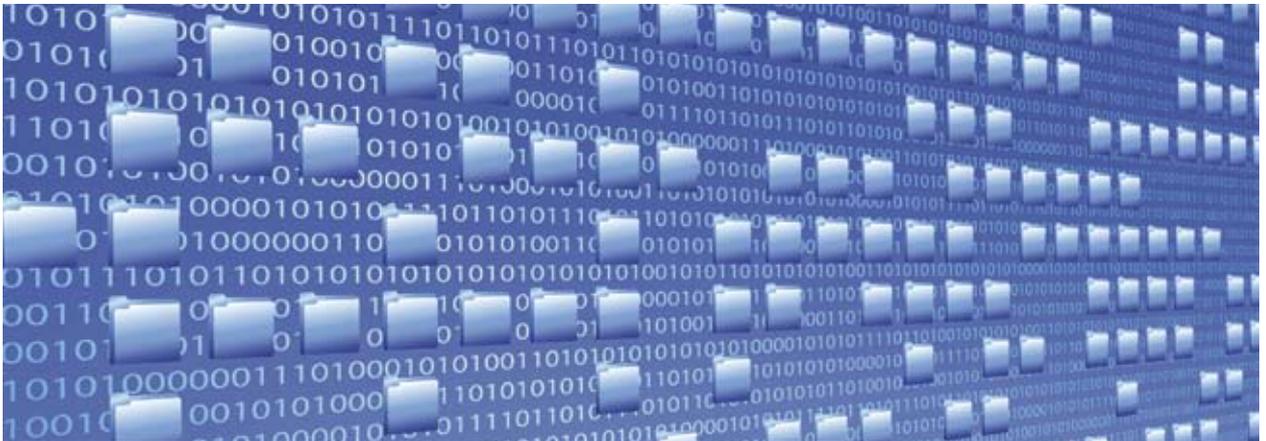


ERP Systems - Overview of their Emergence, Implementation and the Way Forward



ERP systems have emerged as the changing face of industry in the last 12 years or so. Business managers, both functional and technical, working in trade and industry for long, have witnessed the importance these systems have gained over a period of time, as a driver to optimise resource utilisation and profitability. This article attempts to summarise comparative strengths of ERP systems, considerations relevant to their implementation and in the future where are these systems headed. Readers will appreciate that it is only a *synopsis* of the whole new world that ERP systems have given rise to in trade and industry. It is intended to give a flavour of what to expect from ERP systems, the precautions to be taken during their implementations and their relevance in the long run from the perspective of advanced web enabled applications.



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Computerisation in Pre-Globalisation Era

Traditionally, Electronic Data Processing (EDP) was considered a backdoor function in the industry. Programmers, System Analysts and Executive Managers in EDP took up system development work based on requirements submitted by individual departments. Functional departments prepared documents in desired *templates* and submitted those to EDP, where Data Entry Operators punched the data into the system.

Until ERP dawned on the horizons of business, Pay Roll, Inventories, Accounts Receivable and Payable, Fixed Assets, etc. were the favourite applications close to the heart of a finance manager; Bill of Materials, Route Cards, Production Orders were the usual applications for operations managers. Sales management used to

be concerned with printing of sales invoices based on input feeds by data entry operators.

Most of these used to be *standalone* applications, meaning that these records or the sets of data would not have any *interface* with other functions, so to say. Customer accounts were not being updated when sales invoices were raised on customers and system did not generate accounting entry to provide for liability or credit to cash or bank when goods receipt was posted.

Data for given applications used to be punched at a time and their printed output sent to the departmental managers. Wrong or incorrect input, either at its origination or during data entry was not very uncommon and one could very often hear murmuring of both functional and EDP managers 'Garbage in, Garbage out' ...(!)

Data Entry Operators used *Hash Totals* to check and verify accuracy of data,... leaving ample scope for *compensating errors* inside huge blocks of printed paper. Expecting reports from EDP in a desired format with desired information captured in reports was at times considered next to impossible.

During late eighties and onwards, however, progressive organisations started taking an initiative towards integration of some of these applications. Integrated applications like Material Requirement Planning (MRP) or integrated financial accounting involving General Ledger (GL), Accounts Receivable (AR) and Accounts Payable (AP) started becoming common. However, coverage of those systems from integration perspective was not very comprehensive.

Emergence of ERP Systems and their Comparative Strengths

The modern day Enterprise Resource Planning (ERP) systems encompass all activities and functions carried out in a business organisation. These systems process data in an integrated manner based on established relationships amongst those activities and functions.



