Management Information System
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Week - 03
ERP - Evolution and Benefits
**Lecture - 11**
Part 2 of 5

Hello everybody. So, continuing on our journey with ERP Enterprise Resource Planning now we will talk about Evolution and Benefits. I will give you a brief history of the product because ERP is a very integral part of the information system, Management Information System. So, a bit of history and then we will also talk little bit about benefits because that is what you primarily need to understand why ERP and what are the benefits etcetera.

There are several benefits and I already told you little bit about various aspects and that it is multidimensional, it has a very vast exposure, very vast scope and it touches upon every aspects and life of an enterprise. So, it is very broad spectrum application I would say.

Understanding all the benefits will be difficult in this duration, but you must basically understand what are the major benefits so that as a manager and I see you as potential future IT managers, when you will join working in an MIS function, you will be able to you know sell your ideas on ERP to your customers and to your business counter parts.

When you are working on a organization in an IT department, your business managers, production manager, finance manager, purchase manager and other function heads will be your customers and you will have to tell them about the features and advantages of ERP/ SAP and what benefits the organization will get by investing in this technology.

You will be selling the idea of SAP to them and once they get convinced, and head of finance department gets convinced based on the various benefits of the product, the CFO will convince the CEO to go for this investment so, it is very important that you learn and understand what the various major benefits of SAP are
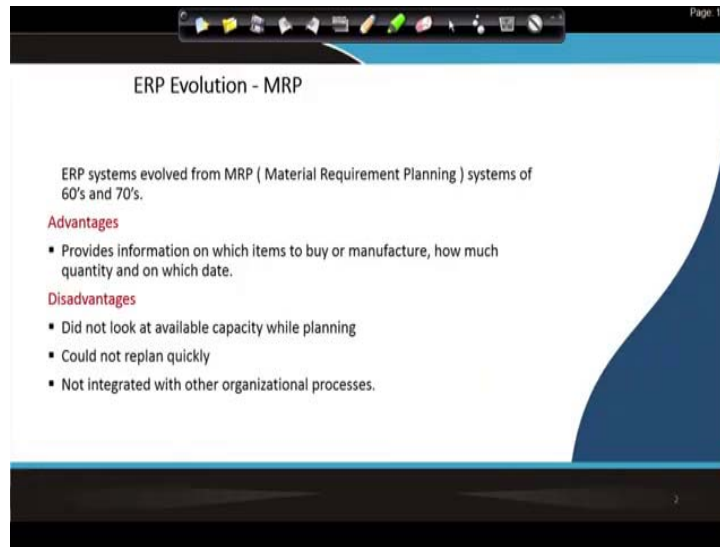
The evolution of ERP - ERP started with something called MRP. MRP is nothing but Materials Requirement Planning. It started from the manufacturing sector, but nowadays ERP is everywhere in all sectors like financial sector, health sector, service sector, banking everywhere ERP is being used.

It started with the materials requirement planning and was used by the manufacturing sector and in my discussion, I will mostly refer to an automobile industry because all of us see cars we and understand the product and have some idea of a car factory. It is very easy to explain things based on the automobile industry scenario.

It started in early 60's and 70's. Advantages were it provided an information on which items to buy or manufacture of how much quantity and on which date. You need to understand something known as a Bill of Material (BOM). I will be using this term – Bill of Material very often in this class.

Any material you take say for example, a Car. A car has got components. It has got 4 wheels for example, 4 wheels, a gear box, an engine, battery, then all the electrical items, steering wheel, seats, the body, the windows, the glass screens, front wind-shield, back wind-shield, the mirrors, radiator, cooler, suspension system and so many other components like carburettor etcetera. All of these materials will be a part of the bill of material of a car.

So, what does a MRP do? When you get an order for say 100 cars, it expands that bill of material using the software called MRP and then, it will tell you that for making 100 cars

you need say 400 wheels (or 500 wheels, if we consider the Stepney) for example and similarly it will give the numbers of each of the BoM items that will be required to manufacture 100 cars.

