

1. Introduction

1.1 Introduction

Current business environment is very much competitive and in order to face challenges of the fierce competition by taking the maximum benefits of competitive advantages, effective implementation of Information and Communication Technology (ICT) based modern Software Solutions has become a key requirement for any organization. This project is about identifying a solution for a key issue of an organisation and successful development and implementation of a MIS application.

Introduction to organization, problem domain and motivation have been discussed in this chapter including the proposed solution. Further, in detail analysis of the problem and justification for the importance of solving the problem also have been included in this chapter with the aim and objectives of the project.



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1.2 Organization

Noratel has been producing transformers in one form or another for more than 80 years and it consists of 16 companies in 12 countries. Noratel Sri Lanka, formerly known as Toroid International (Pvt) Ltd under the Scandinavian based Toroid Holdings, has a proud history of 18 years serving customers around the world. Toroid is an ISO certified company, which manufactures standard or customised Toroidal transformers and chokes for a wide range of applications.

Sales companies in USA, Sweden, Germany, Great Britain, Spain and Toroid Audio Sri Lanka make the Toroid Group accessible to demanding customers. Company structure is shown in the Figure 1.1.

Transformer and chokes are mainly used as one of the major components in Medical equipment, Lighting, Telecommunication products, Office machines, Audio products, Motor control, Industrial control equipment, Instrumentation, Portable tool transformers, Computers and peripherals, EMI suppression and much more... Most of

them demand the highest standards of performance and safety with superior quality. With modern and efficient factories in Sri Lanka, India and, for certain low volume products, Sweden and Poland, using high quality raw materials and components sourced world wide, ensures reliable deliveries. The Toroid Group employs today more than 2800 personnel engaged in research, design and manufacturing in eight companies on three continents.

