Knowledge and Time Management for Manufacturing to Enhance CRM

P. Menaka
Research scholar
Manonmaniam
Sundaranar University,
India.

K. Thangadurai
Phd, Assistant professor
Computer Science
Govt. Arts College
Karur, Tamil Nadu
India.

M. Uma,
Research Scholar,
Dravidian University
India.

M. Punithavalli
Phd, Director of M.C.A
Sri Ramakrishna
Engineering College
Coimbatore,
Tamilnadu, India.

ABSTRACT

Customer Relationship Management (CRM) with Time Management involves managing the customer relationship across all its interfaces with the organization to produce the results as per agenda and acts a KPI to maximize the profit. Knowledge management enables the organization to have a competence with the competitors in the efficient way. Data mining techniques are rapidly expanding field in the current scenario and manufacturing is an application area where it can provide significant competitive advantage. Focus of this paper, is to produce proactive solution, forecasting the budgets using knowledge and time management for manufacturing process. It helps to retain and increase the value of long-term customers, customer satisfaction, improving the profitability, service of product at right time and govern the employees in efficient way. Customizing the time frame increases the profitability of organization**.**

General Terms

Knowledge Management, Time Management, & CRM

Keywords

Key performance indicator, Link analysis, Rule induction.

1. INTRODUCTION

Knowledge is the most valuable asset of a manufacturing organization. Decisions are made based on judgment and knowledge from various domains. Decision support, knowledge management and processing are interdependent activities in most organizations [1]. Although knowledge exists in all business functions including purchasing, design, marketing, production, maintenance and distribution the Time management plays a key factor for organization's performance.

CRM is the major conceptual area of the organization to integrate business and technology process to attain the customer satisfaction and to satisfy the need of a customer. To achieve the customer satisfaction, knowledge and time management is considered in the manufacturing process. A good company needs to identify the problems of customers and enhance the cohesion between customers and their organization [2]. Maximization of lifetime value is a key objective of CRM. More specifically, proper customer understanding and action ability lead to increased customer lifetime value [4].

CRM's workforce management based on time schedule and data collection devices provide manufacturers with highly sophisticated terminals to streamline processes and drive profitability. By measuring and understanding the status of employee and equipment productivity, as well as machine output with time frame, at all stages in the manufacturing process, manufacturers now have a cost-effective means of improving their business processes[6]. This will enable them to increase profitability by increasing efficiencies and conducting better forecasting and budgeting more effectively for profitability.

To strengthen customer behavior, most of the companies concentrate on customer satisfaction as main performance indicator [4] but, here time frame is proposed as key performance indicator (KPI). Customer satisfaction is a bottom-line of business, which results in form of increased purchase of products, repetitive purchases. Activities of organization performs to identify qualify, acquire develop and retain improves the loyal and profitable customers by delivering the right product or service, to the right customer through the right channel, at the right time and right cost [2].

2. PROCESS METHODOLOGY

The frame design of CRM forecasting process exhibits the functional design with time frame used to reinforce the relationship with customer and organization is shown in fig.1 [3]. The process in the frame design is integrated in the common data warehouse and its functional flow is described. Data mining automates the process of finding predictive information in large database. The manufacturing unit is the main functional unit of organization and also for the prediction.

Before manufacturing process, the workflow is started from the business requirement planning. This planning is nothing but information perceived from the feedback through customers. The feedback results the requirements of customers and suggestions from the existing product. No complaints will be received regarding the product, because of effective time management and quality control.