So, the MRP software will tell you to order for 500 wheels, 200 wipers, 100 batteries, 100 gear boxes, 100 engines etcetera. Thus for making 100 cars all the components will be shown to you in the report and it (the report) will say that you have to get these many material.

Apparently this looks simple, but we know the material components are actually in thousands in a car, ranging from very small plastic components to electrical switches, dash boards, meters I mean, so many items that it is not possible for a person to remember and recall all the items without doing a mistake. This is done by this software known as MRP software. Advantage is that a complicated manual task is automated.

Disadvantage of MRP was that did not look at available capacity while doing the material planning. When you are planning to make 100 cars, you need to know how much time it will take. So, there is an important factor of time. It does not take any consideration of the capacity of the machine It assumes that the machines have got infinite capacities. It will tell you the time you will take to produce car, using the standard time and not consider any capacity constraint.

Suppose, there was a change in the order quantity but it cannot replan quickly. Suppose in a order of 100 cars, the customer tells instead of 100 give me only 80 cars. You have to replan or in another case it could be 120 cars. Re-planning in between for a change in order quantity was not possible in this original software and it was also not integrated with other organizational process like finance and materials department.

ERP Evolution – Closed Loop MRP

Closed Loop MRP was the next evolution after MRP which partially solved some of the MRP issues.

Advantages
- Does a manual feasibility check of MRP plan.
- Provides alerts / triggers if the plan is not feasible.

Disadvantages
- Could not replan quickly
- Not integrated with other organizational processes.

So, that was the original MRP used to be called MRP 1. Then came the Closed Loop MRP. The advantage was it was capable of doing feasibility check of the plans. It is a manual feasibility check of the MRP plan output (report) whether it is feasible or not to deliver within the target date and you could also replan any changes. The extra quantity requirement for additional order could be captured and re-planned. It would provide alerts and triggers if the new plan was not feasible. Suppose there is a shortage of material so, the plan will not be feasible. In such cases it will throw some alerts to tell you that there is a shortage of material, and you need to order more raw materials or components in order to complete the increased order quantity of cars.

Disadvantage of Closed Loop MRP was it was not integrated with other organizational functions like Sales, Finance, and Quality department. Integration part was missing. So, it was only integrated for Bill of Material, Stores and Purchase but not with any other functional departments like sales or finance or quality.

ERP Evolution – MRP 2

MRP 2 systems were much more stronger compared to MRP / Closed Loop MRP in terms of functionality. These systems were well integrated with several organizational business processes and had multiple modules.

Advantages

- Include processes for Sales planning, Demand management etc.
- Helped in several supply chain execution processes (like Purchase and Production order execution, Sales execution etc.).

Disadvantages

- Not fully integrated with all organization processes (like: HR)

From Closed Loop MRP the next one was MRP 2. MRP 2 was a bit more advanced and much stronger compared to MRP 1 and closed loop MRP in terms of functionality. These systems were well integrated with several organizational business process and had multiple modules. So, it was now really becoming one of the first ERP system.

MRP 2 included processes for sales planning, demand management etcetera. Many integration effects started coming in and helped in several supply chain execution processes like purchase and production order execution, sales execution etcetera. Disadvantage was that it was not fully integrated with all organizational processes like Quality, Plant Maintenance, and HR etcetera. So, it was a beginning of you can say ERP as MRP 2 started seeing lot of integration.
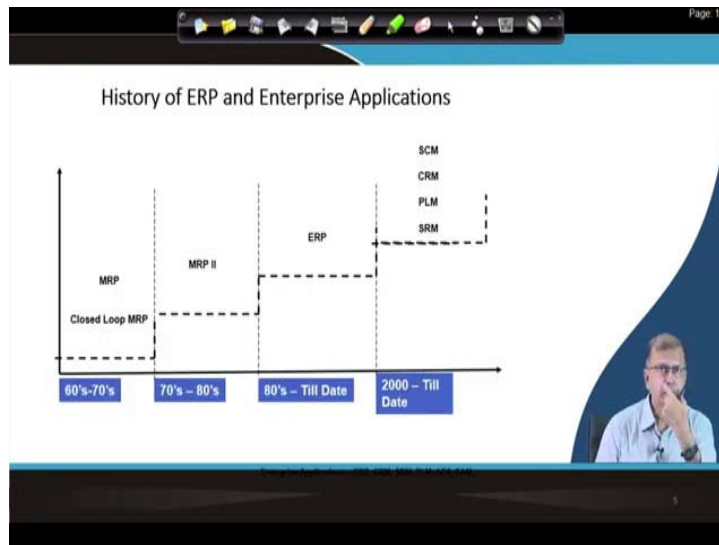
History of ERP by year. We really started having the ERP since the 1980's and then from 2000 onward, we have got additional platforms, like Supply Chain Management, Customer Relationship Management, Product Life Cycle Management and Supplier Relationships Management. Again we will touch upon these later for each of them because these are very important ingradients and extension of ERP. They are also linked to ERP and they are sort of sitting on top of ERP.