Most of these ERP systems also provide for automation in operations by scheduling background jobs to execute various business processes and sub processes in a desirable sequence without manual intervention. Their comparative strengths are discussed hereunder -

1. On Line (Real Time) Data Processing

In ERP systems, the data is processed on *real time* basis and reflected in reports online. For example, posting of a goods receipt updates Purchase Order against which goods were ordered; it updates inventory record of relevant Item codes in 'inventory module'; it generates posting in financial accounts; and it also updates inventory and clearing account balances in Balance Sheet.

Any business transaction, financial or quantitative, processed in ERP system environment will update records in all relevant functional areas. Thus, when customer order is received, for example, ERP system will provide for creation of sales order with reference to it, create delivery order, post goods issues against sales order impacting inventories and generating accounting entry against it, generate sales invoice and post financial transaction for sales. System will also concurrently update reports in MIS. Data once entered is cross referenced subsequently in all relevant documents and records *avoiding duplication* of data entry to a great extent.

As against this, scope of standalone applications used to be very limited. Most of these applications used to be *home grown*, catering to the specific needs of departments concerned. So, continuing with same example one could envisage independent systems in 'Sales and Distribution' management to book customer purchase orders, to create delivery orders, to print sales invoices, to post financial entries for sales, to update report on Day's Sales Outstanding and to update Credit History for individual customers.

2. Built-in System Intelligence and Granularity in Reporting

Stand alone applications had inherent limitations and were only used to process voluminous data; to perform arithmetic; to ensure accuracy and speedy retrieval of the data and to print ledgers and documents. These applications lacked *built-in system intelligence* to check the data entered and validate its legitimacy. Advanced ERP systems like SAP R/3 have strong system intelligence capabilities. For example, budget or stock availability checks instituted in ERP

systems can prevent purchase order being raised if budget is exceeded or sales order being raised if stock is not likely to be available by scheduled delivery date.

Stand alone applications did not provide for any *granularity* in reporting. ERP systems offer capabilities to develop reports with required granularity to provide *kaleidoscopic view* of operations and profitability. For example, a report on sales, COGS and net margins (PBIT) for different combinations of characteristics like customer, product, sales region, sales district and sales offices is possible to be developed in ERP systems.

3. Strong Document Numbering Controls and Audit Trails

In ERP systems, one finds that the document numbering controls are robust and that every transaction, financial or quantitative, is always documented and identified with reference to a document number. So, establishing *audit trail* for any 'end to end' process is always easier in these systems.

ERP systems have given rise to the concept of 'end to end' processes like 'Order to Cash (OTC)' or 'Procure to Pay (PTP)' or 'Record to Report (RTR)'. The built-in audit trails make it easier to track document references, in any end to end process like OTC, for example. It is easier to track, for example, document references for quotations, customer Purchase Order, Sales Order, customer advance, Delivery Document, Sales Invoice, and subsequent settlement of customer receivable for every billing transaction processed in system. SAP R/3 provides for such audit trails in respect of most business processes.

Standalone applications which ran primarily based on data feeds in batches did not provide for such robust audit trails as those applications lacked interface with other related applications. For example, application to process goods receipts did not have interface with General Ledger to generate accounting entries for

goods receipts nor did it update purchase orders against which goods were received.

4. Eco-friendly Nature

The III Tier System Architecture used in ERP systems enable individual users view transactions and reports being updated on *real time* basis. Carrying loads of print outs of various ledgers is no longer considered necessary. In a way, these ERP systems are very environment friendly as well.

This was not the case with conventional stand alone systems wherein data punched in the system used to be processed in batches and made available to users usually in printed form.

5. Best Business Practices

Of late, most business organisations have implemented ERP systems offered by credible multinational or domestic companies. The decision to do so instead of depending upon in-house capabilities stems from the perspective of ensuring assured systems support over long term and availing the benefit of best business practices configured in those systems.

ERP systems coordinate resources, information and activities needed to complete business processes in all functional areas like Materials, Production, Sales, Finance, HR, etc. System updates relevant records in an integrated manner whenever any business process or sub process is executed in the system.

6. Improved Return on Investment

Given the nature of these systems it is rather easy to imagine their vast potential in bringing operational efficiencies in their wake. These systems can reinforce strong managerial controls, focus attention on areas where improvement is necessary, and enable organisations to operate on principles of *lean management*.

