RESEARCH ARTICLE

CUSTOMIZATION OF MATERIALS MANAGEMENT MODULE OF SAP ERP FOR CHHATTISGARH STEEL INDUSTRIES

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Abstract— Enterprise Resource Planning (ERP) systems can help enterprises to reduce operating costs, generate more accurate forecasts of demand, accelerate production cycles, and enhance customer service. To implement an integrated system of materials management, there must be a central database wherein anyone in the company can find out all information about any material passing through the plant. ERP streamlines all the business functionalities and gives desired result in one click. Customization and configuration are parts of ERP implementation process. ERPs are configured, and customized, when implemented. An ERP system can help to improve the communication within an organization. SAP is state-of–the-art software for ERP implementation and customization. SAP is user friendly i.e. information will be obtained as and when required. In our approach we are concentrating mainly on selected functionalities of Material Management module that are necessary for steel industries of Chhattisgarh state for customization of SAP ERP package. By customizing SAP (Materials Management-Module) for steel industry, the product can be ordered and received within safety period.

Keywords— Enterprise Resource Planning, System Application and Products, Materials Management Module, Customization, SAP R/3

I. INTRODUCTION

Steel industries of Chhattisgarh are in the expansion phase. So to expand their business and to make more profit, they need to automate all their business processes. It is also necessary for the steel industries to make a global presence. To fulfil the above requirements, ERP software is very much necessary. After comparing different types of ERP software; we find SAP is suitable.

A. Concept of an ERP System

A system that automates and integrates all modules of business areas is known as an ERP system or simply ERP. An ERP system is used to integrate several data sources and processes, such as manufacturing, control, and distribution of goods in an organization. This integration is achieved by using various hardware and software components [1].

An ERP system is primarily module-based, which implies that it consists of various modular software applications or modules. A software module in an ERP system automates a specific business area or module of an enterprise, such as production, finance, materials management, sales and distribution etc. These software modules of an ERP system are linked to each other by a centralized database [1].

B. History of SAP System

SAP is a German term Systeme, Anwendungen, und Produkte in der Datenverarbeitung. Its meaning is System Application and Products in data processing. It was developed by SAP AG, Germany. The basic idea behind developing SAP was the need for standard application software that could help in real-time business processing. The development process began in 1972 with five IBM employees: Dietmar Hopp, Hans-Werner Hector, Hasso Plattner, Klaus Tschira, and Claus Wellenreuther in Mannheim, Germany [1].

The SAP R/3 system runs on various platforms, such as Windows and UNIX. It also supports various relational databases of different database management systems, such as Oracle, Adabas, Informix, and Microsoft SQL Server. The SAP R/3 system uses these databases to handle the queries of the users [1].

C. Need for ABAP

Advanced Business Application Programming (ABAP, or ABAP/4), is a fourth-generation programming language first developed in the 1980s. It was used originally to prepare reports, which enabled large corporations to build mainframe business applications for material management and financial accounting [1].

The ABAP programming language was used originally to develop the SAP R/3 system. That is, the runtime environment and application programs in the SAP R/3 system are written in the ABAP language [1].

D. Overview of Materials Management Module

Materials Management deals with managing the materials (products and/or services) resources of an organization with the aim of increasing productivity, reducing costs, increase optimization and at the same time be flexible to accommodate changes [2].

A business process in SAP is termed as "Module". SAP's Materials Management (MM) is a part of Logistics area and helps to manage the procurement activity of an organization from procurement process, inventory management, invoice verification, and material planning [2].

Materials Management is the backbone of the Logistics area which includes modules like Sales and Distribution, Production Planning, Plant Maintenance, Project Systems, Warehouse Management, which are highly dependent on Materials Management module [2].

Materials management is highly integrated with other modules such as FI(Financial Accounting), SD(Sales & Distribution), PP(Production Planning), QM(Quality Management), PM(Plant Maintenance) [2].

E. Enterprise Structure in Materials Management

The Organizational Structure in MM is made up of following Organizational Levels:

- Client
- Company Code
- Plant
- Storage Location
- Purchasing Organization
- Purchasing Group

1) Client:

Represents a grouping or combination of legal, organizational, business and/or administrative units with a common purpose [2].

2) Company Code:

Company Code represents an independent accounting unit within a client. Each company code has its own balance sheet and its own profit and loss statement [2].

3) Plant:

Operational unit within a company code [2].

