

AUTOMATION OF WARRANTY MANAGEMENT SYSTEM FOR A SMALL-SCALE MANUFACTURING INDUSTRY

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Abstract-

Warranty Management is key issue in any business especially Original Equipment Manufacturer because it saves unnecessary expenditure against warranty claims. In these days many Expert System and Enterprise Resource planning systems are handling the issues related to day to day transactions. Problems with ES and ERP systems are that it is only affordable by the large scale industries due to its high cost; ES provides domain specific service. ES and ERP systems are hard to understand as well as Business re-engineering is needed to implement ES or ERP. Small and mid scaled Industries cannot afford such ERP's or Expert Systems. There is a need to develop an application that deals with the users day to day activities, easy to understand for employees, provide extensibility-scalability in the application, automate the business process, suitable for small and mid scaled industry, provides facilities for many departments as well as offer Warranty Management effectively yet affordable. This paper explains how a RAD or Rapid Application Development, Relational Database System and .Net Framework can be efficiently utilized to develop such automation of Warranty management. This paper uses "Recommendation System software engineering" helpful for customers to give recommendations to customers as well as users.

KEYWORDS

Warranty Management, OEM, ERP, RAD, RDBMS, RSSE, Automation, ES.

I.INTRODUCTION

As the industrial revolution begins in 16th century it brought tremendous changes in business. Single part was produced by many businesses and often no single business is responsible for the product as a whole. In warranty, buyers were not entitled to receive compensation for any problem associated

With the products unless the vendor had explicitly guaranteed the item. The law formed by the USA in 1914 namely Federal Trade Commission (FTC) defines the warranty as follows:

“....any affirmation of fact or any promise by the seller relating to the goods
....if the natural tendency of such affirmation or promise is to induce the buyer to purchase the goods, and if the buyer purchases the goods relying thereon.....”

The code specifies the obligations of manufacturers, distributors, and any other vendors, with regard to both express and implied warranties. Several laws had been enacted to regulate warranties on various products. Warranty management is concern with post sale support that becomes an important feature of most product sales. Warranty

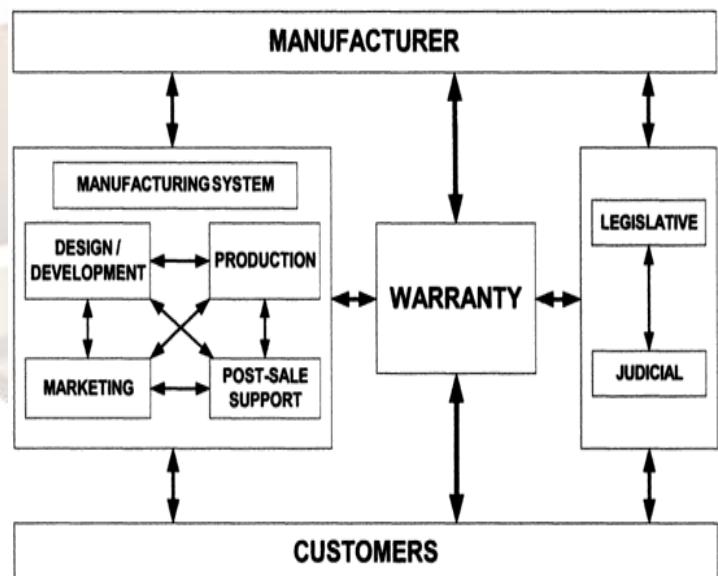


Figure 1.0 Organizational Behavior

is an element of post sale support and manufacturers need to view because it provides satisfactory service to the customer. It as part of the after sale service

strategy. Figure 1.0 shows the warranty management concern with all departments in the business. If the warranty management acts ineffectively then other departments rely on the warranty management also affects. A warranty of any type since it involves an additional service associated with a product will lead to potential costs beyond those associated with the design, manufacture and sale of the product. Costs are in fact unpredictable for future costs, which have typically ranged from 2% to as much as 15% of net sales depending on the product and the manufacturer. If the manufacturers are small scale then it is very costly amount for them to manage the warranties without proper automation. There is need to manage the warranty claims to cut off the exceeding cost on the warranty.