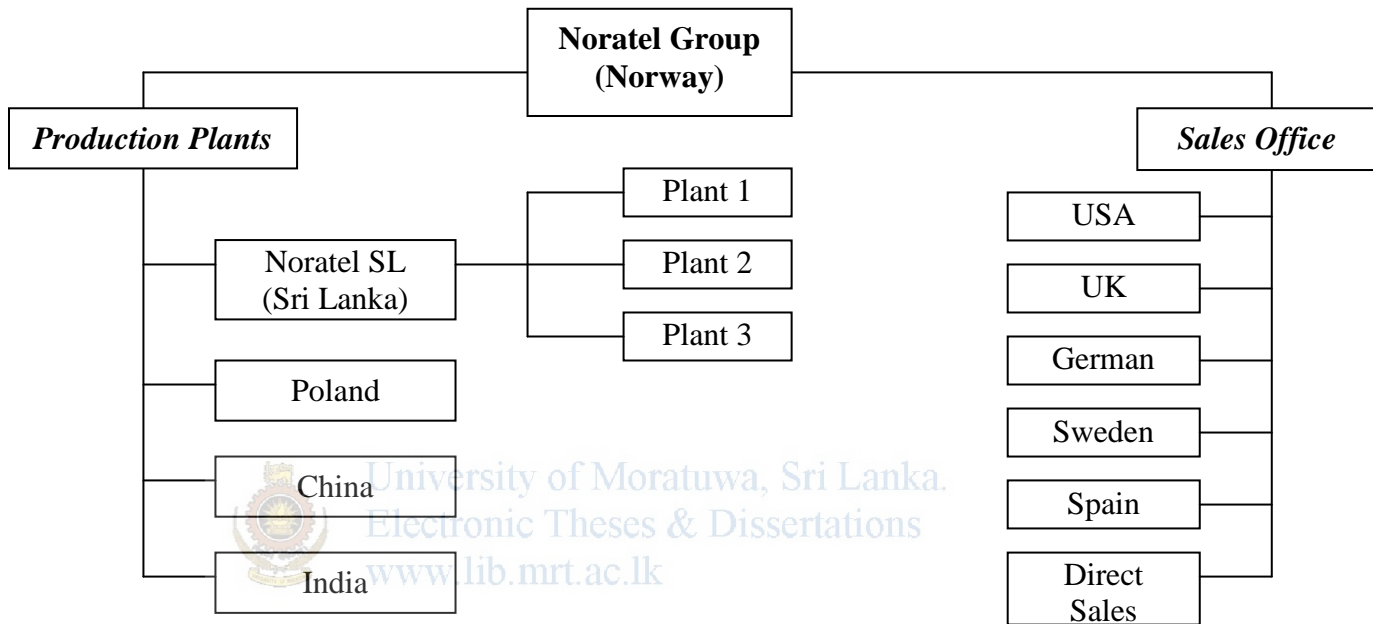


Figure 1.1 : Company Structure

1.3 Problem Domain and Motivation

Noratel Sri Lanka which was established around 18 years ago is one of the world's largest toroidal transformers manufacturing company. It is having very high level goodwill for the high quality products from the beginning Use of high quality materials and high skilled labours have driven the company into that blue chip position. Since there were no a fierce competition in past, company could manage to keep the market share and to achieve its objectives. Since now competitors also are producing high quality products with lesser competitive prices, Noratel Sri Lanka is now facing fierce competition in the market and becoming less competitive day by day.

Already, customers have started to move to competitors because of the low price and now threat of decreasing sales has come to the picture. This information is highlighted in the senior managements meetings which is having every two weeks. This situation has taken the company into the big risk of the existence of the company and threat of loosing employments of around 2200 employees is also there if the group management decides to close the company because of the low rate of return on the investment.

1.4 Aim and Objectives of the Proposed System

Main aim of the project is to develop a software system for measuring and monitoring the productivity of each production line in weekly basis in order to achieve the following objectives.

- To facilitate to make available online all the timing data, production transaction data and all the management information on the productivity while supporting for paperless environment by reducing hard copies.
- To accommodate more orders and reduce over time/ night shift work when the productivity is high.
- To reduce rejects and order life cycle time by increasing the motivation level of employees through rewarding for the higher productivity and there by increase the customer satisfaction.
- Reduce cost of production.

1.5 Solution

Out of the many transformer types, company is producing toroidal transfer which is more efficient transfer type compared to traditional EI transformers. Manufacturing of the toroidal transformers are labour intensive. Average percentages of material, labour and power component of the cost of production are 50, 42 and 8 respectively. The BOM (Bill of Material) of a transformer is very much complex. It may include around 25 materials types and around 30 activities which are having a labour component.

All most all the required materials for production are imported. Since these transformers are used in very much sensitive equipment like medical equipments, air

craft accessories, computers, satellites etc where the accuracy is of utmost important, the quality of the product is very much importance. In order to assure and maintain the excellence in the quality, high quality raw materials have to be used. So, in the context of decreasing the cost of production, controlling power of material cost is very much less although it contributes about 50 percent of the cost of production.

Hence, the other biggest portion of the cost of production is covered by the labour component, that component was identified as the area which we can focus on, in order to make actions to decrease the cost of production.

At present there is not a systematic method available in the company to measure and monitor the labour productivity of the company. In order to face the challenges of global market, there is a requirement to measure the labour productivity and make appreciate decisions. To satisfy the mentioned requirements, an incentive scheme based on productivity was proposed and the management was fully committed to make this bonus system successful and beneficial to the employees. According to the proposed scheme, labour productivity will be measured by production line wise weekly basis, based on daily production outputs. Then a monthly incentive is given to employees based on average weekly productivity values. Incentive amounts are pre defined for different productivity ranges.

Formula for calculating the productivity is defined as shown below

$$\text{Productivity} = \left\{ \frac{\sum (\text{Standard time} \times \text{Qty completed})}{\text{Used man-hours}} \times 100 \times \text{Setup factor}^* \right\} + \text{Adjustment factor}$$

For the above calculation the parameters will be calculated as follows.

Standard times

The Work-study Division is to establish standard times for each operation of each product. The “Timing sheet” should be prepared based on the above times for each and every product. Three timings can be available for an operation and at least one timing should be available.