Some early history of few leading ERPs. In 1972, five engineers from IBM in Mannheim, Germany started the company SAP, with the idea of producing and marketing standard software for integrated business solutions. That is the history of SAP's birth and SAP became the most popular ERP product. Today it is being used by most industries and most of the fortune 500 companies use SAP.

In 1975, Richard Lawson, Bill Lawson and John Cerullo started Lawson software, pre-packaged enterprise technology solutions as an alternative to customized business softwares. This was known as Lawson product. In 1977 a product called JD Edwards came to the market. This was later on merged with Oracle ERP.

In1978, Jan Baan, of Baan Corporation from Holland developed a very popular ERP especially for use in the steel plant segment. Baan software is now known as Infor. In 1987, a very popular HR ERP package known as PeopleSoft was developed and it's HR module was very strong. It was very popular for HR applications and was founded by Duffield and Ken Morris.

PeopleSoft along with JD Edwards have been taken over by Oracle Corporation. Oracle also merged another very popular CRM software called Siebel and with so many take overs, Oracle became next nearest challenger to SAP's popularity. So, we really have two very large ERP product one is SAP and the other is Oracle ERP and the third one is Infor which is number three in the world.
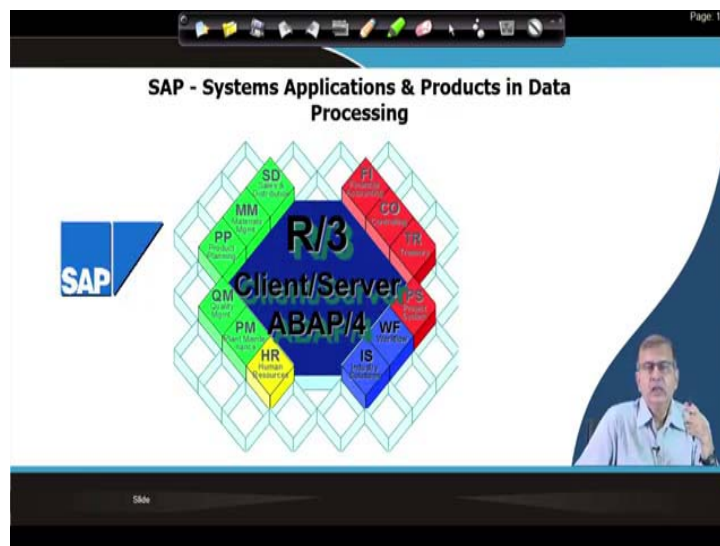
We will talk mostly about SAP and I myself practiced SAP as a consultant many years back and I have done many SAP implementations in Indian companies.

SAP R-3 full form is Systems Applications and Products in Data Processing. It is called R-3 because it is a 3 tier architecture which I will explain later in next slide. Client-Server is the architecture and ABAP 4 is the technical language (software language) like we talk about Java and dot-net etcetera. The software language used to develop SAP product is known as Advanced Business Application Processing (ABAP 4).