4) Storage Location:

This level contains the data specific to a storage location. Stock levels are an example of the data maintained for each storage location [2].

5) Purchasing Organization:

An organizational unit responsible for procuring materials or services for one or more plants and for negotiating general conditions of purchase with vendors. The purchasing organization assumes legal responsibility for all external purchase transactions [2].

6) Purchasing Group:

The purchasing organization is further subdivided into purchasing groups(buyer groups), which are responsible for day-to-day buying activities. A purchasing group can also act for several purchasing organizations [2].

F. Customization

Customization enables organization to adapt the enterprise-neutral and industry-specific functions, delivered as standard, to the specific business requirements of enterprise.
It supports enterprise whenever they:
- Implement the ERP (SAP) System.
- Enhance the ERP (SAP) System.
- Upgrade to a new release or system

Customization controls the behaviour of ERP (SAP) applications. Enterprises can only work with many ERP (SAP) applications after they have made the appropriate Customization settings – for example, after specifying in Customization, which currencies and purchasing groups are used in enterprise. Customization does not enable us to modify SAP standard functions [3].

1) Why customization of ERP is needed:

Organizations might think that their needs are fairly close to everyone else's, and they don't really need customized ERP software. However, Generic approaches miss both simplifications and extra depth, specific to their way of doing business. Customization puts enterprise and their staff at the heart of the system [4].

Large companies have long understood the benefits of customizing their software and spend millions to achieve this goal.

Being fully customizable implies complete flexibility on defining:
- The screens and workflows.
- The data model.
- The reports [4].

2) SAP R/3 Customizing:

Customizing refers to tailoring the SAP R/3 software based on the needs of the customer. Customizing in SAP R/3 helps in meeting a company's individual requirements based on its business. SAP R/3 transactions can be customized to best leverage SAP ERP [5].

To take an example of how SAP can be customized, consider a scenario of a company which sells automobiles. The company may sell its automobiles both in the domestic as well as in the export market. It is important that the company defines in SAP the correct business strategy. Customizing can be used for this purpose. Thus, the company may define a sales organization, define various distribution channels, assign distribution channels to sales organization, define pricing conditions, assign general ledger accounts, define tax determination rules etc. All of the above is possible through customizing in SAP R/3. One important point to remember here is that "Customizing" in SAP R/3 is client specific. But important changes such as changes in pricing conditions are not client specific. Such changes affect all the clients in the system and are cross client [5]. In our project, we are customizing Materials Management module of SAP.

G. Overview of Chhattisgarh steel industries

1) Jindal Steel and Power Limited, Raigarh:

Jindal Steel and Power Limited (JSPL) is one of India's major steel producers with a significant presence in sectors like Mining, Power Generation, and Infrastructure.

With an annual turnover of over US$ 3.6 billion, JSPL is a part of the US$ 18 billion diversified O. P. Jindal Group and is consistently tapping new opportunities by increasing production capacity, diversifying investments, and leveraging its core capabilities to venture into new businesses. The company has committed investments exceeding US$ 30 billion in the future and has several business initiatives running simultaneously across continents.

From the widest flat products to a whole range of long products, JSPL today sports a product portfolio that caters to varied needs in the steel market. The company also has the distinction of producing the world's longest 121 metre rails and large size parallel flange beams for the first time in India [6].

2) Bhilai Steel Plant, Bhilai:

Bhilai Steel Plant (BSP) is the flagship unit of Steel Authority of India Limited (SAIL), the largest producer of steel in India and one of the leading players worldwide. According to World Steel Dynamics, SAIL with a turnover exceeding $10 billion, ranks second in the league of 'world class' steel makers evaluated in terms of a slew of performance measurement yardsticks. Currently producing five Metric Tons (MT) of steel, BSP, the largest in the SAIL family after a capacity expansion program that's currently underway, is set to produce seven MT of crude steel per annum by 2012. (Source: Express computer, business weekly Aug 02, 2010). Bhilai Steel Plant, the first Public Sector Undertaking (PSU) integrated Steel Plant to have successfully implemented SAP ERP [7].

