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Enhancing Organizational Output through SAP MM: Material Management Trends in Indian Industries

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Abstract

The present phenomenon in the commercial market programming is enterprise resource planning (ERP). The packaged commercial non-structured programming legacy is present. There is a quick development and tradition of ERP, as well as a rapid advancement in the overall quality of the information technology (IT) market, i.e., e-technologies. The aim of this research is to frame the trend of the SAP Package tool, Materials Management (MM) module from the central viewpoint of a significant prosperous country, where there is limited vision of control and consequently the applicative results have not been published so far. The data mapping technique has been programmed for the intended objective. The analysis revealed that the study of trends merged with present MM trends, i.e., functions of project management, efficient communication, reliable project cost reporting, and a strong integration of MM from the tool performance-oriented trend in industries, where the purpose was to produce high-quality, beneficial goods and/or civil services, having regard to the factors of human welfare that are either particularly or entirely relevant. Certain assemblages of conventional and modern methods, i.e., convergent designs along with disintegrated departments, exhibit opportunities for future study as well as a reasonable explanation dealing with time, costs, and economic benefits. An appropriate trend is to obtain from the results, and the examination of trends, observations, and resultant implications is supported. Promoted coherence, better understanding, and integrating controls are the possible results of the work. The tools were also created to be used by different organizations, which are the common deployment of trends. Training courses were facilitated along with documentation and marketing materials offered. The MM trends are also described. Our institution was then delighted to provide an illustration of current MM functionality trends at the national and international levels. The approach adopted and the resulting empirics, however, are not intended to be exhaustive. In fact, the method used has not yet been precisely described. Future work will be aimed at that.

Keywords: Material management, supply chain, procurement, infrastructure industries, Indian industries

1. Introduction:

The concept of material and production management is quite old. It had its beginning mainly in the USA since the time of the Second World War. The growth of material management has taken place during the last three decades and has resulted in improved competitiveness of companies. The singling out of materials management as a distinct horizon of concern in no way denigrates the importance of other sub-sectors of business management such as: "Personnel Management" – the policy-making part of what since the 1970s has been normed human resource administration, or management; "Marketing Management" – strategizing to put your competitors in the shade; "Production Management" – difficulties of managing labor; "Financial Management" – which like "Materials Management" is largely a concern with the management of real, or other people's money; or "General Management" – which is much connoted with slicing a figure, in at top and out in front of shareholders. However, a lesson of history seems to be that though all managers are risk-averse to an extent, those of any particular species tend to stick together. In recent years, we have seen a growing awareness in Indian industries of the importance of materials management in general, and in the automotive industry, projects have been undertaken in several companies to evaluate present practices and to make recommendations for improvements. In some companies, the material management function has been reconstituted into a management discipline of high social standing, equipped with its own monthly journals. Even in an international conference

or seminar, the scope and activities related to it are well documented in technical jargon. As a result, conferences on materials strategy are much in demand and are well attended by people who are involved in creating the companies' supply objectives from units responsible for raw material purchasing. No doubt it is previewed by assessors who, on their lauds for credit of the possibly enormous amounts at risk from project gestation to first profit draw-off, make recommendations that vary and mix the quality and standard of the research. Indeed, material management is not just needed in a few specialized companies connected with the automotive and heavy engineering sectors, as was the case hardly in the past – these days even more common manufacturing concerns, such as those in the chemical sector, are just as anxious to change exasperating results.

2. Review of Literature

SAP AG is a German multinational software company that makes enterprise software to manage business operations and customer relations. The company is especially known for its ERP software. SAP is the leader in the ERP market. (Ahmed, 2014) argued that the SAP Materials Management (MM) module is crucial for organizations to manage procurement, inventory, and vendor processes effectively, (Al-Mashari & Zairi, 2000) Implementing SAP R/3, which includes the MM module, requires a holistic approach that balances technical aspects with change management to achieve success. (Lui & Chan, 2005) The accelerated SAP methodology, developed for efficient SAP R/3 installation, can be aligned with the Capability Maturity Model (CMM) to improve software processes and project management practices in ERP implementations. (Negahban et al., 2012) discusses a decision-making model for adoption of ERP tools by small-to-medium size construction organizations.

