CHAPTER 6

CONTEMPLATION OF OUR RECOMMENDED METHODOLOGIES

MIS CONTEMPLATION OF OUR RECOMMENDED METHODOLOGIES

PREAMBLE :

As a contemplation of implementation methodologies discussed in the earlier chapters, twc live cases are presented here which elaborate on suitable methodologies adopted in design, development and implementatiсn of MIS.

The representative examples are drawn from the different organisations having different hardware / software platform and altogether different organisational culture and business environment. The examples elaborate and explain the approach adopted in the systems implementation and overcoming the initial teething problems.

The first example is of a very unique integrated system developed in the area which was not even conceptualised earlier and to that extent it was a virgin system.

The second example is widely used Materials and Inventory Control system. The system is fairly standard but the situation and the environment in which it was implemented demanded special approach. The implementation methodology adopted in this case is far away from the text book process. And therefore it is reflected here which can act as guidelines for many others. (This impression got confirmed when this case was presented in IIMA by the author).

6.1.0 OUR RECOMMENDED METHODOLOGIES :

We have talked about arriving at the appropriate MIS considering the type cf the organisation, size of the organisation and magnitude of the activities. Here, we are trying to present two case studies - a live application developed for two different organisations. The recommended methodologies and the examples discussed here distinctly explain the following features :

1. Modular Systems Design to suit the organisation.
2. Process of Systems Analysis and approach for arriving at Design specifications.
3. User's interface and approach adopted to make the systems acceptable to the users.

These are fundamental issues for any systems project implementations and we have tried to elaborate the 'concept' that can help in implementation of a system. We have tried to clarify our methodology by elaborating these projects and their stagewise implementation. One message gets very clear that no matter how best system design you make it and put efforts for software developments, ultimate success is only if the system is implemented successfully.

In the following projects the thrust on implementation methodology gets very clear. And the first project is such where it gives the dimension of original contribution which gave invaluable advantage to the

management. This example is chosen with an angle to present an angle of `Think Beyond' and it also reflects design and implementation of MIS in a virgin area.

6.2.0 AN INTEGRATED BATCH PERFORMANCE ANALYSIS SYSTEM FOR A CHEMICAL INDUSTRY

INTRODUCTION :

Manufacturing of a range of Colour Dyes is a main product line for ABC chemical industry. The production is planned in a batch and each batch, at the end, produces a particular shade of a colour dye. The proportion of various raw materials decides the shades of a colour and therefore the precision of these proportionate raw material has direct impact on its quality in terms of its product specifications. A system was designed to measure the variations in raw material consumption of a batch vis-a-vis the specified standard raw material consumption. The system was also integrated with MRP to take care of variation in material consumption and update the raw material stock appropriately. The system was also generating necessary information for the marketing and production department conveying the feedback of the batch efficiency.

ENVIRONMENT, CONCEPT AND REQUIREMENT ANALYSIS :

To understand the importance of the system the background knowledge is necessary. There are two types of chemical industries - Industries with continuous process and the Industries with batch process. Manufacturing Colours- Dyes is a batch process industry. Every batch has its processing cycle and various parameters are to be observed for producing a successful batch with an acceptable quality standard. Besides other parameters, the proportion of basic raw

material is a very vital aspect for the production of a dye because any variation would result into change in shades although the main colour may remain the same. The colour has to match the pre-decided market specifications in terms of a colour shade attached to a product code.

The concept was developed to predict in advance whether the batch which is under process meets the required raw material consumption or not. If not, what is the variance and how much it is `off' from the standard. This could result into the following situations :

1. The raw material consumption is more than the standard.

2. The raw material consumption is less than the standard.

In either case the raw material stock needs to be updated to maintain raw material inventory level to its optimum level.

This could also result into non-compliance of `shade specification' when a batch comes out at the end of process. In such case, marketing department shall not be able to deliver the product against the committed order processing schedule which was planned considering the batch under process. This could result into the following situations :

1. Non-availability of product against the committed delivery schedule.

2. Product inventory of a Dye shade for which no orders are booked.

In either case marketing has to take care of their customer and re-schedule the delivery programme.

This kind of situation would be very difficult since the market is quite sensitive and there is tough competition. The system solution worked out for the purpose was not able to rectify the committed mistake but certainly it created an overall awareness and helped the management in controlling the cascading effect of such mistake by getting appropriate input to other integrated areas.