These three timings are

1. Actual calculated time by work study department (PPD time).
2. Calculated time by using a history data (Cal Time)
3. Estimated time (Esti Time)

Above timings are listed based on the highest priority to lowest priority on accuracy level. Highest prioritised timing from the available timing for an operation is considered for the above formula.

Estimation times will be used for first time orders with new types of activities that are not in the program.

Used man-hours

Used man-hours are generated from the time attendance system for the specified period and line wise. A relevant employee's in time and out time is considered when generating the man hours. Movements of employees between production lines are recorded in the shift record sheet which is used to record the shift wise production output. These movement hours also are considered. (Will be added when additional employees are attached to the line and will be reduced if employee is sent to another line)

Set-up factors

The set-up factor is used to compensate machine setup time. Different lines are assigned different values for setup factor, based on the different machineries available in lines

Examples are as follows:

0.941 - for Line 1, 6, 16 and 61

1.000 - for Line 3, 4, 5, 7, 32, 34, 41, 42, 51, 52, 21, Assembling, Potting and Packing

1.064 - for Line 2, 44, Core room and Group lines

Adjustment Factor

This parameter is used to fine tune the final productivity figure when necessary.

Productivity Benchmarks

Based on the monthly productivity percentage of the production lines, Productivity bonus is paid to employees as per the predefined benchmarks. Benchmarks are shown in *Appendix A*.

1.6 Scope of the Project

Proposed MIS application for productivity measuring and monitoring will facilitate to manage following data and management information will be generated based on the stored data.

- Managing of standard work-study timing sheets for each and every product.
- Job timing sheet will be maintained for each and every job.
- Shift wise daily production output records will be managed.
- Job master data, Transformer master data, Production Line master data, Operation master data and mapping data of machines with production lines will be stored in the data base and managed.

Further, a on line dash board will be implemented to see the productivity of each production line at any time on line. In addition to that, this component will facilitate to monitor the productivity variations and analyse the important trends of production lines. Further it will work as a Management Information dashboard for the senior management.

1.7 System Requirements and Technology.

VB as the development language, MS SQL Server as the back end Database, Crystal Report as the reporting tool were used to develop the software solution. RAD as the software development methodology and SSADM as the System Analysis and Design methodology were used in the application development. System was implanted successfully by adding additional eight client computers and additional printer to the existing LAN of the company with eight data entry operators. More about the selected technologies, justifications and feasibility analysis have been discussed in next chapters.

1.8 Structure of the Dissertation

- Chapter 2 : This chapter discusses more about the Problem, Existing System and the weakness of the existing system. In addition, the reasons for developing and implementing a software application also have been discussed in this chapter.
- Chapter 3 : Currently available different Technologies, Approaches, Models, Processes that can be used to develop of high quality software have been discussed in this chapter such a way that the best approach can be selected based on the nature of the project.
- Chapter 4 : Most appropriate Software Development Process, System Analysis and Designing Methodology, and necessary Software were selected based on the nature of the project by considering many factors. This chapter discusses the importance of the selected technology for successful system development and implementation of the solution.
- Chapter 5 : Chapter discusses about the System Analysis and Design of the solution including Requirement Analysis, Business Solution Options, Feasibility Study, Architectural Design and important decisions taken during the software design process.
- Chapter 6 : This chapter discusses about Testing Methods, Testing Strategy, and Test Plans of the solution and implementation methodologies with implementation strategy. Further, problems faced in the application development process also have been discussed in this chapter.
- Chapter 7 : Once the software implementation was done, the next main activity was to evaluate the implemented software to check whether the software meets all the requirements which were identified at the initial stage of finalizing SRS and the provided functionality works properly. This chapter discusses about performing the software evaluation.

Chapter 8 : Final conclusion, limitations of the given solution and further enhancement that may be implemented have been discussed in this final Chapter.

1.9 Summary

Details on the problem that the organization is facing and the proposed solution were discussed in this chapter. Further, justification for the importance of solving the problem also has been included in this chapter with the aim and objectives of the project.

More about current process and the analysis of its problems and weaknesses have been discussed in next chapter. In addition, the reasons for justification for developing and implementing a software application also have been discussed in the next chapter.



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