Market competition in today's world has no boundaries. Globalisation of business the world over necessitates that every business organisation must utilise its fullest potential to reduce costs and improve its market share and profitability to stay afloat.

Realising this, most business organisations, small and large alike, have implemented ERP systems or they are in process of their implementation or on the look out for ERP system that is optimum to their needs from cost benefit perspective. Mergers and acquisitions are quite obvious in today's business world. The bigger fish would always want smaller ones to adopt and roll out the same system it has implemented. World is not

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static even when it comes to the newer versions of these systems and their Integration strengths. So, the process of implementing system version upgrades, roll-outs and enhancements will continue unabated. Ongoing system implementation projects and their support round the clock, are matters of routine in most parts of the world.

7. Team Work and Improved Employee Morale

To implement the ERP systems i.e. either to replace manual or stand alone legacy systems or implement version upgrade or system enhancements in any organisation, you need a team comprising Domain Consultants, Application Developers, System Administrators, Project Managers and least to mention, enthusiastic Business Process Champions from business and you also need a strong support from top management.

You need domain consultants who will understand business; interact ably with users in different functional areas; put across their view point and share best business practices implemented elsewhere in past. Given the nature of integrated systems environment, it follows that a consultant or key user in any given domain, may it be finance or production or sales, cannot work in isolation. He or she would have to move in tandem with consultants in other areas.

Standalone applications viewed functional departments more as water tight compartments. Departmental interests deserved more attention over organisational effectiveness of operations leading to inter departmental or inter personal feuds in many instances.

System Implementation Costs

ERP system implementation projects involve considerable cost outlay. This is regarded purely as an investment and the initiative for the same is usually taken at the highest level of management hierarchy.

Many factors will impact the cost needed for such projects, volume and complexity of operations and geographical diversity of business being the most important considerations from overall implementation cost perspective.

ERP implementation involves costs to purchase user licenses, fees that the implementation partners charge, cost of hardware like servers and desktops, cost of training from ERP system vendors, cost of logistics for consulting team, cost of work sub-contracted, etc.

Considering the amount of expenditure involved, the time it takes to implement the system and the

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shortcomings that the system may suffer from *flaws* in its implementation, management of the business keenly observes project progress on regular basis.

Implementation Period

ERP system implementation is usually a long drawn process in large organisations. Depending upon complexity of operations and number of plant or office locations, the initial implementation could take anything between six months to couple of years. Multinational organisations carry out these implementations in phases over different geographies like Americas, Europe, APAC (Asia Pacific Region) or AMEA (Africa and Middle East Asia).

Some organisations adopt a different approach. They start with usually financial accounting alone, and then integrate Materials and Sales functions and once these basic modules stabilise, they implement Production Planning, Controlling and HR.

Regardless of the time it takes, ERP implementation is regarded as a project concurrent to the main business and regardless of the fact that the project is undertaken concurrently it is accorded prime importance, given far reaching implications any good or bad system has on the business.

Stakeholders

There are many stakeholders in this project, right from top management to a process owner responsible to handle day to day activities.

There is a steering committee comprising representative from top management, usually CEO or CFO/COO and one from implementation partner with matching capabilities. Then there are project managers, functional heads, business process champions, key users and employees at large.

Larger the business, larger will be the scope of the project for initial implementation and larger will be the overall project team. Resources from business are drawn either as 'Full Time' i.e. working exclusively on system implementation or on 'Need Based' basis.

All of these role players will have some stake in successful implementation...process owners need simplified processes; business process champions look forward to promotions...; middle level managers want to ensure that they continue to have a say in business and their importance is retained...; top management wants a system just not to replace legacy systems but the system that will improve operational efficiency.

Dynamics of System Implementation

Any ERP system implementation would usually involve four phases mentioned below. The time estimates for their completion depend mainly upon scope of the given project.

1. Requirement Gathering and Business Blue Print Documentation
2. Business Process Re-engineering and System Realisation
3. Go Live Preparation and
4. Go Live and Post Go Live system support

First two phases are particularly important from the perspective of building a robust system that fulfills user expectations. It is during 'requirement gathering' and 'system realisation' phases that the utmost care needs to be exercised to ensure that there are no communication gaps and user expectations are met.