These are the modules you see here SD (sales and distribution). We use these acronyms very often for sales and distribution, MM (materials management), PP (production planning), QM (quality management), and PM (plant management), HR (Human resources) and, then we have industry solutions which I will talk about later. WF (Work Flow), PS (Project systems), TR (treasury), CO (controlling), FI (financial accounting) etc. These are all most of the functionalities used in any business environment.

Industry Solution - SAP develops specific solutions for particular industries for example, the print media. When they use SAP, they need some very specific thing because in the print media business major revenue comes from advertisements and these sales quantities are different from sales of any material or physical product. When they sell media advertisement space for example, they sell by column centimetres. So, the length and width of that column and the length or the number of words you put in the advertisement is used to price the advertisement item. That is a product for them and they sell by so many square centimetre or something like that. This is not a very common thing. It is very typical of a media industry and hence there is a Media Solution. Similarly, we have industry solution for Oil and Gas (petroleum) industry.

They use very different business processes and nomenclatures which is not very common with other industry. So, they have to be very specific. There is something called a Footwear and Apparel industry solution like for shoes and shirts and pants. They again sell by various different products names etcetera, brands, by size, colour I mean infinite number of combinations. So, they need again a specific software solution to handle such complexities in their sales and accounting functionalities.

For these industries SAP develops specific product which are used by only those industries and they are not used by other industries.

Best Practices in SAP - An automobile industry, is very generic manufacturing industry and the business processes for most automobile industries would largely be common. Such industries do not need Industry solution as discussed above. SAP product gets continuously developed with lot of best practices as more and more large global automobile industries install the SAP software. Others who install SAP later can get advantage of these business best practices and get advantage from that. Car companies like Mercedes, BMW, Toyota, General Motors use SAP and we can learn from their experience. Whenever, an Indian automobile industry use SAP they can get the advantage from the experience gained by SAP from these large and successful car companies of the world.
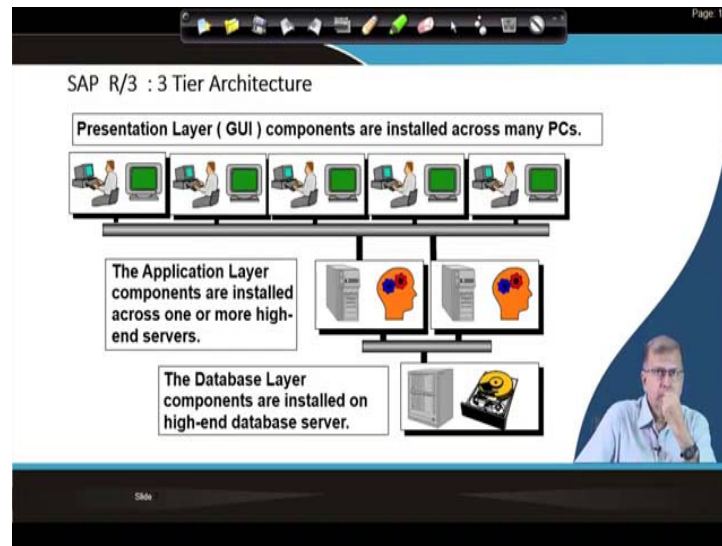
This is the 3 tier architecture. On the top is the Presentation layer (Desktop or Laptop) that is where the user is sitting where the GUI is the graphical user interface is being used by the actual user to access SAP screens and after that you have the Application layer (the servers) where all the transaction is taking place and all the calculation are being done.