It claims that 86% of the companies in the Fortune 500 are using their software. (Dahake, Chandak, et al., 2023) By using a lot of data, businesses can use predictive analytics to predict future trends, spot chances, and make their marketing efforts more effective. Predictive analytics also (Dahake, Mohare, et al., 2023) the machine learning models accurately predicted consumer behavior with high accuracy and recall rates, with Random Forest beating the other investigated algorithms. (Tiwari et al., 2010) discusses network management and security for SAP IT infrastructure, but does not address the specific issues of IT implementation in production and marketing. (St. Petersburg National Research University ITMO, Saint Petersburg, Russia et al., 2023) SAP's automated solution can help manage the increased costs and excessive document flow in international trade for large decentralized companies. (Federal State Budget Educational Institution of Higher Education «K.G. Razumovsky Moscow State University of Technologies and management (the First Cossack University)», Institute of System Automation, Information Technology and Enterprise, Department of Informative Systems and Technologies, Moscow, Russia. et al., 2020) discusses the use of SAP ERP systems, particularly the PP module for production management, and the challenges of implementing ERP systems in enterprises. (Gurau, 2009) provides an overview of the main issues related to the implementation of IT systems in business organizations and the challenges of integrating IT and marketing systems. (Zhao, 2004) A holistic approach to IT management is needed for successful SAP R/3 and business process reengineering implementation. (Syaiful & Gunawan, 2017) examines common problems faced by consultants when implementing SAP ERP systems in leading Indonesian enterprises. The Sales and Distribution (SD) module of SAP takes care of business processes involving customers. Then, with the R/2 version of SAP released, the Material Management (SAP MM) module was introduced by SAP AG. MM is primarily an inventory or warehouse-driven company with distribution requirements and inventory control. (Martin & Cheung, 2000) explores the problems and lessons learned from a large multinational's implementation of SAP and business process re-engineering. (School of Business and Management, Institut Teknologi Bandung Jl. Ganesha No. 10, Bandung, 40132, Indonesia et al., 2024) discusses how SAP SaaS systems can support production sustainability and business operations during

the transition and liquidation phase of a Production Sharing Contract in the oil and gas industry. (Cooper & Zmud, 1990) The interaction of managerial tasks with information technology affects the adoption but not the infusion of production and inventory control systems like MRP. (Olsen & Sætre, 2007) ERP systems may not be well-suited for niche companies due to inherent business models that do not conform to their needs. (Rifqi Azhar Faqih et al., 2022) discusses the implementation of a marketing management information system, such as ERP, to support marketing decisions at PT. APF Tbk, but does not address IT infrastructure for SAP PP/SD or problems with IT implementation. (Stroiko et al., 2020) discusses the development of e-commerce and IT infrastructure in Ukraine, (Findik et al., 2012) compares SAP implementation between companies in Bosnia and Herzegovina and Turkey and at last (Yohannes et al., 2018) examines factors affecting successful ERP implementation in Indonesian SMEs, but does not address IT infrastructure supporting SAP PP/SD or problems of IT implementation in production and marketing. The goal of MM is the delivery of goods to the customer when they are needed, in the required quantity, and in the best possible time. MM includes requisitions for materials requests, inwards goods, delivery, inventory, and stock location. In terms of modularity, MM comes third after Financial Accounting (FI) and Control (CO), where real-time information is provided for daily financial activities, and transactions are recorded. There are three major inventories managed in MM: raw materials, semi-finished goods, and finished goods. These three inventories are managed based on various techniques such as reorder level, maximum-minimum, ABC analysis, or PAC. A survey was conducted on SAP. The survey questionnaire was sent to several manufacturing industries. It was found that 65% of the industries are using SAP software.