SYSTEMS DESIGN AND INTEGRATION :

Originally the system was designed on second generation IBM computer with very limited capability and resource constraint. Since the on-line storage was not available, obviously the files were sequentially organised.

The application of this nature was never tried out and therefore there was no manual system existing parallel to this. Therefore the activities were broken up in the following steps :

1. Creation of Master Data for each product giving the ratio of the basic raw materials used in the process.
2. Systems to get batch wise actual consumption data from the production line.

3. Design the system to match the actual consumption vs. standard consumption based on the Master Data.
4. Generate the files and report of variance which goes to stores accounting to take care of short/excess consumption in the system of Material Requirement Planning (MRP). Report of variance goes to marketing department at top level so that they can take care of change in the planned production schedule (if any).
5. Software development/testing.
6. Systems implementation / feed back / modification.
7. Documentation.

All the above activities were divided in three phases to schedule the plan of implementation. The assignment of task and responsibilities were also phased out in the following way :

a. Collection and preparation of data.
b. Software development and testing.
c. Systems implementation / integration and documentations.

The phasewise activities and details are elaborated below which explains the concept and process involved at each stage.

a. **COLLECTION AND PREPARATION OF DATA** :

This was an important aspect since the success or failure of the system was depending entirely on how accurate and complete work is done in arriving at the

correct and accurate data for each product. The data required was the ratio of the major raw materials for the unit production of each product. Suppose the product is P1 and the raw materials are R1, R2, R3, then the data collected was the ratio of R1, R2, R3 say, 1 : 2 : 4 for 1 kg. of P1.

Similarly, for each product, ratio of major raw materials were collected and a Ratio Master file was created. These data were collected from the respective production department. The exercise of collection of data became quite complex in the cases of captive consumption of the product. for example, in the process of P21, one of the raw material was product P1. Therefore the ratio data shall be generated and worked out considering the ratio of different raw materials used in P1. And when actual consumption data comes, the system has to consider the P1 consumption in the process of P21.

The actual consumption of raw material was captured from production accounting system which generated batch-wise production and raw material consumption report and output files. This data file was the main input which gave the production and corresponding raw materials consumption data.

The product and raw material codification used was

common for all the systems and therefore there was no data conversion involved. With all the ratio master data a multiplication factor was also worked out by the technical experts and it was kept on master data for each product. This was required since the ratio represents only major raw materials and at the end of the process physical weight does not tally exactly to the theoretical total of quantity produced. This multiplication factor is first applied to production before it is compared with the standard ratio of production against the actual consumption of raw material. For example, if the total production is say 1000 kg. and multiplying factor is 0.9 then 1000 x 0.9 = 900 kg. is the production to be considered for the comparison with ratio data.

Now if the ratio data is P = R1(1) : R2(2) : R3(6) then it is understood the R1 = 100, R2 = 200 and R3 = 600 is the standard consumption for 900 kg production. The actual consumption data of R1, R2 and R3 is compared with the above standard consumption and the system is developed to work out the variance in either or all of R1, R2 and R3.

b. **SOFTWARE DEVELOPMENT & TESTING** :

For software development the files and data descriptions were identified. As told earlier, the system was developed on second generation IBM Computer

and therefore a typical master and transaction file concept was applied. The Ratio Master file was developed collecting the product-wise raw materials' data and a multiplying coefficient. The major programs were as under :

1. Ratio Master file creation, validation and updation:

   This program performs a primary check like product code and raw material codes are existing in the respective master data file or not. It also performs general checks like checking the feasibility of the data etc. program enables first time file creation and thereafter subsequent updation.

2. Consumption Data File Validation :

   This program validates the file received from production accounting system. It checks whether the corresponding product master is available in Ratio Master file or not. It also, as an output, eliminates all the minor raw materials' which are not available in Ratio Master.

3. Calculation of Consumption Variance :

   This program interacts Ratio Master File with actual production/consumption data. For the given production it works out the standard consumption as per ratio master and compares with the actual

consumptions. The variance is worked out and a file of variance is created for each raw material which goes to MRP system where it updates the raw material requirement planning to the extent of variance.

The program has second option which is used to take care of captive consumption. As explained earlier, if one product is a raw material for another product, then the ratio relationship of first product is to be considered while working out the consumption of individual raw material [please refer (a) for the details]. The program in one pass identifies all the captive consumption cases and stores in the memory and all those cases are correspondingly taken care of when variance calculation option is run.

