistics (despatch). Thus, ABC operational problems were identified in these processes. Sales logged on inaccurate orders or provide insufficient details for the Engineering Dept. to work on. The Engineering Dept. produced inaccurate drawings and incorrect bills of materials. Manufacturing delays and quality problems were rampant. Testing team had insufficient time to conduct all the tests.

Figure 5. ABC's core and non-core processes.

**CORE PROCESS** = process by which the organisation creates its essential transformations of input to output for its customers

Quotation → Order → Project Engineering → Manufacture → Tests → Despatch

Non-core processes: Materials, Accounts, MIS, HR, Training, R&D
The business profile of ABC in Figure 6 reflected the direction of the company. The 3-year vision was ambitious, but the CEO explained that this vision could be achieved with fundamental changes in mindset. This was the purpose of the reengineering project that had to be undertaken. Engineering Dept. where the upstream work commenced with the hand-over from Sales Department was the guinea pig in this reengineering.

*Figure 6. ABC Business Profile*

**3 -5 year**

**Vision**

**RM400m**

- Intl ops 37%
- Export 19%
- Non Util 14%
- Util (Ind) 10%
- Util (D) 20%
The Old Engineering Dept.

The Engineering Dept before the reengineering was sub-divided into different sections comprising the design section, Bill of material (BOM) section, Projects handling section, test and service sections. The workflow was such that the orders were handed over by the Sales Dept. to the Projects section. The project manager in turn delegated work out to the respective parties involved, i.e., the Design section came up with the design and drawings, BOM section generated the material lists from the drawings, Materials Dept. bought according to the BOM listings, and Works Dept. fabricated according to the drawings. Thus the Project Section was in fact the coordinator to ensure the smooth running of the projects viz., accuracy, quality and timely completion.

Figure 7. Old organisation chart of the Engineering Dept.

As there were so many projects involved, the coordination work was complicated and delays became an everyday nightmare for the Engineering Manager, Mr. Moh. He had to attend to customer demands and hence, at one point in time, he was so bogged down with juggling the production schedule to suit customers' schedules. This was a difficult task, as his promises to the customers could not be kept, as Production seemed to be embroiled in one problem after another such as material shortages and incorrect materials.
Reengineered Engineering Dept.

In the reengineered Engineering Dept., the Projects section was taken over by the Sales Dept. and renamed Contracts Management Team. The reassignment of function was necessary as the past records showed that designers were more concerned with technical issues neglecting the all-important aspect of managing the project and the customer. With this split, the designers could concentrate wholly on technical aspects while leaving the business concern to the newly formed Contracts department.

The old Design section was restructured into 4 teams defined by product grouping to give a sense of ownership to the individual teams, VCB, LV, IS and Bus. VCB handled all items related with vacuum switchgear, while LV handled the low voltage portion. PEP handled international operations and Ring Main units and Bus the busduct related items. This focus approach ensures that the various teams could build up their expertise without having to many product variations, which led to confusion and errors.

These four Applications Teams together with the Test and Service Teams form the new Engineering Dept. as in Figure 8.

Figure 8. New Engineering Department

```
Engineering Mgr (Mr Moh)

Applications Chief Engr
Testing Team
Service Team

Teams
VCB LV Bus PEP
```
Reengineered Works Dept.

Similarly, the Works dept. was redesigned according to the Product Groupings. However, the big shift for Production is the emphasis on modularization to ensure flexibility and timely delivery as described in the later section.

Figure 9. Old Works Set-up: Controller by Parts Grouping

![Diagram showing controller hierarchy with Master Controller, Controller A (Sheetmetal), Controller B (Copper), and Controller C (Insulation Materials).]

Figure 10. New Works Set-up: Controller by Product Grouping

![Diagram showing controller hierarchy with Master Controller, Controller A: VCB, Controller B: LV, and Controller C: Busduct & RMG.]
4.4 The Implementation Stage

4.4.1 STAGE 1: Restructuring the Engineering Dept.

Backed by a well-informed top management after the four weekly brainstorming sessions, Roger embarked on the first phase of the reengineering, restructuring the Engineering Dept. A group comprising the main participants, i.e., the engineers, the top management, and representatives from the various departments, Sales, Works and Materials convened at the Holiday Villa in December 1996 to hear what the CEO had to say. Already in the past couple of months when the senior managers met with the CEO, the rest of the organisation had anticipated this restructuring through the office grapevine. Many were apprehensive about their jobs and the changes that were to come. The morale was low and most adopted a couldn't-care-less attitude.