3) Prakash Industries Limited,Champa:

Established in 1980 with a vision to become an integrated Steel & Power company, delivering sustainable value to all its stakeholders, Prakash Industries Limited(PIL) is today known for its quality products at competitive prices. Over the years the company has spread its wings across the geographical borders of India. In quest to capitalize first mover's advantage in a challenging space with technology intensive Products. Company has set up a state of the art technology integrated steel plant at Champa in the state of Chhattisgarh. The sponge iron Kilns installed at Champa are based on "Stelco Lurgi/Republic steel-National lead(SL/RN)" technology of Lurgi, Germany, which is the only renowned technology in coal based Sponge Iron manufacturing. The Sponge Iron manufactured in the Kilns is being used in-house in the Steel Melting Shop to produce high quality Billets and Blooms which is then used to manufacture high value added finished steel products. Thus a fully integrated approach is adopted in the company.

Company has set up facilities to manufacture Wire Rod, Hard Bright(HB) Wire, Thermo Mechanical Treatment(TMT) bars and Structurals which put forth the concept of forward integration in the company to give highest value addition. With an assured supply of raw material, power and with concept of backward & forward integration, the steel plant of yesterday has emerged as a fully integrated steel plant today[8].

4) Monnet Ispat and Energy Limited, Raigarh:

Established in 1994 under the leadership of Chairman & Managing Director, Monnet Ispat & Energy Limited (MIEL), Mr. Sandeep Jajodia. MIEL's de-risked business portfolio encompasses manufacturing and marketing of Sponge Iron, Steel and Ferro Alloys. MIEL is also engaged in mining of minerals like Coal & Iron Ore, besides generation of power for captive consumption.

Setting up its first Sponge Iron Unit with a capacity of 1 Million Tons Per Annum(MTPA), MIEL, the flagship company of the Monnet Group of Industries, has grown by leaps and bounds over the past 18 years to emerge as the second largest coal-based sponge iron producer in the country. The company is aggressively expanding and is constantly adding value to the area of operations by leveraging its competitive edge of having backward and forward integration of operations.

MIEL is coming up with a 1.5 MTPA integrated steel plant to produce plates, Hot Rolled(HR) coils and rebars at its facility at Raigarh to cater to the rapidly growing infrastructure & construction industry [9].

II. LITERATURE SURVEY

The business environment is dramatically changing. Companies today face the challenge of increasing competition, expanding markets, and rising customer expectations. This increases the pressure on companies to lower total costs in the entire supply chain, shorten throughput times, drastically reduce inventories, expand product choice, provide more reliable delivery dates, better customer service, improve quality, efficiently coordinate global demand, supply, and production [10].

As the business world moves ever closer to a completely collaborative model and competitors upgrade their capabilities, to remain competitive, organizations must improve their own business practices and procedures. Companies must also increasingly share with their suppliers, distributors, and customers the critical in-house information they once aggressively protected [11].

ERP provides two major benefits that do not exist in non-integrated departmental systems:
(1) A unified enterprise view of the business that encompasses all functions and departments; and
(2) An enterprise database where all business transactions are entered, recorded, processed, monitored, and reported. This unified view increases the requirement for, and the extent of, interdepartmental cooperation and coordination. But it enables companies to achieve their objectives of increased communication and responsiveness to all stakeholders [12].

ERP with the greatest possible integration with a central database server, storing all the integrated data there for making the information and data available across the business, across business modules, across its vendors/suppliers, and customers. With the evolution of ERP, businesses took it as the wildest tool that they could have to make their business run smoothly, in a much integrated fashion without losing any information or spoiling the intension of the information when it flows across the business. Companies and businesses across the world made use of ERP tool and the standard processes offered to profit themselves [13].

Implementing ERP systems successfully calls for strong leadership, a clear implementation plan, and a constant watch on the budget [14]. From a project manager's point of view, the most important consideration is a clear implementation plan and a strategy to implement that plan. The plan and strategy, however, should evolve through systematic consideration of the company's requirements and its ability to manage changes that would be required under the new situation [15]
ERP systems, similar to other management information systems, are often perceived as very complex and difficult to be implemented [16], [17]. For many organizations, ERP systems are the largest systems they have worked with in terms of financial resources invested, the number of people involved and the scale of implementation [18].

It is found out that many firms that have experienced success with ERP, have comprehensively reengineered their organizational processes and structures as a method for enterprise wide transformation [19]. In case of implementing an ERP system we should put more effort in customizing ERP modules to compile with the existing workflow, report formats and data needs [18]. Second generation ERP systems use a relational database management system(RDBMS) to store enterprise data. Data conversion from legacy systems to RDBMS is often a time-consuming and tedious process.

Integration of the business processes also faced additional challenges related to new rules built into ERP software and their incompatibility with the established ways of thinking, and the norms of behaviour embedded in the existing work routines [20].