And at the lowest level is your Database layer that is where the servers are storing all the data. So, whatever data is getting created, all transaction data, and master data everything is stored in that Data Base layer. This is a central database layer from where everything is accessed by the user from the presentation layer. This is why it is called 3 tier as there are 3 levels of the IT hardware - Servers in two layers and desktop - laptops on the top layer.
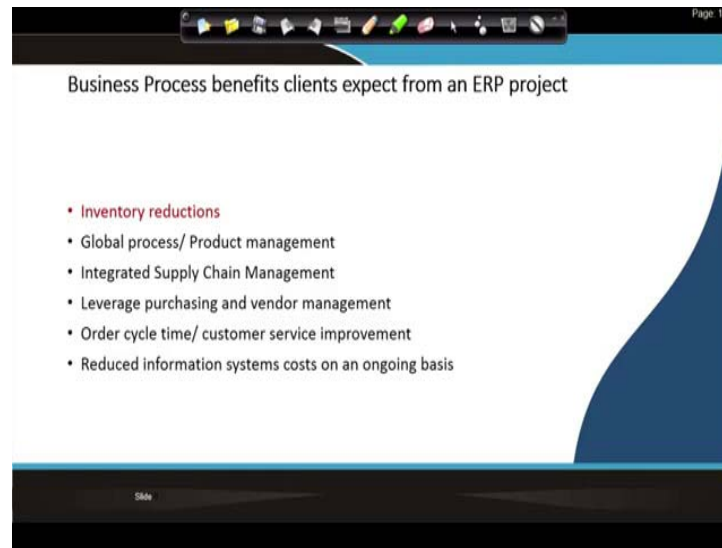
Business process benefits clients expect from an ERP project - We started with this and now we go ahead with actual business benefits. The number one benefit which is showed in red is inventory reduction.

The first advantage which you get is inventory reduction. In any manufacturing industry, the major working capital requirement is for inventory. Inventory blocks up 70 to 80 percent of working capital requirement. Focus of the finance department is how to reduce inventory.

When I purchase a raw material, the idea should be to convert into the finish good as soon as possible and ship it out and send it to the customer. Inventory must move across my organization fast. Inventory comes in, gets manufactured, gets utilized, gets into the finished product and then goes out of the factory to the customer.

For example, in this COVID times, you might have seen that many car factories are not selling many units. So, there is a stockpile. In the factory stock yard one can see that lot of cars are standing. This is inventory blocked and it is not generating cash. So, your money is blocked in the unsold inventory.

In such times, the industries should stop buying raw materials and components because otherwise they will keep coming in, but finished cars are not being sold. This will result

in a stockpile of car and of half-finished or raw materials and other inventory. All your money is getting blocked up in unused inventory.

So, you will run short of working capital, then you will have to go to the banks to borrow money and borrowing money is expensive. So, one of the major advantages of ERP project is how they optimize everything to reduce inventory. How it does we will again talk later.

Global process/ product management: - The global process I was talking about is one of those best practices which we can learn from various other successful companies and also if you are a multinational organization for example. If your's is an European or an US company, they have certain business processes and from here in India you can start your operations by adopting these business processes of your parent company.

You can get all your global processes from your parent company because you are now connected through the software which is a common software. The process they are using you will also be able to use them. This is a big advantage pf being a part of any multinational company.

Integrated supply chain management. - We will talk more when we discuss about supply chain management. From a supplier to a manufacture and to the customer everything is getting integrated and I have shown you a picture about those interconnected gear wheels (example of Tata motors or any vehicle manufacturer, truck manufacturer), where you have the State Transport Corporation (Customer) on one side, the bus manufacturer (e.g. Tata Motors) in the middle and the battery supplier for example, one of the Vendors (Exide Ltd.) is on the other side but they are all integrated.

When one order is released by a state transport corporation for 100 quantity buses, the entire thing gets communicated down to the lowest level to the battery supplier (OEM supplier) for 100 batteries automatically as their information systems are integrated.

Leverages purchasing and vendor management. - ERP is leveraging the purchasing and vendor management because everything is integrated and automated. You just you run an MRP program and the bill of material will explode and it will create purchase orders for all the bought out components. We will talk about that later again in details.

Order Cycle time / Customer Service improvement. - Since things are online and real time, we save lot of time. When we save lot of time means we can produce faster so, this lead to increasing productivity. If I can make things faster, my customer gets his material faster.

My customer service is improved because my order cycle time is reduced. When the customer gives me an order, I can deliver it to him in a very short period of time or in a lesser period of time than what I used to do pre ERP (before ERP). So, even if there is an improvement of 10 percent or 20 percent of productivity and time, the customer will be very happy because he is getting his things faster.