Communicating the Plan

By telling a compelling story, Roger delivered the imperative for a change programme. Change, according to the CEO was very much a part of the Chinese culture. From the time of Confucius, I Ching (Book of Change) had been a much-consulted book. Therefore, change was very much a fabric of our lives.

The group was told the story of Dekan, the tailor, who worked hard and had his share of the success but began to face operational woes, which drowned his attempts to survive. This was the story of ABC. Having enjoyed early successes, the company had grown big and was now infested by problems of its own doing. The group also realised the need to change in this mature stage of the corporate lifecycle.
Defining core processes in the Value Chain as shown in Figure 5 and relating its importance to the company’s business profile as in Figure 6 gave the group a clearer picture of the changes that were to come. The CEO obtained the participation of the group by putting them into work groups to envisage the next three years' business. Each workgroup comprises 10 employees from various sections. Each group was given a product line and asked to project its expectations of the product growth over the next three years. Given this time to build dreams, the groups began to relax and enjoy the session. With this kind of participation, Roger as integrator, managed to diffuse their fears of the reengineering exercise and gained their acceptance of the changes that would affect their work environment.

The Taskforce

A Work Process design team of ten members was formed. It was headed by Mr. Moh, the Engineering Manager and comprises the various section heads of the Engineering Dept and representatives of the other departments. At twice a week meeting, the target was to complete the system design and documentation for implementation in a 2-month timeframe.

The tasks of the team were spelt out as follows:

i) Design process flowchart
ii) Define duties of each section and interfaces with other Dept.
iii) Recommend staffing level
iv) Draw up IT requirements
v) Draw up space design
vi) Draw up schedule of implementation
Throughout the next two months, Roger made sure that he attended every meeting. His presence was a great help to the taskforce as he was clear on what needed to be changed. However, the drawback was that others were affected by his presence and tended to be more subdued. The opinion was that it was not the group that decided but the CEO.

The results of the tasks undertaken by the workforce were as follows:

**i) Design of Process Flowchart**

The process flowchart of the Engineering Dept was discussed at length and revised as follows:

Figure 11. Old process FlowChart

```
\begin{tikzpicture}
    \node (customer) {Customer};
    \node (projects) [below of=customer] {Projects Section};
    \node (design) [right of=projects] {Design Section};
    \node (bom) [below of=design] {BOM Section};
    \node (materials) [right of=bom] {Materials Dept.};
    \node (testing) [below of=projects] {Testing Section};\node (works) [below of=testing] {Works Dept.};
    \draw[->] (customer) -- (projects);
    \draw[->] (projects) -- (design);
    \draw[->] (design) -- (bom);
    \draw[->] (bom) -- (materials);
    \draw[->] (projects) -- (testing);
    \draw[->] (testing) -- (works);
\end{tikzpicture}
```
The new flowchart incorporated the split between Contracts and Engineering Dept, the interactions of the Applications Sections with the various departments.

Figure 12. New Workflow

CUSTOMERS

CONTRACTS

- Std Product: Vehicle/Bus/duct
- Order Received
- Review Order
- Commercial/Technical
- Lead Time of Long Lead Items
- Production Capacity
- Selection of Vendor
- Finalised Order Bank
  Production Capacity with Production
- Create Project Part No
- Key Order
- Organise Kick-off and Handover Meeting
- Handing All Communication with Client

ADDITIONAL REQUIREMENT
DIRECT FOR BOUGHT-IN ITEMS

- Kick-off Meeting
- Discuss & Agreed Delivery
  on Commercial & Scope of Work
  Material, Supply, Testing, Packing,
  Inspection, Place, Decide Vendor

VENDOR DIRECTLY

CONTRACTS

- Project Closing Review

DELIVERY

PACKING

APPLICATIONS

- Understanding Spec & Deviation
- What/when/how much to buy materials
- Handle Correspondence with Suppliers
  for New or Special Requirements
- Timely Completion
  Project Bom/Dwg
  Complete Dwg