II.BACKGROUND

Warranty Management is a key issue in any business especially OEM's because it keeps satisfaction for the customer and saves the expenditures against warranty claims. Now a day's many ES and ERP systems which can handle the issues regarding warranty claims. It perhaps happen that most of the large scale industries are in the position to invest the big amount in the managing warranty claims with the help of ERP systems or Expert systems. The ERP is a set of modules that cover all the departments in the business like HR, Account, Sales, Service, and Marketing etc. which perhaps more important in the business, but it is possible that some features of ERP are not understand by the users. In this case ERP system is useless for that business because it is not effectively used hence performance of the business is not up to the mark due to such ineffective use of ERP. When there is matter of implementing such ERP or ES in small scale industry then these industries are not able to invest such big amount due to their financial condition. Hence there is need of Warranty Management for small scale units that take care of overall departments of the business like Sales, Service, and HR etc with affordable cost.

III.CONCEPTUAL FOUNDATION.

When any product is selling out by the company then it is obvious that it gets some benefit from the product. It is not possible in manufacturing industry to demand amount from the customer for after sells service. If any product sold by company get damaged or faulty then due to warranty period company must have to replace or repair the concern product as per the warranty regulations, but it is an extra expenditure for the company and it heavily affects on the benefit. It is not possible for the small scale industries to spend 2% to 15% expenditure on

warranty claims and also it is not possible for them to purchase costly software to manage the warranty claims, and also it is possible that customer is not satisfied with your service. This is also malice to the business. Because of these issues there is need of Warranty Management application that takes care of warranty, account, operations and Recommendation system that help the business to give the service quickly and provide services as an ERP.

This idea includes some features of the ERP and Expert System; it also includes Recommendation system to help the user to satisfy the customer's need. This system tries to understand the customer's requirement and after analyzing it, it suggests some guidelines to customer requirement along with this it provide Route Cause Analysis for given problem.

Sr.	Topics Covered	ERP	Application
1	Re-Engg. Needed	Yes	No
2	Hard to Understand	Yes	No
3	Affordable	No	Yes
4	Suitable for Small Scale	No	Yes
5	training employees	Yes	No
7	Recommendation System	No	Yes
8	Automate Business	Mostly No	Yes
9	Easy Workflow	Yes	Yes
10	Improve Cycle Time	Yes	Yes
11	Efficient and Scalable	Yes	Yes

Table 1.0 Difference between ERP and application

It is useful in small scale industry because the small scale businesses do not afford to invest big amount ERP, this research paper mainly focuses on the small scale units as they offer some warranty management system with the customer database and preparing the reports of the databases. Table 1.0 discusses some major differences between the ERP and the research topic; by the above discussion we can say that application is really useful for the small scale industry at affordable price with effective use.

IV.IMPLEMENTATION DETAILS

This part of the paper discusses how we will be going to implement the paper, this broadly includes:

- i) RDBMS
- ii) RAD,
- iii) NET Framework.

iv) RSSE

The brief discussion about above mentioned terms are as follows

i) RDBMS

A Relational database management system (RDBMS) is a database management system (DBMS) that is based on the relational model as introduced by E. F. Codd. Most popular commercial and open source databases currently in use are based on the relational model. Figure 1.0 depicts structure of Relational Database Management System in which all the controls of the computer system as well as database system for e.g lock management, Transaction control, and Memory management are concern with the Relational Database Management System.