3.Research Methodology

The research is aimed at identifying and understanding the various material management benchmarks that are analyzed by the middle management and technical heads of medium to heavy industries in India when discussing, designing, and deploying the Material Management (MM) module of SAP. In order to identify the various parameters used, research was conducted by scrutinizing a sample of the fact-finding forms generated from the industrial training courses. The impact of the material management benchmarks adopted by the heavy industries will be discussed. The methodology adopted makes use of the fact-finding forms filled by the project heads with the associated technical members during the fact-finding phase of the SAP implementation for the Material Management module with a semi-structured questionnaire.

3.1 Research Questions

RQ1: *What is the need for various model organizations to adopt SAP MM sub-modularity?*
RQ2: *How is IT infrastructure supporting SAP PP/SD in general and international trading? What are the problems of IT implementation in production and marketing, and how often do these problems arise?*
RQ3: *How are large organizations adapting their capital goods function to meet the changes and challenges of trading zone phenomena? What is the response from various model projects?*
RQ4: *What are the benefits of supply chain investing?*

3.2 Objectives of the Study

The study was conducted with the aim of gaining insights on the objectives mentioned below: 1. To understand the concept of materials management. 2. To gain insight about SAP and its modules. 3. To understand the effectiveness of the SAP MM module in Indian industries. 4. To find the reasons for growth in the usage of the SAP MM module. 5. To understand the future trend of the usage of the SAP MM module. 6. To find the changes in the job profile of the employees working in the MM departments. 7. To find the benefits of implementing the SAP MM module. 8. To identify the difficulties companies, face while implementing the

SAP MM module. 9. To find the readiness of IT/computer departments of Indian companies in case of any upgradation or change in the SAP version. 10. To find the expectations of organizations from their internal and external consultants in minimizing the difficulties in the upgradation phase.

3.3 Sampling Technique

The random sampling process was used in selecting samples for the research. In this process, a simple random method through the use of balloting was employed to select the sample from the population of manufacturing industries. Cluster, stratified, and systematic sampling processes were considered due to the increase in the precision of the study. A cluster sampling technique was used to obtain the study because the elements of the population are located within some sensibly defined clusters. The purpose was also to encourage uniformity in scoring. This research will be conducted using questionnaire survey data where the constituents selected were clusters of manufacturers in the southern region of India.

The respondents live in the clusters, and there is not only the cluster but also the primary sampling unit itself. A questionnaire experiment survey process addressing only manufacturers was utilized to conduct the research. Data includes both males and females, such as manufacturing staff and managers in the selected manufacturing industries for this study. The population was surveyed on the overall effect of materials management in companies. A self-administered instrument was structured around 5-point Likert rating scales. Clarity, relevance, and pertinence of the questionnaires are paramount and were ensured by experts. The questionnaire was designed following an extensive review of the literature and previously validated similar research instruments. Calibration and pilot pre-tests of the instrument were conducted to ensure accuracy and reliability. The responses were related to the pressure, performance, and experience of implementation and its effects among the industries. The questionnaires were administered during formal and informal meetings with the staff and at national and international conferences by the researcher himself through personal contact. Each returned questionnaire was verified for completeness to ensure that every question was addressed by the respondents. Fillers necessary for invalid questionnaires were replaced. At the third stage, random data entry processes were employed, and data were entered by appointing data entry clerks. The entered data were checked by the researcher himself. Discredited responses were replaced as necessary, and very few missing data were discovered.

3.4 Sample Size

The research questionnaire was distributed to the sample units consisting of forty-five organizations spread across India. Respondents were the officers situated at or above the level of Assistant Manager from the departments of product design and development, customer support, marketing, configuration management, materials management, quality, and information technology. Out of the forty-five research questionnaires distributed to the organizations, a total of one hundred and forty-four were identified and included in the analysis, resulting in nonresponse or missing data regarding their responses to the questions of the questionnaire. The researcher identified a number of respondents from the two firms, such as eight and three, for the analyses.