APPLICATIONS

- Create Part No when Requested

APPLICATIONS

FINAL VISUAL INSPECTION

WITNESS TESTING

PRETEST

PRODUCTION

- Production
  - SOE Coordinator to Inspect

DELIVERY

PACKING

ADDITIONAL REQUIREMENT
FOR ONE-OFF PRODUCT

- Discuss with Burst
  RAJA/COMBOPY TEAM

CONTRACTS

- SOE (ERP)
  - Order Received
  - Review Order
  - Commercial/Technical
  - Lead Time of Long Lead Items
  - Production Capacity
  - Finalised Order Bank
    Production Capacity with Production
  - Key Order
  - Handling All Communication with Client
ii]  *Duties of the Applications and Contracts*

Applications Teams had to generate project drawings, create sub-assembly drawings and assign part numbers to all component parts. The team had to build up BOM structures. In-depth technical knowledge was important to ensure cost effective designs. The team would also make purchase decisions. The four teams viz. VCB, LV, Bus and PEP were assigned product lines to look after.

Contracts team was responsible for the critical review of customer orders in terms of commercial laws, technical requirements and production scheduling. Contracts team was required to liaise with customers and authorities on all technical and commercial issues.

iii]  *Staffing Level*

Generally, the individual sections were not satisfied with their numbers. VCB team wanted two more draughtsmen and LV one more Applications assistant but their requests were not entertained as the team leaders did not provide good enough justifications. However, at a later stage, approval was given for this increase in manpower when the project was implemented.

<table>
<thead>
<tr>
<th>Teams</th>
<th>Manpower</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCB</td>
<td>17</td>
</tr>
<tr>
<td>LV</td>
<td>8</td>
</tr>
<tr>
<td>Bus</td>
<td>4</td>
</tr>
<tr>
<td>PEP</td>
<td>3</td>
</tr>
<tr>
<td>Contracts</td>
<td>6</td>
</tr>
</tbody>
</table>
iv] **IT requirements**

Computerisation of the Design Office with a local server to meet the needs of the Application team was a good initiative. Time saving was obvious but precautions had to be taken to ensure that drawings were not lost. The management was generous with the provision of computer. LV had wanted one more computer and this was given too.

**Figure 13. Proposed Networking System For ABC**
Table 6. Old Computer Allocations

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOM</td>
<td>7</td>
</tr>
<tr>
<td>Clerical</td>
<td>4</td>
</tr>
<tr>
<td>Design Section</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>

Table 7. Proposal for Computer Allocations

1 no. Server with 18 nos. computer terminals
1 no. hub with 16 MRP points
39 nos. cabling points for terminals
39 nos. network cards
1 no. networking software

v] Seating Arrangement
There were no complaints with the seating arrangement and all were happy with their new office layout as the furniture was new.

vi] Schedule of implementation
Implementation of the new structure was immediate, after the office renovations were complete which was in March 1998.

At the end of the stipulated period, the group reconvened for a presentation by the taskforce. Mr. Moh concluded his presentation by showing a video clip on the three monkeys. This was the story of how one monkey had at first drawn water from the well only to find that his friends consumed it. He managed to convince one to help him fill up the water jar only to find that it was all consumed too fast. The third monkey was required to help out and but they were unable to persuade this monkey to co-operate and instead,
each ended up collecting his own until one day, a fire engulfed their home. The lack of nearby water supply forced all to evacuate and then, they learnt that co-operation could have saved them from having to start building up their house once again. He used this video clip to demonstrate the need for greater co-operation within ABC although many were sceptical over his story. Many thought that the story was inappropriate.

4.4.2 STAGE 2: Restructuring the Works Dept.

The Works Department was reengineered at the second stage in May 1998. Once again, key personnel were called in for a preliminary round of buy-in. Alex, the Works Manager together with the heads of other departments convened to design the flow of the Works reengineering. The Works department adopted a different approach to their problems; they had highlighted that much of their problems were related to the Engineering Dept. and they should attack these areas first. However, Roger had wanted a wholesome approach and thought that the exercise should go in the same manner as what the Engineering Dept. had undergone.