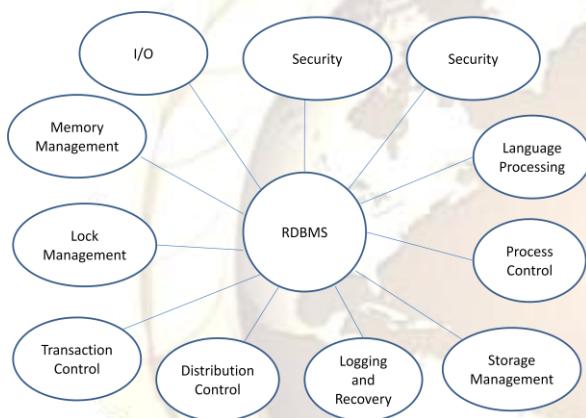


Figure 1.0 Functions of RDBMS

RDBMS also a DBMS in which data is stored in the form of tables and the relationship among the data is also in the form of tables. This study will try to implement the database system in which the data about all the departments are keep in the tables and these tables have the relation with each other. To manage the relation between the tables we need database management system that binds table with each other in the form of data.

ii) Automation

Automation is the use of control systems and information technologies. It reduces the manpower in the production of services; Automation plays vital role in the service sector and in daily experience. Automation has had a notable impact in a wide range of manufacturing, sales, and services.

While considering new approach to warranty management, it must be comprehensive in more ways than one. It must tap into the rich information contained on the warranty claim as well as field data.

It must utilize the vast unstructured data such as information embedded in freedom text fields provided by customers. Similarly information held by suppliers should be incorporated into the knowledge base how, where and when a part was made, handled, shipped and fitted.

The approach of automation can be achieved by a balance between automation, manual claims processing and analytics. We believe that the best way of achieving this balance is through the use of ERP.

While working with databases it is very easy to opt an option ERP for maintaining technological platform that has the intrinsic benefits of collaboration and integration and scalability. While working with the existing ERP system is not affordable by the small scale industries and hence there is need to automate whole system which is affordable by the small scale industry. Structured Query Language (SQL) is also playing an important part in implementing this idea, it provides variety of operations for data manipulation at user side. SQL is generally used in most of RDBMS.

iii) RAD

“Rapid Application Development” (RAD) is a development lifecycle designed to give much faster development and higher-quality results as compare to those achieved with the traditional lifecycle.” Rapid Application Development has “an approach to building computer systems which combines different tools and techniques, user-driven prototyping for high quality and productivity. RAD drastically raises the quality of finished systems while reducing the time it takes to build them.” Rapid Application Development that enables organizations to develop strategically important systems faster while reducing development costs and maintaining quality. It is a process through which the development cycle of an application is expedited. Rapid Application Development thus enables quality products to be developed faster, saving valuable resources.

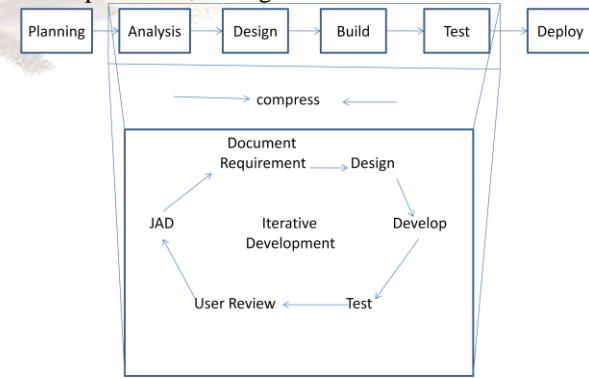


Figure 1.1 Implementation of RAD

Figure 1.1 shows, how the RAD changes the traditional software developing mechanism (Requirement Analysis, Design, Coding, Testing) with the new approach. The most successful change in IT business today is Rapid Application Development. RAD replaces hand-design and coding processes, which are dependent upon the skills of isolated individuals, with automated design and coding, which is an inherently more stable process. It is a more capable process, as it is faster and less error prone than traditional coding. Most organizations are faced with a large backlog of new systems to be developed. Over 65% of the typical Information System's budget is spent on the maintenance of existing systems. These businesses are thus faced with upgrading their aging systems or building new applications. Traditional development lifecycles are too slow and rigid to meet the business demands of today's economy. Here this paper will try to implement RAD because it builds the software in rapid time, this technique allows organizations to build software applications faster, better, and cheaper. RAD enables such development.