4. MIS Reports for Marketing & Production Planning : While it generates the file for MRP system to take care of the short/excess consumption of raw materials, this program with option, generates MIS report for marketing giving the batch efficiency information which helps them dealing with the committed orders of the customers. The MIS report for the production planning gives the details regarding product-wise variance. This information to production planning department helps in

rescheduling their subsequent batches to the extent the batch has failed in specifications and production is required against the committed orders of the customers.

The programs were tested individually on test data and live data. Necessary modifications were done at both systems level as well as program level and having satisfactory test cycle the system was given for implementation.

c. **SYSTEMS IMPLEMENTATION/INTEGRATION AND DOCUMENTATION** :

The system implementation was a tough task mainly because it was giving the performance analysis for the batch production. The variance was exposing the gray area which used to be uncovered whenever batch is failed on quality.

The reports to marketing and management use to tighten up the control on the production line for accurate working and setting up the process parameters and its monitoring. Because where there is no variance but if the batch fails at quality check then it was pin pointing the problem with process parameters.

The system was integrated with MRP and marketing to take care of the charge in the situation both at raw material consumption and production going to the

marketing for the sales. Later date the system was also used for material balancing of various raw material by comparing the issue from the stores and actual consumption reflected in production accounting system. This integration incorporated enough control over waste of raw materials and piling up the stock at the shop floor.

The system was documented in such a way that later date it can be suitably modified with the change in hardware or systems software. The system level, operational level and the users' documentation was prepared to take care of its implementation and subsequent smooth running.

ACHIEVEMENTS

Apart from various intangible advantages derived from the system, the visible and the direct advantages derived are as under :

1. The system established a strong control mechanism on the batch processing in terms of monitoring the batch parameters and thereby improving the quality/performance.

2. The system averted the cascading effect of any error arising out of manual operation.

3. Reduced the raw material wastage because of the

integrated approach highlighted the material balancing between stores issue and actual raw material used in production.

4. The system made it possible to give the projection about the expected batch performance before the end of the process.

CONCLUSION

For any batch processing industry it is possible to workout the system which can control and monitor the efficiency of the operations.

The basic concept discussed here would hold good even for pharmaceutical industry where the cost of the basic raw material is very high and failure of the batch results in total wastes.

6.3.0 MATERIALS MANAGEMENT SYSTEMS - AN INTEGRATED APPROACH AND IMPLEMENTATION METHODOLOGY

INTRODUCTION :

Petrofils is over 300 crore company operating from multiple locations and likely to grow higher in next couple of years. It is a joint venture of Government of India and Multistate Cooperatives.

Petrofils have units at Baroda manufacturing Polyester Filament Yarn and at Valia (near Ankleshwar) manufacturing Nylon Filament Yarn, polyester yarns and spandex fiber.

BACKGROUND :

Petrofils in its 15 years life, started with IBM Accounting Machines changed over to IDM - NELCO 4000 systems in 1980 and now working on ICIM-6000 since 1986 and WIPRO LANDMARK since 1990. The scenario of Information Systems was at its lowest end till 1987. The computer was mainly catering to the accounting requirements. Even the accounting systems were not designed as an integrated system and therefore at various stages the redundancies were observed.

Petrofils faced two generation change shifting from NELCO to ICIM 6000 and ICIM 6000 to LANDMARK. The earlier systems were redesigned and integrated to the extent possible keeping in view the earlier redundancy of various systems and future information need of the organisation. The major change was the shift from Accounting Systems to the Information Systems and from proprietary OS to UNIX/RDBMS.

ABOUT THE APPLICATION :

Materials Management as a function is not different than the activities covered by other organisation. But certain critical areas are peculiar to the Filament Yarn Industry.

The criticality of raw material is very high though the major supply comes from neighbouring unit - IPCL. But in order to maintain the uniform uninterrupted supply, other vendors' are also maintained getting part of the requirement on regular basis.

The second critical area is consistent supply of packing materials. The main packing materials being paper boxes, the storage and regular flow of receipt is a vital factor. The quality and the right quantity must be available all the time else it would create a hold-up at production line resulting into critical market situation.

Similar to packing materials paper tubes/cops for the yarn and the spares of imported machines are critical because they are not available or alternatively, they need to be substituted by indigenous components.