En. Kasim was in charge in this second stage of the reengineering process. The top management team was once again inducted on the objectives of the reengineering, similar to that experienced during the first stage of the reengineering. A plan was drawn up to facilitate the project execution of the selected teams:

Form teams by product groups to develop responsive/efficient methods of producing each product within market constraints.

The 4 teams present their recommendations to the combined groups.
Form taskforce to develop a workable, effective and efficient production organisation structure for Works Dept. and the relevant tools required
Taskforce to present to the Works Dept for comments and acceptance
Implement new structure
Device performance measurement tools with the individual work sections.

Buy – in of the Works Dept.
A buy-in session was held in Hotel Hyatt Saujana in mid 1998 for the works Dept., similar to that conducted for the Engineering Dept. The supervisors and management teams of the Works Dept. were present together with the CEO, top management and representatives from the various departments. Here, those present were once again sub-divided into groups as in the Reengineering Exercise by the Engineering Dept. to allow them to voice out their ideas on the restructuring of Works Dept.

The plan as agreed by the top management was shown to those present at the session.

Formation of working Teams
Four working teams were selected, viz., VCB, LV, Bus and Ring Main Unit sections. For the next three months, these teams debated on the work procedures, flow and timeframes. They were given total freedom to redesign according to what they envisage would bring about profitable growth. According to the foregoing plan, these working teams presented their findings after three months of intensive work.

Presentation by these working teams in NPC Hotel in mid Aug 1998 drew positive and constructive comments from the senior management although modifications to their recommendations required a second round of presentation.
Formation of Taskforce

During the round of presentation by the working team, the taskforce for restructuring the Works department was selected. Again, this cross-functional team which made up the taskforce, worked to restructure the processes, bearing in mind the requirements and recommendations of the working teams. Identification of bottlenecks (sheetmetal assembly was always late in delivering their parts) and existing problems (jobs deferred, last minute changes by customer, duplication of BOM, unknown capacity) threw light on the areas requiring attention.

Another three months of biweekly meetings culminated in a final presentation. The recommendations included:

- Modularity of Assembly
  Before the reengineering, production was job based; drawings were sent to the sheet-metal section for fabrication of the necessary parts. This meant that the supervisors had to know which batch was for which job. Being job-based had its advantages as it meant errors were easily covered up. There were indeed a lot of delays and wastage in this old method.

By introducing work-station, sub-assembly and final assembly, the modularity of such an approach allows much flexibility. Last minute changes by customers were made possible without severely affecting Production time. In the job-based assembly, any changes resulted in excess parts, which had to be reallocated. Supervisors did not have the spare time to complete this, meaning excesses were left to pile up at the Production floor.
Work stations allow the workers pride of ownership and a more focussed approach. Instead of depending on drawings to assess what to make, Controllers need only to send their work orders to the work station to inform them on quantity to make. This saves the worker time to assess the number of parts to fabricate.

Sub-assemblies were also framed in the same way as work station; the only difference was that the sub-assembly section built up the modules for eventual combination with other modules to make a final product.

Finished product assembly is the final stage of production where the various modules were built up based on the jobs. Waiting time was greatly reduced and supervisors could assemble in a shorter time thus making it possible for last minute customer requests to be entertained without causing an upheaval to the section.

*After: Future Work Environment ©*
Flow from Workstation to Sub-Assy

From Workstations

Sub-Cubicle Assy

To Finished Products

Flow from Sub-Assy to Finished Products

Shutter Assy

Wiring Assy

PDS Assy

Breaker Assy

To Testing & Delivery

Finished Products Assy
One common Material list
As mentioned earlier, Production did not have confidence with the bill of material listed by the Engineering Dept and had generated its own material list for fabrication purpose. Furthermore, the BOM lists were not user-friendly and only designed for procurement purpose. Together with the Engineering dept., a new BOM which suit the Production processes was required to reduce much of the time spent in duplication.
• Capacity management

In the past, it was always difficult to assess the production capacity and oftentimes, promises of delivery to customers were not kept due to the initial optimistic assurance of the Production Controller. With capacity management, timeframe for work processes were reviewed and thus, this accuracy meant better forecasts and scheduling. A team of manufacturing specialists was formed to come up with the figures. This was done over a period of two months.