The people who are in the planning process will receive the data and designing the schedule according to the organization behaviour and order placed by customers. As per the schedule and time frame the production of products will be initiated. The required raw materials of a product will be allocated in the stock prior to production process. The stock verification is made before the material planning. As per the work schedule the raw materials for the product will be checked out within the time frame so that delay of material supply will be avoided
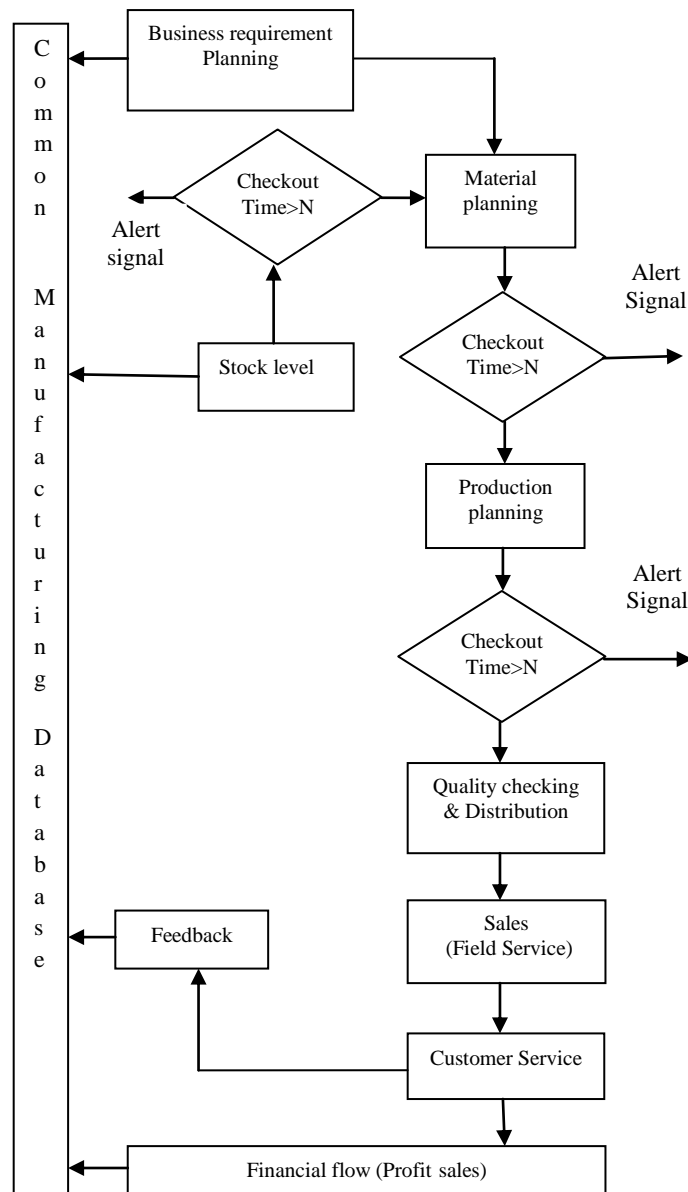
Fig. 1. Frame Design of CRM Forecasting Process

This time frame makes the employees to be aware of their work, prior planning and decision making. The material planning will produce the day today report of data received from the stock within the time frame. Here the timing segmentation avoids the delay of work and makes the employees to work with enthusiasm.

According to the work schedule, which is framed by the higher authorities, the work will be moved from each level within the time frame, helps the organization to govern the process easier and effective way. Time management is treated as a Key Performance Indicator (KPI) and also gives a security to organization.

Production planning is the next step of material planning. In this, according to the product requirements and product design the development modules will be prioritized. The levels of process will be continued.

The time frame is planned for each step of product manufacture. Based on this, processing time should not exceed or lesser than the given time zone, because the quality will be lost. This governs the quality of product automatically without any manpower.

The checkout time is a time period for each level of process which is defined with the value N. Here N denotes the time variant. For each product development, the process design will be varied. So that, for the different levels of process in the production, the value of N is customized [3],[10].

The alert signal indicates the minimum amount of time to end the process. Meanwhile, the employees have to report their status of work to higher authorities whether they need addition of time to complete than the given time frame. This will occur only in the rare occasions. If it happens the additional time will be extended to all the process levels from the given time frame. This helps the higher authorities to easily govern and identify the time difference from which level it occurs.

Data mining techniques used to improve quality control in manufacturing [1]. The quality checking process, verifies the number of products as per the schedule and quality of the products, then distributed to the sales department. Here, the KPI is the key factor for the product quality, so that quality is assured for the finished products. By this damages and complaints of products from customers are totally avoided. Only the suggestions and requirements are received from customers. This is one of the proactive solutions for maximizing the net profit.

Sales are a field of service, where the request will be received in customer service and appropriate team will focus on the analyses and plan. If this requisition is feasible the implementation will be made after the discussion of higher authorities, who recognizes the plan and design of process.

By this, the analyses of feedback give the results of customers need and the movement of products with category. Organization can take decision based on the analyses and prediction of products will be done. In accordance, the process will be continued. This is one the optimized solution for prediction.

3. CUSTOMIZATION OF TIME MANAGEMENT

Customization of time management is managing the entire process of CRM, Where time management is concentrated more in the manufacturing unit. The time frame is initiated from the stock level to sales and distribution. This time schedule is customized according to the process of finished product.