The total inventory of a unit is around Rs.20 crores covering around 26000 items. Also the criticality of the problem is to be viewed looking at the continuous process plant and the magnitude of loss of production in the stock-out situation.

OBJECTIVES :

The following objectives were set to be achieved by computerisation of Materials Management System.

1. To get On-Line stock status of all the items available in the stores.
2. To get up-to-date information of each item under procurement and each item available in stores.
3. To get information regarding overall performance of Materials Department in terms of various exceptional reports.
4. To set up a system which cuts down the document processing time.

SCOPE OF THE SYSTEM - AN INTEGRATED APPROACH :

The scope of the Integrated Materials Management System was phased out into three sub-system modules keeping in view the overall objectives. The philosophy of system considered an MIS approach to materials function where the system was basically designed to serve two purposes :

a. The system must monitor the procurement process and assist in improving the overall efficiency of Materials function.

b. The system must control the inventory.

The three module system was divided as under :

1. Indent Monitoring System :

   Covering Indent, Eqnuiry & preparation of comparative statement for procurement.

2. Materials Transactions Processing System :

   Starts with generation of Purchase Order, covers Materials Receipt, Issues and Materials Return Transactions. This system also takes care of adjustment entries generated because of wrong accounting or due to the shortage/excess of materials found during the verification.

   The system also enables Finance Department to enter the details related to the payments of materials received. This bill passing facility is provided to Finance concurrently through On-Line terminal which can access the details of Materials already received by stores and process the same inputting the data related to payment.

   The system caters to all accounting reports like Stores Ledger, Purchase Journal, JV's etc.

3. M I S Reports :

   This system module takes care of generating all MIS reports which could be of interest to the Materials Manager as well as Management.

The following reports are in-built as a part of the system however many more reports are taken out as and when required.

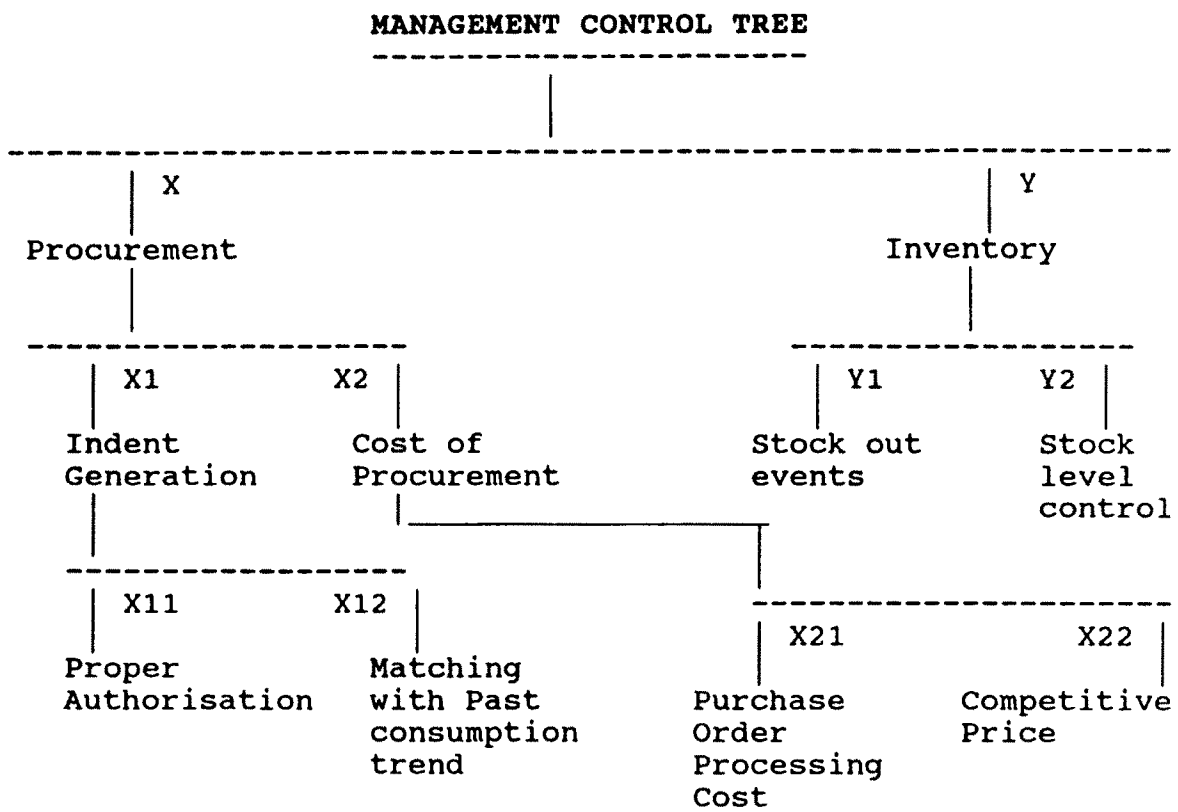
a. A B C Analysis.
b. Non-moving and slow-moving materials analysis.
c. Cost centre wise consumption analysis.
d. Stock out Report.
e. Outstanding Purchase Orders.
f. VED analysis.
g. Consumption trend analysis.