**Usage of Capacity Data**

![Diagram of capacity data flow](image)
Sample of Capacity & Work Order Screen

<table>
<thead>
<tr>
<th>Sub-ID:</th>
<th>Task Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>90 WELDING</td>
</tr>
<tr>
<td>1</td>
<td>10 SHEAR</td>
</tr>
<tr>
<td>2</td>
<td>50 MILL - MAC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task Details</th>
<th>Start Date</th>
<th>Finish Date</th>
<th>Work Order ID</th>
<th>Seq #</th>
<th>Setup</th>
<th>Start Qty</th>
<th>End Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 WELDING</td>
<td>5/3/95</td>
<td>5/3/95</td>
<td>3001-2/1</td>
<td>40</td>
<td>No</td>
<td>25.00</td>
<td>25.00</td>
</tr>
<tr>
<td>10 SHEAR</td>
<td>5/3/96</td>
<td>5/5/95</td>
<td>3001-11/1</td>
<td>20</td>
<td>No</td>
<td>30.00</td>
<td>30.00</td>
</tr>
<tr>
<td>20 BRAKE</td>
<td>5/5/95</td>
<td>5/5/95</td>
<td>3001-8/1</td>
<td>20</td>
<td>No</td>
<td>30.00</td>
<td>30.00</td>
</tr>
<tr>
<td>30 DRILL</td>
<td>5/5/95</td>
<td>5/5/95</td>
<td>3001-11/1</td>
<td>20</td>
<td>No</td>
<td>30.00</td>
<td>30.00</td>
</tr>
</tbody>
</table>

---

File Edit Status Change Info Options View Window Help
<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>SEPT</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>start 1st</td>
<td>start 6th</td>
<td>start 3rd</td>
<td>start 1st</td>
</tr>
<tr>
<td>12kV S/B + Breaker</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36kV D/B + Breaker</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12kV D/B + Breaker</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36kV S/B + Breaker</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24kV + Breaker</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Plan
- Actual
The targets of the taskforce, viz., modular production, common material list and capacity management, were aimed at achieving flexibility through weekly buckets and cell formation (work stations, sub-assembly, final assembly). Such a restructuring would mean higher production volumes, timely delivery and greater efficiency through dedicated and focus control and planning.

Although certain parties at large displayed scepticism on the proposals, the CEO was always encouraging and appreciative of the team efforts. Sales Dept. was relentless in its criticisms during the presentation, making unnecessary suggestions that the plan would not work as it was all very conceptual. What they wanted to see was substantial increase in targets for production volume and detailed procedure to go about this objective. However, Works department was also constrained by their present capacity and any big increase would mean more expenditure that was not warranted since Sales was unable to commit their Sales forecasts. The quarrels amongst departments continued even as plans were ahead for the implementation.

4.5 The Evaluation Stage

The implementation of the plans for the Engineering and Works dept was not as smooth as the design stage. It was inevitable that the skills of some employees did not match the new jobs designed. The new reporting structure for the Contracts team had not alleviated the problems. Many problems relating to unclear scope of work led to frustrations by the newly formed groups. In the case of the Engineering Dept., the newly formed Applications Sections had to work closely with the Contracts Team. This was difficult as there were overlapping scopes of work. Although the
objectives for Applications teams were only to ensure drawing and BOM accuracy, they were heavily dependent on Contracts performance to perform a good job. Most times, they had to rush the Contracts staff to obtain information from the customer. Contracts whose duties were to negotiate with customers, were heavily reliant on Applications for technical matters and needed the latter to be present at negotiation meetings as well. The Applications Team felt that with the split, they were worse off as it did not offer the respite the designers were looking for. Such misalignments of systems, structure, skills and styles surfaced and had to be properly handled by the managers.

Lack of interdepartmental co-operation was apparent and it would appear that certain unhappy parties (those who fared badly in the restructuring, those who had their scope of work narrowed down and divided) wanted the reengineering project to fail. Criticisms from departments not involved in the reengineering viz. Sales and Materials were damaging as they expected overnight improvement.