iv) .Net framework

.NET is Microsoft's platform for XML Web services. Microsoft's .NET Framework is a new computing platform built with the Internet in mind, but without disturbing the traditional desktop application platform. The small scale units are not able to invest amount to build up a web based application but it is necessity that the software should be popup with current technology. It is also required that software must be build within less amount of time without compromising quality. .NET is the perfect suitable architecture for this idea. With .NET it is possible that we can build up both desktop as well as web based application. It also provides popup with current technology. Building a platform from the ground up also allowed the .NET Framework developers to look at the problems and limitations that inhibited application development in the past and to provide the solutions that were needed to quickly speed past these barriers.

.NET is a collection of tools, technologies, and languages that all work together in a framework to provide the solutions that are needed to easily build and deploy truly robust enterprise applications. Figure 1.2 shows an overview of the structure of the .NET Framework. The first thing that it should notice when looking at this diagram is that the .NET Framework sits on top of the operating system. At the base of the .NET Framework is the Common Language Runtime (CLR). The CLR is the engine

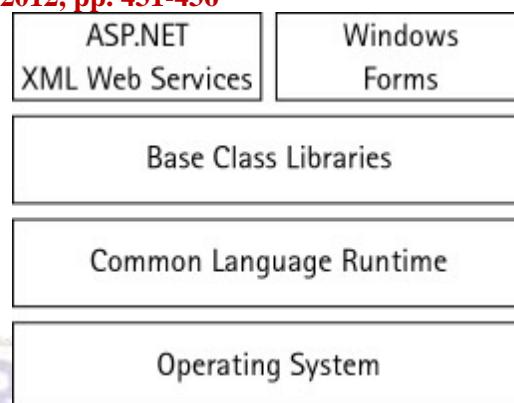


Figure 1.2 Working of .NET

that manages the execution of the code. The next layer up is the .NET Framework Base Classes.

v) RSSE

Recommendation System for Software Engineering used in software applications. RSSE systems help to discover the information related to problem by analyzing users, and by offering variety and relevance guidelines to users. By providing help developers find information they should know and evaluate alternative decisions, RSSEs span a wide spectrum of software engineering tasks and practically unbounded amounts of development data. They can help to navigate large code based by analyzing rich and complex information into clearly prioritized lists. It provides the list of recommendations for the problem.

V. FINDINGS

Implementing this system, businesses will be saving approximately 2% to 15% cost on the warranty claims. It also possible that a business can track the database of the customer within short time and due to which it is possible to give the service at minimum time. This idea is not limited to provide automation of warranty issues but also to provide the customer's database, recommendation system and route cause analysis that is more important for ISO certified business or organization. These all features will be provided by this idea at affordable price and it will work effectively. The cost which is saved because of warranty claims will be invested in some other areas to boost the business. Due to its data backup facility it assures reliability in the application.

VI. CONCLUSION

This Paper discusses Warranty Management system that is useful for small and midsized industries. These industries have limited infrastructure available with them like employees, machines, land, finance etc.

Due to their financial condition they are not in the position to improve the infrastructure available with them. So this idea tries to implement system that is affordable and no need to invest more. The use of RAD, RSSE, RDBMS, .NET framework enables to build the application as fast as possible. The Paper also discusses about the implementation of software system that is going to replace the need of ERP system. This application provides the facilities such as Recommendation system for system engineering, analysis of already entered data to understand type of fault, affordable by the small and midsized business. This software does not require any big investment such as business reengineering, training of employees. It achieves the goals set by the ERP systems. By implementing this paper industries are definitely going to conserve 2% to 15% from warranty claims and that is the main goal of the paper. It also gives the route cause analysis which is also applicable in ISO certification. The objective of this idea is to give helping hand for the small scale OEM's to save their expenditures where ever possible and invest in some other areas from the profit is achieved. This application also uses some backup techniques that assure users data for not getting corrupted.

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