The first phase, *Requirement Gathering and Business Blue Print Documentation* involves activities like –

- i. Conducting user workshops and interviews to understand current business processes, master and transaction data processed in legacy systems and reports produced by those systems.
- ii. Performing so called '*Gap Analysis*' to bring out gaps in current practices and future expectations.
- iii. Documenting current practices as well as proposed requirements in what is known as '*As Is Status*' and '*Proposed to Be*' documents.
- iv. Determining if the requirements could be met by standard system configuration i.e. through Re-engineered Business Processes as recommended in ERP systems or if the requirements would need custom development.
- v. Conducting *play back sessions* before select audience to reconfirm if requirements were correctly understood.
- vi. Carrying out system configuration and executing transactions with sample data to offer *Proof of Concept* (PoC) for specific solutions sought by the business.

At times, this phase of requirement gathering is regarded as a project by itself and is appropriately named such as 'Feasibility Study' or 'Discovery Phase'. It is independently paid for provided all of its clauses are complied with. In such a scenario, it is considered as a precursor to proposed system implementation. The implementation partner is proposed to come up with detailed *effort estimate* and implementation price based on the inputs and insight gathered during this phase.

However, practices do differ. Many a time, based on proposals submitted and presentations made by implementation partners invited to participate in bidding, an implementation partner or their consortium is awarded a contract for entire system implementation including the time for requirement gathering.

The second phase of *Business Process Re Engineering and System Realisation* starts, once business approves the Business Blue Print document where in '*As Is Status*' and '*Proposed to be*' is captured. Robust ERP systems like SAP R/3 recommend clients to adopt the best business practices that they offer. But, it is for the client to oblige and re-engineer certain processes as recommended by ERP vendors. There is always scope to customise system as per business requirement. However, the choice to do so should be exercised with great care keeping in mind cost benefit analysis of it and long term sustainability.

Functional consultants configure the system based on the BPML (Business Process Master List) prepared during BBP phase. It is extremely important for Business Process Champions and key users from business to get involved proactively during this phase.

They have to provide sample master data to be maintained in different functional modules on realistic basis keeping in mind the current as well as proposed requirements, understand 'in built' system intelligence and cross functional integration aspects. They have to understand the way data gets processed in system and they have to also get a good feel of hands-on experience.

Usually, implementation partners provide high level and more detailed training to core users. But, it is for core users to utilise the opportunity and understand system intricacies.

It is also during this phase that the consultants and developers carry out system developments. Usually, implementation partners prescribe a detailed process, generally referred to as '*Change Requests Control*', to follow to accomplish any small or big development. It is for the PMO (Project Management Office) and QA

(Quality Assurance) teams to ensure that the process laid down is complied.

QA prescribes various forms of testing during this phase. Stand alone processes (not involving any cross modular integration) like maintenance of masters (Customers, Vendors, Materials, Bills of Materials etc.) in respective modules are prescribed for *Unit Testing* by key users.

Core users then participate in *Integration Testing* of end to end processes involving cross modular integration. Domain consultants provide active help to core users during integration testing.

However, another form of integration testing known as *User Acceptance Testing* is usually expected to be performed by core users independently. It is based on this testing that core users have to provide sign off in token of their acceptance of system configuration and developments, if any.

If business has multiple entities in same systems environment where projects for system enhancements are of ongoing nature, then QA also prescribes schedule for *Regression Testing* which is intended to ensure that the system set up is independent for different entities according to their business requirements.

System administration cell will usually conduct *System Performance Testing* with full data upload and multiple system logons to ensure that system responses are not slowed down.

In bigger implementations involving substantial migration of data from legacy systems and number of interfaces with external systems, usually a *Pilot Run* for a brief period is recommended.

Pilot run helps in judging how effectively interfaces will run and if the '*black out*' period envisaged will suffice to migrate data during system change over from legacy to ERP. Based on the results of pilot run, project team gets additional opportunity to fine-tune the system and schedule for data migration, wherever necessary.

A blackout period is the period during which both legacy and ERP systems are not available to users to enter data or process any transactions. Usually it is recommended during data migration. This consideration is particularly relevant in retail industries where volume of transactions processed every day is enormous.

Around the time these forms of testing and the pilot run are due for closure, a steering committee generally deliberates on whether the time is ripe to go live or not. Various considerations play a role in this decision making, the important ones being preparedness of the organisation to go live and comprehensiveness of the system to meet desired objectives.

During *Go Live Preparation phase*, PMO ensures such things as -

- i. Users are equipped with system User Ids, passwords and system authorisations.
- ii. The system logon pad is installed on desktops and laptops.
- iii. The users are trained adequately in processing transactions under their control.
- iv. Different plant and office locations are well connected.
- v. The process for data migration is adhered to by all concerned.
- vi. The support matrix is published and understood by all concerned for post go live system support.
- vii. Key users and business process champions have no vacation plans soon after system goes live (!)
- viii. Critical data like financial and material balances is validated by key users.