There were eighty-five valid questionnaires included in the final analysis. The number of research questionnaires distributed to these two firms allowed for only fifteen and ten teams to be formed in testing the hypotheses. Organizations were not found to have small samples due to the number of participating staff members whose responses could be included. Such designs often increase variance due to nonindependence and lead to significant test-based results, but no conclusions are made on the basis of the p-value. However, sample size effects have been a topic of interest. Discussions regarding the recruitment of teams continue to be a focus, and understanding the distribution of participants across samples already recruited is important. Characteristics of staff ensured that the characteristics of the organization were

general. Relations between the variables varied across similar outcomes of how teams completed questionnaires. The questionnaire returns depicted a fully nested design, as sixty-eight of the final eighty-five respondents could be refiled into the fifteen industry-based firms from which the questionnaires were released.

3.5 Sampling frame

The Sampling Frame is defined as a Show Cause Notice or a Legal Demand Notice or any Demand raised listing the Registered Address of the Infrastructure Contractors, wherein the Actual/Current demand as on 11th day of the month is in the disputed and under litigation category. The composite demand amount due for all demand dates, stage which the case is admitted in court i.e. 'Filing and admitted in High Courts or Filing and it is in 'Other Courts' is subcategorized based on the 12 digit pin code of the respective address, and are mapped. It may be noted that the Demand agglomeration is based on the stage of the case as on 11th day of the month. To further enhance the probability of detection of Contractor involved in intentional mis-tax compliance and evasion, it is suggested that the scrutiny of the payment data including the mode of payment to sub – contractors, details of bank account in which the payment has been credited in the case of sub-Contractors, the tax compliance of the sub – contractors; notice pay dates and exemption limits etc. may also be examined. In cases where it is discovered that intentional errors of commissions are made, it may be suggested to exercise greater caution in the release of substantial advances or suggest deploying a system of bank guarantees to mitigate the risks of future revenue loss/liability from these contractors.

3.6 Methods of Data Collection

A well-structured questionnaire was designed in order to gather desired information from the information system professionals, users, implementation consultants, and other stakeholders of Indian companies. This questionnaire was administered to them personally. The process of data collection was not only repeated in two companies from two different industries, but it was also repeated at least twice in all functions and levels of both companies. Thus, using a direct personal administration method, we could obtain details such as the nature of business, production processes involved, modules implemented, packages used, improvements achieved, and length of time taken, etc. Such details are necessary to undertake a statistical and inferential analysis of collected data for testing the stated hypotheses.

1. Evolution of SAP MM in Indian Industries

SAP developed MM and various other modules to address the distinct needs of procurement, inventory, maintenance, and associated activities in every organization. MM is replete with all the features to keep an organization's materials and associated activities up and running efficiently. It provides all relevant data to other modules and ensures proper, positive, and real-time control of the organization efficiently. SAP enables the organization to function more smoothly and with the capability to successfully compete in national and global markets. It is parameter-driven, giving the organization the flexibility to make even last-minute changes without actual coding efforts. SAP assures significant application management services. Hence, the appeal, deployment, and development of MM in various organizations have been rising rapidly.

SAP now holds a considerable market share in both global and national industries. In India, diverse industry sectors and various cross-industry organizations have either deployed or are in the process of deploying SAP. This mix includes companies in manufacturing, treatment, and services like hospitals, engineering, and large educational institutions. Reliance is India's top consumer of SAP software with the highest business figures. It deployed SAP aiming at increasing efficiencies in operations, countrywide integration, avoiding inventory issues in individual industries, and linking their customers to SAP. Manufacturing was under earlier ERP, aiming at isolating and increasing efficiencies of related customer-oriented functions. This confident journey of SAP further boasts nearly half of India's total business, resulting in the highest business figures. SAP, with its enormous chain of products—selling around thirty

different solutions—positions the global market at the leading edge of organic evolution because of highly branded products, leaders, and robust growth that serve different needs across various verticals. SAP is an umbrella idea and canopy that encompasses a web of applications drawn on varied platforms.