Reduced information system costs on an ongoing basis. - With advent of ERP you can get rid of many other local softwares because previously every department is to run their own software. Now once you install an ERP like SAP you can replace all of this software or most of these softwares by a single software. Although initially SAP is expensive, but overall finally, in the long run it will reduce your information system cost because software maintenance is a costly affair.

When you have to maintain may be 50 softwares, it is complicated, but when you have to maintain 1 big software, that is much easier then maintaining 50 different software supplied by different vendors for example. So, you have to have different vendor management contracts, but here it is just talking about a single vendor SAP.
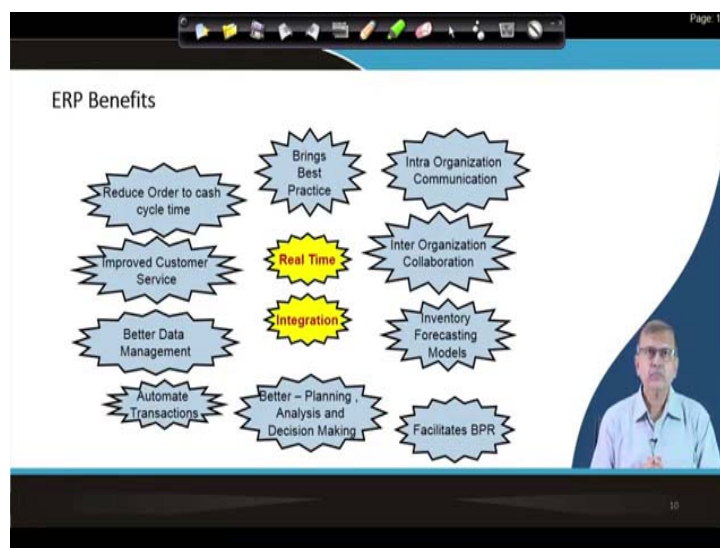
ERP benefits - At the centre you can see Real Time and Integration. That is what we are talking about many times and these are main benefits. The other major benefits are: Best practices which we have already talked about; reduction in the order to cash cycle time. It helps in increasing productivity. It is improving customer service and customer satisfaction. Customer, as soon as it gives an order, it gets its material in a faster time and also gets continuous communication. Through their connected system, customer comes to know when things are ready, when the thing is going to get despatched and when they are going to receive the material.

Customer gets all the information and getting information is very important part of MIS. I know that my material will come, for example, when you order something in Amazon and then you can track your order. Amazon will know that your delivery is promised on 7th of July; today is 3rd of July. You know in 4 days' time it will come and then tomorrow you may see that material will be delivered on 6th July, instead of 7th July. Sometimes it can get delayed and it will come 2 days later. But the important thing is that you have the information. That instead of 7th I will get it on 9th. Then I can change my plans accordingly. Suppose, I was depending on that material for something to do something else, then I will differ that by 2 days because I have got an information that instead of 7th it will come on 9th.

So, that is the power of information and you can do it without asking anybody, without calling up anybody. Simply on your phone you go to Amazon site, find your order, track progress and from there you come to know everything either its coming on that exact date or coming one day before or coming two days later.

Now, that is what is the beauty and power of ERP and just think about your individual one item and now you are thinking about business enterprise working with several customers and several items how powerful this software is. It can give satisfaction to so many customers.

Better data management - I also discussed of online validation which reduces the chances of making any errors. ERP systems use single point of data entry, that is, a single point of truth. You are entering data only once and if in the first time you have not done a mistake then there is no possibility of making anymore mistake for that data. This what is meant by "Single point of Truth".

It is automating transactions - Many transactions get automated and we will talk about that when discussing MRP program later.

Better planning analysis and decision making;- It is a decision making tool and it gives a decision making support , because it is giving you Real time information based on which, you can use take your business decisions.

It facilitates BPR (business process reengineering) - I have told you about the best practices we can learn from other successful international companies like Toyotas of the world and big successful multinationals. BPR takes place when we use these best practices to change/modify our existing business processes.

Inventory forecasting models - It also has lot of forecasting models built in through which you can use to forecast and tell you exactly how much material quantity you need for your operations. That is how you can optimize your inventory requirement by successfully using these forecasting models inbuilt into the system like Reorder Point Planning or Seasonal based Forecasting etcetera.