Effective integration is the key, because if one of these links fails, the organization's performance may suffer and may not meet the expectations of its customers or the service level of its competitors. The primary benefit of integration is that all business units and supply chain partners share the same data, synchronize actions, and minimize distortions in demand management [21].

ERP system is an increasingly popular management tool to reshape a business or organization. Generally, the case study method is a preferred strategy when "how" and "why" questions are being posed, and the researcher has little control over events [22]. The case study method, a qualitative and descriptive research method, looks intensely at an individual or a small group of participants, drawing conclusions only about the participants or the group and only within the specific context [22]. The case study method is an ideal methodology when a holistic, in-depth investigation is required [23].

473

ERP customization is a major source of concern for organizations implementing or using ERP systems. Customization has been used to explain implementation failures for years. However, the question of which types of customization have negative effects and which types of customizations have positive effects, has not been fully explored. Case studies show that lack of customization sometimes causes negative consequences [24].

Business processes in an organization cannot be modelled in an ERP system without customization. All customizations are not equal, and a certain type of customization is beneficial. Changing packaged software to meet user needs is the essence of customization [24].

One estimate is that 20% of the processes in an organization cannot be modelled in an ERP system without customization [25]. Software modification and customizations are needed for the ERP system to meet the needs of the organization [24].

Because customizations are built as part of a development effort, many times during an implementation time frame, customizations may have minor bugs ([26], [27]) that the vendor supplied ERP software would not. These bugs can cause delays in development during the implementation of an ERP, and affect the successful implementation. Customizations have been found to have negative effects on the outcome of ERP implementation projects [28], [29], [30]. The example case in [28] where the entire implementation budget was spent on just four of 20 plants, illustrates the problems that customization can bring to bear on an ERP implementation project [24].

Customization of an ERP will have maintenance and upgrade impacts [31]. Each time a change is required to the system, the effect of the change on the customization will have to be assessed by the organization, as the software vendor will not support these customizations. Many times, this requires bringing in an expert to help with this assessment [24].

ERP software vendors do not usually support customizations in future versions of the software. For example, an upgrade of accounting software is required each year to be compliant with tax law. If a company is using an ERP system with customization, the effect of the tax law upgrade will have to be tested with the customization of the system to ensure processing continues as expected [24]. Functionally, there are two types of customizations: strategic customizations and consistency customizations [24].

Strategic customizations are any customizations that are made with the purpose of achieving a strategic goal or furthering a strategic initiative. The reason these are so important, is that a strategic customization should be in support of the strategy of the company, thus, is aligned with the strategy of the company. When a modification or customization is made in support of the strategy of the company, this will further the alignment of business strategy, and the impacts should be positive [24].

The other type of customization that will be considered is a customization that is made for consistency purposes. Attention has been paid to customizations that are necessary because of a lack of fit between the ERP and the business processes; however, customizations are being made to mimic the status quo, or to mimic a poor business process. These types of customizations are not strategic, and should be differentiated from strategic customizations. These customizations are "consistency" type customization. An example of a consistency customization is when an organization has reporting requirements that include certain headers, footers, and general formatting of data that is not readily available from any of the thousands of generic reports available from the ERP system. The organization may have to code this sort of change, rather than use the reporting tool available from the ERP software. This type of change is not strategic. This type of customization only re-enforces a pre-ERP way of reporting with no added strategic value. This is a "consistency" type customization [24].

TABLE I
SUMMARY LIST OF FACTORS RELATED TO ERP CUSTOMIZATION [38]

Factor	Description	Reference(s)
Differentiation among subunits affects costs and benefits	Organizations may decide to forgo customizations but that would result in compromise costs.	Gattiker & Goodhue, 2004[28]
Deploy strategies to decrease customizations	There is risk to customizations because the developer has to fully understand the ERP system in order to integrate the customization into existing code.	Dittrich et al., 2009[32]; Haines,2009[33]; Ioannou & Papadoyiannia, 2004[34]