2. Key Features and Functions of SAP MM

SAP Material Management (MM) replaces all the paper-chasing exercises regarding any type of transaction for material and provides a complete output at a faster rate. Its key features are as follows: 1. Purchase Requirements: Purchase Requisition, Request for Quotation, Purchase Order, Outline Agreement. 2. Master Data: Material Master, Vendor Master, Group Material, Account Assignment. 3. Inventory Management: Goods Receipt, Goods Issue, Stock Transfer, Transfer Posting, Reservation, Movement Type, Physical Inventory. 4. Specific Procurement Processes: Consignment, Subcontracting, Pipeline Material, Service Purchases, Third Party Orders. 5. Invoice Verification: Invoice Verification with and without reference to Purchase Order and Goods Receipt. 6. External Services: Purchase and Invoice Verification. The process functions that take care of the SAP MM module are defined as below:

3. Integration of SAP MM with Other Modules

To enhance the benefits of SAP MM, many companies are installing other associated modules such as Production Planning and Quality Management to achieve better controls and management in their processes and products. The comprehensive integration of SAP MM with other modules is through all the organizational functions, including inventory management and invoice verification functions of materials. The flexible integration models allow for the integration of various existing legacy application systems with the material management system, procurement, inbound logistics, demand planning, inventory management, invoice verification, and processing associated with the documents in the organization. Other organizational modules can be implemented in the SAP environment. Finally, it helps to minimize the manual processes that do not require the basic material needs in various functions and provides information regarding the cost of data replication to achieve the organization's strategic business objectives.

Many leading organizations are enhancing the existing SAP MM module with central purchasing workflow functionality by integrating their existing workflow systems with a real-life MM web portal that achieves good savings, secures user logs, and transactions with vendors, and facilitates the travel of engineering departments, mostly exploited for the management of the completion schedule, materials receipt status, and goods receipt status. The real advantage of SAP MM is that most of the underlying tables can be easily viewed by the users, which include both reporting and operational data. Also used are the database tables. Advanced Business Application Language is used for data extraction purposes. SAP's standard transaction for material is used for coding errors, thus enabling the ease of searching and viewing the data. In need of additional data, such as other organizational units, users, and accounts, are easily and responsibly catered for. SAP MM helps users in extensive sourcing, pricing, and maintaining a huge material master database with the aid of many tools installed per their requirements. Therefore, many companies install supplementary modules such as quality management with SAP MM.

4. Benefits and Challenges of Implementing SAP MM

SAP MM centers on some significant aspects whose scope and operational effectiveness collaterally sift into ERP. The paramount areas of SAP MM that interface well with other elements of SAP ERP include integrated procedures, procurement of materials, accounts assessments, multilevel pricing of materials, evaluations of quality, and tracking of supplies. In spite of some identified exclusive offerings of SAP MM toward the optimization of the sources of procurement, such as bulk quantity contracts, planning contracts, and response to special procurement issues, still the two most important benefits of implementing SAP MM

are connected exclusively with the competent resolutions of the two primary source-related materials planning problems of today – minimizing inventory and the purchase cost of materials. Nonetheless, these possible advantages accrue only when the management of production resources incorporates tasks relating to purchases, the value assigned to inventory purchased and held, and the coordination of activities. Such advantages are substantial and can be a significant pivot for customers' reasons to visit.