You can apply these to take decision as to how much material to buy by certain time period because it tells you how much we are going to consume. Thus order forecasted quantity and not anything more because I have already told you how extra inventory is nothing but a loss as it results in blocked up working capital. Money which is blocked is a waste.

Inter organization collaboration - I have again explained how the chain works. Supplier to Customer the whole chain works with multiple organization and there is a collaboration because of the connectivity and the using the same ERP. Intra organization communication is within the organization, amongst various department etcetera as because everybody is accessing the same central database. All departments are getting the same information.

The quality of information is now excellent as nobody is having different information about the same thing. So, everybody is getting the same information. This is a big advantage from a MIS perspective.

Getting the best out of an ERP maximizing your return on investments. - I had told you it is a expensive product and implementing ERP software also takes lot of time and money. When you are investing something, the CIO or the CEO or the CFO will ask you first as to what is going to be the return on investment in, how many months or years are you going to recover this investment from the benefits which it is going to produce.

You have to understand as a manager, especially as a IT manager what is meant by return on investment. I am going to invest so many crores of rupees so what is my return.

You need to have a comprehensive or thorough business case for the senior executives and business stakeholders. So, first you have to think is that, it is not just an IT project but it is a business project. That is a common mistake many people do. ERP is not really an IT program; it is a business program because it is doing everything for the business. It is transforming the business, it is helping the business to run. It is fundamental requirement for a business to use any ERP system. Although it is a software and an IT product, but actually it is meant for the business and it is enabling the entire business transformation for example.

Hence, I call it more of a business program rather than an IT program and it is best to see it from the business perspective only because all the value will be derived for the business people. So, the business people have to play a major role in taking a decision on whether to invest on ERP or SAP etcetera.

It provides with an excellent opportunity to transform the business. So, when you implement SAP and business transformation happens, it is called business process reengineering that is where we use a acronym BPR very frequently. You can modernize your business by just implementing SAP and make your business change completely, making it at par with global successful companies.

It entails significant organizational change of course, when you are transforming as transformation means change and you are changing it for the better, you are making it more efficient, making it smarter, making it more productive and making it more excellent I would say.

Without support from business, the ERP implementation falters and IT often has a very difficult time for keeping it going. So, do not keep it within the IT department. When you are thinking anything to do with ERP or SAP etcetera, talk to the business people and involve them because if they are not involved, it will never be successful. Because they are the main users and they are the only users. The IT team is merely supporting it. So, focus on the business people, involve them right from the beginning, then only you can really extract maximum benefit out of an ERP.
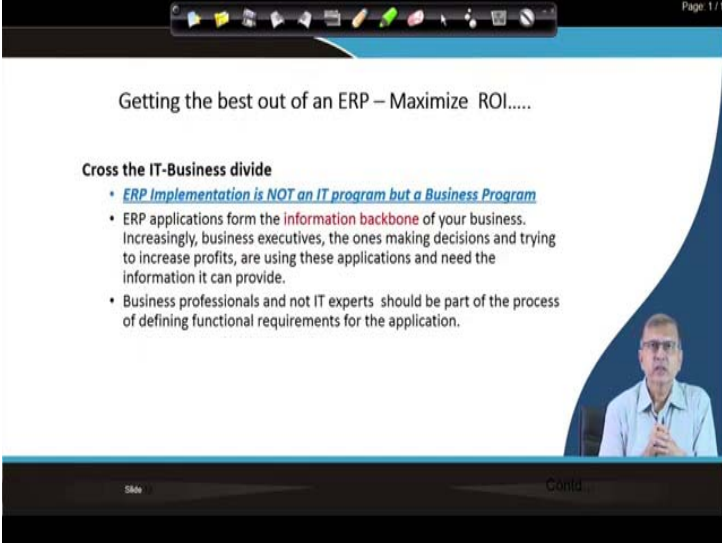

Know your product and reduce your old applications.- The standardized information and processes of these solutions will streamline your operations so that they are more efficient I already discussed this how with BPR, the processes get improved etcetera.