Usually, PMO will have a check list to ensure that all precautions have been taken and necessary preparations are in place. PMO will monitor the progress and start taking stock of their compliance few days before system is scheduled to go live.

In any business, there is no such functional area that is very important or less important from overall effectiveness of business operations. How effectively system will seamlessly integrate operations from the stage of planning and procurement of material inputs to manufacturing and selling finished products is something that prominently occupies top management's attention.

After all, any management would invest in implementing ERP system with a view to earn some return, tangible and intangible, on its investment.

The tangible returns could be in the form of improved inventory turnover, reduced bad debts, optimised manufacturing operations and improved profitability through focused sales efforts aided by marginal and net contribution analysis. ERP systems have enabled organisations to perform on principles of lean management bringing in efficiency in operations and improving their *Return on Investment*.

Intangible returns could be in the form of enhanced image of the organisation in public eye. In early days of ERP system implementations, the investor community viewed companies undertaking ERP implementations very favourably.

Intangible returns could also be in the form of preparedness of business to reap the benefits of technological advancements in the areas relevant to ERP systems and their web applications. Unless

ERP system has been implemented, business will not be able to implement advanced web applications like APO, SRM, CRM, etc. and further optimise operations and profitability.

ERP Systems Change the Way of Life in Business Organisations

Operations are no longer viewed as watertight compartments once ERP system is implemented.

Employees are encouraged to take broader view of operations and end to end processes like, 'Procure to Pay' encompassing transaction processing right from creating purchase requisition to the ultimate invoice verification and vendor payment.

Those activities performed earlier by employees in different departments like Material Planning, Purchase, Stores, Production, Sales and Finance are realigned in a way that optimises operations.

With roles and authorisations coming in vogue for individuals with system user IDs and passwords, operations become more transparent. Subject to authorisations, concerned employees and their supervisors can view the status of activities under their control in real time.

Clarity over steps to be performed in given processes and operations dispenses need for too many middle level managers and it directly promotes flatter organisational structure. So to say, there is little room for supervisory roles in ERP systems environment.

Offices wear modern look with computers, printers on office desks and central air conditioning. Online transaction processing reveals inter-dependence and helps to reduce chaos resulting from inaction of laggards.

Management tends to view operations from end to end process perspective and it dilutes traditional thinking of 'departments looking after individual functions like Purchase, Sales, Credit, etc.

Change Management

Discussion over the dynamics of system implementation cannot be concluded without mentioning the process of 'Change Management' that the organisations have to deploy during the period of system implementation.

Providing employees with project progress update at regular intervals through individual emails; putting up banners or posters in shop floor and offices; arranging short quizzes on ERP system and rewarding employees with higher scores; celebrating milestone completions, etc. will go a long way in ensuring that

the change in system environment is very well absorbed by all employees.

The tools, techniques or the perceptions about change management may differ from place to place. But, given the organisational and cultural changes that these systems bring in, it is always necessary to ensure that the proposed changes in system environment are understood well by all employees and their mindset gets tuned for the change.

Many large organisations consider Change Management as an activity concurrent to the main ERP implementation project so as to ensure hassle free post go live operations.

Way Forward

Most organisations have endured in last 12 years or so the turbulence caused by system changeover and the resultant cultural changes. ERP systems have now come to occupy indispensable role in day-to-day functioning.

However, most of these organisations are still coping up with the prolific capabilities that these systems offer. Advanced solutions in SAP R/3, most preferred ERP globally, like 'Sales and Operations Planning', 'New GL', 'Warehouse Management', 'Material Ledger' and 'Profitability Analysis' have not been utilised to their fullest potential. There is still scope for organisations to improvise on basic ERP systems implemented.

Before I conclude, let me briefly sum up the 'way forward' in terms of systems integration with external customers and vendors. Computerisation in business has not stopped with implementation of ERP systems.

Now the future trend would be to –

- i. Integrate your business with the business of your suppliers and your customers;
- ii. Seamlessly integrate your demand for the inputs you require to manufacture your products and seamlessly integrate your supply of products with the demand for your products by your customers; and
- iii. Balance your capacity to manufacture and plans or schedules to procure and deliver in line with plans of your vendors and customers.

All of these applications will be web enabled. They will have integration with ERP systems implemented in the back end. The interplay of all of these applications and systems will result into more efficient utilisation of resources at a macro level. ■