Link analysis is a data mining strategy for identifying events which occur together. The goal of link analysis is to find common indicators of an event which improves the process efficiency. Among the three general type of link analysis, Sequential Time Patterns is adopted to implement. In Sequential patterns, elements occur in a regular time order [8]. Based on this pattern and rule induction algorithm, time track method is framed. The following steps are used to design the time frame of manufacturing process dynamically. Here, the description of flow is exhibited.

Step 1:   If the plan description date < the plan actual date, and plan description to date > the plan actual description to date then no day difference.

Step 2:   Else if plan description date < plan actual date and plan description to-date < plan actual description to-date then different days are displayed.

Step 3:   Else if plan actual date > To-date the day difference is zero.

Step 4:   If the day difference > 0(exceeds the defined date) the color is set as red for the exceeded days.

Step 5:   Else if the day difference = 0 value the color is set as green. (Work completed in time)

Step 6:   Else the color is set as white, if process is going on.

If (PDFD < PADFD and PDTD > PADTD) then
         DayDifferent = 0
Else If (PDFD < PADFD and PDTD < PADTD) then
         DayDifferent = DifferentDays
Else If PADFD > TD
         DayDifferent = ""
If DayDifferent > 0
         SetColour = Red
Else if DayDifferent = 0
         SetColour = Green
Else
         SetColour = White

4. RESULT AND DISCUSSION

The Knowledge and Time Management is considered as primary factor in CRM for forecasting the customer requirement plan, designing, implementation and distribution for sales. The agenda is followed from sanction of customer order, till the completion of finished products. The schedule frame is designed for each process to complete in time. If the process exceed N value the status of report to be forwarded to the administrator. N denotes the end of duration time which may be, hour or day or month. The exceeded time will be intimated in the red color representation. This intimation helps the higher authorities to capture the status of work in short term. If the work is completed in time, the status will be intimated in green color representation. Else the white color representation is given for progressing work, which is not yet completed.

In figure 2, blue color is the scheduled time for process, and green color is the actual progress time for process. If the process time exceeds the scheduled time (blue) then red color will be intimated till the completion. The results vary according to the time schedule hours, days or months. This visualization presents the clear status of progress to make effective decisions. The results of time mangement for CRM is given with example data. The product design is initiated as per the time slot, when it exceeds the time limit which is intimated with red color and that is managed by the next process as raw material purchase which proceeds from the given time slot. So that, exceeded time is managed by the next one. At the most, time is managed within the time slot, other wise the exceeded time will be continued to the next process, which helps to identify the time consumption.
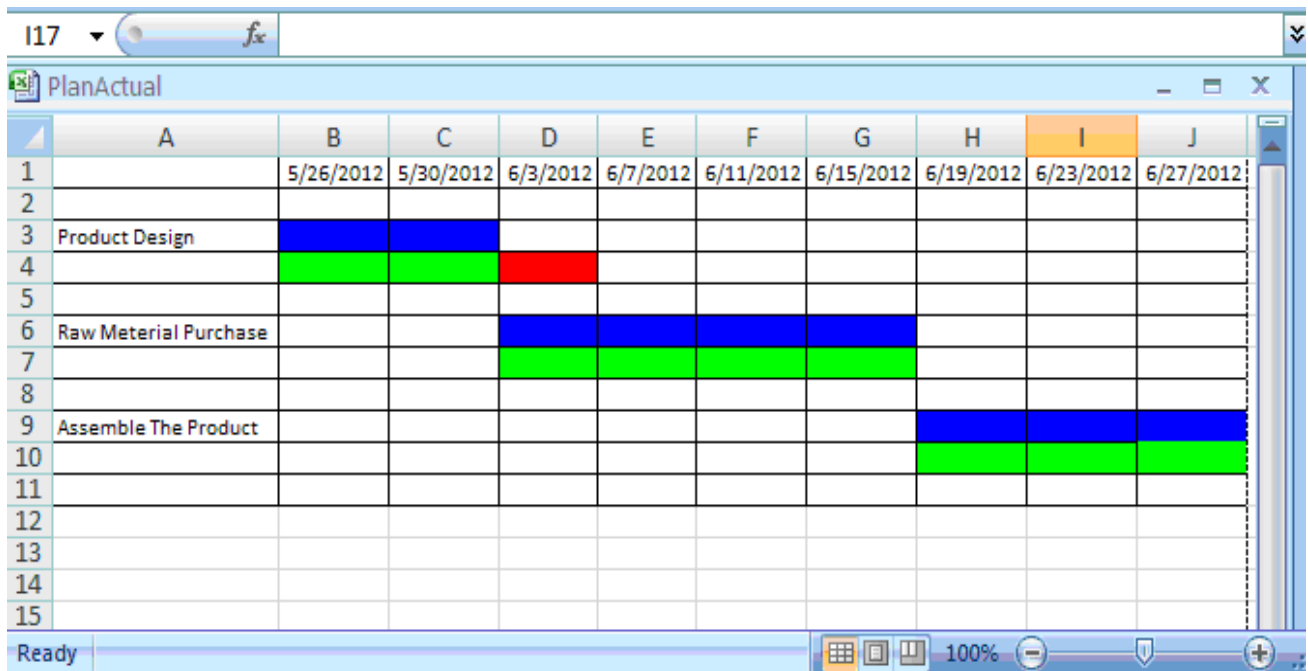
Fig. 2. Results of Time Management for CRM