MANAGEMENT CONTROL ASPECTS OF MIS

While discussing the Integrated Materials Management System the aspects which need to be considered as a part of MIS is the Management Control System. Once the Management Control aspects are clearly defined then related MIS can be designed to create the required data base to make the controls operative at each point as a part of the system.

Following is the Management Control tree conceived for implementation.

Materials Management System



The materials function can be broadly classified under two categories viz. Procurement and Inventory Management.

Inventory Control : Inventory Control can be introduced by maintaining stock level in terms of maximum stock and minimum stock. The levels can be periodically reviewed with the increase or decrease of consumption.

Over and above stock level maintenance, controls on stock out event can be exercised by proper information system which gives the item-wise stock out occurred during a month, based on which the reasons for such event needs to be analysed and, if required, the minimum stock level for that item may be updated. In such situation system can also generate immediate procurement advice to bring back the required stock level.

Procurement Controls : At procurement level two parameters need to be controlled.

a) Generation of new indent.

b) Cost of procurement.

Generation of new indent can be restricted by introducing proper authorisation system whereby the

indent, when it is raised, passes through a channel which can review whether the procurement can be avoided by any alternatives or substituting any other item. Even justification may be asked for the indent. Also indent may be reviewed in the context of past consumption pattern of the same item based on which if required, the advice may be given to update the stock level for the same item.

Cost of procurement would insist for the system which generate the Purchase Order at a least cost. The system is introduced that any purchase costing less than Rs.500/- will not pass through the procedure of placing purchase order, instead it can be procured as a cash purchase. For the items where purchase order is raised, the history of previous prices are maintained for the last one year and as and when required, a report can be generated giving price variance between different lots of procurement for the same item. The

price history is maintained only for previous two procurement since the price escalation, in general, is so much that very old information does not have any meaningful value for comparison.

IMPLEMENTATION METHODOLOGY :

The implementation methodology adopted here had more consideration of human behaviour than the system design. The design of the system could have been more efficient and ideal but the user would not have accepted it and resulted in failure during implementation. The user group was very conservative and needed extensive training on change in manual procedure which was required for take off to On-Line system. The following factual aspects were required to be taken care of while working out the detailed plan of implementation.

1. This was the first On-Line system in the organisation and therefore it called for lots of changes in the manual procedure and style of working.

2. The sensitivity of codification was very high because of various reasons such as; the codification was newly introduced, large no. of duplicate codes for the same item were observed and the fact that the validation of Material Code in true sense was not possible. If instead of one valid Material Code some other valid code is written then it was not possible to detect the error.

3. The exceptions in the procedures were quite frequent where the material shall be received and purchase order shall be placed later. Or the purchase order may not have the indent and so on.

4. The working user group had no exposure on computer and most of the people lack the adequate educational backup.

5. The existing manual record was not cent percent perfect and therefore the counter check of new system was required to be independent of parallel manual system.

6. No additional manpower was to be given to the user department in view of switching over to the computer based system. And also it was true that, till they come to a reasonable stage of working and enter their data which are reliable for further processing, the amount of work was to be an additional load.

7. The internal coordination between Stores and Purchase was getting delinked at times resulting into stock-out, delayed procurement, over-stock etc. and the computer based system was supposed to take care of the related aspect rather than creating bottleneck in the functioning.

8. Provision was required to be made for the transfer of data through PC's in view of the multiple projects coming up at Valia - a different location.