Convince users to buy into ERP system	Obtaining user buy-in would reduce resistance, which will minimize customizations.	Al Mashari , 2003[35]; Haines,2009[33]; Kumar et al., 2002[36]
Reduce the implementation time frame	Shortening the implementation time frame will decrease the opportunity for implementing customizations.	Haines, 2009[33]
Establish a formal customization request management process	Establishing a rigorous formal customization request management process will screen customization requests and only implement those that are critical to the business operations.	Haines, 2009[33]
Build a strong relationship With ERP vendor	A good relationship with vendors can influence them to incorporate organizational requirements into the ERP software.	Haines, 2009[33]
Build a team of business engineers	Having a team of business minded members instead of technical programmers will deflect customization requests.	Haines, 2009[33]
Build a collaborative approach between vendors and organizations	Organizations are working closely with customers to incorporate requirements into ERP enhancements by inviting them to meetings.	Scott & Kaindl, 2000[25]
Configure ERP tables and implement specific modules	Rather than customizing code, organizations can configure ERP tables and implement selected modules to avoid high maintenance and upgrade costs	Lou & Strong, 2004[37]

III. METHODOLOGY OF CUSTOMIZATION

All the activities that will be carried out in this methodology come under customization process. This methodology includes both program customizations as well as report customizations. In our approach we are concentrating mainly on selected functionalities of Materials Management module that are necessary for steel industries of Chhattisgarh state. These functionalities are as follows:
- Material master record creation.
- Vendor master record creation.
- Industrial Sector creation.
- Material Type creation.
- Purchase order creation.
- Goods receipt preparation.
- Invoice verification.

But before implementing these functionalities, we have to define following things:
- Define company.
- Define company code.
- Define plant.
- Maintain storage location.
- Maintain purchase organization.

After defining and implementing the above said things, we generate reports of different styles and formats. Mainly we generate reports at three levels of an organization namely:

A. Managing director level report
In this report, we are showing following information:
- Company code.
- Company name.
- City.
- Country.

This information will be shown in first page and in the next page following information will be shown:
- Vendor A/c No.
- Region of the vendor.

B. Manager level report
First page information will be same as Managing Director level report. Second page will contain:
- State code/name of vendor.
- Vendor A/c No.
- Material No.
- Material Description.

C. End user level report
First page information will be same as Managing Director level report. Second page will contain:
- State code/name of vendor.
- Vendor A/c No.
- Material No.
- Material Description.
- Total valuated Stock.
- Value of Total valuated stock.
- Fiscal year.
- Plant Code.

Further Reports will also be generated as and when needed.
Presently we are using three different reporting formats namely:

1) Classical Report Format:
In a classical report, the output is displayed in a single list. Classical reports are simple reports, which are created by using the output data (final data that have to be displayed in a report).

2) Interactive Report Format:
In an interactive report, we can view multiple lists simultaneously. With the help of interactive reports, first, an overview list (also called a basic list) is displayed, based on which further output lists (or called secondary lists) are displayed. These secondary lists are actually sub reports.

3) ABAP List Viewer (ALV) Report Format :
ALV reports, however, allow us to perform various functions with the displayed output, such as sorting, arranging, filtering, and retrieving data.

IV.   CONCLUSION

It is observed that customization has both advantages and disadvantages. But customization is essential for successful implementation of ERP software. It is also observed that, we can customize whole ERP software package or we can select a module for customization. In our project we are customizing Materials Management module of ERP (SAP) software package. This modular customization is carried out for steel industries of Chhattisgarh state. This customization will be domain specific not company specific. So it will suit to all steel companies of Chhattisgarh. In this paper, we are applying customization concept mainly. Under it, there are two types of customizations: program customization and report customization.

In our project we are mainly concentrating on report customization. We are also performing program customization but in little extent. This project work can further be extended. Various other modules of SAP can also be integrated as and when necessary. Further report customization option is also open. Different types of reporting style can be used for quick understanding of users at different levels of an organization. SAP is state-of–the-art software for ERP implementation. That is why we have chosen it.
It has global presence. New strategies and techniques can be developed to manage the business with a powerful and, as yet, relatively under-utilized tool.

An ERP implementation is considered to be a success if it achieves a substantial proportion of its potential benefits. These benefits might include personnel reductions, a decrease in the cost of information technology, better inventory control, and an improvement in order and cash management. An alternate definition of implementation success is that the system achieves the level of Return on Investment(ROI) identified in the project approval phase.

The non-financial improvements are probably the most significant. Many ERP implementations have failed because they did not achieve predetermined corporate goals.

476

Using the software at the end or after the implementation, is an End User, is the one who performs transactions in SAP after it goes live. SAP is user friendly i.e. information will be obtained as and when required.

With the help of SAP solution we can utilize the existing resources in the company and avoid unnecessary losses. By implementing SAP, losses can be avoided, recovery will be improved and the company can compete in global level.

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