5. EXPERIMENTAL RESULTS

The comparative analysis study is made with various tools, where the results are based on management report, sales ease and technology rating [13]. In fig. 3, Knowledge and time management improves the technology rating index when compared to the other tools. Meanwhile, performance of management report and sales ease will be grown by their customer satisfaction.
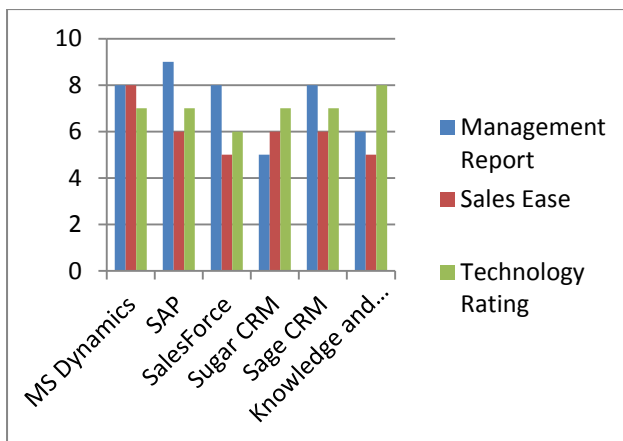

Fig. 3. Comparative analysis of various tools

The Knowledge and time management for manufacturing to enhance CRM is developed based on data mining concept and experimental data are obtained with the platform of VB.Net which is user-friendly in all views and for the users. Fig. 4. gives the implementation results as a graphical view which is listed below:

➢ **Predict the future by Techniques**: By applying Knowledge and data mining techniques the organization can predict the problems before they occur, forecast resource demands which gain the customer satisfaction.

➢ **Most profitable customers**: Customer demographics help to seek and retain valuable customers and develop long term relationship by predicting and fulfilling their needs.

➢ **Maintaining quality of product development**: Time management helps to plan the cycle time of product manufacturing which detects the fault and improves the quality of product.

➢ **Customer lifetime value, acquisition and retention**: This knowledge and Time management increases the customer lifetime value, and forecasting the necessary hidden patterns of customer helps to retain and acquisition of customers.

➢ **Identify Customers and their products:** By the sales analysis, the specific products and loyal customers and can be identified easily.
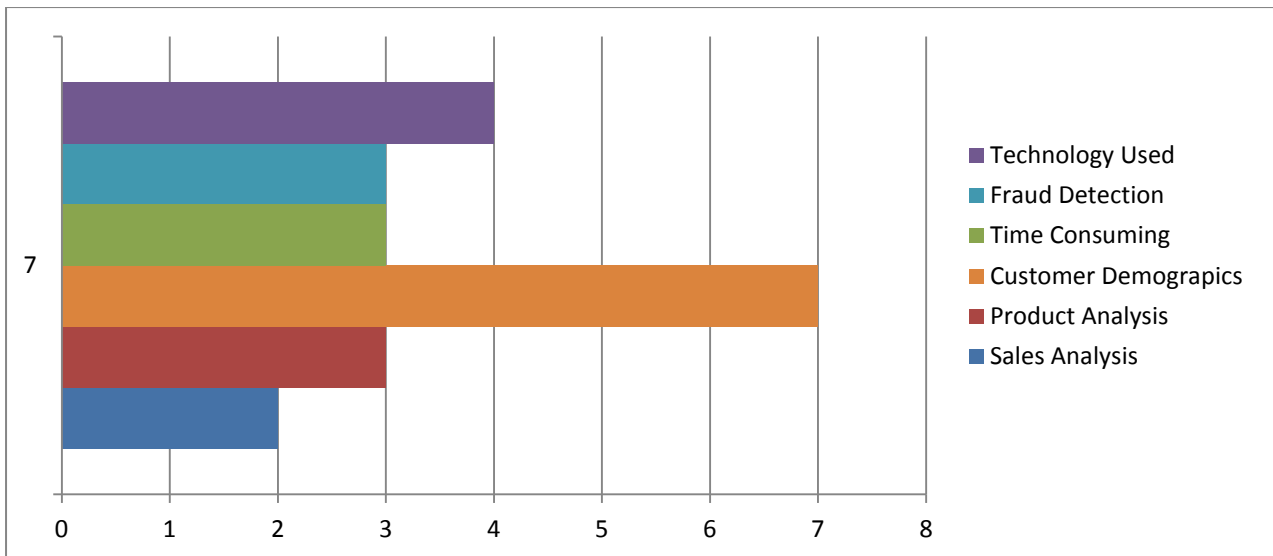
Fig. 4. Experiment Results of Knowledge and Time Management for Manufacturing to enhance CRM.