After considering the above factual aspects the implementation methodology was derived such that the laid down objectives are achieved. For the purpose, total user involvement was necessary and the user was required to be guided and assisted. Normally, in public sector environment, the direct control does not work for any system and therefore the consultative approach was preferred taking the user in full confidence. It was also seen that the user do not get the fear of failure. At every stage of implementation, consolidation was made so that the process is always towards the next stage and the situation does not get created where back and forth movement occurs. This approach was definitely more time consuming than implementing the total system at a time. But considering the fact that the organisation has already set-up procedure for many years, and the user had no exposure of On-Line Environment and no exposure of computer, the stagewise implementation was the only workable path.

The management was quite aware of the background in which the materials computerisation was being implemented and therefore very strong and positive thrust was applied on the entire team of software and user group. This approach attracted the required appreciation and conveyed the priority to all concerned.

The following points were introduced in the implementation plan to take care of the said aspects :

a. The total implementation was segmented in the phases.

b. The Stores procedure was changed in such a way that no document was processed unless it passes through the terminal where the basic information like code, description, unit of measure etc. was getting checked.

c. It was strongly emphasised to follow the decided procedure and variations were eliminated to bare minimum. Such exceptions were taken care only with the help of system personnel and therefore such occurrences were arrested.

d. To test the system, full proof test data were generated and thereby the cross check with manual system was avoided.

e. Considering the duplication of work during the parallel run where the existing manual system is working together with the on-line transaction processing, the users were given necessary support from EDP for day to-day entry/verification of data. The similar support was given, initially, from time to time whenever backlog was generated due to some reason. This approach created a team spirit and a platform through which new culture was introduced.

f. The in-built provision was made to validate and accept any data which comes from PC's. This was required to take care of data coming from other unit as well as this may be required if the main system remains down for more than a couple of days for any reason.

STAGEWISE IMPLEMENTATION -- SEQUENCE OF PROCESS :

Having decided the philosophy of stagewise implementation, the following sequence of process was followed for reaching to the existing level of implementation which enables user to get day to-day stock status and all required information as and when required.

1. Codification ---- change over.
2. Document feeding through EDP terminal by EDP (only issue transactions).
3. Document feeding by EDP on Stores terminal (only issue transactions).
4. Document feeding by Stores.
5. Indent feeding on day to day basis & material master updation.
6. Purchase order printing.
7. No issue unless passed through terminal.
8. Entry of material receipt on day to day basis by EDP.
9. Entry of material receipt by materials department.
10. Updation of day to day stock for all items.
11. Bills data entry against materials receipt by finance.

The following processes were additionally implemented at Valia location on WIPRO LANDMARK on ORACLE RDBMS platform.

1. Generation of material receipt document.
2. Generation of indents for inventory items.
3. Concurrent updation of balance quantity -- real time.
4. Integration of Finance transactions for concurrent party outstanding status.

Although it may look very simple, each step took a time slice and time to consolidate the procedure. Every stage involved training, support and constant review from all the levels including periodic review by the top management.

CONCLUSION :

The education is two-way process and the same is very true in any system project. The implementation of Materials Management System cleared few concepts which may be true for all similar projects and holds good for all organisations.

The following conclusions were drawn which certainly would act as future guidelines and would serve as the factors need to be given the due considerations.

1. The system has to be in tune with the organisational structure and culture and the level of sophistication should be logical and adequate.
2. The stagewise implementation has advantage in implementing the system in already established organisation since it gives scope of consolidation of implemented system at every stage.
3. While changing the system from offline -- Batch processing -- to an on-line, the hardware optimization in terms of its utility will have to be sacrificed.
4. Though the need of user involvement in system project is accepted, often the fundamental aspect is missed that the user needs to be moved and motivated to prepare for the start-up load. The system is to be sold to the user and therefore all what is required is to be done to make the system acceptable.

OUR RECOMMENDED METHODOLOGIES

SUMMING UP :

The projects presented here are unique. The first case study is unique in concept and it contributed greatly to the organisation where it was implemented. While the second project is important from its methodology of implementation. It is also seen that from the zero level of system functionality the entire system was successfully implemented in modular way which reached up to the stage of MIS and the same is operational without change even after five years of its implementation which is enough to know the strength of originally conceived systems, design clarity and built-in flexibility.

In this chapter we have reflected our experiences related to recommended methodologies on design, development and implementation of MIS. We are sure these experiences would provide rich collections of the fact that would contribute for future MIS projects in the country.