The industry best practices will prepare you to handle external pressures such as competition and compliance. So, when you have the best business processes; obviously, you are better than your competitors.

You are doing things much better way than what your competitors are doing so obviously, you will be able to handle external pressures much better than your competitors and also compliance. Compliance is a very important thing, that are you following the government rules and regulations and that is what you take the best practice from successful companies they are always very complaint.

You can be safe when you know that I am not doing something wrong as far as the government is concerned and the rules and laws of the land is concerned. I am following all rules and laws in things like GST and income tax etcetera.

Customization will ensure that your particular needs are being met in these products and you can customize, change it according to your requirements and need as they (ERP) are not very rigid. You can change it to meet your needs and requirements but at the same time you should avoid too many customization as that is one of the best practice. Do not make too many changes because the products are very standard, they are very international, and they are being used by very large successful company so, do not change it , because then it will create more problem for you.

Getting the best continuing on that, cross the IT business divide. - ERP implementation is not an IT program, but a business program. So, that is what I had said earlier I am repeating here. Always keep in mind it is not an IT program, but it is a business program. It should be always the headed by and managed by the business head may be a CFO should actually manage this program.

ERP applications form the information backbone of your business. The information backbone of your business is your ERP or SAP system. Increasingly, business executives the ones making decisions and trying to increase profits, are using these applications and they need all the information it can provide.

The whole business is running on ERP. Because without information you cannot take any decision and all that information is coming from ERP. I have been repeating many times because you should also get it into your system that information, information and information - the whole business runs on information.

Business professionals and not IT experts should be part of the process of defining functional requirements for the application. So, when you are designing your SAP, how to implement it etcetera, lot of functional requirements comes in and here again business professionals have to play the major role. This I will discuss more when we discuss the project part of it. When you implement ERP project, what roles are played by different functional people and how to design the product during the implementation time.
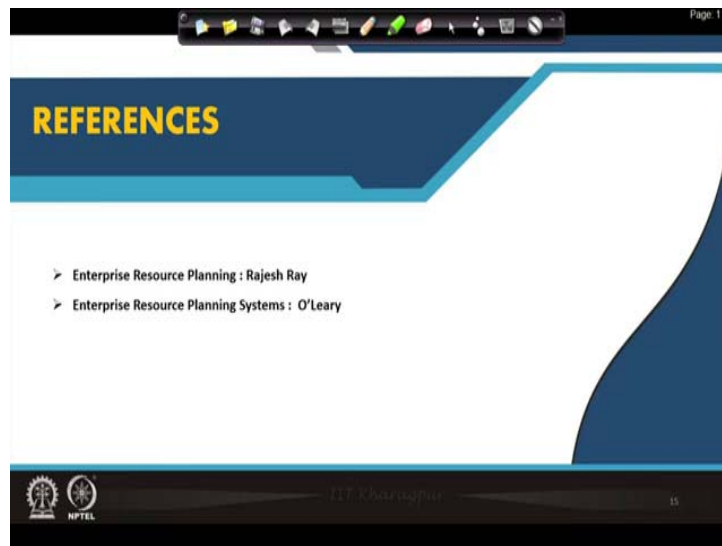
To conclude getting the best out of ERP, maximizing ROI, ERP software can be an expensive and time consuming IT investment so, you have to be very careful when you implement SAP. You have to plan properly and thoroughly, involve lot of people, take the help from the business people and then go ahead with it because it is not an easy job. It is a difficult job implementing SAP (or ERP) software program in the organization.

An ERP applications facilitate the standardization and acceleration of business processes and contribute to the visibility necessary to run your business well and grow revenue and profits. This summarizes all the advantages I have been talking about generally in one sentence.

It is facilitating standardization so, things need to get standardized. You have to have the best business processes, and to contribute to the visibility because you have to be transparent. Same information, the right information will be available across all functionalities.

You need to have the visibility because everybody needs information to run your business well and of course, your business should be growing your revenue and profit. One of the major motives of business is to make profit.

Thank you very much.