6. CONCLUSION AND FUTURE WORK

Knowledge management is applicable in business terms that generates enthusiasm, and motivates higher authorities to work together toward reaching organic growth. Previously, the primitive measures are feedback, service for customer satisfaction and retention. For the proactive solution and maximizing the profit of an organization, the knowledge and time management becomes a key factor. It enhances Customer Relationship Management and streamlines the process for product manufacturing.

Now, Time management helps to avoid the delay of work, builds the personnel to plan and complete the work within time schedule. Organization produces the finished products in time with quality and serves customers on time. Results of time management visualizes the clear status of work progress to make good decisions.

Further research, may be enhanced on various fields of different concerns according their requirements and satisfaction.

7. REFERENCES

[1] Harding, J.A., Shahbaz, M., Srinivas, Kusiak, A., 2006. Data Mining in manufacturing: A Review. ASME Journal of Manufacturing Science and Engineering. 969-976.

[2] Al-Mudimigh, A.S., Saleem, F., Ullah, Z., Al-Aboud, F.N., 2009. Implementation of Data Mining Engine on CRM- Improve Customer Satisfaction. In Proceedings of International Conference on Information and Communication Technologies. 193 - 197

[3] Menaka, P., Thangadurai, K., Uma, M., Punithavalli, M., 2012. Forecasting for Profitable CRM using Knowledge and Time Management. International Journal of Computer Science and Information Technologies. 3711-3713,

[4] Abdullah, A., Al-Mudimigh, S., Farrukh Saleem, B., Zahid Ullah, 2009. Efficient Implementation of Data Mining: Improve Customer's Behaviour. In Proceedings of IEEE/ACS International Conference on Computer Systems and Applications. 7 – 10.

[5] Colleen Cunnigham, Il-Yeol Song, 2007. A Taxonomy of Customer relationship Management Analyses for Data warehousing. In Proceedings of International Conference on Conceptual modeling. 97-103.

[6] Ravikumar, G.K., Manjunath, T.N., Ravindra Hegadi, S., Umesh, I.M., 2011. Cross Industry Survey on Data Mining Applications. International Journal of Computer Science and Information Technologies. 624-628,

[7] Charles, X., Ling Tielin Chen, Qiang Yang, Jie Cheng, 2002. Mining optimal actions for profitable CRM. In Proceedings of International Conference on Data Mining. 767-770,

[8] Rhonda Delmater, Monte Hancock, 2002. Data mining Explained - A Manager's Guide to Customer-centric Business Intelligence. Digital Press.

[9] Qiang Yang, Jie Yin, Charles Ling, Rong Pan, 2007. Extracting Actionable Knowledge from Decision Trees. IEEE transactions on Knowledge and Data Engineering. 43-56.

[10] Jean-Michel Moutot, Ganaël Bascoul, 2009. Effects of Sales Force Automation Use on Sales Force Activities and Customer Relationship Management Processes. Journal of Personal Selling & Sales Management. 167-184.

[11] Khalid Rababah, Haslina Mohd, Huda Ibrahim, 2011. Customer Relationship Management (CRM) Processes from Theory to Practice: The Pre-implementation Plan of CRM System. International Journal of e-Education, e-Business, e-Mnagement and e-Learning. 22-27.

[12] Ngai, E.W.T., Li Xiu, Chau, D.C.K., 2009. Application of Data Mining Techniques in Customer Relationship Management: A Literature Review and Classification. Elsevier Journal of Expert Systems with Applications. 2592–2602.

[13] Jayanthi Ranjan, 2008. A Review of Data Mining Tools In Customer Relationship Management. Journal of Knowledge Management Practice. 1-16.