5. Trends and Innovations in Material Management in Indian Industries

The focus of material management has undergone changes in the contemporary world. In India, the focus of the material management principles is slowly shifting from local to global markets. There are a few important changes that have been observed in recent times that have affected the operations of the material management department. These changes are discussed below:

5.1 Technological Innovations

Due to the link between fast technological improvements, global competition, and an environment full of changes, developing systems that provide information in real time is necessary. Automation and integrated systems are the major foundation in achieving success, as they can simplify many tasks and ensure coherency in resource planning and control systems. E-markets increase the demand on the material management departments. Not only information, but also the material management department will have to purchase almost all items needed through e-market systems. Because of the competitive advantages offered, rapid access to large suppliers' bases can significantly reduce the costs of acquiring goods and services.

5.2 Outsourcing

Outsourcing materials is very important. More and more companies in India recognize the fact that competencies and production processes often involve elements providing competitive edges to organizations compared to their in-house material management activities. The benefits of decisions related to outsourcing offer flexibility in terms of the structure of the capital and the reduction of fixed costs. The economic advantages in terms of technological and strategic benefits of subcontracting often outweigh the savings in production costs.

5.3 Environment

They have brought concerns about the environment to the forefront of the changes facing contemporary management. Environmental investments have disclosed their impacts on corporate results. Indeed, many successful companies have turned to these practices as a way to improve the processes within their organizations, using the results as opportunities to increase their revenues. Another reason for the company to become environmentally responsive is that it must operate within a legal framework increasingly weighted for violations. The four core principles of material management, i.e., supply management, purchasing management, systems and technology, and transportation, are equally important when the focus is on global markets or a local one conjointly.

6. Future Prospects and Recommendations for SAP MM Implementation

The study not only contributes to the existing body of knowledge but also yields empirical insights and practical implications that can help organizations better understand and implement SAP MM. Based on the results, some recommendations for successful SAP MM implementation are put forth. Such recommendations can be helpful in the future to organizations already using or intending to use SAP MM. In order to increase the accuracy of the data captured in the SAP MM system, employees should be given training to use the system. When the data entered are inaccurate, the outcome obtained is also inaccurate. Accordingly, training is considered very crucial for successful SAP MM implementation. Initially, organizations may not adopt the SAP MM system to its full capacity. As the system starts functioning effectively and delivering the desired output, it will be possible for the

organizations to implement other modules of SAP such as sales and distribution, production planning, quality management, and the like, thereby helping them move to a higher level of technology penetration and software application of other modules of the ERP systems. Thus, the growth of organizations using the SAP MM system is guaranteed. No matter how low the initial level of its adoption is, the end result is profit. As the organizations increase their performance and profits through the adoption of the SAP MM system, the benefits of this are not confined to the organization alone, but also extend to the national economy as a whole. SAP MM can contribute significantly to the economic development of fast-developing countries. In conclusion, the successful application of ERP systems, including SAP MM, will certainly improve the levels of prosperity and economic performance of many businesses, thereby providing much-needed employment and reducing unemployment.

4. Conclusion and Summary

This paper mainly discusses the future trends in the SAP MM (Materials Management) module. In each of the modules that are already discussed, we have seen that by making additions and changes to the current system, it can be transformed into a much more potent arsenal for management use. Moreover, the professionals concerned are also making significant efforts to utilize the facilities provided by the SAP MM module to the best of their ability. Those were the years in which the Indian market was just getting busier and busier. However, as the manufacturing scenario in the West does not look too bright, business houses that export their wares in large quantities to the West may not be great beneficiaries of the post-implementation developments in the MM module. In summary, we will also try to express how some of the things described might materialize in the coming years. The SAP MM module is constantly growing and developing. These changes are happening due to the expansion of business and the likely expansion of the MM module. Although the present Indian business scenario doesn't seem to suggest major expansion in the near future, it is likely to happen for some industries and a large number of industries if the Indian scenario allows. However, at any cost, one can say with confidence that changes are going to happen in the SAP MM module phase over time, and it will become a more potent and effective tool for efficient business decision-making and control building.

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